Corporate Standardization Strategy

Seven European Stories

Sven Åke Nyström
Preface

Standardization of products and services is of enormous importance for development all over the world. The aim of this book is to present empirical evidence in the form of stories from seven European corporations regarding how they have reacted to standardization initiatives and rules. With empirical facts, it is possible to understand how standardization actually works; facts provide insights into standard-setting processes and the activities of the corporations concerned.

Over a long period – from 1993 to 2007 – Sven Åke Nyström studied seven corporations, not least using high-level interviews with managers. He attained good access and established fruitful relations with management and gleaned relevant and valuable information about standardization in practice in the corporations. His own business experience was valuable in this work.

The stories in Chapter 4 make up the main part of the book. More than 100 interviews were conducted with people in the corporations and actors in the standardization sphere. Reading the stories will enable the reader to get a good understanding of standardization in practice. The reader who is mainly interested in the empirical parts of the book can go directly to Chapter 3 sections 3–5 and then to Chapter 4 for details about each corporation.

The study could not have been possible without the generous interest from the management of the corporations, and cordial thanks are extended for this.

During the process of the study Sven Åke Nyström had the opportunity to discuss many issues with academics at different institutions. In particular he got valuable advice from Professor Martin Johanson and Associate Professor Desirée Holm, both at the Department of Business Studies, Uppsala University. Holm contributed by carrying out a thorough analysis of the work at a seminar in Uppsala. I myself had many opportunities to exchange views with Sven Åke Nyström, and I offered suggestions and comments during the process of the study. Bo-Inge Holmberg, a colleague of Sven Åke Nyström with an industrial background, provided valuable suggestions and comments throughout, from the beginning of the study to its end. Late in the process, during Nyström’s illness, Holmberg also revised several chapters, following Nyström’s intentions.

The manuscript of the book was almost finished when Sven Åke Nyström passed away in January 2018. With some minor editing from my side and with financial support from Sven Åke Nyström’s children, the book is now available to the public.

Uppsala in September 2018

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Summary

Standardization of products has been expanding for a long time, contributing to economic growth in different ways throughout the world. The European Union has realized the importance of standardization and has been constructively focusing on the development of standardization. This study takes its starting point in the individual corporation, how it acts actively or passively in connection to the development of standards, and how the corporation uses standardization in its marketing strategies to establish market positions.

Seven corporations are studied with the help of interviews on different levels in the companies. A unique set of data has been created and analyzed in a strategy perspective. The study also shows how the corporations interact and adapt over time to standardization institutions and competitors in the respective industries. The interviews were done from the middle of the 1990s to 2007.

The study shows that active participation in standardization processes from early on has yielded results. The active corporations have been able to influence the standards so that they fit in with the corporations’ products and product development. The study shows in depth how this was achieved. Thus, investments in standardization activities have been profitable. The larger corporations have been more successful than smaller ones with fewer resources, leading to the latter’s passive adaptation to standards.

The seven corporations analyzed are Ansell Healthcare Europe N.V. with safety gloves, Finnveden-Bulten AB with fastening systems, Volvo Construction Equipment with earth-moving machinery, Daloc Futura AB with safety doors, Motala Hissar AB with special lifts, S:t Eriks AB with concrete paving units, and SPM Instruments AB with measuring instruments. Thus the seven corporations include both large and small corporations with varying types of products and markets.

The contribution of the study lies mainly in the in-depth case studies. Conditions are described relating to backgrounds to standardization, standardization processes, and effects of standardization. Thus, insights are gained into how the corporations participated in standardization processes in different ways and if and how products were adapted and markets changed.

The study is also relevant today for corporations that are facing challenges in developing strategies for standardization of existing and future products.
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Abbreviations

AFFIX  Association des Fabricants de Fixations Mécaniques
AFNOR  Association Francaise de Normalisation
AG  Arbetsgrupp / WG Working Group
BBC  Betong och ballast certifiering
BBR  Boverket Byggregler / National Administration for Housing, Building and Planning Administration/
BST  Byggstandardiseringen / Standardization of Building and Housing / SIS incorporated in SIS
BT  Technical Board (of CEN)
CA  Administrative Board (Within CEN/CENELEC)
CD  Committee Draft
CECE  Committee for European Construction Industry
CEN  Comité Européen de Normalisation
CENELEC  Comité Européen de Normalisation Electrotechnique
CPD  Construction Production Directive
CSA  China Standard Association
CR  CEN Report
CWA  CEN Workshop Agreement
DIT  Department of Industry and Trade
DIS  Draft International Standard
EADS  European Aeronautics and Defence Space Company
EES  European Economic Space
EN  Europäische Norm, European Standard
EIFI  European Industry Fastener Institute
ESO  European Standards Organization
ETS  European Telecommunications Standard
ETSI  European Telecommunications Standards Institute
EURAS  European Academy for Standardization
FDIS  Final Draft International Standard
FV    Formal Vote
HD    Harmonization Document (Harmonization document with obligation to implement)
HG    Horizontal Group
IEC   International Electro technical Commission (IEC standard is voluntary to implement)
IKH   Kran- och hisstandardiseringen Crane and Elevator Standardization (today incorporated in SIS)
I-ETS Interim ETS (Telecommunications)
IPR   Intellectual Property Rights
ISA   International Federation of the National Standardizing Associations
ISO   International Organisation for Standardization
ITU   International Telecommunication Union
MMS   Material- och Mekanstandardiseringen (today SIS)
MS    Management Systems
NIST  National Institute of Science and Technology
NP    New Project CEN
NSB   National Standardization Body
NSI   National Standards Institute
NWI   New Work Item Proposal ISO
OJEU  Official Journal / Journal Officiel
PQ    Preliminary Questionnaire
QM    Quality Management
RG    Regulators Group / Reference Group
SDO   Standard Development Organization
SIS   Swedish Standards Institute
SMS   Svensk Material- & Mekanstandard (today incorporated in SIS)
SP    Sveriges Provnings- och Forskningsinstitut
SS    Swedish Standard / Svensk Standard
SS-EN European standard implemented as Swedish Standard
SS-ENV European pre-standard implemented as Swedish Standard
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>SSR</td>
<td>Swedish Council of Standardization (Sveriges Standardiseringsråd)</td>
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<tr>
<td>STANTEK</td>
<td>Standardiseringstekniska Föreningen</td>
</tr>
<tr>
<td>TK/TC</td>
<td>Teknisk kommitté / Technical committee</td>
</tr>
<tr>
<td>TMB</td>
<td>Technical Management Board</td>
</tr>
<tr>
<td>UAP</td>
<td>Unique Acceptance Procedure</td>
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<tr>
<td>UNC</td>
<td>Unified Coars</td>
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<tr>
<td>UNF</td>
<td>Unified Fine</td>
</tr>
<tr>
<td>UNECE</td>
<td>United Nations Economic Commission for Europe</td>
</tr>
<tr>
<td>VDMA</td>
<td>Verband Deutscher Maschinen und Anlagebau</td>
</tr>
<tr>
<td>WD</td>
<td>Working Draft</td>
</tr>
<tr>
<td>WG</td>
<td>Working Group (temporary)</td>
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</table>
**Lob der Schraube**

Von Eugen Roth

Ein Mensch, der selber nicht geschraubt
hat auch sein Leben lang geglaubt,
dass eine Redesart wohl bloss,
bei wem sei eine Schraube los.
Doch plötzlich, mitten in der Nacht,
hat tief er drüber nachgedacht
und Schrecken riss ihn aus dem Döse;
Wie, wenn sich alle Schrauben lösen?
Ist´s nicht die Schraube, die die Welt
im Innersten zusammenhält?
Und in der Zeit der Technik jetzt
das geistige Band sogar ersetzt?
Und noch viel mehr muss ihn erschüttern:
Wie ist´s erst mit den Schraubenmüttern?
Der Mensch, in dies Problem verirrt,
wird selbst verschroben und verwirrt
und stellt sich vor in seinem Wahn,
wie Auto, Schiff und Eisenbahn,
Flugzeuge, ja selbst Flugzeughallen
mit einem Schlage jäh zerfallen.
wie alle Arten von Maschinen,
von den gewaltigsten Turbinen
bis zu den feinsten Apparaten
im Nu aus ihrer Bahn geraten,
selbst Uhren, Mikroskope - kurz,
wie in gewaltigem Hällensturz
der Menschheit klug durchdachte Werke
verlieren ihre Götterstärke.
Der Mensch, der Schrauben nie bezogen,
greift anderen Tags zu Katalogen,
darin er sieht, dass es ungläublich,
was alles hergestellt wird, schraublich;
Sechskant-, Zylinder-, Kreuzschlitz-, Bügel-, Passschrauben, Linsensenk- und Flügel-,
der Hohlkopf selbst ist hier von Wert,
der niedere Kopf ist noch begehrt.
Der Mensch erkennt: Es sieht der Blinde,
dass Windung alles überwinde
und dass, wer sonst Geschraubtes hast,
hoch lobt die Schraube - wenn sie passt!

(Poem, a gift from Deutsche Schraubenverband (DEV))
CHAPTER 1. Introduction

1.1 Introduction to standardization

The Great Train Robbery in 1963 in Great Britain meant a substantial cost and setback to the British Railway Company. Since the creation and nationalisation in 1947 of the Railroad Company the costs of running of the railroad traffic has been high with complicated administrative systems. In 1994 to 1997 British Rail was privatised and approx. one hundred companies were invited to operate the trains. The leadership of these companies faced a tremendous challenge. Mutual standards and compatability on equipment were rare. Cooperation in international rail traffic was seen only in the remote distance. Similar experiences were influencing the major Rail Administrations on the European continent. Still today the “robbery” of the users continues, although under less violent conditions. Lack of compatibility and lack of standards combine to complicate and make expensive the operations and progress.

An international steel company with plants in central Sweden and in central England wanted to establish a pendling freight transport system for steel between the two countries. The ambition was to replace slow and costly transports by ship and instead use the railways. It was expected that the freight trains would make the journey between the two countries in twenty-four hours. In reality, the first train in operation, which happened to be the first freight train to pass through the Channel Tunnel, demanded one week. The reason being lack of compatibility and standards with regard to locomotives, equipment, signals, training of personnel. The project was abolished and the goods again shipped by boat.

In 1994 the President of a European mechanical industry, manufacturing components for the European railroads, illustrated the situation of a supplier to the railway companies. He was obliged to operate plants in seven European countries to satisfy the system of standards and traditions in each country. If he had been permitted to have only one or two plants in Europe the cost to the railroads could be reduced by thirty percent.
In the area of transportation the advantages of standards can be illustrated by comparing railroads on the one side, with air traffic, trucks, cars on the roads and shipping, on the other side. In the latter case the necessary infrastructure is constructed with compatible equipment to allow international movements. The absence of cooperation between the actors in the railway industry has prolonged the robbery as far as the manner in which the customers have been treated.

In the EU-EUC interpretation, standardization is a voluntary cooperation among industries, consumers, public authorities and other concerned parties with a view to develop technical and managerial specifications. Manufacturers use standards in construction and production and to meet market demands and needs and to strengthen their competitive position. Through standards they ensure acceptance of innovative solutions and increase in interoperability. Public authorities refer to standards and have a strong obligation to follow standards in legislation, policies and procurement. They have to follow the societal ambitions for safety, environmental performance, accessibility and interoperability. In that way authorities help increase the competitiveness of industry and facilitate competition to the advantage of the consumers.

1.2 Background of the study

After World war II politicians, managements and standard experts met with a purpose to restructure trade. International trade was limited and home markets were the primary objects and the regulatory context. Europe was split up in new and old countries, each one with an ambition to protect their infant industries. Standards came into focus for industries, firstly by management as a means for efficient production and later by politicians as well as by industrial management to facilitate trade. As European and world trade developed standards have become an important tool in companies worldwide.

In the ambition to develop the European economy the politicians turned to standardization. Following a slowdown in the economy, standardization was in 1980s given an even more extended role through the so called New Approach which will be presented in section 1.4 below. For management in European corporations the conditions for trade were changed and the industries exposed to new challenges. This study is in particular focused on corporate actions connected to the New Approach. Depending on products manufactured some companies have chosen to regard and to use standardization as
a strategic tool. Their actions and experiences which have been of great importance in product development, marketing and international trade are observed in this study.

The idea to this study was presented in a memorandum of September 9, 1989, by the then Governor of the Province of Vestmanland, Mr. Carl Johan Åberg, and addressed to the (Mälardalens Högskola as a research project. Based on his experiences and concerns in connection with his engagement in the negotiations between the European Free Trade Association (EFTA) and the EEC Åberg had found that standardization was of rapidly growing importance for the economic functioning of the European market. The Governor referred in particular to the Cecchini report (1988) and its economical and political importance. The effects of elimination of border controls and standardization of products could require a change in corporate and administrative strategy and daily operations. This could affect the small and medium size corporations as well as governments and local agencies.

In the beginning, the European market development was slow and a change was required by the politicians and the market. A new approach to standardization was developed and decided by the EU Commission in 1985 and applicable from 1992. With this approach the conditions of competition for the individual companies changed, mostly with regard to development of trade, exit and entering of new actors and new products on the market.

While working as a consultant I had a few times met the owner of the company Motala Hissar AB, Motala, (MH) who brought to my attention some of the problems of smaller companies in connection with standardization. My curiosity was aroused. In addition, the personal closeness to a fatal air accident, focusing fasteners, which might not have been according to standards, and a possible cause of a disaster, increased my interest in the phenomenon of standardization. (American Airlines 1979).

1.3 The concepts of standard and standardization

Different organizations have different views and interpretations of the concepts of standard and standardization. The issues of standardization have commonly been viewed as primarily a technical matter and accorded a secondary place in economic and business theory. Alternatively it has been viewed as a legalistic issue of setting the rules of the “free” market.

In his thesis, Standards for the Nation (1999), at the University of Delft, de Vries has an extensive account of the concepts, also illustrating some
confusions surrounding standardization. De Vries believes that none of the definitions he presents and discusses corresponds to the application of the concept in general use. As a condition for the approach the interpretations should preferably be in accordance with the ISO definition. In my study the acceptance of the standard by an accredited institution is one of the basic criterias required and a breaking point in standardization activity and analyses. CEN and ISO are basic accredited institutions.

The Swedish Standards Institute, SIS, (1993) has developed the following definition:

"Standard is a document, established in agreement and accepted by an Official organization, which document for general and repeated purposes gives rules, guidance or properties for activities or their result, with the purpose to bring best possible order in a certain context; Note: Standards should be based on grounded results from science, technology and experience with the purpose to develop the general welfare of society".

I will use the definition of standard development by Hesser et al. (2007) when they state that with the concept of standardization they mean the conscious and deliberate work of a group of actors within a given institutional framework for the purpose of creating a standard.

When discussing the value of standards Egyedi and Blind (2008) point to the fact that standards create compatibility, that is interoperability or interchangeability, and allow products to work together and equipment parts to be substituted. In anonymous markets, complementary products can be used together based on standard interfaces. Egyedi and Blind refer to Schmidt and Werle (1998) who state that standards, as a point of reference, coordinate technology and development. Standards structure the way the markets develop.

The view of the technician has primarily been focused on standardization of production planning, production and physical products. In management literature several studies have been written especially during the late 1990s and beginning of 2000, on the subject of standardization, on the use of standards and on the work of standardization organizations. Standardization
as part of corporate strategy has been observed only in a few studies. The view of the marketer has mostly been based on discussions regarding standardized marketing. An exception is Hesser’s and Mellink’s Standardization in Marketing (1997), an early research study on the use of standardization in marketing.

Standards of technical contents are related to a product and a management standard is focusing on management and governing systems. ISO 9000 series is an example of management systems. In each case it is a difficult matter for management, through standardization, to decide a strategy regarding quality level for its products. Standardization can be seen as a way to reduce the number of rules (Perrow, 1986). A machine or a line of production contains a number of rules built into the machine itself. Thus machines ensure standardized products and reduce the number of rules regarding dimensional characteristics. It is a way to simplify. In an organization "Standard Operating Procedures" (SOPs) are developed as a manner for decision makers to facilitate the decisions, transfer of instructions and to reduce uncertainty (Cyert and March, 1963).

In a statement by Baskin et al. (1998) standards specify the methods for interaction, the measures of equivalence, the limits of performance, quality, or degrees of compatibility. They may also include safety, reliability and test methods.

When the creation of the European Inner market was drafted standards were part of the process. Several problems emerged however, and it was soon realized that a new stream-lined method regarding standardization was needed.

1.4 EU and The New Approach

As a consequence of a slowdown in the European economic integration in the early 1980s it was realized that the expectations of the Inner Market had not been met. A change was required with new strategies, in particular focusing on companies working with goods and services crossing borders. This involved transportation as well as location of manufacturing, modes of selling, distribution, servicing and the adoption of products according to standards, and other views. Through these policies and actions by the Commission of the European Union standardization has increased rapidly in scope and importance. The new conditions have exposed the individual companies to new threats and possibilities as the national protection has diminished and
eventually disappeared. After different revisions The New Approach project was completed in 2009 according to the Directives, in particular on machinery safety and medical devices. In the year 2009 1.782 technical bodies, TCs, Committees and working groups (WGs) were engaged by CEN to produce required standard documents.

To improve the functioning of the Inner Market The Commission of the European Union developed The New Approach. This view has been followed since the mid-1980s. It is based on two principles (Commission on the European Communities Green Paper COM (90) 456).

- *mutual recognition* of national rules; this presupposes that the objectives of national legislation - health, safety and so on - are equivalent and that only the means of achieving them are different;

- legislative *harmonization* at Community level only occurs exceptionally in those areas where the objectives of national legislation are not equivalent when harmonization is necessary; Community legislation must be limited to laying down essential requirements for safety, health and environment. It is up to the producers to chose by what means they wish to comply with these requirements.

The major issues in the New Approach by EU may be summarized as follows:

* legislation is limited to essential safety demands

* authority is exercised through reference to European standards

* standards should in principle be voluntary

* products made according to harmonized standards are expected to be in accordance with safety demands

* products approved in one EU country may be sold without obstacles in the whole of the Union.

Jacques Pelkmans (1987) of the European Institute of Public Administration, Maastricht, has also described the situation and problems leading to the decision to apply the New Approach. The central policy question with respect to technical trade barriers, according to Pelkmans (1987), is how the EU can achieve a fully-fledged common product market, while the Member States retain the ultimate responsibility with respect to social objectives such as safety, health and environment.
Pelkmans points to the “legal regime” which concerns the prohibition of measures similar to quantitative restriction, according to the scope of interpretation in Art. 30 and exceptions to this prohibition according to Art. 36 of the Rome treaty.

The “policy regime” is presented in Art. 100 of the EU treaty and deals with considerations of overriding public interest, such as health, safety and consumer or environmental protection, which could lead to differences in national regulations which in their turn could hinder EU trade.

A study on The European Union and the New Approach by Hesser and Hautama (2007) is included in Hesser et al (2007). It is their conclusion that the CE mark, together with the declaration of conformity is the machine’s “technical passport” to have a product placed on the European market. Also, the elimination of technical barriers to trade in the EU has been and still is one of the most important ambitions to achieve a genuinely free and functioning Internal Market.

With the launching of the New Approach the EU gave a signal to European industry, that new demands were forthcoming and products would have to be adapted to new standards. This answered to a large extent the research question “why” standardization was required and left to the industry to answer “how” standards should be developed.

The number of standards developed in 1992, the year when the New Approach began, was 901. In the year 2009, 13,745 documents were produced. From the remarks by many authors, it is natural to conclude that the European Standardization System has had a most dynamic period.

1.5 CEN Standardization; Drafting of a standard and directives

Standards are developed by different groups of stakeholders, corporations, organizations etc and on different levels. Internal, corporate standards represent the initial level followed by national standards. CEN represents the official European level, which today comprises 95% of all standards. The international level is represented by ISO, working closely with CEN. Following the steps for the standardization process according to the established rules, (fig. 1.1), the official standards are prepared and issued by independent organizations like ISO and IEC on global level, and by CEN, CENELEC and ETSI on European level. On national level in Sweden, Swedish Standards Institute, SIS, carries the responsibility for ISO and CEN cooperation.
When a proposal for a new standard is received by CEN, it is forwarded to the Members for a vote. CEN has thirty-three National Standards Organizations, NSOs as Members. If the proposal receives support a final draft is distributed for comments to interested parties, a so-called Enquiry. If the voting on the draft is positive, after taking part of any submitted comments a formal vote will follow.

A European standard must be adopted as a National standard not later than six months after its approval. Contradictory and overlapping national standards must be withdrawn. It should be remarked that the withdrawal is obligatory even if the National Standardization Body originally has voted against the proposed standard. This is part of the EU policy to facilitate the development of the inner market.

The CEN Secretariat for the Technical Committee (TC) prepares and organizes the work according to the resolution and guidelines of the Technical Board (BT) and according to the mandate. The work is done in accordance with the CEN/CENELEC or ETSI Internal Regulations and Instructions for Secretaries (Fig.1.1). A Technical Officer is appointed at CEN to be responsible for the subject. The work of the TC is usually organized in Working Groups (WGs). During the last few years, the desire of extended Global standardization has been reinforced. Some differences between the International standardization and the European corresponding activity do exist.

If a European standard is contradictory to a national, e.g. Swedish, law or set of regulations the National Standards Body, i.e. in Sweden SIS, must demand an exception, a so-called “A-deviation”. This means that part of the new standard does not apply in the country in question. The announcement of the A-deviation must be made not later than at the moment of the reply to the enquiry. Within CEN there is also a procedure called “Preliminary Questionnaire” (PQ). The purpose is to determine the possibility to accept a Global standard as a European standard. The PQ is then followed by a Formal Vote (FV).

The Unique Acceptance Procedure (UAP) of CEN combines Preliminary Questionnaire (PQ) and the Formal Vote (FV) which shortens the period of handling the project. The ambition is to rapidly accomplish and accept a reference document, often an ISO standard as a European standard. The UAP procedure is also frequently used by the committees instead of submitting a draft to a second Enquiry after taking care of major substantial comments.

The implementation of standards is either of voluntary or more or less of compulsory character (SIS 2005). When a binding obligation exists to im-
plement standards a corresponding obligation exists to withdraw standards with contents inconceivable to the implemented standard.

 According to the so called Vienna Agreement the same specialists can be working both on ISO standards and on European standards at the same time. Approximately 70 - 80 percent of all specialists involved, from authorities or industries work for the two organizations (CEN).

 The EU Commission prepares and delivers to the proper Standard Development Organization (SDO) instructions and demands for the preparation of the new standards in documents called Directives. These would vary in content depending on the conditions of the industry concerned. For the SDOs, industries and other stakeholders it is important to stay informed of the development and these directives.
Figure 1  Drafting of a European Standard

The flowchart shows the typical process for the proposal, development, adoption and publication of a European Standard. Other options exist, including the parallel development of common standards with ISO.
The final application of all standards is voluntary as long as there are no legal or directive constraints to the contrary. Even when there is an obligation to implement standards the voluntary interpretation still applies (SMS 1993). Implementation occurs on national level as a consequence of the membership of the standardization organizations CEN and CENELEC. This implies that the national standardization organizations are required to implement the EN, HD and ETS. This is done by adoption and notice of the new standard and withdrawal of in conceiving national standards.

Other important publications from CEN are the Technical Report (TR) and Technical Specification (TS). The consequence of these basic rules implies that when a global ISO or IEC standard has been implemented on European level, or has reached the status of European standard, an obligation enters for all European standardization bodies to implement the European standard.

Implementation of a standard can also occur through "making it available", viz. by publishing a notice of its existence. A considerable number of CENELEC/HD has been implemented through the means of "information". They are, however, not included in the catalogue or statistics covering Swedish standards as they have not been identified with a SS or SS-HD number.

The documents describing the standards have their own numbers. This is constructed with a prefix referring to the issuing organization and a number as well as year of publication. A standard document thus can carry a number like SS-EN ISO 9000, which means that an ISO standard has been implemented also for Swedish and European use.

Implementation of a standard means that the contents of standards, developed within an organization, is transferred and included in the publication series of another organization. This can apply to implementation from one level to another, i.e. European to national, like Sweden for example, SS-EN.

International standards are implemented on a voluntary, but recommended basis by all national members. The membership in European standardization, in CEN/CENELEC/ETSI makes it compulsory to implement all established European standards. An implemented standard has the same status as other national standards.

Following the steps for the standardization process the official standards are prepared and issued by neutral organizations like ISO and IEC, on global level.

Standardization is a never ending activity and the railway industry is only an example. To describe and analyze all branches and types and sizes of industries within a study of this type would not be comprehensive. Over time
it is like most areas of economic activity exposed to different influences. The creation of the European Union and the European Market, building on traditional evaluations, has increased the importance of standardization. It has complicated the structure but has also made it a factor to consider by European and international business actors, scientists, consumers and administrators.

Other forces which influence standardization are present on the market. A substantial increase has occurred in the number of transactions between companies. Outsourcing has become a commonly used management tool which has influenced the need of direct standardization in the individual corporation. Public authorities and public procurement refer in increasing extent to standards. In addition the demands regarding environment, health and safety aspects have been increased.

Standardization means negotiations for establishing of the standards and for their regular revisions or renewals. The negotiations require experience and preparations. Normally, the corporations meet in Technical Committees (TCs) or Working Groups (WGs) with competitors, some customers and representatives of standard development organizations and authorities. In every country, interested in a particular forthcoming standard, the National Standards Organization, NSO, through its National Technical Committee (TC) has collected and prepared the views and proposals for the WG meetings. The delegates in the Committees and WGs are individual experts and represent their respective country in these negotiations. The ambition is to arrive at the best standard possible while at the same time being conscious of the state of the art in the manufacturing of the product. Technical knowledge and knowledge of other languages are essential in standard development as well as financial resources to cover fees and expenses.

In a critical perspective of corporate standardization it should be observed that standardization does not always mean to find the best technical or the most economical solution. This could also be applied to environmental conditions. The most important point is to find a balanced solution with regard to all technical and managerial flows, internal and external, of the corporation based on the revenue of the total working capital.

As the outcome of the standard negotiations depends on the skill of the negotiators, these have been particularly observed as well as the activity of the company played in the national preparations.

Standardization activity within ISO and CEN has been intense and increasing during the last ten to fifteen years. In their book Egyedi and Blind (2008) use the term “standards dynamics” for the changes of and interaction
between standards, or what happens to standards once they have been set. They study the changes that standards undergo, competition between standards and the interaction and friction between complementary standards. They see this development in standardization as a source of dynamics in existing standards. Two types of standards may be distinguished, technical standards which normally are related to a product, and management standards normally dealing with governance and management systems, like the well-known standard ISO series 9000. The technical and managerial levels of the standards are established by the companies and other participants in the work of the Committees. Due consideration must also be taken to “the state of the art” of the industry”. With this concept reference is made to the safety, technical, mechanical and scientific knowledge which existed and was reasonable to predict at the time of production (Mimer, 1992). To Hesser (2008) the state of the art is the development stage of an advanced process, appliances and operating methods. It is the peer reviewed by the leading experts in the respective field to achieve the legally prescribed objectives.

The evaluation of the value and efficiency of a standard depends on the role and views of the stakeholders. It can hardly be measured in economic terms. If a binding standard has been established the manufacturer has two alternatives, one to follow the specifications of the standard and adapt his equipment to the demands of the new standard, or two, withdraw from the market.

1.6 Purpose of the study

Standards are developed in contexts with different groups of interests from business, authorities and other organizations. This study will reflect traditional corporate standard development, from 1985 also conducted within the context and consequences of the New Approach. CEN and ISO interplay with National Standard Bodies, (NSBs), focusing in particular on corporate management and products concerning health, safety and environment.

The purpose of this study is to gain knowledge, experience, describe and to analyze corporate action in connection with standard development and change of standards. Based on studies and experience of seven internationally active corporations facing the new conditions regarding standardization, knowledge of actions and reactions in the standardization process will be generated. Changes in standard development conditions and strategies are in
focus. Management activities regarding standardization are conducted in new or long lasting relations.

The study contributes to developing a framework for increased understanding and knowledge of and insight into the problems, conditions and considerations which the corporations face as a consequence of international standardization. Such a framework should be of value for the future discussion of standardization strategy and management attitudes and decisions, when facing questions regarding standardization, including competitive situation and marketing.

1.7 Outline of the study

The first chapter gives the background to the study, tells of the organization and importance of European standardization. Theoretical perspectives will follow in chapter 2. These perspectives will constitute the base of a method of a quality field study.

Seven corporations will be especially focused in this study. The ambition is to describe and discuss how these firms act with regard to strategy, organization and markets in the context of standardization.

Like raw material, production equipment and channels of distribution, standards may be seen as a resource established as a legal or market asset. As a resource it would constitute an important factor in the analyses of standardization. The activity of standard making is normally conducted in different Technical Committees, (TCs) and Working Groups, (WGs), new or long lasting depending on the type of product and organization in charge of standardization. The strategically alternatives facing the corporations as standard makers or standard takers is illustrated in chapter 2.

In the development of the European economy and a well working industrial structure, the politicians have placed a large responsibility on standardization, involving management in corporations and administrations.

The concepts and contexts of corporate standardization have been explained. They are part of the theoretical frame of reference for the study. Against the background of an account of The New Approach the formal procedure of standard making has also been described. The purpose of the study has also been presented as well as problems connected to the phenomenon of standardization. The outline to the theoretical framework is presented in Chapter 2 where also a model is presented to support the analyses of the
cases. The method applied for the study will be described in Chapter 3 where also the case corporations are presented.

The presentation of the cases in Chapter 4 represents the heavy part of the study. The model from Chapter 2.1 is applied on all cases. In that way an analysis of each company can be made in Chapter 5 with comparisons between different factors and characteristics in the cases. This discussion is based on the framework and model from chapter 2. Finally, the conclusions of the study and its possible contributions are presented in chapter 6.
CHAPTER 2. Previous research and a standardization process model

2.1 Previous research

With strategic use I refer to situations when a company has the choice of adaption to standards in its branch or takes or maintains a leading position based on superior, sustained technique without standardization. In these situations the corporate standard may be used as an international marketing tool. Also, when the company is not a technical leader, a strategic decision has to be made whether to be a taker of standard or not. Thus strategy is concerned with the decisions facing individual companies while policy concerns the consequences on the industry as a whole, comprising manufacturers, suppliers and customers as well (Grindley 1995).

In management literature little has been written on the subject of standardization or the use of standardization as part of a strategy. In a discussion of conceptions of environments Scott (1993) notes that “institutional categories and rules are also promulgated in the form of "industry standards" and specifications which attempt to impose some uniformity in size, dimensions of components, parts and procedures”.

David and Steinmueller (1993) point out that there are different ways of strategic thinking by which major producers are in a position to dominate and control the standardization process.

To characterize a standard Egyedy and Blind (2008) refer to the metaphor of “the keys always hung at the same nail”. This may include the view of developing a habit or regulation.

The Economist and Business Strategy Consultant Peter Grindley has presented a study (1995), which deals with the relationship between standards, technology, business strategy and policy. The ambition with his study is to help bring standards more fully within the realm of business strategy and policy. With this perspective standards can be regarded as a component of analysis alongside many other conventional aspects. Grindly (1995) has contributed to standardization literature with the ambition to broaden the under-
standing of how standards work and to help establish standards as a normal component of business strategy. Grindley believes that standards are central to business strategy and the most important component of new product success. There are several ways of classifying standards but the main distinction is between quality standards, concerned with the features of the product itself, and compatibility standards, concerned with the links with other products and services. Quality standards are often divided into two further groups, minimum attributes and product characteristics.

Understanding the basic standards mechanisms helps resolve some paradoxical market behavior of new products, such as why many markets converge to a single design, why the best product is not always the winner, why it sometimes pays to give away know how to competitors to ensure that the market adopts the design and why a trial approach to a new market may fail, Grindley underlines. According to Grindley (1995, p. 5) and examples provided by him, competition and increased volumes also bring down prices rapidly. He sees three strategic problems for the firm; first to establish standards for a new product, second to maximize returns from standards for the individual firm and thirdly to compete effectively. According to Grindley standards define any common set of product features. They range from loose sets of product characteristics to precise specifications for technical interfaces. And the aim of strategy is to use standards for competitive advantage. Grindley sees standards as central to business strategy and the most important component of new product success and once established they continue to affect competition. Once standards are established they continue to affect competition.

Standards enable products to be used with complementary goods and services or to be linked with similar products. Similarly, household appliances and automobiles need service networks, competing credit card systems need retailers willing to accept them and accounting systems to process them, even prescription drugs need doctors familiar with their use. These all rely on compatibility standards of some sort, and many “non-technological” systems depend for their success on standards.

Grindley’s opinion is also that Standards Bodies tend to concentrate on the technical aspects of standards. The most important factors may however, be on the market side. In general, standards may be too important for the future of the company to be negotiated in committees and to be settled in the market place. The strategy consequences of these problems, time delay and that standard bodies are considered conservative, may be that the most effec-
tive way to establish an efficient standard is to turn over the standards setting process to the market.

According to Grindley committees may outperform market forces in coordinating standards by giving firms an opportunity to choose standard by negotiation before they make irreversible investments. Grindley has listed a number of studies regarding basic economics of standards. Among the leading studies of the complex aspects of strategy and policy he points to Kindleberger (1983), Arthur (1989), Farrel and Saloner (1985), Besen and Saloner (1989) (1990) as well as to Gabel (1991) and Saloner (1988).

Grindley is hesitant to the engagement of Governments in the process of standardization. He sees the state as an external actor who could modify the profits of the game thus establishing desired standards. Grindley is studying compatibility standards and makes the distinction between these types of standards as opposed to quality or measurement standards. The compatibility standards define the interface requirements allowing different core products, also from different manufacturers, to use the same complementary goods and services, or to be connected together in networks. For Grindley, the aim of strategy is to use standards for competitive advantage. Once standards are established they continue to affect competition. It should be noted that Grindly (1995) and Ogus (2001) are focusing on High Technology Products in which area the conditions at present are somewhat different to those in the mechanical and other traditional industries. Grindley (1995) also explains that decisions such as whether to use one’s own design or a competitor’s, whether to protect or allow open access, and whether to subsidize production of complementary goods and early sales, rather than invest in product development, are examples of standard strategy.

Vernon (1979) has pointed out that modern standards are easily transferred to developing countries which become competitors to industries in the Western World. He arrives in his theories on internationalization to the "courageous" opinion that developing countries might offer competitive advantages for location of manufacturing when the product is properly standardized. “The courage”, according to Vernon would be required to contradict the Heckscher-Ohlin theorem concerning international trade. In this connection Vernon also brings marketing into the discussion of economic theory, which earlier has not been discussed to any larger degree. Information demands cost and the foreign entrepreneurs are not always prepared to invest in unpredictable, although developing countries.
Today, for the modern corporation to be active on the international market place, it is a major consideration to take standards into account. In that way international acceptance of products and services is achieved regarding quality, environment, quality assessment, health, safety and human factors. At the same time a company cannot participate in all external committees and organizations affected by the company (SIS Hb 124:2000). It is a vital step to identify the standard committees which offer the greatest opportunities for corporate impact. This would apply regardless of the size of the company. Issues like quality, product safety and environment, demand explicit programs, just as programs to manage standards participation. As mentioned above most companies have a choice and must decide to either participate – or not – in the development of standards in their business area. Participation means that they may influence and control the standards in their respective industry. If it is chosen not to participate, the short term savings of costs may be at the expense of self-determination in the long term perspective (Ibid.)

In a paper of September 2001, at the Third Interdisciplinary Workshop on Standardization Research, Dr. Henk de Vries of the University of Rotterdam presented a document titled “Standardization – Outline of a Field of Research”. With reference to Hesser (1997) he expressed the view that standards and standardization had not yet reached the state of an academic discipline.

In 2009, eight years later, he is an active researcher and Assistant Professor in the Department of Standardization at the University of Rotterdam working together with Professor Knut Blind from the Fraunhofer Institute, Germany. This can be seen as a strong confirmation of the increasing importance of standardization and surrounding scientific research. DeVries has identified not less than nineteen different theoretical fields having a bearing on standardization.

Two studies, one by Grindley (1995) observed above, on Standards Strategy and Policy and one edited by Hawkins, Mansell and Skea, focusing Standards, Innovation and Competitiveness, both published in 1995, are parts of the frame of reference of this study. Hawkins, Professor at the University Of Calgary, Canada, and his colleagues, have edited a number of Papers from a seminar on The Politics and Economics of Standards in Natural and Technical Environments. In his introduction, addressing the problems of standards and standardization he sees different elements like political, economical, social as well as technical and environmental/ecological disciplines.
When facing a situation of development of a standard for the corporate product the companies meet a number of strategic questions. Some of the aspects can in short be described in terms of de Vries (1999) of being a standard maker or standard taker. In their contribution towards a *Theory of Standardization*, Baskin, Krechmer and Sherif (1998) with a background in telecommunications, identify the range of stakeholders from standards creators to standards.

### 2.2 A standardization process model

Standards vary in strength and content. As will be realized from the cases in chapter 4 the technical complexity varies from uncomplicated products to sophisticated instruments, machines and managerial standards.

Technical strategy in this framework refers to the way in which companies directly and indirectly open and extend the knowledge base of the company. Technical levels are described above in connection with framing of the problems in section 1.6. They create the basis for the development of the industrial products and corresponding standards.

Product standards can be more and less extended. A standard expressed as Standard Operating Procedure (SOP) has no official blessing or status or may not even be documented. Thus, the establishing of an official standard for a product is a critical point in its development and existence. It has reached a certain technical and/or managerial level. With the development and acceptance of a standard the structure of the market and marketing changes. In the view of Grindley (1975) a critical mass has been reached and the product enters into a second stage of strategy where maximum returns are expected. In the third stage competition is fully established.

For the positioning and measuring of the companies in the model, evaluations have been made together with the companies concerned, views expressed by competitors and trade organizations. Market shares and technical reputation are the basic measures for the market positions in the model. The use of a large number of standards as well as advanced technical development and formal engagement in standardization activities have been considered as factors of strength reinforcing the position of the company.

**Corporate standard strategy and tactics**

With reference to Kipling and Yin, Baskin et al. (1998) present in their paper
a framework for standardization theory in terms of answers to six questions which might help to define an approach to standardization. The first three questions relate to planning the development of a standard – the strategy - and the second three questions refer to developing a standard – the tactics.

**Questions concerning strategy**

Why seek a standard?
What is the category of product or service to be standardized?
When in the product cycle to standardize?

**Questions concerning tactics**

Which is the appropriate SDO?
How will consensus be reached?
Where will the standard be used?

With the answers to the six questions a framework for standardization is established, according to Baskin et al. (ibid). Every case study in chapter 4 ends with a model which will give an overview of the case. The model and its content is presented and described below in this chapter. A deeper analyses and comparisons between the cases will be found at the end of chapter 5.

The above authors also draw attention to the shorter product life cycles, increased competition between suppliers and emerging substitutes leading to the ambition to make standardization provide the lowest common denominator. They also point out that a decision not to standardize implies a decision to seek a unique, possibly controllable, market. This could be a correct decision when a product or service has few interfaces to other products or services. On the other side, a decision to standardize indicates the ambition to address markets with some commonality. It also confirms the understanding that there will be competition but that there is value in supporting common interfaces.

In the forthcoming analyses of the corporate cases answers to these questions will be used directly and indirectly.

One of the researchers who has collaborated with Hesser at the University in Hamburg is Hendrik Adolphi whose thesis work had the title “Strategische Konzepte zur Organisation der betrieblichen Standardisierung” (1997) /Strategic Concepts in connection with Organization of Corporate
Standardization/). One ambition of the study by Adolphi was to develop concepts which are required to organize corporate standardization. He underlines that the organization of corporate standardization must satisfy the different demands caused by standardization. Against the background of EU-legislation the conditions regarding e.g. ISO 9000 are compulsory and increasing in importance and in demands on the corporations. As part of the study Adolphi has undertaken a written inquiry to 130 companies and on that basis particularly studied the organization and functioning of standardization departments in the corporations.

In the study on Standardization in Companies and Markets (Hesser et al. 2007, pp. 213-256) Hesser has listed different types of strategy on company level. The ambition is to show the complexity of the subject and how the strategies relay to the concept of in-company standardization as a management tool:

1. Strategy as a self-contained, standardized and integrated design pattern for decisions
2. Strategy as a market sector selection instrument
3. Strategy as an instrument to assign management tasks to different hierarchy levels
4. Strategy as an instrument to design the organizational structure, taking account of long-term objectives, action program and available resources
5. Strategy as a way to achieve a competitive advantage by assessing external chances and risks as well as internal strengths and weaknesses
6. Strategy as a criterion for the intended economic and non-economic contribution of a company to its stakeholders.

Competitive fields

The different views can now be linked together and be illustrated as a tool in the form of a model according to figure 2.1 below. It follows from standardization theory, that after the establishing of a standard the manufactured products of the actors in the industry have a tendency to become similar. Also the prices from the different manufacturers have a tendency to diminish and converge (Grindley 1975) (Levitt 1983), Vahlne (1991), deVries (1999).
The model in figure 2.1 will be used to describe the market position of the case company and the movements of its products in the standardization process from no standard to a developed CEN or ISO7CEN standard.

Reference may again be given to Grindley (1975), and Schmidt and Werle (1998) who state that standards, as a point of reference, coordinate technology and development. Standards structure the way the markets develop.

Standardization is a never ending process. Standards are also revised at regular intervals. The passing of time is illustrated in Figure 2.1, with an arrow beginning in point F.

The view of the concept of product quality, as used in the model, is a business based view. The origin of the product quality could be an internal company standard, SOP standard, National Standard and later an EN, or even more advanced standard or quality system.

From the standardization point of view one can discern in the model three different types of markets, firstly a Competitive Wide field, ABEF, (X), open to all parameters of competition and no standards developed, secondly, Competitive Field, BCG, (Y), with standard(s) developed and other parameters than product and price gaining in importance, and thirdly, Competitive Field CDEG, (Z) with Neutral Competition consisting only of Product and Price. In field, (Z) these two parameters are similar for all producers. Depending on the strategy of the corporation, its products may be placed in different positions in competitive fields or also withdrawn from the market. Observations of movements of competing products in the model may provide strategic and early information to management.

Arrows are used in the model to describe the activities. Thus, three factors are combined in the arrow; market position as described above, length of the arrow, indicating efforts to adapt products to new standard, and slope of the arrow, giving strategic direction, up or down or stable and extent of development of new standard.

In the analyses of an industry or of a selected number of companies in an industry, standards have seldom been included. A purpose of this study is to try to determine what happens within a corporation when a standard has been or will be developed or changed for its products.

When product and price converge for a standardized product on the market they are reduced in importance as competitive parameters. After a while they vary only in limited extent from one company to another. With the model I want to illustrate an important principle connected with the establishment of standards, viz. that competition to a large degree is transferred to other parameters than price and product. Markets and marketing may
change. In the model 2.1 the market positions of our case company and the competition are indicated in Field X, where the arrows begin. No standards exist in this position. When, however, an official standard has been issued and adopted by the company, it moves into a new position in field Y.

Other parameters which become important are a positive reputation, advanced in innovations, location, and time of delivery, transportation and sales promotion. Components exceeding standard levels without supplementary costs to the buyer – unexpected customer satisfaction - counts more and more. These are parameters developed and used by the companies in Field (Y). In figure 2.1 below, the principal figure, no standards exist in point F and field X is open to all kinds of competitive parameters. For a product in or near point F, in competitive field (X), the variations in competitive parameters are unlimited. The Football games arranged by organized leagues follow strict rules while the games on the school yards are flexible in their structure. With competitive fields I have the market for the product in mind. It is not as a geographical market but as a combination of all types of parameters applied in the competitive sales efforts in relation to all competitors.

To describe the model in general terms, any number of producers and products would in the beginning be on the particular market for our product P. No standards exist. When a standard later is developed a new situation in the process occurs. Depending on the skill and resources within the corporation different strategic aspects may be imagined. The words by Professor Simons at the beginning of the study declaring that “He, who does not participate in external standardization is doomed to work according to the standards of his competitors” (de Vries 2007 p.28; in Hesser et al 2007).

In Chapter 4 the model will serve to describe the strategies of the corporate cases. I use the dimension competitive position and competitive fields to illustrate the positions and movements the business companies. They will be used to illustrate the change in market position of the corporation before and after standardization. The technical level and standard strategy are focused as well.

In the beginning, and with no valid standards developed, all competitors (C) are positioned in field X. When new standards are published new requirements might be directed towards the producers. For some of them exit from the market is a necessary step. This development is illustrated in figure 2.1. There are initially three Competitors. Two remain in Field Y. In reality this number could vary extensively as will be described in the cases. The higher the technology in the industry the less is the space for competitive parameters as exemplified with nuclear plant technology. (Finon, Staropoli 2001).
When going from point F towards C and passing the line BG, a Critical Line has been passed. A standard has been established with GC as the minimum level. The neutral, competitive field Z, (CDEG), corresponding to the standard, has been established for the product. This field now consists of the established standard valid for the product, and the price of the product. The slope of the line FC may vary depending on the character of the product and its standardization history. The upward direction and the lengths of the arrows for competitors C1 and C2 indicate a higher level of technical or managerial content and quality in the product. This also reflects possible costs for adaption to the new standard. Competitor C3 remains in Field X and its products are not according to the standard established and accordingly withdrawn from the market. Depending on the level of technology or management requirements the standardization process follows the line FC.

On and above the line GC, the technical differences are small and the products more and more similar as time passes. If the product is under the line GC, it is not according to standard. The prices of the products also con-
verge and also follow the line GC. These two factors, product and price, unite to establish a Neutral competitive field, Z, or CDEG. The level of technology of the product and sophistication of the management standard the more defined and specific the product will become. To illustrate, I have placed the technology of a nuclear plant in the extreme field to the right in the tool model. For a nuclear plant the standards, with added technical quality specifications, are extremely detailed, leaving little space for suppliers to present their competitive advantages (Finon, Staropoli, 2001). It is pointed out by these authors that one of the reasons for the French leading position in nuclear energy success is the extensive use of standards. In Chapter 5, dealing with the analyses of the cases, I have used the model to illustrate the strategies and positions of the companies.

As an example in figure 2.1, three producers, Competitors (C) are competing in Field X and initially no standards are established. With the introduction of a standard the conditions change. Corporation (C1) is on a technical level sufficiently high to adopt the standard without changes in product or management routines. It moves automatically to Field Y. For company (C2) changes in product quality, tooling etc are required before being able to present a product according to standard. In the model it has a longer and more costly way to go in comparison with company (C1). This could also be as a consequence of strategic action by a strong, negotiating company.

Competitors (1) and (2) both have adapted their products to the new standard and are well positioned in Field Y. Both have applied the same price and their products are close to identical. To gain advantage against competitor (2), company (1), as an example, has developed new instructions for the handling and use of its product, based on the new standard. These instructions facilitate the handling, storage and use of the product.
CHAPTER 3. Method

3.1 Introduction

The overall purpose of this study is to examine corporate actions in connection with standardization, get knowledge of and describe what happens in their industry and why. How do the companies react to the demands of standardization, with regard to product technology and level, standard strategy and market activity?

This study is constructed as a qualitative field study, mainly based on interviews. The subject deals to a large extent with the transition of a corporate function, standardization of products from an old to a new system. It touches on an ongoing activity, with a change from an old to a new approach with new experience gained. To a large extent it connects to activities and knowledge collected from international contexts. The learning aspect is present as well, which is important in corporate standard development.

Access to corporations and persons for interviews and discussions has been a prerequisite for the study. I have been fortunate to be able to maintain close and long lasting relations with my selected companies, with related industries and individual experts for many years before, during and after the theoretical part of my studies on the Doctoral program at the Department of Business Studies at the University of Uppsala. I have worked with the same seven companies from 1994, all through the study. In the background of the seven main cases more firms will be mentioned as examples for comparisons.

In the beginning the research direction was rather vaguely formulated. Later, concepts, insights and understanding have been developed from opinions in interviews, literature and other sources. A study of the phenomenon of standardization in a general corporate perspective contains a large number of aspects and considerations.

In a qualitative research model, as has been chosen here, personal preconceptions may influence the work in many ways, like selection of companies to study, collection of data, interpretation of statements, understanding of the problems and personal evaluations as indicated by Gummesson (1988). From
previous employments, i.a. at the Swedish Chambers of Commerce in Lon-
don and Paris, Manager of a subsidiary company to Fiesta Steel Company,
Trade Commissioner /Handelssekreterare/for Sweden in the U.S, knowledge
of a large number of industries has been gained. The practical experience of
international trade involving many countries and companies has widened the
perspectives. The long lasting engagement in standardization and its possi-
bilities to facilitate trade and strengthen the European market has been of
particular interest to me.

The choice of method is a consequence of the theoretical base of a study.
One method for case selection may be to look for extreme cases with the
ambition to emphasise special conditions, traits or circumstances. A similar
method is to search for cases of critical character with the intent to conduct a
test against a theory or hypotheses. Still another way to select cases is to use
some kind of a judgement selection with a general ambition to find cases of
particular interest to the study.

In the selection of a research strategy Yin (1900) has identified three
conditions that distinguish the strategies on another basis than hierarchy, namely:

a) the type of research questions posed

b) the extent of control an investigator has over actual behavioral
   events

c) the degree of focus on contemporary as opposed to historical events.

When the company faces a situation involving the process of evaluating the
need of establishing a new standard for a product being of economic interest
to the company or, in some other way, having an influence on its activity,
different ways of action and activities may be visualized. A situation of
choice between “standard maker” or “standard taker” develops. Also the
alternative of a “negative action” may be imagined.

When approaching standardization, a number of principal problems and
aspects become apparent. The history of standardization is long, from the
days of the Romans´ size of battle carriages through the size of railroad
tracks and to-days´ microchips as examples. The years of development have
also been marked with complicated negotiations. Swedish NSOs and compa-
nies have been heavily engaged in standard development and negotiations.
The number of actors, corporations, administrations and consumers involved
is endless. The size of the organizations varies from small to large companies.

The differences in resources, skill and knowledge between the actors have been and are still considerable. The technologies, structures and cultures vary from one industry to another and from one country to another. The introduction of standardization in a corporation has similarities with introduction of new technique. Most of the studies on this phenomenon have been connected with larger corporations (Pettigrew, 1973, Gerwin, 1985) but other studies also deal with introduction of new technique in small firms (Norén, 1987), Lindqvist(1991).

3.2 Collection of data and information on cases

Information has been gathered through written material and through interviews, mainly through visits to the companies and organizations. In addition updating information has been gathered on Internet home pages on all companies and related sources. The visits and interviews have taken from one to five hours or a complete day. Follow-up questions have been answered by telephone. A comparatively long interview was completed on every first contact. The interviews have been recorded on tape and typed in their total length and contents. Follow up interviews of approximately one to two hours have been made on some occasions.

With focus on each of the seven cases, interviews have also been made with external sources, like standard administrations, trade organizations, competitors, with personnel of the corresponding standardization organizations and the national secretariats of the actual corporate standardization case. This has been done in order to verify facts and to get additional and external information on each individual case. I have also participated in conferences when representatives of the case companies have presented their views of the corporation in a standardization perspective.

The empirical data have been checked with the respective respondents and amendments and changes have been made. In some cases internal business information has been withdrawn.

The interviews and documents have been registered for each separate case. Documents, correspondence, protocols, brochures, technical information and other relevant material have been made available and received at the time of the interviews or mailed to the author as requested and agreed.
I have divided the interviewed persons in two main categories:

I. Internal corporation, present and past
   A. management
   B. responsible for standardization function

II. External corporation, present and past
   A. representatives of involved standardization companies and committees
   B. others, mainly within standardization administrations.

The interview guides are found in appendix 3.1 for representatives of the corporate cases and 3.2 for representatives of organizations.

The interviews have been based on the interview guides, and reflecting the research against the theoretical frame of reference. During the course of the work the questions in the interview guides have been extended to a certain degree. In the beginning of the interviews, the interviewed persons have been invited to spontaneously give their accounts on the corporate view of standardization, corporate evaluation, strategy, organization and personal involvement with regard to standardization. Thus a more free and spontaneous conversation was established before the questions in the interview guide were used, more as controlling instrument. When necessary, additional questions were asked in order to get a full coverage and deeper penetration of important areas. The questions covered a number of areas which were presented to the interviewee in different order depending on the development of the flow of conversations. By development of time, training and gaining of knowledge of the subject, the questions became more qualitative.

When the case interview was completed, the result was sent to the company for an opportunity to give final comments. If no comments had been received the case was completed. Follow up questions and conversations by telephone and e-mail have been exchanged.

3.3 Companies selected

I have chosen to study seven companies. They have been known or referred to me in view of a special relation to the phenomenon of standardization.
With the arrival of the New Approach (1985-1992) they faced a new situation with directives regarding standardization. Some of the experiences gained by the companies are of similar kind for all of them, but each one of them also has met with unique challenges. The selection of more than one company gives a broader spectrum of different situations and activities. The interview guides are found in appendix 3.1, for representatives of the corporate cases and Appendix 3.2 for representatives of administrations.

The presentation of the cases in this study is a summary and combination of all interviews and documents regarding each particular case. Data has been reduced to a description of the process, structure and activities with due consideration to internal and external forces. Special emphasis has been placed on the background of the corporation and the interaction with other organizations. Thus data about the corporations is concentrated on factors and events having direct interest and influence on the phenomenon of standardization.

Of the companies focused, three are large and four smaller, SMEs. An SME, Small and Medium-sized Enterprise, is normally a company with less than 250 employees. In other connections a medium-sized company could have 500 employees. During the time of this study one company, Daloc-Futura AB has expanded and is considered a Medium sized company. The number of employees at the start of the study is serving as base in comparisons.

With the author’s background, working in and with Swedish industry for many years, a considerable preknowledge of the industry exists. The mechanical industry, building material and equipment industry have been placed in focus of this study with the EU Machinery and Building Directives as the main bases. Manufactured products of different types as well as in different positions on the product life cycle scheme has been sought.

The corporations selected represent in one way or another unique aspects as to the approach, activities, knowledge and experience in standardization. This study concerns six Swedish and one international, Australian – US – Belgian, company in order to widen the perspective. They will below be presented in the order of entering into the study.

The interest in the subject of standardization was created when the owner of the first company, Motala Hissar AB, Mr. Rolf Sundström, at a meeting in 1989 indicated that he might be forced to sell the company as a consequence of European standardization. The company specializes in production of small lifts for persons with impaired mobility and for small goods. I have stayed in touch with the company over the years and at the end of 1993 Motala Hissar
AB was sold to Kone Hissar AB. The problems regarding standardization had contributed to Mr. Sundström’s decision. The special situation of Motala Hissar AB gave me a preunderstanding of the problem and made it particularly interesting to study the company as the first case. The interest in standardization phenomenon was reinforced.

The second selection was made after interviews with two representatives, independently, of the hardware chain Jerngruppen AB. The question was asked whether within their stores, (with approx. 8,000 - 10,000 products in each of the stores) any supplier had distinguished himself with standardization as criteria and with particular emphasis on standardization in combination with production and marketing. As an example, the multinational company *Ansel Healthcare Inc.*, with European headquarter in Brussels, Belgium, was brought to my attention (Interviews: Leffner, Ruckman, Jerngruppen).

During the course of the early general and introductory interviews my attention was also drawn to the corporation of *Bulten AB*, today *Finnveden-Bulten AB*, manufacturers of thread forming and self drilling screws, head bolts, nuts and custom designed special fasteners. The proposal was received from SMS/SIS in 1992. The Bulten Corporation was established in 1873 and it has been heavily involved in the development of standards for their products on a worldwide basis. When standardization started within the framework of ISO, thread forming was on top of the agenda and the committee secretariat for this standardization project was located to Sweden. Members of the staff of Bulten AB have served as chairmen of the committees concerned. Standardization has had an important influence on the company. It is today reconstructed and the activity is concentrated to Finnveden-Bulten AB, established in 2002, now with headquarters located in Gothenburg.

The importance of access to detailed information led me to contacts with the sixth and seventh companies, *SPM Instrumentss AB, Strängnäs* and *VME Industries Sweden AB, Eskilstuna*. Both companies, and their personnel responsible for standardization, had been known to me for some twenty years and the subject of standardization has over the years been dealt with in several formal and informal discussions almost monthly. Mr. Karl-Erik Grancrona of VME Industries AB was the Chairman of CEN Technical Committee for Earth Moving and Construction Machinery and thus had a wide experience of standardization and was also in position of first hand information of the formal and informal work and discussions. His later successor was Mr. Jan Mimer, Corporate Lawyer.
Mr. Roland Lagerbrandt, Production Manager of SPM Instruments AB, was also engaged in the evaluation of Quality Management Awards and had also followed the process of standardization with particular attention. The company had a negative attitude towards standardization and was not directly obliged to follow the New Approach. From a standardization perspective the company strategy and situation was nevertheless of interest.
### CORPORATE CASES AND PRODUCTS

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Name</th>
<th>Products</th>
<th>Product area</th>
<th>No. of Employees/approx./</th>
<th>Company establ. year</th>
<th>Turnover 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ansell Healthcare, Brussels, Belgium</td>
<td>Protective gloves</td>
<td>Protective gloves</td>
<td>11000</td>
<td>1907</td>
<td>8.340 MSEK</td>
</tr>
<tr>
<td>2.</td>
<td>Finnveden Holding, Göteborg</td>
<td>Fastening systems</td>
<td>Fastening systems</td>
<td>1833</td>
<td>(1873)</td>
<td>1992</td>
</tr>
<tr>
<td>3.</td>
<td>VCE Industries, Eskilstuna</td>
<td>Earth moving machinery</td>
<td>Earth moving machinery</td>
<td>11000</td>
<td>1875</td>
<td>56.000 MSEK</td>
</tr>
<tr>
<td>4.</td>
<td>Daloc Futura AB, Töreboda</td>
<td>Safety and fire doors</td>
<td>Safety and fire doors</td>
<td>343</td>
<td>1920</td>
<td>641 MSEK</td>
</tr>
<tr>
<td>5.</td>
<td>Motala Hissar Motala</td>
<td>Lifts for crippled persons, small goods</td>
<td>Lifts for crippled persons, small goods</td>
<td>60</td>
<td>1985</td>
<td>155 MSEK</td>
</tr>
<tr>
<td>6.</td>
<td>S:t Eriks, Uppsala</td>
<td>Concrete slabs for walkways</td>
<td>Concrete slabs for walkways</td>
<td>160</td>
<td>1900</td>
<td>391 MSEK</td>
</tr>
<tr>
<td>7.</td>
<td>SPM Instruments, Strängnäs</td>
<td>Measuring instruments</td>
<td>Measuring instruments</td>
<td>229</td>
<td>1975</td>
<td>213 MSEK</td>
</tr>
</tbody>
</table>

**Sources:**
Case 1: Annual Report 2008; Företagsfakta 3 M Peltor
Case 2: 4, 5, 6, 7: Alla bolag 2009 10 20
Case 3: Annual Report, 2008, Dept. of Information VCE
3.4 Analyses and interpretation of cases

The ambition has been directed to the search of patterns or tendencies in the reactions and activities of the companies corresponding to series of events or established phenomenon. The patterns may have part of their origin inductively generated from the empirical data and part from the frame of reference of the study. Each case will first be analyzed individually and later analyzed in its total entity in comparison with all cases combined. The conclusions are made in connection with every case analysis.

The comparative analyses have been directed to answer the specified interest of research. On the other hand, the discussions of the results are conducted on a more liberal platform but with the ambition to correspond to the theoretical concepts which have been presented in the frame of reference. In this part of the analyses some of the conclusions will be validated based on information from the vast area of literature on the subject.

The selection of cases also reflects the ambition of the study to have companies of different sizes as part of the research and also companies with dissimilar products. In agreement with Yin (1989) it can be stated that each case serves a specific purpose within the overall scope of the study.

3.5 The interviews

As appears below in table 3.2 104 interviews have been completed. Of these, 26 interviews have been completed with representatives of the seven corporations directly concerned and 56 with trade representatives, including competitors and trade organizations. In addition, 22 interviews have been made with professional standardization administrators and organizations like SIS, CEN etc.
The number of interviews is substantial and has required planning preparations, travel arrangements and follow-up activities. I have been fortunate to be able to combine interviews with travelling on special invitations from the United States and Germany.
While I was teaching at The University College of Mälardalen two students wrote essays on the subject of standardization. An interview with Volvo Construction Equipment, VCE, was made in cooperation with the students. The interviews in the U.S. were made in connection with an invitation from North Park University, Chicago, to lecture on European Marketing Strategy and International Economy. As a result of an Exchange Program with the University of Göttingen, Germany, I was invited to spend one month at this University. I also had the opportunity to visit The University of the German Armed Forces, Helmut Schmidt University, Hamburg, for valuable information on standardization with their experts on the subject. A list of conferences attended is included in appendix 3.
CHAPTER 4. Seven corporations

4.1 Case One, Ansell Healthcare Europe N.V.

Ansell Healthcare Europe is a world leading company in production and marketing of hand protection equipment, mainly in industrial applications. This applies to areas like automotive and transportation industries, pharmaceuticals, chemical, metal fabrication, glass, electronics, food processing, building and construction as well as food processing. Annual sales in 2008 amounted to 8,340 SEKM.

The company was founded in Australia in 1905 and in 2007 it had more than 11,000 employees worldwide. In Europe the headquarters are in Brussels with distribution centers in Aalst, 25 km west of Brussels, in Paris and in Wupperthal. In 1989, 1993, 1995 and 2000, major acquisitions were accomplished and made Ansell the leading company in the world in their industry. The major activity is now in the United States. The operations are conducted in three divisions, consumer unit, medical unit (operations gloves) and the industrial unit. Ansell has only one or sometimes two persons employed in Sweden for technical information and consultant work. One of these has been Mr. Anders Jonasson, member of CEN TC/162 WG 8, and now with North Safety Products, with related products and still member of WG 8. Orders from the distributors/customers are placed directly with the European Sales Office in Belgium.

According to the European legislation a glove is an item of Personal Protective Equipment PPE, which protects the hand or any part of the hand from hazards.

Production is made in long series and in few plants located in Mexico, Malaysia, Sri Lanka and the United States. Over the last few years Ansell has placed more and more of their production in China. A substantial number of companies, large and small, are manufacturing glove products in rubber, leather, textile etc. Ansell has about 12% of the world market which is slowly growing. The European headquarters and European standardization projects are managed from Brussels. Large competitors are located in China, Malaysia, France, U.K, Germany and Thailand.
Protection of Workers has long been an important issue in Sweden. Ever since the beginning of the New Approach in 1990s, the work environment was observed with increased attention. When Sweden joined the EES, the proposition to include questions regarding work environment were placed in the document dealing with free movement of goods, primarily aimed at reducing trade barriers (Jacobsson, 1997).

The legal requirements, initially from the EES and later by EUC, regarding this area of products have renewed the industry, according to industry representatives. There is however, because of the higher level of cost, a tendency that the major producers are leaving Europe.

4.1.1 Directive PPE

In 1989 the EC Commission presented two Directives touching on personal safety, Directive 89/656/EEC on the use of Personal Protection Equipment, PPE, and the PPE Directive 89/686. The first of these Directives concerns the use of personal protection equipment at work places, including the employers’ responsibility and obligation to eliminate risks and hazards, while the second is the so called PPE, Product Directive concerning manufacturing, testing and marking of personal protection equipment. All gloves for industrial use were included in the directives while private use is not included.

The PPE directive mentions two levels of risks, simple risks or normal risks plus mortal risks. This classification is said to represent a problem for the industry. The pictograms, or symbols, on the gloves are a second problem and in the opinion of Ansell Healthcare they sometimes may give misleading information. Thirdly, information to the users is sometimes given only upon request, through instructions on separate leaflets, as it would otherwise mean that the company, in their own opinion, would deliver more paper than gloves.

In an EU standardization perspective this industry is well advanced, due to a large extent to the EU ambition to improve workers’ protection.

The standards developed from 1994, would later, as a consequence of the new approach, require substantial changes in the products, tests, marking, packaging etc. For some industries the costs involved were prohibitive. Many competitors retired from the industry. The Ansell company did not have any knowledge of the contents of the Directives when they were presented by the EU Commission.
In specific tests a glove may perform in a certain way. The results of that testing may be graded. Level “0” indicates that the glove is either untested or falls below the minimum performance level. Higher numbers up to “4” indicates higher levels of performance.

Through the new Directives a European employer would be responsible to make a risk assessment and select proper PPE. The PPE equipment manufacturer is obliged to pay compensation for injuries caused by deficiencies in protective gloves. The new demands had been circulated through all trade organizations before being applied. The PPE Directives defines the minimum requirements. The requirements are further developed in European standards - EN- standards. The application of these standards is the most usual way to comply with the Directives, as this achieves a “presumption of compliance”. As a consequence one may in principle assume that the product is manufactured in accordance with the Directive.

In Sweden, a distributer of Ansell Healthcare, Jerngruppen AB, had analyzed the development of standardization within their area of activity and decided to put pressure on their suppliers already at the time when Sweden applied for membership and in 1995 joined the European Community. The suppliers of Jerngruppen AB were encouraged to participate in the standardization process and to have changed their routines by July 1st in 1995. Although it was difficult to analyze the components of the price it was estimated that the cost for standardization would amount to 2 % of the product price, mainly because of the testing and marking. PPE products without the CE mark would not be included in the Jerngruppen AB assortment. As importers, Jerngruppen AB would be responsible for the certification.

4.1.2 Standard development and standard strategy

The Technical Committee, CEN/TC 162, WG 8, related to personal protective gloves, was in the beginning headed by a French chairman. Mr. Guido van Duren of Ansell Healthcare Europe, Brussels, was leading one of the Sub Committees WG 2, related to mechanical protective gloves. Mr. van Duren of Ansell is from 2009 chairman of WG 8.

From the beginning of EU standardization Ansell Healthcare has played an active part in the standard making as well as during the revisions of the standards.

The company was earlier already engaged in standardization in the U.S Standardization know-how was now transferred to their European operations. The emphases of their efforts were directed towards presentation and
testing of their forthcoming products. Lobbying was activated towards the European testing institutes and Ansell was the first company to have their products tested and approved by an authorized agency. This gave the company a possibility to have their products on the market ahead of competitors. After the original introduction of their products Ansell has participated in and leading the regular standard revisions. The Chairmanship of their standard WG has permitted a close cooperation with CEN and National Standard Organizations ((NSOs). Ansell Healthcare is strongly active in many types of networks, i.a. one concerning standardization and another related to seller/buyer relations.

Ansell Healthcare was one of the first companies in Europe to get involved in the new standardization program, according to their previous Global Technical Director, Daniel R. Gasman, and the present Technical Services Director, Mr.Guido van Duren. The primary aim of the Personal Protective Equipment, PPE, and Directive was to increase safety at work. One way to achieve this ambition was to establish standards for the manufacture and use in all countries of the European Union. Van Duren is Chairman/Convenor of CEN/ TC162/WG8/PG2, leading the European expert working group related to EN 388 for mechanical protective gloves. He is responsible for the company, Ansell, technique. With the presentation of their own opinions they were informed of competitive development and aware of innovating tendencies from competitors and customers. Ansell also had the financial resources to adapt to possible new standards as well as a team of experienced negotiators, i.e. from the US. Some of their European country managers were also engaged in the negotiations. Thus Ansell were in a position to present the strategic proposals of increased quality levels which eventually forced some competitors to exit from the business.

The top management of Ansell Healthcare is continuously following the standard development with close attention and coordinates product development, innovations with standard development. One reason being that Ansell Healthcare has production worldwide and wants to coordinate the development. Mr. Guido van Duren, Technical Director, also in charge of standardization, believes that Ansell Healthcare has influenced the standardization process to a great extent. It was part of the strategy and ambition from the beginning. In their presentations and literature, the information is based on and connected to standards. This applies also to education and training of sales personnel and of distributors. The buyers at the outlets are now more conscious of the CE-rules. It was indicated that, in general, Swedish manufacturers within the PPE area often were ahead of their European counter-
parts. The adaption of the products to standards would for many be an adap-
tion through testing of an already finished product.

It was underlined by spokesmen at the distributor Jerngruppen AB, that
with the arrival of the new standards several manufacturers would disappear
from the market. The distributors were satisfied about the quality develop-
ment and referred to the experience from many cheap, inferior products sold
through other outlets, as e.g. fuel service stations. Products which could not
meet the standards would disappear or have to improve in quality. It was
believed within Jerngruppen AB, that some countries outside Europe, espe-
cially Asian countries, would encounter problems in the beginning of the
application of the new rules. Jerngruppen AB had started to look for re-
placements, primarily for their leather gloves, and Ansell Healthcare was
expected to produce gloves in similar material. This tendency has later been
confirmed by the distributor. As indicated above, also Ansell Healthcare had
during the last few years started to produce in China.

4.1.3 Presence in standard negotiations

In the standardization meetings of CEN TC162/WG8 Ansell Healthcare was
invited to be represented by experts from their U.S. organization. These ex-
erts sometimes presented standards adopted by the American Society for
Testing and Measuremen(ASTM) as the bases for developing certain test
methods in the EN standard. In some meetings

Ansell Healthcare was represented by as many as six experts. The coop-
eration in the WG8 worked well. However, in the beginning many manufac-
turers went their own way.

Mr. van Duren has over the years participated in the establishing of
standards and in regular revisions as well. Mr. Anders Jonasson, their Swe-
dish representative, has also participated over a long period but, as indicated
above, is now representing another company, North Safety Products, part of
Honeywell Corporation, and is also active in the WG8 meetings and an ex-
pert on PPE.

Some of the standards established:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 374</td>
<td>2003</td>
<td>Gloves Giving Protection from Chemicals and Micro-Organisms</td>
</tr>
<tr>
<td>EN 381-4</td>
<td></td>
<td>Test method</td>
</tr>
<tr>
<td>EN 381-7</td>
<td></td>
<td>Requirements</td>
</tr>
<tr>
<td>EN 388</td>
<td>2003</td>
<td>--- “ --- Mechanical Risks</td>
</tr>
</tbody>
</table>
EN 407: 2004 "" Thermal Hazards
EN 420: General requirements for protective glove
EN 421: 1994 "" Radio-active contamination, radiation
EN 511: 1994 "" Cold

4.1.4 Testing of products

Ansell Healthcare started to test their products before standards were established. The testing equipment was expensive and smaller companies could not afford the investment. The testing, marking of the products and cost for more detailed information to the customers, have added a small portion to the price. In the beginning of the standardization negotiations most participants wanted to have their own private testing method approved.

The marking of the year of production on the gloves represented a problem with regard to the EU Commission and has been very costly for the companies, even more expensive than the tests. The PPE Directive required a mark with year of production indicated, as an example, “CE 96”. For the manufacturers the annual changes were expensive and a change had been requested at the EU Commission.

Ansell also cooperated with the certified body, Institute de Textile de France, ITF, now called IFTH, Lyon, which was the first notified testing body on the market for this industry. In this way Ansell Healthcare succeeded to have their products approved first of all companies in the industry. The company also conducted tests at their American facilities. The Swedish representative, at that time, of Ansell Healthcare, Mr. Anders Jonasson, pointed out that there was a shortage of testing capacity in Sweden. The waiting lines had been long and in some instances early competitors/actors had already conquered large parts of the market. In this connection Ansell Healthcare had been leading in the competition.

From 2006, the tests are conducted at the Belgian test institute, a few kilometers from the Ansell Healthcare offices. A testing agency has also been established in Germany and these agencies have established a network to improve the methods of testing. The cost of a simple, chemical test amounts to 500 Euros and for a more exotic chemical test up to 800 Euros. At IFTH, Lyon, it was confirmed that the cost of testing was a problem for the smaller companies. Also it was underlined at IFTH that the companies which did not participate in the development of standards were running a considerable risk
as they received no information of the standardization development and were delayed in the product development and marketing. The IFTH had received many requests from developing countries regarding testing of gloves. The participation by Ansell Healthcare in standardization had been a clear advantage for developing of the standards, also in the opinion of IFTH. This organization had participated in the standards development with many experts and regretted the difficulty to have additional industries join in the project. The experts had conducted different tests and presented their outlines to the standards. The discussions had sometimes been intense. The group leaders of the WGs and the most knowledgeable delegates had influenced the work. This standard project had been developed in three years which was considered a relatively short time. The time aspect had been important.

When the European standard had been agreed upon, Ansell Healthcare presented the new conditions in a booklet for their customers and stated:

“Our technical group has also prepared a comprehensive glove selection guide, based on tests performed in our own laboratories to the new EN standards. At time of writing, these tests have yet to be validated by the approved new certification bodies. However, as soon as the results can be officially confirmed, they will be published and included in our marking and packaging as required by the new legislation.”

The Ansell strategy was to take advantage of the new standards by being first movers and with early tests and publication of guidelines and other information to their customers they were successful in their efforts. In their Guide to the new standards it was also pointed out that

“Much of the relevant legislation remains to be voted on by Member States, and may therefore be liable to last minute changes. Nevertheless, as the leading supplier of protective gloves within the Community, and an active participant in the agreement of new pan European standards, Ansell Edmont Industrial can offer at least a useful introduction to the new regulations, and some guidance as to how this will affect you” (Guide to The New EN Standards on Hand Protection, Ansell Edmont; a Revised Guide to EN Standards for Gloves, Ansell Healthcare).
4.1.5 Competitive perspectives

The French company, MAPA, part of the Hutchinson Industrial group owned by Total S.A., French Petroleum Company, is a major competitor of Ansell. MAPA pointed especially to the necessity to arrive at mutual understandings of standardization with other companies in the PPE industry, regarding the basis of declaration concerning the responsibility of the manufacturer before the product is put on the market. The products are expected to be tested before presentation on the market. For some categories also an annual test is required. MAPA estimated the cost for a normal test to around 4,000 Euros. Also MAPA could see that small companies were disappearing from the market. MAPA had their own laboratory and had about 100 products on the market. MAPA participated actively in the standardization negotiations. American experts brought into the negotiations by Ansell Healthcare had left a positive contribution. Several MAPA products had been withdrawn from the market. The cost, as a consequence of standardization, had become too high. The testing on their part was done in Germany. It had been indicated at the end of the 1990s by the MAPA management that the cost of standardization must be reduced. At IFTH however, they were of the opinion that corporate managements had become more engaged in standardization.

MAPA were also concerned about the import into Europe of competing products from Asian countries as these products were not always tested. The import control is supposed to be done by the Customs. MAPA had some production facilities in Europe but it was difficult to make the units competitive. The MAPA representative, Mme Rodot, has participated in the standardization work for many years and had a leading position in the WG. She and others had found that many TC/WG chairmen concentrated on collecting papers for distribution at the meetings. In the group she was heading, the documents were assembled and distributed ahead of the meetings, leaving room for better discussions and rapid compromise and decisions. Some manufacturers were represented by employees from subsidiary companies in many countries. Those delegates were present to hear and learn what was going on. The work had been slow in the beginning but when “we” got to know each other in the standard network the compromises started to arrive more rapidly.

The strategy of MAPA was now to keep the cost as low as possible and by being present at the start of the work we will avoid product changes. We want to be the first to know, Mme Rodot stated. MAPA has a market share in France of approx. 30% and in Germany 5%. Standardization had not par-
particularly changed the market shares, Mme Rodot believed and “they were still in the same boat”. The production of gloves for mechanical use had been facilitated but for MAPA competition regarding leather gloves made in Malaysia had been stronger.

For the employers in the industries it was now important to become familiar with the two Directives, one regulating the protective aspects and one regarding the practical use of the gloves. As from July 1st, 1995, only products with the CE mark could be used. The TC/162/WG8 is still active since EN standards need revisions. In the standardization work in CEN/TC/162 WG8 no SME was represented.

It is of interest also to look at and have the perspective of another company in the PPE industry and active in standardization projects. The Swedish company Peltor is also owned by an American company, Aearo Inc. This American company has chosen not to interfere with Peltor in their European standardization, nor to make use of the CE mark in the United States. In connection with ISO TC/43 SC 41 standardization projects, both Peltor and Aearo are represented and meet occasionally. Mr. Jakobson from Peltor is leading the project and there is a strong ambition to connect the ISO project with the CEN process. In Europe great efforts have been made to develop the standards in question and Mr. Jakobson would like to see the standard also accepted on an international level. The Secretariat has been placed in Sweden and Mr. Björn Andersson of The Work Environment Authority, (Arbetsmiljöverket) has been the Chairman. Representatives of the users of the products have occasionally participated in the process.

It was emphasized also by Peltor that the testing in their opinion had become very expensive. Most of the testing was made in Finland and England for Peltor. The Swedish testing agencies had not been very active in acquisitions and had apparently specialized on other product areas. Mr. Jakobson pointed out that the standards in the Peltor area had been written in such a way that they were not leading the technical development in any particular direction, thus leaving room for a constructive innovations and neutral product development. It was an advantage to participate in the standardization process and to be informed of the development, especially when drastic changes could be forseen. But nowadays, this happened very rarely, according to Mr. Jakobson. Internally in Peltor Mr. Jakobson was available for advice and information to his colleagues on demand. No regular, internal meetings were arranged.
In the product area of Peltor a number of standard committees exist where Peltor has been or is represented:

SIS-TK Helmets
SIS-TK 396 Hearing protection
SIS-TK 110 Acoustics and noise
CEN/TC 159 Hearing protection (with
WG 1 finished with three standards established and replaced by)
WG 6 demands regarding passive hearing protection and testing fulfillment
WG 2 standards for active hearing protections; work related communication or e.g. radio

WG 6 and WG 2 are part of standard EN 352 Hearing protectors; parts 1 - 7 of the standard are finished, parts 8 and 11 are in the finishing process while 9, 10 and 12 are under preparation.

4.1.6 Company Standardization and marketing

Ansell Healthcare, MAPA and Peltor are all working within the PPE field but differences exist in their handling and use of standardization.

In Ansell Healthcare standardization was a base for product development and marketing. From the Technical Director’s office information and training was provided for the employees and seminars and conferences were arranged to inform distributors, sales personnel and customers on the use of Ansell’s products. In MAPA the role of standardization was also important, but more defensive and not applied to the same degree as with Ansell Healthcare.

In Peltor the person responsible for standardization primarily served as a reference and as an informer when new standards or changes in standards could be expected. Equally, when a technician needed information the standardizer served as source of information. Through their representative in the committees, however, Peltor influenced the standards and was kept informed of tendencies regarding product development.

At Ansell Europe the same marketing organization pattern, with only a few technical service and consultant employees in each country, was applied
all over Europe. Orders and deliveries were handled by the customers in direct communication with the European sales and marketing offices in Belgium.

Also Ansell Healthcare worked actively with lobbying, in particular concerning the development of methods of testing with the testing institutes. In European meetings sometimes six representatives from US Ansell Healthcare participated.

In a comparison between Ansell Healthcare, MAPA and Peltor along the lines of suggested by Baskin et. al. (1998) Ansell works with strategy and MAPA, Peltor have a tactical view. Based on standards, rules covering marking and sizes were established by Ansell. With the experience and testing equipment brought in from the U.S. by Ansell they had a definite advantage. They had the knowledge and were ahead of the competitors to put their standardized products on the market. They had their own testing equipment as required by the new standard and were first to address the testing agency established in Lyon. Ansell Healthcare has tested over 350 products externally and has more than 300 types of gloves on the market, some types in different models. They use the information on standards to reach the customers. In some projects Ansell Healthcare interacts and coordinates in networks with their competitor MAPA of France to make their presentations on equal level. Today it is more difficult to enter into the market as the cost of the testing is considerable, as expressed by many trade representatives. The Swedish company Peltor, also in the PPE area, has confirmed that they have withdrawn some of their minor products from the market because of the testing cost. They expected that some companies could disappear from the market. Peltor still had a positive attitude towards standardization and had generally participated in a Swedish subcommittee.

Participation in exhibitions, trade fairs, conferences etc were important parts of the marketing activities of Ansell Healthcare and of other players in the industry. A comparison may be made between Ansell Healthcare and Peltor, Värnamo, Sweden. Both are owned by American companies and active in the PPE industry, Peltor is a manufacturer of products for protection of head, (helmets) eyes and ears. The company has also participated in the standardization process since the New Approach was started. In order to be able to put a product on the market legally the product must have a CE mark. The PPE standard has been established to present a way to meet the demands of the Directive.

The process in the different groups had worked well, according to the Peltor spokesman. But the legal and administrative process had demanded a
very long time, almost as long as the technical part. The contacts with authorities have also increased, which experience is also supported by the important distributor Jerngruppen AB.

The discussions in the WG network have been constructive and the comments on the standard proposals equally of high quality. Sweden has for many years had the Secretariat of CEN TC 159 as well as the Chairmanship and in such a way we have been well prepared for the meetings, Mr. Björn Jacobsson of Peltor declared. Sweden has had a high quality level in the area of PPE for many years and could contribute with extensive experience. With their active participation Peltor was well informed of the standards development as well as on competitors’ products.

At the Düsseldorf Trade Fair for Safety Equipment in 1995, not less than 85 companies were presenting hand protection equipment. In interviews with European companies great concern was expressed regarding products from Asian countries without the required CE mark. They were equally negative regarding the Market Control supposed to be undertaken by the Customs authorities. Many violent discussions were heard between importers and European manufacturers regarding the marking on the products. The situation has during the years improved considerably in this regard, according to the industry.

The industry had found some problems with the Directives and appreciated the meetings with the competitors to arrive at the same level of interpretation and understanding.

Ansell Healthcare has a wide program covering many types of PPE gloves. The new entrants on the market mostly specialize on one or two types of gloves. Much work has been done to inform the market of the new rules. If somebody sells protective gloves which are self-certified, it has to be mentioned that the products are only for minimal risks. Also, manufacturers from outside Europe are forced to have a European representative.

With the detailed standardization, the demand by the customers and users for documentation has increased. The demand in the standards to have special marking with the CE logo on the gloves is an expensive procedure. These costs may even be higher than the testing, according to company sources.

In Sweden Ansell Healthcare had nine distributors, one of them Jerngruppen AB.

In the U.S. the market is used to the ASTM standards but marketing of the Ansell products in this country, as well as in Australia, is done with the CE mark. The sales personnel have been trained in this direction, and the knowledge of the European standards is becoming more familiar. The CE
mark is not a barrier, except for the cost, and it was not a trade policy defeat, in the opinion of Mr. Van Duren. “And we try to have a global view on standardization in our marketing“, he concluded. The ASTM standard in this domain was not as detailed as the CEN standard. Ansell Healthcare was also certified according to ISO 9000.

The international competition for PPE products has increased with e.g. Japanese companies appearing on the market. Ansell Healthcare is steadily developing and introducing new products on the market. The standards do not represent an obstacle in their product development but there is always an effort to exceed the standard and quality to maintain a leading position on the market.

The Ansell Healthcare market-standardization strategy has been to work massively with information and training, sometimes forcing competitors to leave the market, especially those with limited production and in high price brackets. All their products of Ansell Europe sold in Europe are according to standards.

At the distributor Jerngruppen AB it was emphasized that Ansell Healthcare for many years was ahead in their marketing in the perspective of standardization. Special catalogues, early information and testing had been prepared and conducted well in advance of others. The CE mark was applied in advertising and brochures. The product changes in the Ansell Healthcare program were less important than in products from other manufacturers. North Safety Products were like Ansell Healthcare active in the use of standards in their marketing.

The distributor, Jerngruppen AB, had selected a special person to follow and advice the internal and external activity in the perspective of the new standards. However, the development during the last few years has made Jerngruppen start their own factory for PPE products in the Far East and is presenting a line of products under their own name, well adapted to the standards prevailing. The established standards had facilitated entry into the market.

When a company has chosen an active role in standardization, like Ansell Healthcare, it is important to organize and to enter into strategic alliances to be able to better anticipate the future development. In this aspect Ansell has collaborated in interaction with MAPA and others in a network. There is a tendency that the products become more and more similar. Ansell Company has made considerable progress on the market as a result of their standardization strategy and the market shares have increased, although no figures would be provided.
A protective glove could perform several functions. It could be heat resistant and resistant to chemical products as well. David (1985) has observed the situation with a standard performing several functions but states that there is empirical evidence that standards generally perform one main function. This is in agreement with my analytic model.

Referring to the basic model, described in Chapter 2.1 (p. 26), I want to illustrate in figure 4.1.1 below the market position of Ansell Healthcare before and after standardization with the steps taken by the company.

Before the CEN standards were developed Ansell Healthcare (A) and their competing producers (C) were in the Field X. Ansell already at that time was above the average quality line (FC) for the industry and also near the line BE, critical line between no standard and a developed standard. Compared to the competition, Ansell has been the leading company in the industry leaving the competitors on a lower level. When the standards were published it was only a formality move for Ansell Healthcare to pass the line BE and enter field Y.

Compared to Ansell Healthcare (A) the competitors (C) from the beginning were in a lower position in the standard negotiations and had to make longer and extensive moves to pass the breaking line and position themselves inside Field Y. To some extent the competitors approached Ansell with regard to the position of the products.

For Ansell Healthcare it could be a strategic ambition to raise the quality substantially. In that way competitors would be forced to invest large amounts in product development and tests and also for some companies to exit from the industry. From the model it can be seen that Ansell Healthcare (A) and the Competitors (C) started in Competitive Field X where no standards existed and the qualities of the products could vary substantially. Ansell was already at that time close to the forthcoming CEN standards and ahead of competitors (C). When the standards were introduced (the BE -line) Ansell and Competitor both were required to move upwards along the quality line FC. Some Competitors had to move a longer distance than A and were satisfied to stay close to minimum line GC. Ansell has chosen a strategy with a higher quality profile. For some competitors, in the lower part of Field X, the standards requirements were too costly and the companies withdrew their products from the market.

In Field Y, the products from the different manufacturers become similar and so does also the price. Competitive parameters such as publicity, product documentation, delivery time, service, location and others become more important for Ansell in their marketing.
The comparatively long arrows A-A and C-C in the model indicate a substantial increase in improvement of the products in the industry. The products from the different manufacturers also become more and more similar. Also some manufacturers/competitors exit from the industry as a consequence of standardization. In the case of Ansell Healthcare (A) their initial position is quite close to line GB. With only a small movement Ansell could move into Field Y and announce that their product is in accordance with the standard requirements. It can be regarded as a strategic move to undertake this step. Thus, substantial pressure is put on competitors to follow the industry leader. Both Ansell and Competitor C are anxious to give a signal of quality in their products.

It should be noted in the model that one competitor C is present in field X but absent in field Y. The company may have been forced to exit because of sublevel standard of their products. It may also have chosen to move to a low-cost country. This latter alternative has been applied by Ansell Healthcare themselves by opening of production plants in China in Mexico, Malaysia and Sri Lanka. This implies that the model should be considered in a European perspective. From a theoretical point of view this development has been observed by Vernon (1979). Vernon states that when a standard has been established the document might facilitate the construction and movement of production plants to low cost countries.
4.2 Case two, Finnveden-Bulten AB

4.2.1 Company history, establishment and development (in the following “Bulten”)

The poem at the beginning of the study, “Lob deer Schreiber” (“Praise the screw”) gives an indication as to the importance and value of this device. It is often a small product and victim of many jokes but the production of quality fasteners requires extensive knowledge of material, construction and sophisticated machinery.

After the wheel, it is believed that the screw was the second most important invention by humanity, or perhaps by nature itself. Screw formed shells are abundant at sandy beaches where they with screw motions penetrate the ground. The history of the screw has been presented by Bramston in his study on Standardization and Technological Development, An Empirical Study of The Consumer Electronic Industry and the Mechanical Component
Industry (1996) and also by de Vries (1999) and Vu Tuan An (in Hesser et al. 2007).

During the research to find unique, representative and experienced companies in the area of standardization I visited the Swedish Material and Mechanical Standards Organization, SMS, (today SIS) Stockholm. This organization was established in 1919. It has since changed its name nine times. It was suggested by SMS to approach the corporation Bulten AB Hallstahammar, Sweden, manufacturers of thread forming and self drilling screws, bolt screws, nuts and custom designed special fasteners.

The Company had been deeply involved in the development of standards for fasteners and related products on a worldwide basis, particularly ISO. With the development of the European market and creation of CEN the engagement in standardization was even more extended.

A large number of books and articles have accounted for the technical development of fasteners which represent an important part of the international industrial history. Fasteners have played a leading role in technical development. The focus of this case study is to regard corporate history, activities and standardization together. In addition to the study of literature, trade journals, corporate documents etc, interviews have been made with the staff at Bulten as well as with representatives of international trade organizations in the Bulten product area. Competitors in Germany and Sweden have also been interviewed (Appendix 2).

An extensive interview was made with Mr. Charles J. Wilson, Director of Engineering, Industrial Fasteners Institute in Cleveland. He also provided substantial written information (Wilson, 1971; IFI 1973; Mechanical Engineering, July 1986) He resembled strongly in the conviction of the importance of standardization Mr. Carl Gösta Dock, ISO/TC1 Chairman in 1985, and colleague. Wit Mr. Ingvar Isakson, Bulten, and Mr. Wilson I have during the last years remained in touch as well as with Mr. Klas Lindquist, Secretary of the Swedish SIS/TK 103 Fasteners.

The participation in the establishing of an international thread standard can be seen as part of the total strategy of a company in the development of its industrial context. However, the involvement of Bulten and the relevant Swedish Standardization Secretariats ISO/ TC 1, SIS TK/103 (SMS TK 8) SIS TK 102 (SMS TK 37) in the establishing of the required international thread and fastener standard systems is unique, both with regard to results achieved, consequences and the enhancement of Sweden as a mediator country. The long chain of involvement of the company and Bulten executives and staff in this task is unique.
The history of Bulten is in this context of particular interest and their experiences most valuable. The company has since its start worked strategically on different levels of standardization and developed a mix of strategic elements which have varied from time to time. It has actively taken part in national and international standards organizations as well as consciously tried to exploit new standards. Bulten has from the 1970s and 1980s been highly affected by the consequences of standardization in the form of a growing inflow of low cost mass produced standardized products from low cost countries and been forced to find strategies to cope with this threat.

The establishing and development of Bulten is closely related to the industrial development of Sweden, in particular the railroad system, which started in the mid-19th century. The import of fasteners like screws, nuts and bolts required to locomotives, rail cars, tracks and bridges had increased rapidly. No independent manufacturer of these products existed in Sweden and every mechanical shop either imported or manufactured the fasteners according to their own needs and ideas.

At the initiative of two engineers, Messrs. Nils Peterson and Gottfrid Rystedt production was started in 1873 in Bultfabriks Aktiebolaget. Financial manager was Mr. Herman Friedländer (Bultfabriks Aktiebolaget Hallstahammar Genom Sjuttiofem år 1873 - 1948). The site selected was Hallstahammar in the Province of Vestmanland, where an old industrial site offered the supply of ground and the water energy required. Mr. Nils Peterson became the first President of the company. The first machines ordered came from England. At the end of 1873, 17 men were employed producing railroad screws, nuts and bolts. Bulten soon became an important employer in Hallstahammar and in 1897 the company had 272 employees.

During the depression of the 1920s Bulten faced an increased competition from foreign manufacturers. During a study tour in 1925 to the United States the President of Bulten at that time, Mr. Hans von Kantzow discovered a number of new machines with a production capacity tenfold as high as those in use at Bulten.

The strategic decision was taken to invest in these new machines and to develop new markets outside Sweden. Even if the difficult years also around 1930 were strongly felt by Bulten, the established international network with agents in most European countries, South America and India and subsidiary companies in many countries allowed the company to consolidate and expand. In 1933 Bulten merged with Eskilstuna Fabriks AB, a manufacturer of chains. An important part in the history of Bulten was the establishing of the subsidiary company Kanthal AB. Based on inventions in the 1930s by Mr.
Hans von Kanzow, Kanthal AB, became a global leader in the production of heat resistant material for electrical heat generation. In 1943 Ramnäs Bruk AB with their production of lifting and anchor chains was acquired by Bulten.

The technical development which followed during and after the First World War created an era of mass production, in particular with regard to the development of the automotive industry. To remain competitive in production it became necessary to work with interchangeability and to provide for spare parts availability.

Based on opinions of industry representatives the technology and knowledge to make a fastener would be placed as 5 or 6 on a scale from 1 to 10. 10 would represent a nuclear plant. It can equally be said that the screw product mature industry. But new products as well as new manufacturing machinery and fastener needs do appear regularly. Some products are withdrawn which is reflected in the regular revisions of the standards.

4.2.2 Acquisitions and changes in ownership

After the Second World War the Bulten expansion continued. In 1947 Åshammars Bruk AB, manufacturer of fasteners in stainless steel, was acquired, and in 1967 another production plant was established by Bulten in Kalix, in Northern Sweden. Another plant and warehousing facility was acquired in Svartå, Sweden.

Although Bulten had a wide international network, international trade with fastening elements was limited in the years 1950 – 1965. Home markets dominated for the producers in the individual countries. Bulten at that period had 70 - 80% of the Swedish market. The major competitor to Bulten was Göteborgs Bult AB, which ceased production in the mid 1970s. The business activity in Göteborgs Bult AB continued as a trading company.

In 1972 the Bulten-Kanthal group had approx. 3.500 employees, of which approx. 2.200 within Bulten in Sweden and 350 in subsidiaries in foreign countries where an important expansion had been undertaken. At that period, however, international competition became stronger and markets were lost rapidly. Not only Bulten was suffering but the situation was similar in Germany and England. Standard fastener manufacturing was almost wiped out in those two countries. Also in the United States the industry was strongly affected. Certain barriers or obstacles to trade were established in the U.S.A., i.e. through quality control, marking of origin etc. A new generation of production machinery was developed.
The Bulten-Kanthal group was split up in the beginning of 1980s. The Kanthal division was sold. Internationally, Japanese industries had during the 1970s concentrated on nuts. Also industries in low cost countries, including Italy, had started to manufacture fastener products. Manufacturers in different countries had previously lived safely on their home markets. As a consequence, in the United States, France, Germany, Great Britain and Sweden a number of industries now went out of business.

Based on established international standards and advanced technology and machinery, Japanese competitors almost conquered the markets of the western world, especially for nuts and small dimension screws. Bulten in 1970s also sent representatives to Japan to study the situation. The Bulten Company applied the same strategy and acquired similar nut making machinery as was used by the Japanese. It was soon realized that the competition still was too strong. On renewed visits to South East Asia it appeared that Japanese machines had been acquired also by low cost countries or moved by Japanese owners to areas with a low cost structure. Production was placed in shelters with gravel floors and no walls.

To remain an actor on the low cost product market Bulten started importing and marketing standard fasteners from South East Asia and from other countries with lower production cost. Bulten also in 1980-81 acquired the major domestic trading competitor, Göteborgs Bult AB.

The competition still dominated the market for standard products. Within Bulten, the strategic question of concentrating on *standard* products or on *specialized* products had been discussed at great length. To the representatives of Bulten participating in international standardization it was evident that foreign competition, partly through standardization, would have severe consequences on the company. Top management was informed of the expected development but the steps taken were not drastic enough for adaption to the new conditions (Bulten, Protocol: Strategic plan meeting 860407-08).

In Competitive Strategy (1980) Porter quotes a case (Illinois Tool Works; Manufacturers of fasteners, p. 57) in which he maintains that this company, directing itself to the fastener special market, has developed special products with a view to make the customers dependent on deliveries only from this firm. In Europe the market for special products was created by the users and developed by the construction engineers.

Through standards, product information, knowledge and competence could be easily transferred which facilitated entry into the market. Bulten was unable to stay on the market for standard products. Also from East Germany and Italy competition became severe.
In the beginning of 1991 a major reconstruction was undertaken at Bul-ten. Overnight, business activity was stopped. One week later the activity was restarted and reorganized by the old owners and the new company, Bul-ten Automotive AB, was established. The most profitable products and the best machinery were kept and the business was oriented towards specialized fastener products, in particular to the automotive industry. Of approx. 850 employees 350 were reemployed.

Mr. Anders Karlsson from Göteborgs Bult AB became President of Bul-ten Automotive AB in 1991 and the reconstruction was finished in 1992.

In 1994 Bulten was acquired by Errece AB from the Lindén-group and strengthened its profile as a manufacturer of fastening elements as screws, nuts and bolts in particular for the automotive industry. The company was listed on the Stockholm stock exchange and was operating at a good profit. The company still had manufacturing plants in Hallstahammar, Ås hammar, Kalix and Svartå in Sweden. Another manufacturing plant was acquired in 1995 in Germany. In 1996 Bulten established Micro Fasteners Co. with a factory in Beijing for the worldwide supply of products for the electric and electronic industries. Another manufacturing plant was acquired in Poland. The main customers, among approximately 350, were Saab, Scania, Opel, Volvo and Ford. Bulten at that time was present on some 40 markets in the world.

Bulten and their sub suppliers are certified according to ISO 9000, 9001, automotive quality system QS 9000 and Ford Q1. According to Mr. Ingvar Isaksson of Bulten and others, the quality demands from the automotive industry exceed the demands required for the approval of ISO 9000.

In September, 2000, Finnveden AB, through their subsidiary company, Finnveden Fasteners AB, offered to acquire Bulten (Finnveden, 2000). The major owners of Bulten, Atle AB and Lindéngruppen AB, took a favorable view of the offer. The acquisition was completed and Bulten was withdrawn from the listing of the OM Stockholm Stock Exchange’s O-list.

In the announcement of the offer, the President of Finnveden stressed the position of the new Corporation as a leading supplier to the international engineering industry, primarily to the European automotive industry (Finn-veden 2000). As a result of the acquisition of Bulten, Finnveden would become one of Europe’s largest fastening systems companies with sales of 4,500 SEKM and approx. 3,500 employees. The presence of Bulten in several countries, including Asia, would strengthen Finnveden’s international organization, according to the President. The Swedish market would repre-
sent approx. 50% of the combined sales. The head office of Finnveden was for strategic reasons moved from Värnamo to Gothenburg.

In 2006, under the ownership of Finnveden, listed on the Stockholm stock exchange, Bulten had a total of 550 employees in Sweden, Germany, France and England. In 2008 Bulten had 870 persons employed within plants and sales offices in Sweden, Germany, Great Britain, Poland and China. The annual sales amount to 1.500 SEKM.

The economic development pattern of Bulten has followed to a large extent the economic development of the society in general with turns up and down, mostly as a consequence of changes in the pattern of world economy, trade, advancement of new industrial regions and development of technology and particular standards. Through all these changes in ownership, economic turmoil and success Bulten representatives were involved and leading the international standardization of SMS, SIS, ISO and CEN, mainly with ambition to improve manufacturing methods and to facilitate the growing international trade. The Presidents or the Chief Engineers represented their companies in this special function.

4.2.3 Industry structure

Bulten was acquired in the year 2000 by Finnveden AB/Finnveden Fasteners AB. The ambition was to strengthen Finnveden’s position as a leading supplier to the international engineering market, primarily the automotive industry. In view of Bulten’s vast international operations it was believed that the acquisition would boost the international operations of Finnveden. Bulten was the dominating producer of fasteners in Sweden. At the time Bulten was well established and enjoyed a strong position on the Swedish and international markets.

The competition to Bulten on the Swedish market was offered by some ten to fifteen importers with products from Europe as well as from Asian countries. In Germany about 120 firms were in the industry in 1978 which was reduced to 90 manufacturers active on the market in 1994. In 2006 the list of producers in Germany contains 60 companies with Kamax as the largest manufacturer with approx. 1.500 employees. The German market had developed in a similar pattern as the Swedish, with a number of small companies disappearing. German companies had acquired competitors abroad and foreign companies, (including Swedish, Bulten and American) had acquired fastener companies in Germany. Some examples of joint ventures with other European countries had also been noted. The production was
more and more devoted to special products while standard products were imported. Deliveries to the automotive industry, including sub suppliers had become more important. According to trade organizations there was also a tendency that top management was less interested in standardization.

4.2.4 The development of international thread standards

Society of Swedish Engineers 1884

It is of particular interest to note, that Bulten already in 1884, eleven years after establishment had taken the initiative to standardize nuts and bolts. In a letter in 1884 by one of the founders of Bulten, Mr. Nils Pettersson, to the Society of Engineers, proposed standardization of nuts and bolts. In a meeting of the Society of Swedish Engineers in October of 1884 it was for the first time decided to make standardization an issue on their agenda. Two years later a plan for standardization of nuts and bolts was approved.

(Bultfabriks Aktiebolaget Hallstahammar genom sjuttiofem år; 1948 p. 22).

Association of Mechanical Industry 1919

At the end of the 19th century and in conjunction with the development of the railways, fastener industry expanded rapidly.

Another period of strong growth followed with the need of machinery elements for the efforts connected with the First World War 1914-1918. This was further accentuated by the development of the automotive industry and mass production of machinery elements around 1925-1940. In Sweden, the Sveriges Maskinindustriförening (Association of Machinery Industry) in 1919 appointed a Standardization Commission to give particular priority to machinery elements, including nuts and bolts. The main ambition was to reduce the manufacturing cost but also to secure compatibility between the elements from different suppliers and to make spare parts easily available.

4.2.5 The Whitworth Thread

Through the invention of Sir Henry Maudslay of the lathe with a guiding spindle it had been possible to manufacture threaded products with identical profiles and in that way, interchangeable. It should be remembered however, that many machine manufacturers wanted to maintain their own thread system to connect more closely their customers for supply of spare parts. The
practice of special threads still exists in some areas of products, i.e. for sewing machines. In England, Maudsley had a student employee by the name of Joseph Whitworth. In 1841, Sir Joseph Whitworth, had presented his booklet “Paper on a Uniform System of Screw Threads”, leading to one single thread system, the so called Whitworth-thread. This was the first standard developed on national level and it created the basis for the most important standard in modern times (Teknik & Standard nr 3, 1987; SAC ISO/TC1 N 529; The review of ISO/TC1 History). It should be remarked that other systems existed at the same time although Whitworth was the oldest. The thread angle was established with a profile of 55 degrees. In France a system (SI) with 60 degrees was developed by Sauvage. It was the only metric system, while the others were in inch threads. In a chaotic situation Whitworth assembled and analyzed all existing systems of threads and laid the basis for a national thread system in his country (Teknik och Standard 1986). His proposal was approved the same year, 1841, by The Institution of Civil Engineering. Substantial savings were achieved through his so called W-system. It specified a thread profile in 55 degree thread angle and rounded top and bottom as well as two series of diameter/pitch combinations. At that time England had a dominating position in trade and the W-system was spread to many countries with all dimensions specified in inch. The European metric screw system, developed by Sauvage in France was different. In that way the system was not interchangeable with the original W-system.

In the United States the inch-thread was introduced by Sellers, with, however, several deviations. It was named ASME (American Society of Mechanical Engineers). The major change later undertaken was a change in thread profile angle from 55 to 60 degrees. This meant practically the end of the Whitworth W-thread in the fastening system.

In Germany, the DIN 13, also called the M-standard, was introduced in 1917 and contributed strongly to the development and confusion. It was adopted in Sweden, Spain and Latin America. France stayed with their own system, SI. Many different systems existed and the growing international trade was hampered.

### 4.2.6 The M- (Metric) Thread accepted

In the history of modern standardization the year 1898 is of particular importance. In a conference in Zürich that year the base profile for the so called M-thread was accepted. It was the first step towards a thread system acceptable to everybody. It laid the ground for screws and nuts to fit together,
regardless of the source of supply. If a screw broke down it could be replaced anywhere in the world by a product with an identical thread (Fogningsteknik 6/95). Earlier the British Standard Whitworth (BSW) had been established in 1841 and the American Standard Screw Threads (previously the Sellers Thread) in 1864.

Through the Zürich agreement it had been established that it was possible to reach an accord in important technical matters nationally and internationally. Industry standard became a common concern to groups of industries but also to the individual company as a means to develop their international marketing. The prometric countries of France, Germany, Italy and Russia had participated in the Zürich conference.

In 1889 France, Germany, Italy and Russia tried to establish a working group in order to present a metric thread. This effort failed, however, and the French SI Thread (System International) had no success. It was evident that tensions between these powers were present also in the area of standardization. From 1900 standardization became an important issue internationally with the creation of National Standardization Organizations, NSOs, in most industrialized countries, including Sweden. In Britain, British Standards Institute was established in 1901 and in Germany the mechanical industry assembled at the same time to bring order in a "tragic threads system". In The Netherlands a standardization organization was established in 1916 and in Germany DIN was established in 1917. (In 2008 some 26,000 experts were engaged in DIN projects; Similar organizations were established in France and the United States in 1918.

From ten more extensive systems, and several minor examples, agreement was reached to follow two systems; one based on the Whitworth W-inch system and one based on the Metric thread, the M-system, as established in Zürich.

One of the major driving forces in Sweden was Bulten with Technical Director, Hjalmar Barr, 1919 – 1940. Mr. Barr was Vice Chairman and later Chairman of the Technical Head Committee for Standardization of the Association of Swedish Mechanical Industries (75 år med SMS).

Since Bulten was active in the industry of threaded fasteners, the question of standards was important to the company. Standardization efforts for threads actually started 1884 and continued during the early period of ISA. In the Bulten Product Catalogue of 1919, handmade and machine made nuts were offered both with Whitworth standard and Swedish standard. Already at that time Bulten were pioneers in their area of products and a Swedish
standard published the same year was rapidly used by Bulten in their sales catalogue.

4.2.7 International Standards Association, ISA, 1926 – 1942

A turning point in this chaotic situation with different thread systems occurred in 1926 with the establishment of the International Standards Association, ISA. The national standardization organizations from 16 European countries plus Japan and the U.S.A. became members. Sweden joined the group in 1928 and in the beginning of the activity the number of participating countries varied from one meeting to another. The work of ISA was conducted in technical committees. The Swedish delegation, having impressed on the members at earlier meetings, was entrusted with the Secretariats for ball bearings, diametric norms and widths across flats (75 år med SMS p. 29).

England was awarded the Whitworth thread system, screws, nuts and bolts. ISA functioned until the Second World War broke out. The last Bulletin from ISA dealt with the important subject of tolerance systems, of special interest to Mr. Hilding Törnebohm, SKF. He later became Chairman of ISO/TC1. Screw threads were the basic elements of manufacturing industry and applied in practically every branch of industry. Two committees ISA/TC1 and ISA/TC2 were appointed, one for metric screw threads and one for inch screws. ISA was active until 1942.

4.2.8 International Standards Organization, ISO, 1946

After the Second World War the ambition of international, worldwide standards was renewed and International Standards Organization, ISO, was established in 1946 in London. Its predecessor, International Standards Association, ISA, established in 1926, had faded away during the Second World War. During its existence, however, standardization of fasteners had begun with a perspective of both a metric and an inch system.

After another two years ISO was open to all countries, also to those countries defeated during the war. Its first technical committee ISO/TC 1 was established in 1946 in order to develop an international thread standard.

Committee No. 2 ISO/TC2 got the corresponding task of developing a standard for fastening elements and their mechanical properties and the Secretariat given to DIN. For every committee a secretarial country was ap-
pointed and Sweden was awarded the Secretariat for ISO/TC1. The Chairman was Dr. Hilding Törnebohm, SKF. Working with Dr. Törnebohm in his Committee was Mr. Alfred Hoppe, also from SKF and a language specialist. Mr Törnebohm had a special corporate interest in thread taps and in this instance an international thread standard was very important, as well as the limitation of the number of varieties. Mr. Törnebohm and Mr. Hoppe were responsible for the Secretariat in Sweden during many years. In the opinion of Mr. Dock these gentlemen developed the good reputation of Sweden as negotiators and mediators and bridge builders. Dr. Törnebohm was also chairman of the committee for tolerances for bare axles and holes, initially a Swedish project which became an ISO standard. From Bulten, Mr. Hjalmar Barr, Technical Director, had participated in the SMS Technical Head Committee already in 1931. (Standardiseringen i Sverige 1922-1992, pp. 64-5).

4.2.9 Review of History of ISO/TC1

ISO Stage One 1947 – 1958, – Preliminary Stage

To describe the work and development of ISO/TC1 the new Secretariat of Standards Association of China (SAC) has prepared a review of the development in six stages.

As threads were considered very important, the first technical committee, ISO/TC1 was again set for threads, metric as well as inch screws.

In the first meeting of ISO in London in 1946-47, Dr. Törnebohm of SKF, Sweden, proposed in his Foreword to the meeting, that only one committee be entrusted with the thread question. His system, the T-System, was never adopted although it would, in the American view, have constituted major simplifications and the development of a single world standard. It was however not given adequate consideration and work internationally proceeded historically with inch countries following one path and metric another. In 1949 the ABC countries (America, Britain and Canada) reached an agreement with due publication of the Unified Screw, UN Thread Standard. During the 1950’s the metric countries continued their own development work. In 1958 the UN thread was ready to be adopted as ISO standard in inch. When Mr. Allan Roslund of Bulten became chairman of ISO/TC1 in 1961 there existed thirteen different thread systems in the world. At his retirement ISO had decided on one metric system,

It was primarily not a technical question, rather a diplomatic matter, Mr. Roslund declared at the same time. The great problem was that screws from
the different systems were not compatible with each other (Teknik & Standard nr 3, 1987).

To meet the market demands, ISO/TC1 decided to prepare the standards of both metric and inch screw threads separately. The “S” was used for small screws. The basic standard systems of Screw threads, which are used today, were set up.

Mr. Gösta Dock, Bulten, had started his work with standardization in 1950-51. At that time a number of large export countries, among others Canada, England the United States presented their demands for a new system regarding threaded fasteners. It had been especially evident during the World War II that the interchange ability between nuts and bolts had been a great international problem. It was estimated that the U.S. spent billions of dollars during the Second World War simply because the allied nations did not have the same screw thread system thus preventing interchange ability of parts (Dock). The standardization organizations in the United States, Canada and Great Britain were ordered in 1945 to develop a new system for screw threads. The “Unified System”, applicable for threads, measurement of threads, screws, nuts and bolts etc was established at a conference in Ottawa. It was requested that this system should be applied on Swedish machines exported to these countries. It was demanded also by some major Swedish industries like ASEA, Ericsson, and Volvo that (SMS)/SIS should adapt this system. Thus, Sweden, for inch threaded products got a new standard which replaced the old Whitworth-thread. A considerable advantage at the exchange of system was that the UN- and W-threads in principle were interchangeable with each other. For a period many industries in Sweden, like Volvo, worked with the inch system.

At the same time, proposals to modernize the metric system were developed to take advantage of the latest technology. The need for revision was simultaneously surfacing in both inch and metric countries. Thus for a long period, however, work within ISO was conducted along two lines, metric and inch, which were both accepted. In view of the strong economic interests it was not assumed that the two systems could be merged, especially not in the Anglo-Saxon countries, with U.K. leading and with North America following. Some items were however shared through the international application of the Unified, UN, threads and the metric threads. There was also a mutual profile on the threads, the ISO-profile, with point angel of 60 degrees.
ISO Stage Two 1959 – 1970, Three kinds of Thread, M, UN and S

An important stage, number two, critical in terms of value at stake and progress in standardization occurred 1959 to 1970. From a number of standards, one metric system of standards and one in inches had been established in addition to a standard for Small crews. Thus the basic standard systems used today were on the way.

ISO Stage Three 1971-1983, Basic standards ready

It is maintained that this was the most difficult period in the history of ISO/TC1 (Threads ISO/TC2 Fasteners). In the beginning of the 1980s ISO after years of negotiations, was at the end of Standardization Stage three, and the standard system for M and UN screw thread were established. This was a milestone for the standardization of threads. Bulten was among the first to manufacture and launch on the market the new ISO standard fasteners. This was a strategic decision and not without risks. Through the good reputation of Bulten the customers followed their move to adopt the new ISO standard, among others, Volvo AB. This meant a change from the DIN standard which had been in extensive use for many years. It had taken almost 40 years to arrive at one international standard which was accepted by the dominating industrial countries. It was a standard that should be applied on all metric hexagon head screws and nuts. The Swedish secretariat had been open to German cooperation and the German contribution, through DIN, had been most fruitful (Dock, Isaksson).

When the new ISO standard was agreed upon, Bulten was leading the marketing and was most successful with the new ISO standard system. The company had been heavily engaged in the development of the standard. In the negotiations Bulten and their executives had been exposed to great pressure from the United States and the major European countries on the one hand as well (figure 4.2.2 p. 82).

Several reasons had contributed to the long period to arrive at a positive result. In the U.S.A. there existed on their 3/8 – screw a key width of 9/16, or 14, 3 mm. It was requested by ISO that this should be increased to 17 mm when transferring to M 10 nuts. This would require more material and space, according to the U.S. representatives. Sweden agreed, but Germany objected strongly, even if they had the same key width on screws for their own automobile industry. After a hard and long battle a compromise was reached at 16 mm but hard feelings had been aroused and lasted for years.
In the beginning of this period the U.S. presented a proposal to the world to make a soft conversion of the system of inch screw threads into a metric screw system keeping inch dimensions and mechanical properties but expressed in rounded metric units. The system was called “Optimum Metric Fastener System” (OMFS). A long and hard battle threatened to destroy the results of the work so far achieved of ISO/TC1 according to European industries and standardizers. This matter will be observed further down the text.

**ISO 1984 – 1999, Stage four; Revisions**

The main work in this period was to revise the existing standards. For six of the standards the revision demanded ten years of work.

**ISO 2000 – 2004, Stage five; Four years of Standby**

After the revision of certain standards and approval of other, new standards there were no work items of ISO/TC1. At the same time the economic allocations for the SIS Secretariat of ISO/TC1 and ISO/TC1/SC 2 were stopped. In 2000 SIS had to inform ISO about their wish to relinquish these secretariats. Compulsory

**ISO 2004- , Stage six; ISO/TC1 works again**

China applied for the secretariat and in 2004. ISO/TMB (Technical Management Board) decided to locate the secretariat at SAC. ISO/TC1 works again. (SAC; The Review of ISO/TC 1’s History; ISO/TC1 N 529)

**4.2.10 Standardization activity – Bulten participation**

On the initiative of Bulten, The Society of Swedish Engineers already in 1884 presented a standard for nuts and bolts. SMS issued their first standards regarding screws and bolts in 1920. Since then the work with standardization of threads and fasteners has continued with varying intensity, but always with Bulten participation. Occasionally, new products demanded new standards and with the technical development, revisions of existing standards have been required (Lindqvist, 1994).

An outline and design for a Swedish strategy for fastener standardization was presented in 1994 by Mr. Klas Lindqvist, Secretary of SMS/ today SIS (Projektbeskrivning SMS TK8; project nr 50-29-112). It is underlined that the technical development will present new demands and challenges for an active standardization policy. Standardization so far, had been conducted on
national level, as well as on international, global level with a strong Swedish contribution.

In that way the international standards were easily transposed into Swedish standards. The activity within CEN had gained force and had reached a high level which had also influenced the work within ISO, particularly with regard to regular revisions. This has since then been the view of Sweden to work with CEN and ISO together as much as possible.

The strategy declared that Sweden should participate and influence the European standardization work regarding fasteners and that the Swedish aspects to the largest degree possible should be included in the International, ISO, and European. CEN, standards. Due consideration should also be given to avoid the establishing of barriers to trade.

Sweden should also carry the responsibility for the Secretariat for ISO/TC 2 SC 1/WG 7 for stainless steel fasteners as well as to develop Swedish standards for other types of fasteners. The international duties were connected to ISO/TC2 and the European to CEN TC/185 Mechanical fasteners.

It was declared that the Swedish international engagements should be fulfilled through active participation by Swedish experts in the different WGs appointed by ISO/TC 2 and CEN/TC 185 and subcommittees. The Swedish comments to international and European proposals were collected by TK 8. The international results were transferred into Swedish standards after approval by TK 8 (Lindqvist, 1994). Mr. Isaksson of Bulten was the Chairman of TK 8 1985-2002 and was succeeded by Mr. Kurt Andersson of Bulten. In view of the technical development the need of competence, the work is today in the hands of specialists, although the presence and interest of top management is frequently demanded. Also, the standards developed were almost exclusively on national level while today standards to 96 - 98% are related to international applications.

Bulten has been active and promoting official standardization from the very beginning of standardization efforts. In today’s perspective, standardization was essential for the survival of the corporation. Bulten has actively participated in committees together with competitors and customers and standardization experts from SMS/SIS. At the same time the external ambition of standardized products is reflected in standardized activities within the operations of the company. It should be noted that standardized activities do not always demand standardized products. The same view applies to standardized products as they do not always demand standardized activities.
Starting with the demands and involvement by the co-founder of Bulten Mr. Nils Petersson in 1884, Bulten company has had a unique engagement in official standardization. In the beginning their strategy aimed to arrive at more rational production methods. As standardization became more sophisticated other elements of commercial character became important, such as selection and application of best standards and speed in its presentation and use on the market. In addition to Chief Engineer/Technical Director, Hjalmar Barr who participated in the first meeting with SMS in 1919, following representatives from Bulten (and SKF) have been or are still engaged in the work of ISO/CEN/SMS/SIS Thread/ Fastener Committees:

Hj. Barr, Bulten, Technical Director, Vice Chairman,
Chairman of SMS Standing Committee. 1919 - 1940
(Tech. Dr. Hilding Törnebohm, SKF
Chairman, ISO/TC1 and 1947 - 1953
President ISO (1953 - 1956)
John Ingeström, Bulten and Fabriksbolaget,
Chairman, SMS Standing Committee 1959 - 1965
Allan Roslund, Bulten, Chairman, ISO/TC1 1961 - 1987
Carl-Gösta Dock, Bulten,
Chairman, SMS Standing Committee 1975 - 1991
Chairman, ISO/TC1 1987 - 1997
Chairman SMS/TK37 1975 - 1985
Ingvar Isaksson, Bulten,
Chairman, SMS/TK 8, 1985 -2002
Member of SMS/TK8 and SIS/102 1974 - (2009)
Chairman ISO/TC1 1997 – 2002
Swedish Delegate to ISO/TC2 1974 - (2009)
Bertil Hahre,
Swedish Delegate to ISO/TC1 1987 - 2000
Chairman SMS/TK37 and SIS/TK102 1985 - (2009)
Klas Lindqvist, SMS/SIS, is the Secretary of SMS/TK 8, SIS/TK 103 and SMS/TK 37, SIS/TK 102 from 1990 of the Swedish National Standards Committee of ISO/TC2. He succeeded in many respects his father, Mr. Magnus Lindqvist, who joined SMS in 1941-42 and retired in 1987. Mr. Klas Lindqvists holds the Secretariat of ISO/TC 2/SC 1 WG 7 which has had a Swedish convenor over all years since the start of the group. It should be noted that the engagements of the executives of Bulten and the Swedish Secretariat have been long lasting. This has created stability in the standards work as well as in the operations of the company whenever standards would be on the agenda.

4.2.11 International implications involving standards

In the automotive industry the initial thread grade was not fine enough and another system was accordingly established, the SAE thread (Society of Automotive Engineers). The two systems developed became nationally known as ANC and ANF, (American National Coarse and American National Fine, respectively) A few years later the two different systems became united under the title of USST, United States Standard Thread.

The situation had become rather chaotic as the interchange ability of the fastening elements had been practically eliminated. This was especially harmful to the development of small industries, but also to the automotive industries with production in many countries. The problems became particularly evident in connection with the two world wars. During the Second World War an order was issued by the War Cabinet in London that a mutual thread and screw system had to be developed. This was achieved towards the end of the war and was titled the Unified System. It was basically copied from the ANC and ANF system but was used extensively. The German industry, the leading proponents of the Metric System, had not yet recovered from destruction during the First World War and the inch system dominated the industrial stage. As a consequence the UN- System, with UNC = Unified Coarse, UNF = Unified Fine, was also adopted in Sweden at the demand of the major export industries. In the following process endeavouring to reach an agreement on diameter/pitch combinations the negotiations 1958 in Lis-
bon ended in a conflict between the major nations. For dimensions below 6 mm an agreement could not be reached and a decision was taken to work with one inch system and one metric system. A world standard for products with M-thread was not established until 1967.

Bulten started to manufacture “Unified threaded” products. Also, Bulten had bought their machinery in the U.K. and in the U.S. why most of the dimensions were expressed according to the inch system. Mr. Dock pointed out, that in his opinion, the more sophisticated a product may be, the stronger is the demand for standards. It was in the interest of the manufacturer to have his product as simple as possible to reduce the price of his final product. As an example, Mr. Dock mentioned the small electrical motors from ABB (ASEA) or the modul standardization of Scania which gave considerable profits in rationalization.

In his Paper presented in 1971 at the University of Wisconsin, Mr. Charles Wilson, Technical Director of IFI, Cleveland, and Secretary of the OMFS Committee referred to the Swedish initiative from 1947-48 and to the visit to Sweden, France and Germany by an American delegation, and concluded that “it is truly the most significant engineering project of the fastener manufacturing industry in the twentieth century“.

The British influence with the inch-system was strongly felt during many years as part of the Industrial Revolution, considered by many to have had its origin in Great Britain. The rolled round iron came from Britain and the rolling tracks were made in inch measurement. This is where the Maudsley lathe with the lead helix was developed. The lead of the spindle was expressed in a certain number of threads per inch. Iron bars in inch dimensions plus thread rising in a number of threads per inch give an inch thread. Later when the English industry exported their rolling mills and lathes to the European continent the inch thread became the ruling system.

In 1963 the U.S. Department of Defence and West German Defence Administration began discussions and negotiations regarding the production of a Main Battle Tank to serve as a major vehicle for NATO. The negotiations stalled over the issue of use of DIN standards for metric screw standards or the Unified. The problem was resolved in May 1965 by the use of metric fasteners in those assemblies and subassemblies produced in Germany, and inch fasteners in those assemblies produced in the U.S. Interfaces would be metric. It was a political rather than a technical practice which saved the project. At about the same time the Industrial Fastener Institute served as an early warning system to its American members and advised many industries
to begin thinking of solutions for tomorrow’s problems with regard to the metric system.

In 1964 another historic meeting, the ISO 6th General Session, was held in New Delhi, India. ISO/TC1 had earlier agreed on the screw profile and selected a full range of pitch-diameter combinations in both inch and metric measurement. After years of head stemming an agreement was now reached on formulation for all tolerances and allowances, one in metric and one in inches. The ISO Inch Screw Thread system was identical to the Unified System, already standard in the U.S. The ISO Metric Screw Thread System was new and gave the metric countries a possibility to focus on a single world metric screw thread standard. It was established that ISO had become the vehicle through which this was to be accomplished. Bulten took strategic advantage of this decision to which Messrs. Dock and Isaksson had contributed to a large degree. Mr. Isaksson had joined Bulten in 1962 and worked jointly with Mr. Dock. According to competitors they made a most efficient campaign to introduce the ISO standard in Sweden as a segment for Bulten. Wherever you are in standardization, the more important it is to consider the threads and fastener elements, Mr. Isaksson stated, and referred to the low number (ISO 68-1) of the ISO standard for these products. Later they were regarded as “gravel”, maybe with a low status, certainly by the persons not engaged in the process, Mr. Isaksson remarked. The work with the threads was organized by Sweden with a certain number of other countries engaged, particularly Germany.

While Bulten after 1967, with success, changed to ISO, (figure 4.2.2) other European countries stayed with the DIN standard. Bulten met no or little competition on the Swedish market, where customers like Volvo and SAAB, with sub suppliers, converted to ISO. It was apparent that some conflicts with importers occurred. Internationally the DIN standards were very strong. One advantage with the ISO standard was a saving of weight in the products. Also, Mr. Magnus Lindqvist, SMS, confirmed that the strategy of concentration of most of the “eggs” of Bulten in the ISO-basket was risky but extremely successful.

From 1968 to 1975 Mr. Isaksson of Bulten assisted Ford Motor Co. in the changeover to the Metric system.

During the years of 1950-1965 international trade with fasteners was limited. Bulten dominated the home market and had a market share of 70 - 80%. The situation was similar in the U.K. where Guest, Keen and Nettlefolds Company, GKN, dominated the market. This company was split up and sold out and does not exist any longer in the fastening industry. In 1969/70 the
import from Asian countries increased rapidly, initially with simple screws and nuts. These were produced in highly effective machines. The long production series in Asia were unheard of in Europe. Within Bulten discussions were frequent regarding which way to go, standard or special products. Special products had been sold to the larger customers at low prices.

Some industries had however chosen a strategy to provide the customers with their own fastener elements in order to get future sales of spare parts. It was also evident, that as time had advanced, and the bigger companies were more and more represented by their subsidiary companies in standardization meetings, especially with the development of CEN as of 1981. There was also a tendency that the major companies opened corporate standardization centres in central Europe.

Based on thorough studies and preparations before standardization meetings, Sweden had over the years gained a position as an important member of the standardization world, much more than what corresponds to the population of the country, Mr. M. Lindqvist declared.

4.2.12 Trade obstacles for fasteners

The absence of standards had been a trade barrier between Europe and the United States, in the opinion of Bulten. There were industries which developed their own standardized threads i.e. for bicycles, Singer-threads, the G-thread by Ericsson and others. This was done with the object to bind the customers to the suppliers and to make the customers buy original spare parts at high prices and also to avoid pirate copying. And, Mr. Dock emphasized, without the Swedish efforts we would not today have an international standard in this industrial sector. This has saved and will in the future save still more of billions of dollars for the industry and for the consumers, Mr. Dock believed.

To the Bulten Company, international thread and fastener standards were and still are of great importance. In 1992, Mr. Ingvar Isaksson of Bulten, Customer Service Engineer, succeeded Mr. Dock. Isaksson has also been leading and participating in the negotiations in ISO/TC1 and was also Chairman of the corresponding Swedish National Committee for Fasteners. Mr. Kurt Andersson, also of Bulten, succeeded Mr. Isaksson as chairman of the Swedish Mirror Committee in European standardization within CEN/TC 185, established in 1989.
In connection with the case regarding the Bulten company and standardization, two particular events, in which Bulten has been intimately engaged, are especially observed.

One, the OMFS, has been mentioned above

1. The Development in the United States of an Optimum Metric Fastener System, OMFS

2. The US Fastener Quality Act, FQA 1990

These two events have occurred separately but to some extent in parallel steps. These events may be seen as derivates of the standards for the international thread system. The two companies, Bulten and Volvo Construction Equipment were both involved in the process of FQA, one as a producer and one as a consumer. The stories are examples of how standards regulations may be used or may influence or be influenced as trade obstacles.

4.2.13 Optimum Metric Fastener System (OMFS)

The Development of an Optimum Metric Fastener System, OMFS, was a proposal to a study presented by the Industrial Fasteners Institute in Cleveland, Ohio, USA, (IFI) to facilitate the transfer of the inch-pound system into a metric system. It had been realized in the United States export industries that the inch system was an obstacle to international trade and also a problem for companies with production units abroad, like the automotive industries. Through the efforts of IFI a Public Law 90-472, dated August 9, 1971, was passed in the U.S. Congress charging the Secretary of Commerce to conduct a study to determine the impact of increasing worldwide use of the metric system on the United States.

As trade developed, it was realized in the late 1960s in the United States that the import of fasteners had increased substantially and voices were raised to demand trade barriers in the shape of technical requirements, import limitations, organized production in low cost countries as well as import by the fastening manufacturers themselves. The creation of OMFS released an extensive management activity.

An ANSI Special Committee to Study the Development of an Optimum Metric Fastener System was appointed by the American National Standards Institute in April, 1971. The purpose was to develop a system of standards for mechanical fasteners, to be stated in metric units of measure and also with the object to reduce cost through technical improvement and simplifica-
tion. The presentation was preceded by extensive studies and research on fastening elements.

To the European fastener industry, the U.S. presentation was not too diplomatic, Mr. Gösta Dock, Bulten, believed. In the presentation of OMFS in a German trade journal the headlines read as follows “Superman versucht Supermetrisch zu sein” (Dock 1976). The incoming Chairman of ISO/TC1, Mr. Dock, believed strongly that the negative trade balance of the United States in the area of fasteners had played an important role in the development of the OMFS. He was also of the opinion that General Motors had actively supported the initiative of the OMFS. After conferring with European colleagues, Mr. Dock had written an article in a trade journal denouncing the proposal. This was not appreciated in the U.S. and Mr Dock felt that he was “black listed” for many years.

A strong ideological and technical debate raged between the European countries on the one side and the U.S. on the other side. In interviews with Mr. Charles Wilson of IFI and Mr. William Ellison, Technical Director, Standardization, General Motors, it was stated that the initiative had come from the IFI. But, Mr. Ellison later questioned the wiseness of IFI to develop a Metric / European system. “The experience of the Metric System was wider in Europe”, according to Mr. Ellison.

ISO/TC1 was under the chairmanship of Mr. Allan Roslund, former Technical Director of Bulten. In these negotiations Mr. Carl Gösta Dock, of Bulten and later successor of Mr. Roslund as Committee Chairman, had actively participated. From the years 1971 to 1976 the discussions and negotiations were delicate and difficult and the articles in trade journals presenting pros and cons were numerous. As indicated above, one of the U.S. adherents to the OMFS was General Motors Corporation, according to Mr. Dock. Regarding the M6.3 x 1, the Director of GM Standards Division, Mr. Roy Trowbridge, had a particular desire to see this thread accepted. This was a dimension close to M6 and thus representing a considerable risk of mistake, accidents and weak joints, according to the European delegates. Accordingly, the major European manufacturers, including Bulten, refused to produce the M6.3 dimensions, an action which was not well received in the United States. This dimension was never included in the ISO thread standard. With the word “optimum” the U.S. study meant to indicate the “best” system. Their object was also to arrive at cost reduction through technical improvement and through simplification.

European experts have admitted that the OMFS was theoretically a better concept. Finally in 1975-76, and under the Chairmanship of Mr. William
Ellison, successor to Mr. Trowbridge, an agreement was reached and the metric detailed system accepted. First an agreement was reached regarding a mutual thread profile, according to the ISO thread, and later also regarding the diameter/pitch combinations. In Europe it was considered a victory; in the United States it is believed that the OMFS was accepted with some smaller changes. For General Motors, and other U.S. companies with plants in Europe and in other metric countries, the metric system was most practical. The metric system gained impetus in American industries and generally in the country and worldwide. Both ISO/TC1 and ISO/TC2 have since continued efficiently and an international standard was developed and applied and used in most industrial countries. The ISO metric thread has been called “the most important standard in modern times”. The contribution by Swedish secretariat and by Bulten staff in this connection has so far not been fully realized. Mr. Allan Roslund of Bulten was the Chairman of ISO/TC1 replacing Mr. Hilding Törnebohm of SKF. According to Mr. Dock, who participated in the negotiations, the existence of two competing metric systems would have cost billions of dollars in waste and caused many accidents. The differences in standards had represented an important barrier to international trade. In trade journals a graveyard could be seen with a cross over a grave with the name “OMFS”.

The officials of the IFI had, however, spent a lot of energy on the project (Industrial Fasteners Institute, 1973). The differences were mostly centred on a thread mount standard of M6, 3 mm which the Europeans opposed strongly because of risks of accidents. The American proposals were based on computer based calculations which was a long step forward in the production of machine elements.

In the interviews in the United States I had the opportunity to transfer greetings from Mr. Dock and his Swedish colleagues to Mr. Ellison of General Motors and to Mr. Charles Wilson of the Industrial Fasteners Institute. The greetings were warmly reciprocated. To explain the U.S. stand in this issue, Mr. Wilson provided me with extensive printed material, including this presentation:

1. **SCOPE**

   This OMFS Recommendation establishes screw threads for metric series mechanical fasteners in sizes 1.6 to 100 mm inclusive. It establishes the basic thread profile, the diameter-pitch series, the maximum and minimum boundary profiles for Gauging and minimum boundary profiles for gauging, and acceptance criteria
Mr. Gösta Dock, the former ISO/TC Chairman, handed me the following announcement from a German trade journal.

*Figure 4  End of standard war and debate; German Trade Journal. 1975*

The ISO/TC1 has since then continued efficiently and international standards have been developed and applied and are used in most industrial countries. The latest meeting took place in Beijing, China in 2006. The development of standards and an open international trade policy facilitated the transfer of technology and a switch in countries of production (Vernon 1979).

The U.S. export industry is now more adapted to the metric thread system. A Special Committee was established in Washington to proceed with the continued adaption of the metric system in the United States. From 100% inch application in the industry the metric system had in 2006 reached 70% among the exporting companies (IFI).
It is more likely that the OMFS was an effort to unite the world around the system in such a way that the U.S. industry would not be suffering. Later European experts have admitted that the OMFS was theoretically the best. The cost and consequences of continued negotiations represented insurmountable obstacles for the European delegates.

4.2.14 Fastener Quality Act (FQA)

A U.S. Government study was published in 1988 with the title “The Threat from Substandard Fasteners: Is America losing its Grip”? The study reveals a number of cases where defective fasteners have been detected and also cases where accidents have occurred as a consequence of substandard fasteners.

In 1990 the U.S. Congress passed a law regarding qualities and testing of fastening Elements PL 101-592. The reaction was strong world-wide and intensive negotiations took place in order to make a revision or to have the law revoked. Frequent contacts were taken between the industry and the Congress and the date of application of the law was postponed. As the subject concerned “health and safety” the possibilities of abolishment were extremely small. It was evident to many companies that the FQA could cause considerable problems and cost to the industry, both domestic industries and to industries exporting to the U.S. In Sweden the forthcoming problems had been observed by the legal department (Mr. Jan Mimer) of Volvo Construction Equipment who brought the question and its possible consequences into focus.

Representatives of Volvo visited the US National Institute of Standards and Technology (NIST) in order to find answers to some additions and changes demanded by the FQA. The conclusion of the meeting was an extended confusion. The adaption problems would be difficult and complicated and would cause problems both within the United States as well as abroad, according to the industry representatives. In Europe a meeting was called by the European Industrial Fastener Institute (EIFI) in Paris to discuss the consequences of the American law with regard to the European fastener manufacturers.

The assumption was expressed, that this was an effort which could discriminate trade. It would, however, have consequences on American industries as well as on suppliers in Europe and Asia. The Swedish Board for Accreditation and Conformity Assessment (SWEDAC) had officially com-
mented on the law and also noted the risk of trade discrimination as well as complicated and bureaucratic licensing system by official testing laboratories (Fogningsteknik, p 8, 1/98). Mr. Gösta Dock had seen the OMFS and the FQA as efforts to hamper the import of fasteners into the United States.

Already in 1982 the import of fasteners had exceeded the export in the U.S. trade balance. In view of the large number of accidents caused by unlawful fasteners he found a certain support for the new law originating in the FQA (Fogningsteknik 5/93 p. 18.) It was unclear how to handle raw material and already finished fasteners representing large values. Re-testing also presented a great problem. A deluge of “non complying” fasteners in the marketplace would create millions of dollars worth of financial problem for manufacturers and customers as well as disturbance in the supply.

After a few years of discussions the Law was passed but not in its original shape, much to the observations and efforts of Mr. Mimer of VCE.

FQA was a trade barrier aiming to reduce the import of substandard fasteners. The consequences of the Act turned out to be most problematic as it threatened the operations of the serious companies of industries both in the United States as well as in the world at large.

4.2.15 Standardization experiences and observations

When standardization started within the framework of ISO, thread forming was on top of the agenda and the committee secretariat for this standardization project was located to Sweden.

Bulten was strategically most active in these negotiations. Through standardization it was endeavored to reduce the number of varieties, reduce products in stock, increase specialization and longer series in production. This was necessary in the efforts to meet the competition from low cost countries. Members of the staff of Bulten have served as Chairmen of ISO/TC 1. Standardization has had an important influence on the company.

Through standardization of the fasteners, markets opened for more competition. Countries like Japan, and later Taiwan, South Korea, India, Malaysia and other low cost countries gained access to the world markets.

Through their early participation and strategic leadership in the ISO standardization process, Bulten made considerable profits. They advised their customers on standard development and established close and long lasting relations with their customers. But the international development, with growing production of standard products in low cost countries created a tremendous threat and challenge from the 1970s and on. At the end of the
1980s international competition became stronger. For Bulten markets were lost rapidly. The U.S. market had been important for Bulten but the company now took a heavy beating. A considerable reconstruction thus was necessary.

Mr. Dock recalled having participated in many important international meetings on standardization. At one point his chairman, Mr. Roslund, and Mr. Dock proposed the creation of the European Fastener Institute (EFI) in response to the American Institute of Fastener Industries (IFI). The EFI was not established at that time as the proposal originated in the "wrong country", according to Mr. Dock. With France or Germany as initiators, it would have been a different issue, Mr. Dock believed. The Institute exists today, however, in the shape of EIFI and "EURAFI", an organization mainly for the suppliers of fasteners to the Automotive Industry.

However, Swedish efforts and contributions within ISO resulted in standards for threads, TC 1, fasteners TC 2 and ball bearings TC 4, simple products, it would appear, but exceptionally important. With the support of a standard, the production series could be made longer and the production was rationalized and highly automated machinery could be afforded. When a new standard was forthcoming and ready, the internal work within Bulten was initiated with working groups involving technicians and sales representatives. Many smaller industries did not participate in the standardization but took advantage of our work, Bulten maintains. Most of these smaller companies have disappeared. They were the first to go when competition from Japan became most intensive. At that time, it was also considered to demand some kind of trade restrictions in Europe, as already demanded in the United States. It was motivated by the inferior qualities of the fasteners, errors in product declarations etc, with mortal accidents as a result, Mr. Dock stated.

As mentioned above CEN was established in 1961. The first meeting regarding threaded fasteners took place in Berlin in 1989, ten days after the fall of the Iron Curtain. Tension was high in the Swedish delegation over the possible outcome, Messrs. Dock and Isaksson of Bulten have stated. Would national interests destroy international standardization? One of the first and most important decisions was to agree to a transfer of ISO standards into EN standards. Much to the relief of the Swedish delegates, a majority in the Committee decided to work in line with the ISO spirit and under the leadership of CEN/TK 185 (ISO/TC 2; CEN 135) a program was established to transfer approx. 200 ISO standards into EN standards. Priority was given to a base standard, with particular emphasis on dimensions and mechanical properties, which was later completed with product standards. Most of the work was completed and transferred into EN standards. Some differences have
persisted regarding details with regard to the building industry. As part of the opening of free trade within the Common Market a large number of standards were ready by the beginning of 1994. Work has since continued in a dynamic manner. This beginning was of extreme importance to CEN.

Regarding patents, Mr. Dock admitted, that they had not within Bulten been sufficiently prudent on some occasions when touching on product development with competitors. Information could have been given away without considering the long term consequences. In these instances, standardization could be a disadvantage. If a company was the proprietor of a successful and patented product, it cannot be standardized. And for that reason many companies do not want to participate in the standardization process which might turn into a threat to the company. Bulten had experience from cases when American companies with patented products refused to have their products standardized for the risk of copying and pirate fabrication. If a company possesses a technical breakthrough product you demand a patent. This is a negative aspect of standardization which, however, has a positive influence on the product development. In one of his educational course papers Mr. Dock had stated that one of the problems in future standardization will be the fact that some of the mostly used products are protected by trade names or patents. Thus it would be difficult to make a Swedish standard based on these products. The establishment of a functional standard, providing the user with the necessary information, would be one way to bypass this difficulty and give the manufacturers development space (Dock, Standardizing 83).

Cost wise, standardization had in most cases, especially for simpler products, meant a reduction in price. For more sophisticated end products, e.g. engines and similar products, these may have become more expensive as a result of standardization, especially if a monopoly situation is created. This could be exemplified e.g. in the computer or communication industries.

Hoops and Hesser (2001) have presented a Paper with a study from EADS Airbus GmbH in which the opportunities for replacing drawings parts (construction products) by standard parts are examined. The results reveal an enormous potential for cost reduction by greater use of standard parts in the design process. Through a random sampling examination it was shown that on average the cost of obtaining standards parts was only 10% of that for drawing parts.

Mr. Dock and M. Isaksson were of the opinion that the cooperation between the technicians had always functioned in a positive way. The relations between economists had sometimes been frosty, with differences especially
among the representatives from France, Germany, Italy and the United States. During the period 1950-90s the French delegates were supposed to follow a French National Directive to speak French during the meetings. The presence in the negotiations by marketing representatives would not have facilitated the work, Mr. Dock believed.

Under the chairmanship of Bulten representatives, executive meetings were sometimes held in Hallstahammar, headquarters of Bulten. Information was presented and discussions held at the company hotel and in the evenings entertainment was organized. It was an excellent way to work together, make progress and to achieve results. When the meetings were held in major cities, the delegates had a tendency to disappear in the evenings and return by 4 o’clock in the morning, Mr. Dock recalled.

Official government agencies participated occasionally in the meetings. It was indicated that the financial resources were limited for more frequent participation. Sweden often represented the countries of Denmark, Finland and Norway. It was underlined by Mr. Dock that standardization was a neutral platform where competitors could meet and cooperate. In this connection it was of interest to note that during World War II a delegation from DIN, Berlin visited Sweden and proposed DIN standards for certain strategic Swedish industries (Mr. Magnus Lindqvist).

It was evident that the Bulten participation in standardization process gave the delegates a unique knowledge of the competitors and their products. This information was forwarded to the sales managers. In case of questions from the clients regarding competing products this information could be of a certain value for the representatives of the company. After the standardization meetings a report was established and a conference was arranged at the head office. No new production or stock building was allowed before the standard decision was reached. And for the smaller companies affected by new standards, the time for adaption was critical.

Well ahead of time before new negotiations, internal discussions were held at Bulten. As a next step, meetings were held within TK 37 and TK 8 at SMS/SIS in Stockholm. The mandates for the delegates were formulated. CEN/ TC 185 which was started in 1989 can be regarded as a parallel to ISO TC 2, and in both organizations the same persons make up their respective delegation. ISO TC 1 is charged with standardization of threads. Some 12 -15 countries participated regularly in the international meetings. Work was delegated to special WGs or ad hoc groups and the decisions taken in plenary meetings. The results of the negotiations depended strongly on the organization and skill of the chairmanship. And this could vary.
Dock and Isaksson had to work and live with a hard negotiation climate between Europe and the United States as well as with regard to Japan. The growth of the economy in the Pacific area had been considerable and the industry was moving towards high technology. Japan had always participated in the international negotiations within ISO. Mr. Dock had found that they in the beginning had an attitude of wait and see but later presented far reaching proposals. They certainly protected their interests, but most often they had lost in the voting. Mr. Dock concluded that the Western countries were afraid of the Asian advancements. Russia had often voted no, but was later a strong metric country. During a long period before the Second World War, however, Germany had to a large extent dominated standardization with their experience and large industries. In addition, they had documented a strategic skill, Mr. Dock, had found. When they translated their own standards to other languages, e.g. into Spanish, they gained influence on the Iberian peninsula and in South America. This was also confirmed in interviews with German manufacturers.

To a large extent, fastener producers in different countries had previously lived safely on their home markets. In the United States, France, Great Britain and Sweden a number of companies went out of business as a consequence of the Asian competition. Regarding hexagon screws, competition from former East Germany and Italy was equally strong and a movement towards Southern Europe by the industry was noted. German competitors were Kamax, sometimes cooperating with Bulten in matters like surface treatment, Berger, Bauer und Schantze, Kerscher (BSK) and GKS, a rather new competitor. Later this company was hit by fire and rebuilt by their insurance company compensation. Still bankruptcy could not be avoided and the GKS company was acquired by Bulten.

I have followed the activities of one particular company, Bulten, in the perspective of international, official standardization. The participation of Bulten and its representatives during the years in ISA, ISO and CEN standardization has been of considerable international importance. The strategy of early adaption of Bulten to ISO standards also gave Bulten an advantage in their own production and marketing and reputation. In this development work Bulten cooperated closely with their major customers like Ford, Saab, Scania and Volvo and others. Cooperation between Bulten and suppliers of raw material, like steel, had deepened. The international experience with inferior quality of steel and illegal branding and standard deviations had changed the pattern of work.
In the presentation of the model describing the standardization process it was indicated that under certain circumstances the model would be given a different design. This happens with the Bulten case due to the fact that standards were already established and in extensive use when the CEN standards were demanded. Standards for threads and fasteners were already in use in the 1920s when ISA was established. Later these were replaced by different standards, above all by DIN standards. When ISO standards were launched Bulten made a unique move and were the first manufacturer to adopt the ISO standard. It was connected with great risks but turned out to be a most profitable move. The ISO standards were later accepted as CEN standards and for Bulten the changeover represented no problems. With the publication of the CEN standards the earlier, mainly ISO standards, were withdrawn from the Swedish market and presented as European Norms (EN) standards. As will be seen in the model Bulten was for some time alone in marketing the ISO standards. Bulten Company has been engaged in external standardization regarding their products for over one hundred years. As appears from the accounts above different standard systems have been at the base of the business activity. To illustrate and explain the major lines over the years I connect to the model from chapter 3 and its principles and now in an historic perspective. As will be seen below the first standards regarding their manufactured products were in accordance with the International Standards Association (ISA). It was followed by Bulten (B) and a number of international producers, competitors (C) especially European companies. After the Second World War the DIN standard was followed widely, and also by Bulten (B). When ISO was established, the first standards developed were for threads and fasteners. A unique pattern can here be observed. As can be seen in 5.2.1 figure Bulten is alone and was alone for a number of years in Sweden to work with ISO standard. This was a strategic change in partnership with considerable risks for the company. It turned out however, to be most profitable for Bulten generating substantial resources. Before switching to ISO Bulten had the support of some of their major customers, including the automotive industry. This meant a change in network and also that a new network was created with the major customers, the automotive industry, contributing with stability.

The next step is the BG line below representing the transfer of ISO standards into CEN standards in 1989. The standards are mainly built on ISO standards. Bulten (B) and some important competitors (C) are leading in the industry. This will be further illustrated in figure 4.2.3 below illustrating the conditions of today.
Bulten had over the years presented a number of innovations in their technical domain. Often these innovations had been developed in cooperation with major customers. These had been given a first user advantage for a period of time before the new product was presented for standardization, also in cooperation with the customers. The proprietary relations were solved with the support of license agreements. The development of a new product demanded a long period time from and constant cooperation between developers, production and marketing representatives.

As part of a new sales strategy concentrated on special products the sales staffs of Bulten meets regularly with the buyers and construction engineers of the important customers. Technical solutions are discussed and production and cost improvement suggestions presented. The relations with the major ten suppliers and the four most important customers have over time become regular. When Volvo, as part of its general supplier and standard policy, decided to increase the number of suppliers Bulten cooperated with Volvo in the transfer of knowledge regarding methods and concepts in the fastener industry. We have had a cooperation based on a concept from 1965 and it was a complicated process to transfer and interpret all details, Mr. Ingvar
Isaksson of Bulten, stated. Volvo had for years been well advanced in their demands and knowledge regarding fasteners. And this project became a source of a mutual story of development of competence. Mr. Isaksson had particularly underlined that standardization does not necessarily mean a reduction in varieties but could open the possibility to play with many different factors.

The restructure of Bulten during the 1990s and concentration on special products had as consequence that international product standards were no longer particularly important to the company. The customers, however, demanded a supplier with knowledge and experience of standards. The production of specialized fasteners had replaced the standard fasteners and also demanded a reorganization of the company, especially on the marketing side with closer contacts with the customer. Also the export organization had been restructured. Earlier Bulten had a Product Development department, also including standardization. After the reconstruction, standardization activities, which previously had engaged 3 - 4 persons, were reduced and connected to certain persons within the company, primarily Mr. Dock and Mr. Isaksson. Before, Mr. Isaksson had supported the marketing section with printed sales information and technical knowhow. Mr. Isaksson was in 1997 Chairman of SMS/TK 8, mechanical properties, and his colleague, Mr. Bertil Hahre, quality chief engineer, Bulten, was at the same time responsible for SMS/TK 37 Screw threads.

In the beginning of a standardization program some investments were required for adaption of machinery to the new standards. A new standard today would not demand any expenses. In 1980 we changed the width across flats on our screws and this demanded new tooling and expenses. Mr. Dock recounted.

Bulten had over the years worked with many patented products and products on license from other companies, especially from the United States. In the 1970s Bulten tried to introduce a new fastening grip” and cooperated with colleagues in United Kingdom and Germany. The efforts failed, however. The Swedish market was too limited and in the fastening industry large volumes and international markets are required.

At one point Sweden wanted a special tap at the tip of some screws to guide the screw at the assembly operation. Cooperation was established between and with the customers, including Volvo, and a standard was established. We argued, Mr. Isaksson said, at the ISO meetings to have the standard established and after translation into French, Volvo had some informal contacts with Renault S.A. Later the standards were accepted, with German
support, and we clearly had influenced the development, Mr. Isaksson stated. But, like Mr. Dock, Mr. Isaksson admitted that the personnel working with product development do not always think in terms of protecting corporate ideas, as we do not fully see the part of the progress.

Mr. Isaksson had worked extensively with product development. He had in no way seen a conflict between standards and product development or patents. New products and improvements in existing products reach the market as standard sooner or later, he declared. As an illustration, Mr. Isaksson showed a product manufactured under license from the American company Camcar, “Torx Plus”. It could not be classified as a regular hexagon screw, star and cross, but there was now an interest to have it standardized. But naturally, the company had no ambition to start such a procedure as the product was protected by a patent. It was also a product important to Bulten. The preceding product in the family was Torx which was introduced in the beginning of 1970s and Bulten acquired the license at the end of 1970s. The patent had expired but the trade name offered protection, Mr. Isaksson stated. This was an example how innovations could be protected. But, with sufficient knowledge the product could be copied and marketed under another trade name, he added.

The attitude of the Bulten Company towards standardization was still totally positive, Mr. Isaksson stated, and the support for the work of ISO and CEN/SIS had continued. In view of the international orientation and engagement of Bulten the standardization work was expected to continue. Many industries, especially the automotive and cellulose industries, standard institutes etc had participated in a constructive way. Standardization of fastener elements had been successful and important groups had been established and good results achieved, Mr. Isaksson concluded.

4.2.16 Management views

As mentioned before, Bulten in 1983 acquired the major domestic trading competitor; Göteborgs Bult AB. Mr. Anders Karlsson had been working with this company since 1975 and became President of Bulten in 1991. The company was at that time split up in several units and parts. The old Bulten became Bulten Automotive AB. Bulten Automotive became part of Errce AB in 1994. In 1995 the Company had 320 employees compared to twenty years ago when over 2,200 were employed. Bulten Automotive was now specialized exclusively on the automotive industry. The market situation was described by Mr. Karlsson as very tight with competition basically
from European manufacturers. The Asian competition, China, Taiwan, Malaysia etc dominated the market for standard products. Still special products for i.e. the automotive industry were demanded locally. Within Bulten the question of concentrating on standard products or on specialized products had been discussed at great length. The emerging competition that Bulten experienced from Japan, East Asia and other low cost areas from the 1970s by low cost standard products was not only due to cheaper labor, but also to the advancement in mechanization, Mr. Karlsson stated. Through the standards, the competence requirements and the learning requirements were reduced and the minimal cost for the East Asian producers made it impossible for Bulten to stay in the market for standard nuts. The reputation and high degree of trust that Bulten had as producer of bolts and other fasteners, however, became an important resource for bridging the distances to buyers. Confidence could be related to the quality of the standardized products and, at the same time compensate lower prices from competitors.

In his analysis Mr. Karlsson pointed out that the reconstruction in 1991-92 was required to counter the international competition. But, he believed, that this was only part of the explanation. As often occurs, in his opinion, when a company expands, there is a tendency to accumulate more overhead than the market can carry. And you were always one step behind when it comes to reduction in the indirect functions, compared to the direct functions, Mr. Karlsson stated. There was also at Bulten an imbalance between workers and white color employees. It was rather a relationship of 1:3 instead of 1:8. It was always easier to expand. You walk into the workshop and look and decide to buy a new machine and you can replace one employee on the factory floor. This was earlier a tradition within industries, according to Mr. Karlsson, to regard the direct production labor and not sufficiently observe the indirect situation which in reality is the governing process. To summarize his opinion, it was the market development, supported by standardization, the increasing competition with falling prices and internal reasons which caused the problems and the reconstruction in 1991. These were views expressed also by Mr. Dock and Isaksson. Thus standardization played an important role.

Earlier Bulten had an oligopoly situation with Göteborgs Bult AB and both had operated with substantial profits and large overheads. In this oligopoly situation some small importers began to take a larger part of the markets and it was difficult for the major actors to rapidly slim their organizations to regain their competitiveness. If the managers had listened to the employees in the plants in Hallstahammar and in Kalix as well, they would
have learned of maybe one hundred stupid investments and lack of guidance and unclear strategies, according to Mr. Karlsson. Nobody knew the position of the Bulten Company on the market and in which direction Bulten was or should be heading. This was also the opinion of the competitors, according to President Karlsson.

In 1995 Bulten exported 40% of its production which represented a reduction from 60% a few years earlier, when 90 - 95% of the production was standard products. This was due to the increase in demand by Swedish automotive industry. The market situation had during the last 20 years become one European market for specialized fasteners and one global market for standard fasteners. Often, the sales work is a joint project with the customer and our technicians and the product development time could be very long, maybe six to eight years. The ambition was to approach a development time of three to four years.

In 1995 Bulten had a European market share of 5% with the ambition to continue to grow. Half of the production of fasteners was consumed by the automotive industries. With the acquisition of the new plant in Germany, Bulten was aiming at market share of 10-12% and to strengthen the position outside Scandinavia. Ford Motor Company had become one of the major customers and this cooperation had offered Bulten new and valuable experiences. The production in Hallstahammar and Kalix had doubled during the last two years and a reasonable profit was made.

In his previous position with Göteborgs Bult AB, Mr. Karlsson had participated in the standardization committees and was familiar with the activity. Within the standardization activity we had a perfect cooperation with our customers, especially since Bulten at that time was the only manufacturer in Sweden, Mr. Karlsson stated. Standardization was for Bulten an excellent platform for exchange of views and experiences with our customers, especially the automotive industries, trying to lead them towards the use of identical fasteners.

Through standardization, Bulten had an inroad to the international markets, was kept informed, and also had a possibility to influence the development. Our strategy and participation in standardization should be regarded against this background, Mr. Karlsson underlined. We would rather be part in the center of standardization and listen and learn and influence the development - in our interests and for the benefit of our customers. It was not unusual in international negotiations that you acted in a way which could be negative for the competitor and promote your own product.
For Bulten during the 1990s, standardization was of limited organizational attention on management level. It was regarded as an instrument of marketing and an important way to maintain relations with our customers and the market and to create and maintain the know-how. It was under all circumstances part of their policy and important to maintain the projects. It was only rarely that these matters were discussed on management level. The reports and the responsibility rested with the Bulten technicians and the marketing group for application in their relations with the customers, Mr. Karlsson declared. He admitted that some new ISO and CEN standards had demanded changes and investments within the corporation. These steps were always discussed with the management group. Product development was a continuous process and there were no conflicts with standardization, mainly due to the fact the products were of mature age.

Through special standardization the contact surface with the customers was widened and Bulten could become more familiar with the situation, problems and organization of the customers, Mr. Karlson believed. He confirmed the advantage of the knowledge and actions of Mr. Isakson in the chairmanship of TK 8 when Bulten was dealing with i.e. SAAB and Volvo. Regardless of the regular standardization process, Bulten first tried to convince and cooperate with their customers when a new development was under way even if a new standard had not been established. This was part of their marketing idea. At a later stage the customers would probably demand that a standard be established, although we try to keep it as our own solution as long as possible, Mr. Karlsson said. But when a standard demand originated from the market the manufacturer was obliged to accept the situation. At the same time he did not find that standards were obstacles to product development. Bulten marketed several patented products, acquired under license.

The penetration of the European market by Asian competitors was facilitated by the existence of a European standard, according to the Bulten management. Transfer of technology is widely facilitated by well defined standards which describe the product relation between the manufacturer and the user. Mr. Karlsson felt that fasteners were mature products. The horizontal acquisition of a factory in Germany had given Bulten the advantage of extended production capacity, corresponding to their sales capacity. At the time of the acquisition the factory was new since 18 months. In Sweden, Bulten was the only producer for the time being. In England and France only some 3-4 companies remained of about 25 respectively 75 a few years ago. The situation in Germany was identical and Mr. Karlsson believed that only some
25 would survive. The customers had become larger and larger and demanded delivery of complete systems.

Mr. Karlsson regretted the bureaucratic battles in the past within ISO particularly, and elsewhere which increased the expenses and created unnecessary obstacles. Also, he noted, many companies did not participate in the standardization projects. He did not see any indication of differences in corporate development whether participating or not in the standardization projects.

The process to develop an ISO standard required approximately five years or more and to develop a Swedish standard a period of two-three years was normal. He had also found that in Germany the industry and customers did not cooperate in the same close way as was done in Sweden. Also, in some cases DIN had not forwarded information from the fastener industry to the users. Mr. Karlsson believed that standardization within his product area had been conducted in an efficient way and the money invested well merited, especially through better relations with the customers. As Mr. Karlsson personally had a positive attitude towards standardization this was also the essence of the strategy of Bulten.

4.2.17 Competitors’ views

The general picture of the industry given above by Mr. Anders Karlsson was similar to that expressed by Mr. Wulf of the German competitor Peine. The latter was however much concerned about the increasing volume of individual corporate standards being developed. The length of the shelves with individual corporate standard files could be measured in meters for several companies. It cost the manufacturers of fasteners substantial amounts to handle this volume of information which was certainly reflected in the price of the product and in the cost to the customers. Mr. Wulf was convinced that the management of the customer companies was unaware of this waste of money by the construction engineers when not using an established standard. One product could be connected to more than ten standards and a time consuming and expensive search had to be undertaken with every demand. It was an established policy within Peine to participate in the standardization work and he believed that Peine, with approx. 450 employees, and their German competitor Kamax, with approx. 1300 employees, had influenced the standards. Both companies had separate standardization departments and committees. Mr. Wulf could often see a battle of influence between the
standardization departments and the purchasing departments and that the simplyfiers were the most influential.

At the German manufacturer Bergner, RIBE (1 200 employees) it was pointed out that of the total cost for a fastner 15 - 20 % were manufacturing cost and remaining 80% logistics. With the support of standards there was a good potential to reduce the total cost, according to President Bergner. His company participated actively in standardization and he believed that his company in that way had influenced the standards and gained valuable knowledge.

Dr. Hellwig, DIN, and Secretary of TC 185, was well acquainted with Bulten and the Swedish market and was impressed by the Swedish contribution in the standardization activities. With superior knowledge and authority Bulten had influenced the standards. He saw a similarity in the development of the economy in the fastening industry in the two countries of Germany and Sweden. The cost of the standardization activity was high and was carried by a few, larger companies while the smaller had a free ride. In a longer term this was harmful for the smaller industries and their competitive position, product adaption and product development. In this perspective many of them would disappear in a few years, Dr. Hellwig feared. Those companies which do not participate in the process have no idea of what will be forthcoming. The adaption to new standards might sometimes be costly to the manufacturers but even more so to the users. He had also noted that top management today was less interested in standardization than before. The corporate managers were of the erroneous belief that they could save some money that way, Dr. Hellwig had found. The pressure to produce CEN standards was now stronger than before, Dr. Hellwig said, but the Vienna Agreement was important to follow. In the establishment of this agreement Mr. Gösta Dock had played an important role.

There was a trend in the fastening industry, through which manufacturers and sub- suppliers to the automotive and other major industries became tied together in teams. This team-building was seen by the fastener industry as a competitive advantage for the European manufacturers.

The analysis of the change and movement of activity patterns, the degree of compatibility and synchronization between different business activities can help to illuminate the processes of standardization and their effects. For example one effect, as well as a purpose of standardization, is to make activities easier to adapt to each other. The corporations were active in the standardization process in varying degree, externally and internally.
4.2.18 Bulten strategies

Standardization has been on the agenda for Finnveden/Bulten AB ever since the establishment of the company, 130 years ago. Manufacturer of machine elements, such as nuts and bolts, screws, fasteners of all kinds, Bulten first saw the advantages of standards connected to a rational production. The company has later played a unique and important role in industrial history.

The company has been exposed to a number of changes in ownership but all through the years the major product program is unchanged and standardization has been considered to be of importance on all levels in the company.

Based on their participation in standard making Bulten at one period were pioneers with the ISO standards for fasteners on the Swedish market. Through standards they profiled themselves with great success. As a consequence of the participation by Bulten in the ISO and CEN organizations, the company was well informed of possible forthcoming changes in threads and fasteners and the company became world known.

Bulten with Messrs. Dock and Isaksson as negotiators preferred the ISO thread in comparison with the DIN standard. The change by Bulten from DIN to ISO threads was an important and dramatic step. With the support of the major customers, like Volvo and SAAB, it turned out to be most profitable for Bulten.

In the 1970s the ISO standard was universally on the move. Modern production technique and standard documents were available and applied in more and more countries. Competition from low cost countries became strong. New machinery, identical to those in use in low cost countries, was acquired by Bulten. This time the equipment was acquired from Japan, which country had already sold similar machines to many countries.

At the end of the 1980s competition was reinforced again, now also from manufacturers in Europe. Bulten continued the battle and this time the company purchased the most modern machines, in particular from the U.S. However, to no avail. In 1990 a reconstruction of the company was required to keep the company and production running, and now in reduced scale. Over the generations of employees in Bulten, many technicians have been standardization leaders and particularly devoted to standardization. Management has supported the task and sometimes as many as close to one hundred technicians on all levels have contributed with their knowledge to establish the thread and fastener standards.

Bulten has gained a wide reputation of quality and respect in their engagement in standardization and as a source of technical knowledge. This
has been a valuable resource in times of economic slowdowns and has created long term relations with the customers. Their willingness to create standards had facilitated trade and also supported the establishing of manufacturing, especially in countries with a low cost structure.

The competition from low cost areas of the world has strongly influenced the corporate life of Bulten. It was hinted by competitors that international competition was sometimes facilitated through standards developed by and with Bulten participation. From 1990 Bulten changed corporate strategy which involved the abolishing of production of standard fasteners. Instead Bulten concentrated on special and more sophisticated fasteners, often developed in cooperation with the customers. Advantages in this connection were geographical closeness to the customers for service and advice and a high level of product knowledge.

During certain periods several companies within the industry have gone out of business against the background of increased competition from low cost countries. Porter (1990) has seen the same situation and development on the U.S. market.

Some particular aspects need to be underlined. All manufacturers in the industry expressed the regret that standard fasteners were overlooked by the construction engineers. Many engineers were inclined to invent their own fastening elements, thus increasing the cost. Also the logistics surrounding the production was too high.

It is difficult to compare the value of standards. The poem at the beginning of the study gives an illustration of the endless applications of the thread and the screw. The Director of Engineering of the American Fastener Institute, Mr. Charles Wilson, has in 1971 expressed the view that the documents, prepared mainly by Bulten and creating the basis of the thread and screw standards, represented the most significant engineering project of the fastener manufacturing industry in the twentieth century.

This also connects to the debate in the first half of the 1970s regarding which type of thread should be applied in the world of engineering. In view of the increase in US export of mechanical products the IFI had presented a proposal to an Optimum Metric Fastener System, OMFS. The proposal had been presented without prior consultation by IFI with their European colleagues, especially Swedish, with the Secretariate, and with countries like Germany and France participating in the battle. On the European side it was argued that the ISO standards should not be changed. A change would involve a cost of billions of dollars, according to the Europeans. On the US side it was argued that the OMFS was the best Invitations to criticism were
demanded on a world wide basis by IFI. According to IFI some 100 objections were received. They were all answered and explained in detail, Mr. Wilson stated. No one ever reacted after receiving our views and explanations as indicated above. European experts have later admitted that the OMFS was theoretically a better system. A change of fastener system would have been too costly, “we could not afford that” the Europeans declared.

The technical debate was unique. In 1975 the ISO standard was no longer challenged. The Chairman of IFI, Mr. Ellison of General Motors, stated that “after all, the Europeans had more experience than we of the metric system”.

The standards in focus in this and following case, regarding Volvo Construction Equipment, threads and fastener elements, have been exposed to yet another experience. It was evident that a number of accidents had occurred as a consequence of fastener of sub-standard quality. These had been delivered in particular to the US market and in large quantities. The US Congress reacted and proposed a law regarding quality and testing of fasteners, the Fastener Quality Act, FQA. This could represent a major trade barrier for practically all types of fasteners, with negative effects for foreign as well as domestic companies. As will be seen in the next case, the executives of VCE were instrumental in making the US Congress perform a unique turnaround and never signed the law. Standards still may appear as trade barriers.

In connection with the development of the new CEN standards Bulten could build their strategy around the long established ISO standards. As can be seen in Figure 4.2.2 Bulten (B) moved with a small step from Field X to Field Y. Also for the competitors (C) the move was of minor significance. The traditional, expected effects of standardization, with longer series in production, less number of types of products etc, were however achieved.

Fasteners are mature products, some of which are standardized. Some are none standardized, but especially developed according to customer demands. The development and acceptance of the CEN standards is illustrated in figure 4.2.3 below.

Through standardization Bulten (B) has moved from Field X to Field Y. The arrow indicating the product improvement connected with standardization is limited for Bulten as well as for some competitors. As the fastener products from the different suppliers are quite similar a large space is available in Field Y for other sales parameters than price and product. In the case interview at AG Berger in Germany the President of the company indicated that logistics amounted to 80% of the sales value.
Standards are however developed and the competitive situation is changed. The change in product quality as demanded by the new standards was limited as can be seen in Figure 5.5.2. Bulten was in a good position to have their products labeled with the CE mark. Most of the competitors (C) had to make a longer move to have their products adapted to the new standards. The prices of the products on the market are converging and the products becoming more similar as a result of the standards. Manufacturers who do not follow standards must exit from the market. As a consequence of the long term development Bulten strategically has moved towards the production of special products. With differentiation the company tries to distinguish its own production from those of the competitors by superior performance, service and image, as observed by Porter.

Figure 6 Model of standard development process, Bulten
4.3 Case three VOLVO Construction Equipment AB

4.3.1 Company history, products manufactured

In the Swedish Government Study “Den osynliga infrastrukturen” (The invisible infrastructure) SOU 2007:47, the standardization strategies and organizations for some of the major Swedish corporations, i.e. Volvo, are presented. Within the supporting functions of the company, Volvo Technology, Volvo Logistics and Volvo IT can be distinguished.

The corporation has approximately 100,000 employees with production in 25 countries covering markets in over 200 countries. Net annual sales amounted in 2008 to 285 MdSEK. Volvo Construction Equipment VCE, had approximately 11,000 employees and 56 Seemed in sales. According to SOU 2007:47 all standardization, except IT, is from historical reasons centralized to the corporate department Corporate standards CS, which reports to Volvo Technology. The CS unit employs 25 persons, who handle 90% of the internal standards concerning development, production, documentation and distribution of mutual standards necessary for the different corporate units. They also handle the external standardization engagements of Volvo. This external part of standardization is normally conducted within the framework and cooperation of SIS. Other Volvo Divisions have at least one person appointed as responsible contact person with Corporate standards and these persons meet regularly. At the same time these experts coordinate the external engagements of Volvo Corporation. Persons interested in matters of standardization may easily find information on the Volvo internal web system. Within the corporation it is comparatively easy to find colleagues interested in working with standardization but as this task often comes as a supplement to the ordinary duties it is more difficult to get them more deeply involved (ibid.).

For Volvo Corporation it is a planned, own activity, to use standardization as a means to achieve coordinating advantages, by using, as an example identical motors or chassis, component parts etc in trucks, busses and construction machinery.

This type of scale advantages seems to be the main driving force of the standardization strategy of Volvo, according to SOU 2007:47. The picture given above in the Government study is confirmed in interviews and corporate documentation.

As will be seen in the following pages this strategy sometimes takes other shapes in other situations and levels. At Volvo Construction Equipment,
VCE, Eskilstuna, a special service group, Laws and Regulations, is handling matters regarding standardization and regulations. Mr. Jan Mimer, lawyer, has been in charge of this service for about ten years when he succeeded Mr. Karl-Erik Grancrona.

The VCE Division is part of the Volvo group and is an important international manufacturer of construction and building machinery, especially earth moving machinery and equipment. For some of its products it is the leading manufacturer in the world.

The company was started in 1832 as a small mechanical workshop by Johan Theofron Munktell and under his name in Eskilstuna, Sweden. The company developed rapidly with production of wood cutters, printing presses to complicated steam engines, tractors, locomobiles, motor rollers, threshers and to today’s construction and earth moving equipment. It is the oldest industrial company in the world still active in the area of construction machinery.

In 1892 the diesel engine was patented in Germany and the year before the first Swedish prototype to a combustion engine was presented by a man called Gyllenhammar, originating from Lidköping.

The steam engine period initiated in 1906 by Munktell was successful, much as a result of the cooperation with Samuel Owen. More than 6,500 locomobiles were produced from 1853 to 1921 in addition to 31 locomotives made during 1853 - 1893. This development of the new type of engine constituted a technical breakthrough and represented a threat to the Munktell Company. In line with the established policy of making all major components within the corporation itself an extensive development program was started. In 1913 the Munktell Company introduced the first Swedish tractor with a two cylinder, combustion crude oil engine. The diameter of the wheels exceeded two meters.

From the mid 1920th Munktell became strongly involved in Swedish standardization. The strategy and driving force behind this engagement was to establish more efficient production methods. The company was represented in the standardization negotiations by the President or Chief Engineers, (Standardiseringen i Sverige, SIS, 1992; Ollner).

At the same time the brothers Jean and Carl-Gerhard Bolinder were also working on the development of a crude oil combustion engine. With the assistance of a Consultant, Rundlöf, the Bolinder Company developed a two stroke, crude oil combustion engine, which turned into a tremendous success, especially as a boat engine. In the 1920s this engine had a world market share of approximately 80%.
The two companies, Munktell and Bolinder, met with considerable problems during the 1930th. As both companies were owned by the same bank a merger was organized, which at the time was the largest industrial merger in Sweden. The new Company, Bolinder-Munktell, (BM), maintained the earlier production program of Munktell and concentrated on engines, tractors, motor graders and rollers as the heavy components of the program.

The BM crude oil combustion engine was manufactured until 1953 when it was replaced by a new series of modern diesel engines developed within the company.

In 1927 the Volvo automotive company had been established by Gustaf Larsson and Assar Gabrielsson, after an agreement at a meeting three years earlier in Stockholm. During the Second World War Volvo started a cooperation with BM in the production of farm tractors and other machines. In 1950 BM, Bolinder – Munktell, was acquired by Volvo. The name of the company was changed in 1973 to Volvo BM AB in order to accentuate the Volvo ownership.

After a major reconstruction by Volvo in 1977 it was decided that Volvo BM should concentrate solely on the development, production and marketing of construction equipment.

During the Second World War aircraft engines were produced for the Swedish Air Force, based on licenses from the USA and Germany. With the introduction in 1954 of a tractor loader and with the diesel program already established, the foundation was laid to present a program of construction equipment and building machinery with particular emphasis on earth moving equipment. This was reinforced by the strong increase in demand during the 1960s.

In order to strengthen its position on the American market Volvo made the strategic move in 1985 to merge Volvo BM AB with Clark Equipment Corporation with their subsidiary Company Euclid. The product name “Clark Michigan” was changed into “Michigan”. The whole group was renamed The VME Group and one of the major companies in this group was VME Industries Sweden AB. From 1985 the VME Group consisted of the following trade names Volvo BM, Michigan, Euclid, Åkerman and Zettelmeyer, a long established German company.

In 1995 the Volvo Group acquired from Clark Equipment the 50% share of ownership in VME, previously in the position of Clark. The new group was renamed Volvo Construction Equipment (VCE). Additional companies were acquired in North America, France, Brazil, China and South Korea.
The Construction Equipment Industry offers all kinds of machines required in the construction area of activity, like road making equipment, concrete equipment, tower cranes, crushing and screening equipment, construction site hoists, dumpers, back drive loaders, hydraulic excavators, graders, compactors as well as earth moving equipment. The VCE production program at present includes wheel loaders, dumpers, scrapers, graders, articulated dumpers, hydraulic excavators, rigid haulers and an excavator loader model. On a world scale the VCE Group is the leading producer of articulated haulers and one of the leading producers of wheel loaders and rigid haulers. The VCE product and innovation profile includes in particular the articulated hauler concept, as well as the automatic power shift transmissions and quick-change attachment systems. In all some 150 different products are manufactured and marketed.

4.3.2 Company and industry structure

As indicated above the Volvo Group consists of several separate divisions which all report to the headquarters in Brussels. The focus in this study is on VCE Industries Sweden AB, where the staff function for standardization is located to Eskilstuna. There are three major manufacturers in VCE branch. Caterpillar of the USA is the leading company and makes approximately 15,000 units per year. Komatzu of Japan is second and is somewhat smaller than Caterpillar. VCE Industries is the third largest company and makes about 5,000 units a year. In addition there are a number of smaller manufacturers evenly distributed in most European countries but with a certain concentration in Italy. VCE Industries Sweden AB had a turnover in 1993 of 3 MdSEK.

Production facilities are located in Europe as well as in North and South America and Asia. Marketing and service are provided through a number of wholly owned sales companies as well as through independent dealers and distributors. The products are sold in well over 200 countries. Still it must be remembered that Construction Machinery Equipment is a low volume industry compare to cars and trucks. The major markets are in Europe and in North America. Asia is a growing and important market.

The Construction Equipment Industry is characterized by a few large multinational corporations and a large number of small and medium sized companies.

To summarize, the market is global and the competition is increasing. This is leading to more efficient product development with cost reduction
and shorter time cycles. New machines are introduced more frequently and product life is getting shorter.

This is a development when the required technique also must comply with a legislation which is getting more and more complex and costly. Implementation of new and more stringent safety legislation, including standardization, takes place at shorter intervals. All these conditions underline the need of global harmonization and standardization to avoid producing different machines models for different markets (Mimer).44

4.3.3 Directives

The EU Commission has published different Directives. One of the most important is the so called "Machine Directive", No 89/392, plus three additions per 1995-01-01. This Directive touches on practically all cases in this study.

The Directive has later been revised in 1998 and another edition is of 2006/42EC. This latter Directive will apply as European law from 2009-12-29 (CEN BT N7718 Rev 1, 2007-02-15).

Machinery is described in the Directive as “an assembly of linked parts or components, at least one of which moves, with the appropriate actuators, control and power circuits, etc, joined together for a specific application, in particular for the processing, treatment, moving or packaging of a material”. The manufacturer is responsible for verifying whether a particular product falls within the scope of the Machinery Directive.

The first standards based on the Machine Directive became a reality as of 1993-01-01 and is of considerable importance for manufacturers of machines and components (SMS; SIFU, Maskindirektivet 1994). It concerned strongly VCE and constitutes the basis for their corporate action in standardization. The same strategy would be applied by many corporations in similar situation. There was, according to Mr. Karl-Erik Grancrona, VCE, also a crystal clear ambition to follow the Machine Directive with emphasise on health, safety and environment. In the beginning of the process of European standardization the Directives were more extensive. With the New Approach a division has been made between firstly the legal part and secondly the technical part.

The legal part was taken care of in the Directive and the technical part is confined to CEN. The earlier system was more time consuming and demanded a time of six to eight years before a standard could be agreed upon. Today, six years is the desired maximum and this is an improvement, ac-
According to VME. The work within ISO has also been characterized by slow handling, the TCs meeting being held every second year or in 18-month periods. This has now been reduced to twelve-month periods.

At CEN the staffs was not sufficiently dimensioned for the new and extensive tasks given the organization. Only five-six persons were handling the work in 1989-90. In 1995 the number had reached sixty. In 2006 approximately 120 persons are engaged. In this connection the Vienna agreement, mentioned above, allowing CEN to use ISO-standards and vice versa, has been of great value. As long as there is an ISO standard or when ISO has started on a new standard, CEN does not start on a new series and vice versa.

4.3.4 Appointment of Technical Committee (TC) and Working Groups (WG)

Through their lobbying activities targeting the EU Commission and standard organizations VCE learned early of the forthcoming Directive. When the document was being prepared by the European Commission representatives of the corporation were kept informed of the development and had the opportunity to give their views on the contents, even before Sweden became a member of the EU. This early mutual interest and strategy helped to emphasize Swedish industry and VCE in particular as a source of knowledge for the standardization project.

VCE followed closely the development. DIN appointed Professor Gönner from Germany to Chairman of the TC. At the request of VCE, Mr. Hans Andersson, President of Sveriges Mekanstandardisering, (SMS/SIS), contacted Professor Gönner, with whom he was earlier acquainted, and in October of 1988 a visit was paid to professor Gönner by Andersson and the VCE representative, Mr. Karl-Erik Grancrona, also Chairman of the Swedish TK for corresponding machinery. At the meeting the interest and particular competence and size of Swedish industry in this area was emphasized. The Swedish ambition was to take charge of the forthcoming Secretariat for the WG on earth moving machinery. Professor Gönner duly thanked the Swedish representatives for their interest but he also pointed out the important German industry in this field, which had expressed similar ideas. He was not in a position to give any promises.

In December of 1988, Professor Gönner called the European national committees to a meeting for assignment of the Secretariats of the fourteen WGs to national committees according to table 4.3.1 below. Twelve countries were represented. The Chairman, Professor Gönner, started the assign-
ment discussion with the groups with the highest number and proceeded downwards, from 14 to 1. It was evident that the German representatives were most ambitious to be assigned several Secretariats. *Earth moving machinery* had been given WG 1 status. When half of the WGs had been assigned, Professor Gönner took the Swedish representatives aside at a coffee break and informed them that a number of countries, among others Germany, France, Italy, Spain and United Kingdom, had an interest in WG 1, concerning Earth moving machinery.

The discussions continued and after assignment of WG 3 concerning Drilling Equipment to Sweden (with Atlas Copco AB) another break was ordered before the two remaining WGs were assigned. When the meeting resumed, Gönner rather abruptly asked the head of the seven man large German delegation if he had correctly understood that the German delegation had no objections to allow Sweden to head the WG 1. The head of the German national committee gave the matter a very quick thought and replied with his positive confirmation to Professor Gönner.

At that moment the Italian delegation was forced to leave the conference room in order to catch a return flight back home. It was indicated by the Italian delegation, however, that they already had prepared a draft for standardization concerning the field of WG 1. From the Spanish side it was pointed out that they had no industry of their own of this kind. The French delegation had no objections to Sweden as long as the meetings were conducted in English or French. The representatives from the UK raised no objections and Sweden was entrusted the Secretariat for WG 1. It is the opinion of the Swedish representatives that they were assigned the chairmanship for WG 1 on the basis of established friendship between standardization officials in Germany and Sweden. The German committee hesitated to have the Secretariat placed in France or Italy and this opinion was later shared by the Swedish officials concerned.

*Table 3 Assignment of WGs to national committees in TC 151; Construction Equipment and Building Material Machinery*

<table>
<thead>
<tr>
<th>TC151</th>
<th>Piling and extracting equipment</th>
<th>DIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>WG 1</td>
<td>Earth moving machinery</td>
<td>SIS</td>
</tr>
<tr>
<td>WG 2</td>
<td>Piling and extracting equipment</td>
<td>DIN</td>
</tr>
<tr>
<td>WG 3</td>
<td>Drilling equipment</td>
<td>SIS</td>
</tr>
<tr>
<td>WG 4</td>
<td>Tunneling equipment</td>
<td>DIN</td>
</tr>
<tr>
<td>------</td>
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</tr>
<tr>
<td>WG 5</td>
<td>Mobile road construction machinery</td>
<td>DIN</td>
</tr>
<tr>
<td>WG 6</td>
<td>Machinery and equipment to process building material</td>
<td>DIN</td>
</tr>
<tr>
<td>WG 7</td>
<td>Delayd</td>
<td>DIN</td>
</tr>
<tr>
<td>WG 8</td>
<td>Machinery and plants for preparation, transport, distribution and fitting of concrete and mortar with hydraulic binding agents</td>
<td>DIN</td>
</tr>
<tr>
<td>WG 9</td>
<td>Thermal installations for the cement, lime and gypsum industries</td>
<td>DIN</td>
</tr>
<tr>
<td>WG 10</td>
<td>Machinery and plants for the production of pre-fabricated elements from concrete and calcium-silicates</td>
<td>DIN</td>
</tr>
<tr>
<td>WG 11</td>
<td>Machinery and plants for mining and tooling of natural stones</td>
<td>UNI</td>
</tr>
<tr>
<td>WG 12</td>
<td>Machinery and plants for the manufacture of fine, heavy clay and refractory ceramics etc</td>
<td>DIN</td>
</tr>
<tr>
<td>WG 13</td>
<td>Machinery and plants for the production, Treatment</td>
<td>DIN</td>
</tr>
<tr>
<td>WG 14</td>
<td>Demolition machinery</td>
<td>BSI</td>
</tr>
</tbody>
</table>

### 4.3.5 Organization of WG1

The somewhat unfinished Machine Directive was delivered by CEC to CEN for establishing of appropriate standards. The CEN Technical Board (BT) decided to instruct DIN to be in charge of the Secretariat for the Technical Committee, which became CENTC 151 for Construction Equipment and Building Material Machines. Under the TC 151 fourteen WGs were to be established for various types of equipment and products, one of these being Earth Moving Machinery.

The first meeting of the WG 1 was held in Stockholm in March, 1989, under the Chairmanship of Mr. Karl-Erik Grancrona, Head of the corresponding Swedish national committee and employed by VCE. The EU Ma-
Machine Directive had been thoroughly studied and the areas defined where standards were initially required. Eleven machine families had been distinguished.

The initial work was organizationally hampered by one member of a national committee who objected to most of the initiatives taken by the Chairman. The obstructive member was normally working for a Social Insurance Agency in his home country and was only remotely connected to standardization and construction equipment. At the request by the chairman to the person in charge of the national committee of this representative he was replaced and work could proceed. His countrymen had since been most cooperative, in the opinion of the Chairman. Preparations for an agreement on a standard require extensive discussions and negotiations. Normally a proposal is prepared and the members are asked for comments and then approve or reject the presented texts by hand rising. With over 30 participants from 9 countries it soon became obvious to Chairman Grancrona that time would be wasted with all persons discussing every detail and aspect. The WG was therefore divided into four smaller groups and each group assigned its specific tasks. This was a new type of work organization in standardization. The groups were given their tasks in the morning and asked to deliver their conclusions in a few hours or a day later. The composition of the groups changed sometimes according to particular competence of the members in the WG. After the first meeting, according to this scheme, it was decided to follow this pattern also in future meetings.

Sometimes when disagreement persisted, Mr. Grancrona had evening meetings, cocktails or dinner with the parties and the problems, mainly of technical character, were normally resolved.

As a strategy for the standardization work Chairman Grancrona proposed and introduced a reversed approach by placing the driver of the equipment in focus of the operation. The view and the conditions of the driver became the base and starting point in the establishing of the standards.

At the start of the work of WG 1 the agenda covered some basic points like:

1. What ISO standards are adopted as EN-standards?
2. What other ISO standards can be adopted as EN-standards?
3. Other international directives or rules which can become EN-standards?
4. Are there other national standards which can be used for the preparation of? EN-standards?

5. Is there a need for new safety standards for Earth Moving Machinery? (Developed, either by ISO or by CEN)?

The existence and use of many ISO-standards facilitated the work of WG 1, according to Grancrona. At the same time it must be observed that TC 151 worked in liaison with other CEN/TCs dealing with other product areas. At every meeting a group of three persons were elected to verify the notes of the Secretary and the agreements reached. The notes were introduced in a computer and examined and approved during and at the end of the meeting. The importance of an efficient Secretary was apparent.

A consequence of this organizational design was that WG1 got ahead of all groups in their standardization performance. However, work had been hampered by the fact that other standards, required for WG 1, had not been ready on time. These standards, as indicated above, were of other types, described as A, B or C – standards. An A-standard refers to matters like instruction books etc. B-standards deal with noise, vibrations, compressed air systems etc. WG 1 was working with C- standards, which concern complete units like tractor-dozers, loaders, excavators, dumpers etc. It was the ambition of CEN that the A- and B- standards should constitute the reference basis for the C- standards. Mr. Grancrona noted that the A- and B- standards were prepared by people of universities, authorities, testing- and approving organizations, thus referring to a difference in degree of ambition between representatives of these categories and the business sector. Representatives from business organizations dominated the C-standard groups who were anxious to have the work completed.

It was expected by the EU Commission that the standards according to the Machine Directive should be finished by 1993-01-01. Nobody realized, however, the extent of the work and the number of standards required. The preparation of A- and B- standards, chiefly by scientists and researchers, also demanded a much longer time than expected. In the committees for A and B standards the industry was not represented in a noticeable way, in the opinion of VCE, and this was an important mistake by the CEC. Now the C-standards had been ahead of the A- and B - standards.

Based on the Vienna Agreement between ISO and CEN it had been possible to use many of the standards from ISO/TC 127 as references. From the beginning it had been indicated that WG 1 was not supposed to use any ISO
standards. These extremely conservative views, in the opinion of Chairman Grancrona, were overcome. He believed that when finished standards already existed they should be put into use and not changed. The instructions to WG 1 were presented in the Machine Directive. The opposing view was based on the fact that the ISO standards are and remain voluntary while the EN standards are of a more binding character. An important aspect in this connection was that when the EN standard was implemented by a national committee, opposing standards were withdrawn. The basic argument was, and still is, to arrive at a free and liberal trade without technical obstacles. Grancrona referred to the cost of trade barriers, estimated in the 1990s by EU to amount to 17 billion SEK annually and to the ambition to have this amount reduced by 30 - 40%. Particular problems in the standardization process within WG 1 were new, relatively small products like mini loaders, compact loaders, mini excavators etc.

Another problem area was the electrical components. At an early stage a line defining the territories CEN/TC/151 WG1 and that of CENELEC had to be drawn. Unique situations confused e.g. in mining equipment and conditions and cranes. A third problem was connected with construction equipment which travelled on building sites as well as on public roads. The rules varied to a large extent from one country to another. WG 1 had worked for about three years before the Machine Directive was published in more complete shape. The WG 1 was kept informed of the ongoing discussions and preparations but Grancrona found it remarkable to start the assignment before the directives were established. He concluded that the WG 1 was actually ahead of the work of the Directives. But the EU officials were very open minded and listened continuously to the opinion and findings of the WG. Grancrona visited Brussels three times for meetings and discussions on a specialist level regarding the Directives. The Swedish secretariat realized and decided early to consider the machines under their responsibility as Machine Families. They proceeded to make The General Safety Requirements covering the different families. In a following step additions and exemptions were made wherever necessary for individual products. Within the WG 1, the new system met with considerable resistance at the first two meetings but at the third meeting agreement was reached on the administrative process. The system of working within TC/151 WG 1 regarding the General Safety Requirements has become a pattern for other WGs. The General Safety Requirements contain common requirements i.e. for steering systems, stability, notice, lightning etc. The machine specific parts, dealing with technical measures for the different machines, are machine families.
TC/151 was composed of experts from DIN as well as representatives from Environmental Protection Agencies and industries. The author has participated in a German WG meeting.

WG1 functioned during six years and completed its work on standardization for Construction Equipment and Building Material Machinery. The proposals were published in the Official Journal and the standards were harmonized as EN 474-1 to EN 474-2. As mentioned above, revisions have later been conducted.

4.3.6 Decision making within WG 1

All decisions within WG 1 were taken on a consensus basis. Chairman Grancrona especially stressed the need for the Chairman to have thoroughly studied the subject to be discussed and to maintain a flexible attitude. He found it useful to apply a mixture of pedagogic methods and psychology and it is also important to listen to the delegates - and sometimes also to say no with particular strong will, as were his findings. In some instances the standardization preparation process does not move from one square to another for quite some time due to the lack of ability or willingness to cooperate. The need of quality in leadership has been stressed as particularly important in the international standardization process (Tamm Hallström 1995).

As mentioned, Chairman Grancrona had developed a particular meeting strategy in two steps. One of the reasons being that the WG sometimes consisted of up to 40 people and it would require hours of discussions to arrive at decisions. The WG was during the meetings divided into four task groups with each one responsible for their special task. When time was appropriate to prepare a finished document, an Editing Committee had been selected by the Chairman to edit the final drafts. This Editing Committee consisted of one German delegate, one from France, one from the U.K. and one from Switzerland. The Swiss delegate had knowledge of the three languages, English, French and German. In the experience of Grancrona very few, if any, was capable of handling three languages with advanced technical texts.

The members of the Editing Committee were technicians and were selected by Grancrona also on their basis as representatives of important manufacturers. The Swiss member had a function as a Sales Manager in Europe for his American company for Europe, Africa and parts of Asia. The other members were in charge of standardization within their corporations. Mr. Grancrona was the Chairman also of the Editing Committee and had a secretary participating in the committee work. The drafts of the Editing Commit-
tee were presented to the WG. With the drafts already well anchored the consensus decisions were rapidly made. When a decision had been reached in a morning session, requests for changes after lunch, which could occur, were not allowed.

The coordinating efforts in the Editing Committee had been most efficient, in the opinion of many participants. Corrections and language problems were solved together. The draft was prepared in English with translations into French and German. No principle changes were made in the material as the Editing Committee was supposed to concentrate on adaption of languages. The documents were prepared at the same time in three languages, with time consuming translations and mail handling reduced to a minimum. The principle part of the job was done in the Editing Committee, Grancrona believed.

The next step in the draft editing process was the examiner of EUC, in this case a Mr. Paul Machen. Meetings were arranged with the Editing Group and Mr. Machen. He had some suggestions for improvement and clarity. One of the areas where some changes were made was in reference to "remote control". The proposed layout to the standards, with the general requirements in one part and specific rules in a second part, facilitated the process of changes. It was estimated by Chairman Grancrona that about nine months were gained in the time process.

Mr. Grancrona remarked that all members of the Editing Committee had become good friends. They were all strongly competing on the business level but worked well together in the standardization process and also enjoyed spare time together. The meetings of the Editing Group had been arranged at alternating locations.

Patents were considered to be an advantage to the owner but had not represented any obstacles in the work of WG 1.

4.3.7 Influence by VCE on standardization process and standard making

With the hope of being able to influence the preparation and development of a standard the Chairmanship had been of great importance, according to Grancrona. When nominated to chair the TC151/WG1 Grancrona was relieved from his previous duties, dealing with safety of the manufactured products, to devote 70-80% of his time to standardization.

As an example of advantages to VCE Grancrona demonstrated the draft to the new ISO standard on the machine lighting system. This was written by
VCE, based on the experience and development within the corporation and discussions with road and automotive authorities in several countries. A similar situation had applied also to rear mirrors. The consequence would be that some of the competitors, especially the smaller firms, would be forced to change their products. The participation in the WG and the chairmanship facilitated the introduction of standard proposals originating at the VCE company. It was expected that the published standards would be revised every fifth year and this schedule has in principle been followed. It was stated by VCE that as a result of standardization the products from the different suppliers had a tendency to look alike.

It is of interest to note that the WG 1 was in 2008 awarded the ISO Price for the Best Standard of the year.

4.3.8 VCE standardization strategy and organization

In the beginning of European standardization there was no written policy document within Volvo or VCE concerning standardization. According to the VCE President, Mr. Lars-Göran Moberg, standardization can be regarded as an essential and natural part of the corporate product development policy and strategy. This also appears in statements with regard to work descriptions for different departments or sections of the company.

Participation in official standardization activities within VCE was further developed around 1978-80. The process is in principle endless but the publication of a standard document represents a milestone. At the time of the interview the President of VME, Mr. Moberg, had been on his present position for three years, and he had a positive attitude towards the official standardization process. In his opinion the corporation has had advantages in product planning and product development. The time aspect is also important as valuable indications were gathered in the process of standardization with regard to tendencies of future development”. Moberg saw advantages for production as well as for marketing. Step by step, purchasing would also be influenced by the standardization process. As a manager he supported strongly his staff working with standardization.

The system of standardization rules was interpreted by Grancrona’s section at VME Headquarters. Grancrona states that the company has spent considerable resources on adapting the products according to the Machine Directive.

The VCE standardization organization corresponded to and supported the chart as suggested by Hesser above (p 54).
4.3.9 Product development and standardization

At the VCE Corporation Grancrona had been in charge of the national and European standardization process since 1988. He had a military background and training and was an officer of the Swedish Army. He retired from VCE in 1998 and was replaced by Mr. Jan Mimer, lawyer and expert on product responsibility.

With regard to technical development, the products of VME cannot be considered as mature, in the opinion of Mr. Mimer, Corporate Lawyer. Still some areas, light systems and rear mirrors, were not yet harmonized in standards. Thus, there was a continuous development in the "state of the art".

The staffs of the standardization function are organizationally positioned within the department for product development. About 500 employees are actually working with product development and innovations. Four employees were handling the standardization questions. Mr. Grancrona was in charge of the tasks connected with ISO and CEN and the national standardization committee. Mr. Jan Mimer, lawyer, was working with implementing the official standards within the corporation. Two members of the staff were working with the development and use of standards, i.e. for nuts and bolts, within the organization itself.

With the large number of employees engaged in product development VCE was in a position to be able to present new ideas, new inventions, frequently on the market. The major advancements were protected by patents but other innovations were made available to the customers as optional components used to facilitate sales.

The implementation of standards had been systematic and well planned. Managers, engineers, mechanics and others had been trained and given instructions on the standardization process and rules. To make all information available to the employees, laws, standards, rules and regulations are registered in the company data system. The knowledge must not be confined to one or two persons. The four staff members sell their services to all subsidiary companies within the group. In every company a responsible contact person has been appointed for standardization matters.

During the last few years VCE had spent substantial resources in product development. It was the opinion within the corporation that the "state of the art" in their industrial branch had been raised. This would have consequences on the competition.

A special C-standard had also been developed by and for the VCE Group. This was in accordance with the demands of the Machine Directive for a
The harmonized standard, in addition to the standards that are normative references in this standard. It is the normative standards which tell or prescribe in detail how things should be.

The corporate lawyer, Mr. Mimer, pointed out that those standards are written by technicians for technicians but they must not work alone. The documents represent a legal base which demands a certain consideration. The labour and environmental agencies also have an interest in the process.

From the marketing point of view, the market does not pay any extra for safety or for more environmental friendly products, Mr. Mimer stated. The market demands the products according to the EU Directive. In the view of the law maker the demands of the market were included in the product, Mr. Mimer concluded, and leave to the manufacturers to improve the "state of the art" and to the consumer to make a cost/benefit analysis.

Mr. Mimer described the curve of the development of the "state of the art" as proceeding step-wise. Sometimes an important step upward is taken and sometimes long periods with horizontal portions occur. In an economic reality it can even be perceived that the curve slopes downward. In certain periods the machines can be too heavy because of all extra equipment and the elimination of the extras represent a sloping curve. From the point of safety you can never produce a machine which is 100% safe and this is a part of the background to the discussion of the "state of the art" concept. Sales material, instruction books, commercial films etc were examined by the standardization officers to verify that all material was in accordance with the Machine Directive and standards. The understanding of the importance of the process is to-day universal within the corporation, He saw the "state of the art" as a chain involving: mechanics - electronics and standards-economy. The established standards and the "state of the art" give the levels established and manufacturers who do not reach this level will either have to adapt their products or otherwise see their products disappear from the market. By 1995-01-01 all products were supposed to carry the CE-mark or be declared to be in "conformity".

Mr. Mimer underlined that the company did not want to figure in a legal case regarding product liability. The participation of VCE in the standardization process aimed at influencing the development in a direction favourable to VCE.

For many years, VCE had as a product strategy to adapt their products to the standard requirements in every country. This had created a situation of instability and had also demanded considerable resources. One difficulty had been to determine the direction of the US. standardization requirements. The
Japanese had earlier chosen to go their own way but during the last few years the tendency was to converge on ISO standardization. Mr. Mimer also pointed out that earlier no particular long term strategy had been developed for dealing with official standardization. Regular conferences on the subject were organized within the corporation and before every meeting with a TC or a WG a planning, or strategy meeting was held to arrive at a common position. In these connections we also draw on the experience of our marketing department, Mr. Mimer declared.

In 1993 a study was made within the company on the interest and knowledge of the Machine Directive and standardization. The question was considered to be of minor importance at that time, especially in a marketing perspective. People were taking safety more or less for granted and as a compulsory item, Mr. Mimer said. It was difficult to make the customer buy the machine on the basis of safety and standardization arguments. But this view was rapidly changing. Politicians and also business leaders realized that hospital and sickness costs must be reduced and under those circumstances machine safety became important. This was also the basic message pronounced in the Machine Directive, according to Mr. Mimer. And now there is the requirement to have the products marked with the particular "CE" - mark. Some of the smaller, competing manufacturers had proceeded to mark their products with "CE" but we were not fully convinced that they were aware of all the obligations. We have thoroughly examined our products and verified through protocols every step taken, Mr. Mimer pointed out. In our products we already have the technology and components which meet the demands we expect to encounter in three years from now. This is a continuous process to which there is no end, in the opinion of Mr. Mimer.

Within the staff group of Grancrona-Mimer, strategy discussions were becoming more frequent as they found the subject to be complicated and difficult with a number of gray zones and views of society to consider. As an example of one of the important questions under discussion were machines "on and off the road". The ultimate desire of the marketing department would be to have a loading machine or an excavator to be able to run at 120 kms per hour on the highway, Mr. Mimer mentioned as an example.

European standardization had influenced VCE in many respects, not only in development of products but also with regard to quality and environment, marketing and relations to society. The industry branch wanted an immediate harmonization of the standards as they do not want to pay up to 400.000 Swedish Crowns per machine to have it approved in separate countries, i.e. Italy, France and Germany, Mr. Mimer stated. Daily, we have had to answer
to questions from different authorities in different countries and this has cost us and the customers substantial amounts of money, Mr. Mimer pointed out. As an example of double inspection by authorities the following could be required in Germany: - Traffic type inspection, - TÜV Technische Überwachungsverein; Labour welfare inspection, - TBG Tiefbau Berufsgenossenschaft.

Investments required by the introduction of new standards had normally been discussed and agreed upon within the corporation before the decision was taken in the official institutions. No particular limits or directives had been given to the corporate representatives in case of rapid decisions at meetings of the Technical Committee or Working Group. Representatives of the subsidiary companies in Germany and other countries had participated in the standardization work within national committees of other countries. This was an advantage for VCE which also participated in the USA in similar standardization programs.

All products made by VCE were included in the standardization process. Standardization had lead to changes in the products of VCE since 1992. The size of the production series is only marginally influenced by standardization.

The patent instrument was an advantage and VCE was the owner of several important patents. In the standardization negotiations there had been no problems in this regard.

4.3.10 CECE, CONEQT, Industry policy document

Twelve national associations within the European Construction Equipment Industry have established a Committee for European Construction Equipment, CECE, with Secretariat in Brussels. In cooperation with, and support of the European Commission, CECE has taken the initiative to present a Project Document considering the situation of the Industry in Europe, in particular with regard to European policy and long term strategic objectives. The project, called CONEQT, Construction Equipment for tomorrow, has been prepared by a Team of thirteen representatives of the industry and Secretariat. Mr. Jan Mimer, lawyer of VCE, has been a member of the project team and the views of Volvo and CECE correspond. As one of the ways to improve competitiveness and trade opportunities outside of the EU the continued support of international standards and recognition as harmonized standards are deemed important to the industry.
The European Construction Equipment Industry has identified a number of policy areas to which they want to draw the attention. Nineteen recommendations have been formulated with a view to reinforce the position of the global status of the industry and define objectives in the areas of standardization regulation, environment, safety and research. The industry approaches the so called Cassis de Dijon-principle by declaring that a product which has been approved in one EU Member State should also be accepted in the other EU Member States, according to the principle harmonization, “approved once”, and accepted everywhere (CECE 2007, p 4).

According to the CECE, the European Construction Equipment industry comprises around 1.200 companies with 140.000 employees. The turnover of the industry amounted in 2007 to approx. 31 billion Euros, corresponding to 5 percent of total engineering production which is also 30% of the worldwide production of construction equipment. Also, over 30% of the annual production is exported outside of the EU. North America is the largest market with 39% of consumption, Europe 27% and 23% for the Far East countries and 11% for the rest of the world.

It is underlined by the CECE Project Team that for continued growth and survival, the manufacturers must be able to compete in virtually every market against competitors from every market. Competition from low cost countries in the Far East is increasing the pressure on the European Construction Equipment manufacturers. China, India and Russia represent developed technologies and future serious challenges (CECE p. 6).

The European home market for construction equipment is a most regulated market. The Industry admits, however, that this has been an advantage in connection through the creation of the single market. The safety requirements from the New Approach have been advantageous and the use of harmonized standards has provided opportunities for global standardization. On the other side, the Industry feels that there is a lack of a coordinated European policy, which is putting a great burden on the European Construction Equipment Industry. Too often, there is a promulgation of new and unique rules in the different Member States where European frameworks do not exist. Even if they do exist, new regulations are passed which lead to market fragmentation and negative consequences contrary to the ambitions with the creation of the single market.

In addition, it is pointed out by the industry, that an inadequate level of market surveillance is harming the competitiveness of the European Industry. Self-declaration has been a strong force of development for the European legitimate manufacturers but the presumption of conformity is being abused
and the lack of market surveillance encourages non-compliant machines being imported into the EU in increasing numbers. The European market is created and represents a major competitive advantage, the industry maintains. But the next step now is the global market with a changing operating environment and uncertain regulatory pressures which need to be addressed, according to the industry report (CONEQT 2007: p 7).

On top of their list of recommendations, CONEQT has placed Better Regulation. Article 95 of the EU Treaty, dealing with the free movement of goods should be the basis for any new regulation (ibid. p. 8).

In a Document 2007/08:140 of April 17, 2008, the Swedish Government informed the Parliament of the participation of the Government within the area of standardization. It is emphasized that the accelerating global process is changing the conditions for standardization. It is stated that participation and influence in the development of standards is required in order to allow for the demands of the society with regard to safety, efficiency and durable development. A target for the Swedish research and innovation policy would be increased development of research leading to development of new products, processes and services. Standardization would contribute to increased commercialization of the results of research. The Swedish government declaration seems to be well in line with the ambitions and recommendations of CONEQT.

Instruments, like standardization, have to a large extent helped the European Construction Industry to remove barriers to free trade, but a true single market does not yet exist, according to CECE. They have found that important differences between the Member States still exist. Construction equipment operators are sometimes unable to compete for work across borders due to the need to modify and have recertified their machines according to local rules.

CECE is of the opinion that a significant number of machines and systems related standards exist which could support a legislative framework based on the New or Global Approach.

As part of proposition three, CONEQT brings The European Standardization Process into focus. It is underlined that

- The basis of a harmonised CEN standard is that it is a consensus position of experts involved in its development and with the approval of a safety consultant who checks that the EHSR's (Essential Health and Safety Regulations) are correctly interpreted and fulfilled. Standards developers are
stakeholders having an interest in the standard and normally come from industry, research and test institution, trade unions and public authorities responsible for safety enforcement. The procedure for developing CEN standards is both democratic and transparent. Despite this excellent fundamental principle the standard process is being jeopardised and the free market impeded by the possible misuse of the safeguard procedure foreseen in EU Directive (ibid p. 12).

In the CONEQT Project, under recommendation four, CECE has found an alarming tendency that some representatives of public authorities are working in forums which are developing sector specific guidance that conflicts and competes with harmonised standards. In line with the EU ambition it is pointed out in the CONEQT document that harmonisation and standardization of the requirements is a way to remove the trade barriers. CECE points to the WTO “Agreement on technical barriers to trade” which relates the lack of standardization to the technical barriers to trade and emphasizes on standardization and mutual recognition as being the right path to advance trade issues on the global marketplace. For VCE, CECE represents a network in which the company plays an important role.

4.3.11 Standardization and competition

The corporate competitive situation was strongly influenced by standardization, in the opinion of Grancrona/Mimer. The standards give the minimum level and allow the manufacturers to decide where to place their own levels. At VCE the minimum levels are generally exceeded and that is the area where the company has positioned itself with regard to its competitors. Some competitors have raised their minimum levels but many are left behind. Most of the major manufacturers have raised their product levels but some manufacturers were likely to encounter problems in the future, according to Grancrona. A manufacturer, participating in the official standardization process was to some extent working on his own protection, in the opinion of Grancrona. As an example he stated the circumstances when the pressure vessels of VCE were not permitted for use in France, although the products were just as good as the French. It is one of the ambitions with European standardization to eliminate actions of this kind, according to Grancrona. If there is a manufacturer in a certain country, and a standard is being prepared, you try to develop the standard according to the level where your own prod-
uct is positioned. But, it is emphasised, that when it comes to health, safety and environment, the "state of the art" has to be followed. Another aspect of the participation in standardization is the knowledge gained on competitors. Certainly, the competitors were well known to the marketing department but the contacts have been widened through the standardization process, Grancrona stated. We have knowledge of the persons responsible for different tasks and new relations had been established. In a certain way VCE also gets more knowledge of the competitors, even if everybody tries to keep some knowledge secret. As an example VME had put down considerable efforts concerning emissions from engines. The levels prescribed for the years ahead had already been surpassed. At the same time VCE was aware that many competitors also made great efforts to improve their products. Grancrona believed that at VME the standardization instrument was applied at 100% in marketing, purchasing, and manufacturing, product development, in tools and in work systems. Extensive material for training of personnel had been prepared and was used within the corporation. Grancrona believed that standardization had given his company a considerable added strength.

In 2001 The Volvo Group acquired Mack Truck in the U.S. and Renault Truck in Lyon, France. The Volvo 3P unit was established, consisting of the Swedish Volvo Truck and the two acquired units in the U.S. and France. The project had several ambitions, one of which was to arrive at a common, shared truck platform for use in all three brands. With the support of standards, produced by the Corporate Standards, CS, within Volvo it was believed that synergies and knowledge could be transferred to all three truck plants. However, the technicians in Lyon were not making full use of these standards. The problems have been studied and reported in a Master Thesis by Caira and Liuha at the School of Business, Economics and Law, Göteborg University, (Cross-brand standardization – A case study of Volvo 3P, 2007). The definitions and interpretations of standards and standardization are based on Brunson, Jacobson (2000). The research problem was to find out how the process of standardization could be improved in order to increase the usage of common standards within Volvo 3P Lyon. The results point to a number of problems, lack of communication, resources, language, and management shortcomings etc.

VCE had transferred the general requirements of the Machine Directive to concrete demands in the standard. At the same time it is a strategy for the company to exceed the lower limits of the standard and to find itself in a better position in many technical areas, like noise reduction etc. Then this is used as arguments in the marketing efforts. It had not been the ambition of
VCE to work for a low standard level in areas where we are strong, only to
develop sales arguments, Grancrona remarked.

President Moberg believed that companies which have chosen to remain
outside the standardization process would encounter difficulties in the future.
But many of these, mostly small companies, are surprisingly tenacious and
reappear after one bankruptcy after the other. Moberg found it correct to
conclude that standardization will demand an increase in the general price
level of the company’s products of about 2 -3%.

VCE had taken the initiative to new standards wherever the company saw
a need. The basic proposals mirrored the experience of VCE and the prod-
ucts made by the company. The competitive position was step by step im-
proved.

Based on the fact that detailed descriptions and information were given in
the standard documents Mr. Moberg found that standardization to some ex-
tent could facilitate entry into the branch. But for the smaller manufacturers
and sub-contractors problems would arise from the demands of increased
knowledge and stronger quality rules.

Moberg also emphasized that information on competitors was available
not only through standardization. The products of the competitors were thor-
oughly studied in many instances and places. The corresponding status of the
machines of the competitors with regard to standardization was well known.

Mr. Grancrona considered his task with standardization to be oriented
towards Europe and was supposed to reinforce the European competitive
position. However, the sales organizations of the US and Japanese manufac-
turers were represented in the European standardization programs. They had
been most observant but were in no position to influence the process. There
had never been any disagreement or controversy but they had been required
to adapt to the European rules and regulations. The technical barriers ob-
served by the non-European representatives, were in a European perspective,
only in matters of safety. A number of small manufacturers did not partici-
pate in the standardization programs due to lack of resources and also due to
lack of understanding of the importance of standardization, in the opinion of
Mr. Grancrona. He considered them to be spectators who did not quite un-
derstand how to participate and how to influence the process. In addition,
lack of knowledge of foreign languages in the small corporation was a severe
problem. Grancrona saw two types of subcontractors: those making old
products and those making new products. The manufacturers who had not
yet adopted the new standards would soon encounter difficulties, according
to Grancrona.
The VCE position with the Chairmanship and the Swedish secretariat had given VCE a strong platform to influence the standardization process. With few exceptions, i.e. for lights and rear mirrors, the European harmonized standards now exist and VCE believes themselves to be in a strong competitive position as a result of their standardization strategy.

4.3.12 Cooperation VCE with the Secretariat TC 151/WG 1

The Trade Organization, Sveriges Mekanstandardiserings (Swedish Mechanical Standardization Organization; SMS) now SIS, has served as the Secretariat for WG 1.

Mr. Hans Andersson, (HA) was the President of the Organization and Mr. Jan Olof Andersson, (JOA) Secretary, both with long experience of standardization. With our engagement and participation in European standardization we are leading the development, Mr. Mimer stated, and if others were ahead of us with the "CE"- mark it was due to their ignorance. But, of course, we may also have the phenomenon of overdoing, Mr. Mimer said. Within our group of four specialists we often have deep discussions about how far to proceed to arrive at a reasonable level, Mr. Mimer admits, and this is a heavy responsibility. If you position yourself too high on the safety scale on a product which is already reasonably safe the competitor may chose to position himself on a lower scale and you lose the business. The customer does not want the cheaper machine; he wants the safety he expects and is not willing to pay for anything else, Mr. Mimer concluded.

Mr. Hans Andersson, President of SMS, strongly believed that standardization was increasing competition. Europe was becoming one, big market with easier access through standardization to all national and regional markets. In one particular area, the subcontractors, standardization will place increased demands on the company with regard to knowledge and better use of material and capacity to supply entire systems. They will be required to be familiar not only with products but also with rules and regulations.

We were approaching a period in Europe with considerable increased competence among the suppliers as the components will be more and more advanced, HA pointed out.

The situation for the small and- medium sized industries, SMEs, was becoming more and more important to the national states and to authorities, including the EU Commission. With regard to standardization it was a matter of knowledge, where do the SMEs find it, can they read it, understand and
apply it in practical use, HA asked rhetorically? And the standards were not always translated into your own language, was another point raised by HA. He also saw the next few years as critical for the Swedish small industry with, at the same time, great potential if they were well managed. After all, the Swedish companies were leading when it came to application of rules regarding standardization. It was part of our national heritage, HA believed, and compared Sweden with neighbouring Denmark, which at that time was leading in adaption to the EU directives.

In Germany standardization was conducted in another manner, on a higher level and they (DIN) were obliged to teach the companies. In Sweden the companies were capable to handle the issues themselves, in the opinion of HA. But only 10% of the standards were translated into Swedish. This is no problem for big industries but the small firms were hampered in their development. SMS had requested SEK 15 million from the Government to provide a translation service for the industry and the matter was still under discussion.

SMS/SIS gave and participated in courses and seminars on standardization which was rather rare in other countries. We have to move our positions ahead in order to maintain a high level of knowledge, also in the field of standardization, HA believed.

SMS/SIS worked closely with about 150-200 companies which also participated in the financing of the organization. Within the mechanical industry some 8,000 - 10,000 companies were active and totally SMS estimated that some 40,000 firms were affected by standardization. SMS reached effectively about 1% of the total and 99% are not even aware of standardization, Mr. Andersson believed. Every month material was distributed free of charge to some 6,000 companies and SMS/SIS spent a lot of their resources on information, he underlined.

The price of a standardization document varied from SEK 200 to 6,000. A complete collection costs several hundred thousand SEK.

At the end of 1980s we could have moved our positions ahead considerably if the important actors on business scene, Federation of Industry, Federation of Mechanical Industries, the Labour Unions etc, had listened to our pleas, HA stated. But they were not organized to handle questions of this kind. We informed the labour organizations but they only concluded that they were not organized for standardization. Instead they had knowledge on rules regarding labour protection. In HA’s personal opinion the Federation of Mechanical Industries should have pushed this question much stronger but they missed the possibility to take a leading position. They should have
talked with EC/EU Commissioners; politicians etc and then advised them on what to do. Instead, three individual companies acted forcefully, ABB Robotics, Atlas Copco and VCE. The Federation of Swedish Industry had too few lobbyists. Still, Swedish standardization had a good reputation internationally and SMS had often received requests for assistance and cooperation from other countries, i.a. Germany. But it was difficult to make management understand the importance and possibilities with standardization, HA felt.

The relations to USA and Japan were also sometimes rather strained with regard to standardization. In the USA Europe was sometimes described as a Fortress in this connection. HA felt that Europe sometimes was used in this direction i.e. when introducing global standards from ISO into EN. When the standards become EN standards they were no longer voluntary and suddenly the preparation of ISO standards becomes very detailed. In many of the European committees Japanese representatives are participating.

From the marketing point of view a standard can be used as part of the information package connected to the product. In that way the manufacturer is telling that the product is made according to standard and corresponds to the established requirements. We will see much more of this in the future, HA stated, and standardization can be used extensively in marketing. The big problem was that very few leaders realized what the issue was about. We have been fumbling with the question in Sweden for years and our authorities had no leadership in this regard, HA concluded.

SMS/SIS was established in 1919. The organization had as an object to initiate, advice and coordinate standardization within the Swedish mechanical industry and coordinate the international relations. HA had worked with SMS since 1981, first as Technical Director and since 1983, as President. His views were collected to illustrate the cooperation within an industry regarding a specific product area. The ambitions to promote Swedish participation in European standardization had been accentuated in 1984-85, according to HA. It was considered important to protect and advance Swedish interests in the European standardization process. At that time the initial discussions regarding the Machine Directive were held.

“We looked upon the planned document as an embryo to be considered in connection with the New Approach”, HA stated. The activities and support of SMS/SIS were essential in the development of standards for earth moving equipment, he believed.

The draft to the Machine Directive gave complete liberty to the manufacturer. No tests, evaluations or controls were imagined. Later, the requirements placed on the manufacturers came forward. We felt within our organi-
zation, HA stated, that this was very important to follow by and for Swedish industry. Standardization was already high on our agenda, especially when it comes to production technique, and we believe that we were rather well advanced in this field. In Sweden there are several mechanical industries competing successfully on the international market. Also, the environment, safety with the machines, organization of production environment etc. have been important to us. Thus, we managed to open constructive discussions with officers of EUC and EFTA and we invited members of the staff of EC/EU to visit our annual spring meetings to present and discuss their views. In that way we entered the standardization process at an early stage, HA recalled. VCE and their industrial group had for many years been engaged in standardization. They were early aware of this phenomenon. And in VCE we had a partner who strongly and in a serious way took care of their possibilities to satisfy the requirements of the authorities. Thus, together with VCE and also with Atlas Copco Corporation and ABB Robotics we got involved in this particular standardization process. The three companies acted very consciously for standardization in their respective areas and products, which were often complicated and sometimes dangerous to handle. In other words, we got a team of very forceful and determined members, HA pointed out, and we soon realized that we were in a rather unique position. The Directive was being prepared with regard to the legal contents, and standardization was prepared with regard to the technical contents. We could only influence the Directive through working on our relations with the officials of CEC, even if Sweden was not a member of EC.

In the standards area, Sweden was a full member with voting and deciding rights. It became obvious for us to concentrate will full strength on standardization, especially since we had very competent people at our disposal. These companies were all acting at the top of global technology. As an example HA described the efforts on behalf of Swedish manufacturers of heavy road vehicles, Scania and Volvo, to arrive at standard length of maximum 24 meters for the trucks. The general requirement was established at 18 meters, but with some exceptions. One experience gained from these contacts, however, according to HA, was that our arguments were well received and that fruitful relations were established for future cooperation.

When CEN was requested by the European Commission to establish standards with reference to the Machine Directive, Sweden did not have the capacity or competence to handle the secretariat. The Germans, through DIN, took the initiative with regard to construction equipment and building equipment machines. At the meeting in 1989, described above, when the
WGs were assigned, we acted rather forcefully, HA stated, and had to meet arguments especially from France, which country also had an interest in our product areas. Sweden was supported by some of the important countries, which earlier in the meeting had been assigned other WGs. Actually only one person was expected from each country, but the different countries, especially their business corporations, wanted to protect and to work for their own interests. This made the task very complicated and difficult. From the beginning the standardization process was badly organized. The structure of work and structure of meetings were hampered. The A- and B- standards were lagging behind and they were supposed to serve as bases for the C-standards to be prepared by WG 1. All this has demanded a substantial input of work and efforts, according to HA.

There had been no particular rivalry between the manufacturers - competitors, HA felt, but rather between the Technical Committees, TCs. The committees believed that various tasks belonged to their respective domain. HA particularly endorsed the excellent work of Mr. Grancrona, with perfect knowledge of language, technology and organizational talent, as well as his associates and the VCE Corporation.

HA had also met with Mr. Tuve Johannisson, President and CEO of the Volvo Group, of which VCE Sweden AB was one part. HA was satisfied over the support provided by the head of the Volvo Group to the WG as well as to Grancrona. HA regretted at the same time the reluctance of top management to get involved in the standardization process. The relations of SMS/SIS with the industry were on expert level and HA would like to see more involvement of top management in standardization issues. SMS had worked too many years as an information channel, HA found. There was a strong need to elevate standardization to a strategy and top management issue.

Work had now advanced to the position that manufacturers were obliged to follow the rules and regulations. And the problems were particularly apparent on mid-management level, in HA’s opinion. Many companies were lagging behind in their product development and took substantial risks. The CE-mark was like taking a legal oath that the machine was in accordance with the safety requirements. If an accident happened, related to the machine, the manufacturer was responsible, then there was no way to escape. In addition to compensation for damages, the machine could be removed from the market.

A machine must not be sold unless it carried the CE-mark and was accompanied by the certification document. It should be noted, HA pointed
out, that all technical documents were not yet prepared and during the first few years the demands would be somewhat more lenient. The public process on the part of the authorities had not kept up with the development.

VCE had acted according to the ideal strategy and they had created the ideal position, HA believed. They can act early in the product development and change process. If they had not participated, the opposite would have prevailed, HA thought. You leave room to the competitors to make their technical solutions the accepted standards. It was just as important to act against your competitors as to act for your own solutions. Such a strategy cannot of course be conducted openly to any larger extent, but it was just as important as to arrive at a finished standard. HA here saw strong counter-forces in the standardization process represented first of all by the competitors. In the standards one should not give the technical solutions but formulate the requirements. HA, as well as Ollner /VLT) quoted an example of ABB Truck AB which company manufactured electrically driven trucks. The Directive for this type of product was published in 1986 and gave detailed information about the requirements for the products in order to be admitted on the EU market. In the Directive it was stated that the battery tension must not exceed 96 volt as otherwise the risk of ignition sparks was too high. In order to compete with corresponding German and French diesel driven vehicles ABB Truck had earlier started to develop trucks with a higher battery tension than 96 volt. With the Directive of 1986 the whole EU market was suddenly closed to the Swedish manufacturer. ABB Truck was forced for many years to find a solution to the problem. The company had to work along three strategy lines to achieve a change in the Directive:

1. Contacts with other manufacturers; most competitors agreed that the Directive of 1986 should be changed but many still manufactured gasoil- or diesel driven vehicles. The interest in cooperation therefore was rather limited.

2. Contacts with EU negotiators. The officials awaited the development and nothing happened.

3. Active participation in Swedish standardization within SMS/SIS jurisdiction in the development of a new EN standard. ABB Truck was ahead in the development and there was a possibility that the larger trucks could be approved in Europe and the market reopened. Many years had, however, been lost.
Thus, it is a technical game, as well as a tactical game and the solutions must turn out to my advantage, HA stated. But, he added, it was also a matter of information, you learn a lot from the association with your competitors. It should be remembered that you are working with the leading experts in Europe in your particular field and that everybody endeavours to have an open technology. Some companies which do not reach the technical requirements will disappear and exit from the branch.

It was realized at an early stage within VCE that standardization was important, JOA stated and he believed that the work had been of great value to VCE. By being inside the standardization vehicle, VCE had first of all had a longer period for adaption of their own products and secondly they had been able to promote technical solutions based on their own technology.

Within VCE Mr. Grancrona had strong support for his work. At the first meeting the President of VCE was present at the evening dinner. This was highly appreciated and established a high level for the work. The Directives coming to Sweden were handled by the Board of Trade (Kommerskollegium) and SMS had made the interpretations and translations, JOA pointed out. All proposals to standards in the mechanical area were sent from CEN to SMS. These proposals were published in the monthly publication of SMS and SMS invited comments and views.

The proposals to standards from the WGs were sent to national committees for due “first time comments” within a 6-month’s period. During these six months there was a possibility to influence the final preparation of the standards to some extent but not in any major degree, JOA remarked. One condition was, however, good knowledge of languages, as the drafts were presented in English, French and German.

The comments were returned to the TC which normally forwards the documents to the WG involved. The working groups normally consider their task completed with the first proposals and any major changes would have to be very well documented. Another change would mean continued work, change in products and adaption of new rules. The Swedish comments to TC 151 were prepared by TK 251 under the chairmanship of Mr. Grancrona. In TK 251 representatives of industry, the Environmental Protection Authority, (Miljö-skyddsverket) participated. In the second stage all comments had been evaluated and the new proposal was put to a formal vote, either yes or no. This had to be concluded within two months and each country had a certain number of votes, in the case of Sweden five. In this stage only editorial changes can be considered, JOA declares. In ISO every country has one vote. The second standard proposal is sent by CEN to the EUC, where it is
evaluated by officers and consultants on the basis of possible value and use by industry and society. If the officers consider that these proposals meet with General Safety Requirements as required by EUC the standard will be published in the Official Journal and thus, harmonized. Each country is now obliged to implement the standard. In branches where one company was technically way ahead of others, standardization was not possible, according to JOA. Should a company manage to get its unique product as European standard it would mean a considerable and unfair advantage for the company in question. Efforts have also been made to establish patented products as standards but this had so far been avoided. In the electronic industry, however, this was a great problem. Countries with strong industrial traditions tried to influence the development in a direction favourable to its industries. Multinational companies which work on many national committees have in that way, through their representatives a particular advantage to promote their own views. A strong market position also adds to the possibilities to influence the development in a direction favourable to the company, like Caterpillar, JOA pointed out. He supported the experience that through the standardization process you get an insight into the products of the competitors which can be useful in developing your corporate strategy, technically and with respect to marketing.

Mr. Andersson also believed that his WG1 had functioned well. As Secretary, you coordinate all activities and a valuable experience was gained. Mr. Grancrona was not a technical specialist but was supported by experts at VCE. JOA believed that DIN had dominated and influenced the European standardization process. DIN had considerable resources, many and well prepared representatives. The French delegates had a tendency to be more formalistic and missed the contents of the standards. To many companies the process of standardization involved investment costs, in machinery, marketing etc, JOA stated. As a further example he referred to a discussion regarding the height of the interior of the cabin of an excavator. An agreement had already been reached and the companies in the industry had started production planning in accordance with the agreement when a new proposal was presented. It was revealed that another change, according to the new proposal, would cost about one million SEK to every company.

Through the introduction of the management standard ISO 9000 an increased interest in international standardization had been noticed. Through standardization, entry into the branch was facilitated. The interest from Russia had been particularly present, according to Mr. Andersson.
4.3.13 Views on the European standardization process

European standardization was an enormous task, according to HA. The standards of, at that time, eighteen countries, were supposed to be merged. The cornerstones were laid out without knowing how the building should look, HA explained. And this applied to the standardization system as well. Small step by step decisions had been made which had created a chaotic situation. Also, within EU the situation had not been satisfactory, which had been damaging i.e. to the Building Directive. It should be remembered that the mechanical standardization started 75-90 years ago and standardization within the building industry 25 years ago, HA stated.

The counter forces to the EU administration were the big standardization organizations. The DIN organization felt that in their view the development was out of balance and they became very active, HA felt. We also had the testing and approving organizations which all strived to take as large a piece as possible of the action, according to HA. Much of the development had to be conducted in parallel sessions and not in a step by step activity, one organization after the other organization. In addition it was not necessary to have the representatives of eighteen countries meet. Smaller groups can do the job, as been seen in TC 151.

Lobbying was an important and planned action by VCE and also by Ansell Healthcare. It was directed towards EUC, CEN and NSOs as well as towards colleagues and customers. According to Jutterström (2006) lobbying is a phenomenon of increasing value. Through lobbying the management of the companies obtained early information of discussions regarding their product areas and also had the possibility to express their views and influence the development.

EC/EU Directives were not yet established and published and the CEN organization not fully staffed when work on standards started. VCE acted rapidly with regard to the Swedish NSO and together they informed the responsible officers of EUC, CEN and the Chairman of the forthcoming Technical Committee of their willingness to assist in the WGs.

Through the cooperation between VCE and the Swedish standardization organization SMS/ SIS, the Secretariat WG 1 of CEN TC 151 was placed in Sweden under the Chairmanship of Mr. Karl Erik Grancrona of VCE. The Swedish company Atlas Copco had worked along the same lines.

The strong position of Bulten was already established from engagements within ISO which above all demanded special working relations with DIN, AFNOR, BSI and other NSOs.
Another aspect concerning the three large companies in this study was the involvement of subsidiary companies in foreign, national committees. Through participants in committees in other countries they could present the views of the mother company and gain information of direction of discussions.

An important experience from the case of VCE, is the organization of committee work by Chairman Grancrona and the Secretariat under J O Andersson. After some early, problematic meetings the work to establish the required standards went rapidly ahead. Frequent consultations between EUC and CEN and the Swedish Secretariat were held to coordinate the views on technical matters. The first standards of WG1 were established ahead of others and ahead of schedule. In view of the large number of delegates the work had been divided in steps with groups given specified duties. After presentation of agreed drafts an editorial group prepared the text in the three languages simultaneously and in the last step consensus became a rapid formality.

This pattern for the work was later followed by other WGs and in the following revisions a similar work organization has been followed. As most of the standards proposed already existed within the VCE technical departments the work of Chairman Grancrona was facilitated and the experiences of VCE helped to arrive at decisions regarding the standards. For some companies, especially the smaller companies, this meant a change in their products. In some cases VCE also had to adapt their products. Grancrona retired in 1998 and was replaced by Mr. Jan Mimer, lawyer, and head of Laws and Regulations.

Through all the standardization activity, management strategy supported the work within the company, from top level all through the entire Division.

The experts within VCE had in advance of the meetings discussed and prepared proposals, sometimes in cooperation with colleagues from other companies. Within VCE all standards are announced on internet and regular meetings are arranged to inform and guide the technicians on the use of standards. This involves not only the construction technicians but also employees from marketing and purchasing.

All persons interviewed at VCE were convinced of the advantages and profits gained through the extensive use of standards. VCE is a member of the European Industry Organization, CECE. With policy declarations and reports of consequences of regulations and standards CECE works to improve the competitiveness of the industry and trade opportunities inside and outside the EU.
In Figure 4.3.3 below the position of VCE (V) before and after standardization is indicated. Already before the new standard was decided VCE was in a high position. For the competition (C) in general, the steps necessary to arrive at standard level was longer. In the model this is expressed by a longer arrow for the competitors (C) than for VCE (V). Many companies were forced to leave the industry. The lengths of the arrows indicate substantial product changes as a consequence of standardization based on safety.

Figure 7 Model of standard development process; VCE

4.4 Case four; Daloc-Futura AB, Töreboda, Sweden

4.4.1 Company history, products manufactured, industry structure

Daloc-Futura was established in 1942 in Lidköping and is since 1970 run by the second family generation with Mrs. Inga-Lisa Johansson as Chairman and President. The headquarters are located in Töreboda, South Western Sweden. The group designs, manufactures and markets doors to provide protection against burglary, fire, smoke, sound, flood, explosion etc. Most of
the products are of steel although a major plant for wooden doors for public buildings was opened in Töreboda in 2004. This new production line completed the Daloc door program and contributed to make Daloc the leading supplier in Northern Europe. The doors are designed and tested to correspond to high demands and standards and comply with national and international specifications and according to insurance company requirements. Daloc has been manufacturing fire doors since the 1940s.

Daloc-Futura has grown steadily and organically since its establishing in 1942. From 1978 growth has been achieved through creation of subsidiary companies and strategic acquisitions of competitors. In 1995 the sales amounted to approximately 200 SEK M. In 2005 the group consisted of seven companies under the umbrella of Daloc-Futura AB and had an annual turnover of approx. 500 SEK M. Daloc employs approximately 300 persons. Headquarters with management, sales and financial departments are located to Töreboda, Sweden. The Scandinavian countries represent the leading market area for Daloc.

There are several manufacturers of fire doors in Sweden where Daloc has the largest market share. About 90% of the production is based on customers’ orders and 10% is produced for stock storage. In spite of these proportions Daloc is capable of producing in long series with automated production and a minimum of exchange of tools and supervision. Delco believes that other companies in their trade have followed in the direction of Delco’s rational production, influencing products as well marketing as purchasing.

The investments have been substantial. Many competitors have disappeared since Delco was established. Only in the area of Töreboda 4-5 competitors have left the business and during the last few years 2 – 3 additional companies have gone out of business. A concentration has been made on product segments where Delco believes that they are leading. The regional concentration by many manufacturers on similar products is interesting.

In Sweden four - five actors are in 2007 on the market. Daloc’s market share of 60-70% on steel doors makes them the largest Scandinavian company in this product area. With the new capacity in the production of wooden doors their market share is growing also in this area. Delco was a pioneer in their way of production technique but competitors in Germany and Italy are making strong progress. Doors and components for buildings exposed to threats of war or terrorism or similar acts were supplied since 30 years to clients worldwide and had created a positive reputation. Delco was exporting to some extent to England and Ireland and was sometimes following Swedish construction companies in international projects. The major competitors
on steel doors were Robust AB, with some 20% market share plus Interdoor AB (part of Enviroid Group, UK since 1985) and Maxidoor AB with a share of 14% together. This latter company had manufactured fire doors since 1950 as has also Hellbergs International. Swedoor, (Weld-Jen) and Westwood (Moelven) are major actors on the market for wooden doors. All companies have an interest in expanding on the international market and await appropriate conditions regarding standards, classification and testing.

In Germany one company, Hörmann, is leading in size of employees and turnover. There are some 50 manufacturers on the German market, five of which are of the size of Delco or larger. Hörmann is present on the Swedish market. In Italy two important companies dominate the market. In Norway there are four major manufacturers but none of dominating size, in addition to some ten smaller companies. In Denmark there are also approx. 10 competitors of a smaller size while the Finnish production is limited. Delco has the largest turnover among Swedish producers. Competitors have disappeared from the market because of inferior technique and the high costs of testing the products as a consequence of new standards. Few foreign competitors are present on the Scandinavian market and the market position of Delco is considered strong, also financially.

4.4.2 Directives

There is no particular Directive concerning fire doors. The production of safety equipment is a regulated market with politicians oriented in favor of customers and less favorable against producers, alleged by representatives of the industry. The governing document in the industry is the Construction Production Directive, CPD / Byggnadsdirektivet/. It was established 1988, long before Sweden became a Member of EU in 1995. The years outside the EU were costly to Sweden, industry believed.

The CPD Directive is similar to the Machine Directive but considered more difficult to comprehend. Interpretive Documents were published and supposed to facilitate the understanding of the Directive. The Directive concerns products to be marketed in many countries, while on the other side the building as such and the construction laws are not yet covered. Work on the Directive has been in progress for several years. The demands by the regulating bodies may be expressed according to the new system by the CE mark. This represents the limit of official requirements. The demands of the Directive are based on function and very brief. Therefore they have to be completed with national rules (Brandposten, Nr 17, Dec.1997, p.9). Professor Ulf
Wikström, SP Swedish Technogical Research Institute, was of the opinion that sometimes the rules were more complicated than necessary. Corporate interests could sometimes be visible and countries with extensive competence, like the Scandinavian countries played an important role. To the smaller countries these rules were particularly important.

The EU Commission demands from Regulators Group, RG, consisting of Government Representatives, proposals to standards and through special mandates to CEN, or to other agencies with more knowledge, but authorized to develop the standards requested. Sweden had two representatives in RG, one elected by the Parliament and one by Boverket /the National Administration for Housing, Building and Planning Administration /. In the rules issued by the Boverket, /Byggregler, BBR/, it is specified what type of door is required for the different situations. This involves classification, testing and production control as well as proper installation (EURO-klasserna införs som Svensk Byggnorm (Sundström, Björn 1999) (Brandposten 19-20 juni 1999).

According to Professor Wikström, SP, specialist on fire and fire testing, the national methods of testing and classification had been poorly based on scientific methods. If a wider base for international trade is contemplated equal conditions must exist between the different national markets. The Scandinavian countries were in this connection well advanced and competent, according to professor Wikström, of SP Swedish Technical Research Institute. The major member countries of the EU, France, Germany and the UK were all quite active to influence the rules as well as some independent consultants. The Swedish industries had been rather passive in comparison with their colleagues in other countries, according to Wikström. Lately some trade organizations had been established and within the network of these organizations Swedish industries had been more active. Wikström pointed out in 1998, that we touch here upon an important problem. It is around the table that normally the national representatives decide. Now it is the large industrial groups which dominate the financial resources which decide and which may spread the cost of testing over a large volume of products and time. Sweden has pointed out that the testing will be costly and lengthy and harmful for the smaller industries. We see here a clear tendency towards larger scale production. The markets must be opened or we approach a difficult situation.

It has now been proposed by the EU Commission that within a few years it will become compulsory with CE-marking also on building products. A new Regulation, Construction Product Regulations, CPR, will replace the
CPD. In that way the whole procedure will be simplified and more clear, diminish bureaucracy and regulations. (Sundström, Ljung) SP, Teknik och Forskning.

When the product standards are well developed a certain transfer or introduction period will apply and it is expected to cover a period from year 2012 with a coexistence period 2012-2017. The final decision on the coexistence period will be made by the EU and its application will create equal conditions in all member countries. In Sweden only the European standards will be applicable and new marking on the products will be demanded.

4.4.3 Standard development in industry and corporate standard strategy

The Daloc-Futura group has for many years been in the forefront of companies developing and implementing EN and ISO standards. In view of the complicated and delicate type of products the role of authorities is more influential. Through far reaching standardization also of production, and longer series, profitability is achieved by Daloc, as described by representatives of the industry. Through standardization, the products become interchangeable with those of the competitors. On the other hand, it was pointed out in the interviews, as an experience, that there must be a limit for product standards as otherwise product development might be hampered. And there was always a risk that the old rules were kept too long. Daloc is involved in standardization, TC 127 WG 3 (UK) partly for door products, partly for fire protection. The standardization activity is connected with considerable costs and smaller companies in the industry were less present in the standardization procedure. Daloc has had the position of the Chairmanship in the WG.

The following standards are applicable or will be applicable for fire protection doors:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS-EN 1634-1</td>
<td>Testing of fire resistance of door constructions (2000)</td>
</tr>
<tr>
<td>SS-EN 1634-3</td>
<td>Testing of fire resistance of door constructions; Smoke protecting doors etc (2005)</td>
</tr>
<tr>
<td>SS-EN 14600</td>
<td>Doors and windows, operational, with fire resistance etc. (2005)</td>
</tr>
</tbody>
</table>
Standard regarding theft and burglary:

SS-EN 14351-1, prEN 14351-2, SS-EN 13241-1

Fire and smoke pr EN 14351-3, prEN -13241-At the competitor
Maxi-Door the products are approved by type and certified on the basis of ISO 3008 and NT fire 008 (Norwegian Test).

An estimated time schedule for the introduction of a proposed European system for testing and classification of fire resistance in building construction components and reaction to fire in materials is published in the journal Brandposten (Wickström, Ulf), Brandposten (June 1999: p. 28) by SP Swedish Technology Research Institute. Still the authorities and industry are discussing and negotiating to find solutions and arrive at an agreement. New parameters have been introduced which complicate the procedure. The new schedule presented by EUC aims at a finished system around year 2010 but another delay will probably occur.

Already in 1967, Daloc established production lines according to the new SIS standards, quality class 1. Decisions regarding standardization are taken in the Technical Council of the Daloc company. When new standards or tendencies are determined, members of the staff are informed. Before negotiations Daloc-Futura often has discussions with industry colleagues regarding forthcoming proposals in CEN/TC 127 (BST) SIS/TK185. For Daloc, being a producer of steel doors as well as wooden doors, combining different production technologies, there could sometimes be technically complicated situations.

In a discussion on structure of standards Daloc-Futura pointed to the British standards which were earlier more or less absent in this industrial branch. Voluntary schemes were now more common. The German rules on the other side, were very complicated. Still in standardization, the German standards were more and more followed in Sweden. The German standards were more detailed and orderly with rules specified even for the making of drill holes etc. Earlier Germany had similar rules to those of England and to some extent also similar to those of the United States. Holland and Belgium had different regulation system. In the United States the standards are based on lose components which is not an acceptable system in Europe. In the CEN negotiations Germany wants to establish their own system of regulations. A complicated method of testing was established which was difficult to penetrate.
A normal test at SP would in 1996 cost approx. 15.000 to 20.000 SEK and the corporate cost would amount to 50.000 SEK. In 2008 these costs would amount to 80.000-90.000SEK respectively 150.000 SEK. To conduct a series of testing doors with wickets, e.g. 4 x 6 meters, would cost a company approx. 2 -3 SEKM plus the internal cost for construction, testing and experiments. The Germans wanted this particular system and as a consequence there are only German manufacturers on the German market. There is a different situation on the market in Germany as compared to the Swedish market.

4.4.4 Participation in standards negotiations

“If a company invests in standardization, which I have done in all my professional life it is time consuming, demands patience and interest, but on the other hand you get an additional technical value. For Daloc-Futura standards have contributed to more efficient production methods and growth”, Mrs. Johansson says. Through subscriptions to new standards and rules and regulations the company is always updated and able to participate in correspondence and work with standard authorities.

All products of the company are tested and certified according to the complex of rules established on Swedish and international level. It is also of importance to Daloc to have their products approved by third party certification. Standards represent our base of operation and as an activity reference” President Johansson has declared (Standard Magazine, SIS Nr 2, June 2007). The continued ambition would later be that we should surpass to a higher profile than the standard, Mrs.Inga-Lisa Johansson, explains. This policy is reflected in the position of the Daloc arrow in figure 4.4.1.

Over the years standards have become even more important to Daloc and the openness in standardization represents no problem to Daloc, Mrs. Johansson has stated. Most often the work was a matter of regulated specifications concerning dimensions, quality and similar questions. There was still room for corporate specialties and secrets according to the Daloc standardization philosophy (ibid). Daloc had in their position some patents but so far these did not represent any problems in connection with standardization.

Today the demands on the doors and other products of the industry were more and more specified in different laws and regulations. The functional demands are also more important and the details are left to the producer and the buyer. In the old rules there was a major problem in the cost of testing of
the doors which could amount to 200,000 Euros or more. However, the testing and the approvals are considered necessary as the producer would otherwise be excluded from the market. This is the case for smaller companies which cannot support these costs, according to trade representatives.

In the CEN negotiations many countries demanded exceptions for their particular technique. Many testing authorities also have excessive demands which complicate the procedures but on the other hand, create revenues for the testing agency, according to the industry.

Regulators Group is an assembly of Government representatives, thus superior to standardization, established to advice the EU Commission on mandating CEN and others to produce standards. Sweden is represented by the National Administration for Housing, Building and Planning Administration /Boverket/ (Rantatalo, Sundström). Sometimes members of Regulators Group meet with members of TCs.

Representatives for the industry believe that European standardization was started before Europe knew what standards Europe would need. Standardization offers advantages but may also conserve old technique and thinking and methods, according to trade representatives.

The National Administration for Housing, Building and Planning /Boverket/ in Sweden is requested by the Government to execute the decisions of the Parliament /Riksdag/. It was criticized by the industry for lack of information of the ongoing development in a larger perspective. In this way Sweden could be on the way to lose know how, according to industry representatives. In the negotiations between other countries these were represented by experts who supported the industries of their respective countries. This did not always apply to Sweden, industry representatives felt. Sweden had replied in the Regulators Group that we find the European rules acceptable but that separate demands from different countries could not be admitted. Norway had supported Sweden on this point but they did not belong to the European Union. Denmark, for example, may keep their set of rules on the condition that they approve of the European regulations. The different German states had no agreement with the EU and at the start of the European Community they were free to act more or less as they wanted with a “Boverket” in every state. Italy was accepting everything - but did as they wanted, it was speculated. Belgium needed their special rules - “or the country will burn”. Thus it can be concluded that every country wants their own set of market limitations, except Sweden, according to some spokesmen for the industry.
In the discussions in the committees, too much time has been devoted to “nuts and bolts while it is more important to discuss the functional matters and that should be the direction of the standardization, according to Daloc. The ambition with a standard is to establish a level of requirements and not a specification of material.

Also, it had been indicated that the national committees CEN/TC 33 (France) for testing of doors and Swedish TK179 were dominated by wood specialists which was different compared to steel materials and conditions. CEN/TC 127 (UK) SIS TK 181 handles fire regulations and tests. In this committee more manufacturers are engaged in comparison to other groups or categories. There was no particular power center in the industry of fire doors, except the influence from DIN and German manufacturers. Daloc stressed that standardization means that you must meet certain demands and that standardization neutralizes the power in the industry. You meet a rule to which you must obey. Power, is more a matter of not declaring what rules should be had. But power rested with the person making the daily decisions, Mrs. Johansson declared.

Within the Daloc-Futura group, Daloc AB and Daloc Trädörrar AB were certified according to ISO 9001 and 14001 and Daloc Sheltec AB according to ISO 9001. Protection of the environment was considered important in the designing of the products.

The Daloc Security doors were certified according to European standard ENV 1627, resistance class 3. The High Security doors are approved type-wise according to EN standards where such standards exist and otherwise according to Swedish standards.

Daloc-Futura had earlier a somewhat pessimistic view regarding the possibilities to arrive at a standardized European system. The President of Daloc-Futura, Mrs. Johansson was a member of the Specialist Group under CEN/TC 127 working with standardization of fire tests. In this Group technical specialists and representatives from the testing agencies participate. The manufacturers from each country had a desire to have some special items from their own country in the standard, which would in one way or another represent an obstacle for the competitors and international trade. Daloc-Futura had mentioned, as an example, the temperature limits when testing a door. In Sweden we would prefer to have 280 degrees while the Germans proposed 180 degrees. From the English side a time limit of 7 minutes was suggested. According to Daloc, the method eventually developed, was to a large degree a copy of the German method. It has become a European standard and as such applicable also in Sweden. Also within Regu-
ators Group the regulations are prescribed for all of Europe. The expensive method of testing now established could be an obstacle for smaller companies to act on the market and they might disappear. “For the national economy this could be considered a loss but for Daloc-Futura is would represent a certain advantage”, it was stated. It is a clear advantage to have an approval.

It had been stated as a guideline by the Swedish Government to the surveying agency, Boverket, National Administration for Housing, Building and Planning that Swedish manufacturers must meet international competition (Industridepartementet, /Department of Industry/, Promemoria, 1996). When it was learned that Finland had requested to have the same rules as Sweden in a certain standard, it was suggested to Boverket that they forwarded and worked for the same Swedish-Finnish rules within Regulators Group. Under reference to the Department of Industry the demand was rejected by Boverket. It had taken years of efforts for information to SP, in order to convince them of the problems, but now the situation had changed. It seems that much of the problems were similar all over the Construction Industry sector.

Sweden had a different structure in the Construction industry compared to Germany which had a large number of medium and smaller companies and a high control level regarding material. The responsibility for the construction of a building had in reality rested with the construction company but was now transferred to the builder, who might not possess the required knowledge. The power of the architect had been reinforced and the builder uses his own architect and own construction engineer. In other countries the architects have a different role but a tendency towards the German system was apparent.

In every document addressed to the customers of Daloc-Futura standards and standard numbers were specified. Thus catalogues and instructions were well updated. Results of tests and controls were presented and the minimum test limits had been surpassed for most of the products. The company was well ahead time wise when a new standard and or a new type of testing was required. In that way they were the first to present products on the market corresponding to new regulations and standards.

Daloc views the developing European market as a possibility and challenge but for the time being, the testing and control rules represent obstacles. It was indicated that in the near future the strategic product development strategy could be reformulated.

The main marketing management of Daloc is located to Töreboda. Distributor outlets, stocking the Daloc products, are established in several loca-
tions in Sweden. A system of franchise for local sales representatives had been established. The turnover of personnel in the company was limited, thus establishing long lasting relations with the customers and increased know how within the company, the President pointed out.

The strategy of Daloc had been clear from the very beginning. The company participates on national and international level in standard development. The standards concern the products as well as the testing methods. The knowledge thus gained in this way was rapidly applied in production as well as in marketing. The position of Daloc is unique in this regard and the company had commercially met with an impressive success. Their technology is above standard and when a new standard is being developed they are first on the market with new technology and new products. The Technical Council devoted a considerable time to discussions and evaluation of possible innovations.

There exists a competition from some minor companies and some international corporations. The strategy from the smaller companies is developed according to their resources; they just meet the standards on the lowest level possible. In addition they cooperate in marketing and sometimes in technical development and use of consultants.

New products were often generated by the demands of authorities as well as by demands from the market. The fact that costly tests and approvals for new products were required prevented new domestic firms to enter on the home market. However, foreign companies represent a strong potential threat to Daloc and other Swedish firms.

In Germany the drawings and construction documents for a tested and approved door, according to standard, may be acquired for production under license from original constructors. These could sometimes be consultants working in the industrial branch.

The National Administration for Building, Housing and Planning /Boverket/ responsible for Construction Rules in Sweden, had approved the EU regulation, that tests conducted in another EU country may be approved also in Sweden. When exporting from Sweden to another EU country special approval was required in the other EU country receiving Swedish safety doors. This opens possibilities for foreign companies through direct export and / or acquisition of a Swedish manufacturer to market their products in Sweden. In the Regulators Group, technical specialists participate but there was an impression that work is too much concentrated on protection of the individual trading areas, according to Swedish representatives of the industry. In this forum of dialogue all countries, except Norway and Sweden, have
presented their reservations and particular demands stressing that their own rules are more important than the European proposals. According to the Maastricht agreement every country may have its own system of rules, and they do have, according to the industry, all except Sweden which followed the European standards. “We open our market, while we are prohibited to enter other markets“, it was believed. SP in Borås, Sweden, and other agencies could thus approve a test made in Italy for the Swedish market. It is essential that these tests are identical but this is not the case today. It must be possible to repeat the tests, but the level of repeatedness is only about 10-15%. As a consequence important testing agencies have been established in Germany. Sweden had made an extensive effort to establish an agency accredited for testing according to the German DIN standards. Visits had been made to Germany and German representatives had visited Sweden for instructing Swedish testing agencies. To some extent, tests could now be conducted in Sweden but additional tests were nevertheless required in Germany. Doors may have to be tested during one year on both sides and still new demands for testing could be required. Continuous testing may be required and still the result may be that testing is not sufficiently frequent. Daloc felt, that they would never have their products approved according to the DIN norms.

The smaller companies in the European industry had established an organization for cooperation in testing and marketing. The sales from these companies were normally handled through distributors and only a minor portion was sold in direct contact with the final customer. To handle testing and regulations the smaller companies often hire consultants. The major companies in the industry of Europe had established a Federation, EDSF to develop and promote the interest of the corporations (European Doors and Shutters Federation). This organization now has half of members of the CEN Standardization Committee and Daloc is represented in the network of this group. The manner in which Daloc is working with standard strategy support the views on standardization as a valuable tool of Corporate Intelligence.

Management strategy has been successful in balancing investments in production capacity, market growth and technical development and all through these activities standardization has contributed to their strong progress.

Daloc-Futura is a leading company in standardization within the industry. The President herself has been personally and directly engaged in the projects although the size of the company today has made it necessary to dele-
gate the standardization questions to a close associate, member of the Technical Council.

Standardization is on the agenda of the Technical Council of the Company and is at the basis of all planning regarding machinery, production and marketing. The company is represented in the relevant TCs and WGs and has strongly influenced standardization. The company is open in the standardization discussions and through this attitude they are also well informed of the technical progress in general and particularly aware of the tendencies within the industry. The products of Daloc are regularly and frequently tested by certification institutions. Technically the products most often are above the level of standards prescribed which is illustrated in model, figure 4.4.1 below.

This strategy makes the company competitive. Other companies have chosen to position themselves technically on a lower level. Daloc has strategic ambitions to expand internationally but have met with an unusual bureaucracy in the industry and in authorities, which hampers international trade. Daloc-Futura AB, with their subsidiary companies, and their major competitors are ISO 9000 certified. In figure 4.4.1 below can also be seen that Daloc is the leading company of the industry. Competition is split with some smaller companies just passing the standard line BE. These companies have limited resources for standardization and testing and are satisfied to have their products just above the minimum standard level. The internal knowledge of standardization in these companies is limited and sometimes consultants assist in standards development and approval. As a result of standard demands many competitors have left the industry. The arrows D-D and C-C indicate that important product developments were required before arriving at approved products. At the same time the leading position of Daloc is underlined. The manner in which Daloc-Futura is working with standardization strategy seems to support the views on the use of Corporate Intelligence expressed by Bousquet (2009, p. 43).
4.5 Case five; Motala Hissar AB, Motala, Sweden (MH)

4.5.1 Company history, products manufactured, industry structure

This company was established in 1972 in Motala, Sweden, by Mr. Rolf Sundström and his brother Gunnar to manufacture mechanical products. In 1982 the first lift for persons with impaired mobility was delivered and four years later the activity was concentrated on this product only.

Two principal types of lifts are made, Motala 2000, and the new 6000, with additional five alternatives. The special features and benefits of the lifts are above all the flexible sizes, the low power consumption, the Guided Chain drive system, rapid installation and the compact design. They have
found a niche in which they are the leading actor. Traditionally, lifts are electrically driven cable devices or with hydraulic drives. All products from MH are customer adopted and no identical lifts have ever been delivered. Still production of components is in as long series as possible, all according to the Technical Director, Rolf Jammyr. The new President, Dr. Ari Niemenen, earlier connected to Nokia, also Motala, is of Finnish origin. The founder and former owner of the company, Mr. Sundström, has retired from all activities within MH.

A colleague to MH in the industry hinted to Kone Gruppen of Sweden that MH was for sale. Kone made the acquisition in 1990. Since then MH is a subsidiary company of Kone Inc. which has over 29,000 employees and annual sales of 3.6 SEKMrdr worldwide, and head quarters in Finland (Kone Annual Report, 2006). The MH technology completed the product program of Kone. Apart from ownership and a vast sales organization at the disposal of MH, Kone is not involved in the operations of MH. In that way MH gained access to the experts and resources of Kone AB, Stockholm, in the standard development process.

In 2009 MH had approx. 60 employees which is twice as much compared to 2002. It is the largest company in the group of smaller companies in the industry. The products from MH are in a medium price bracket. Kone is one of the largest companies in the industry but makes larger size products than MH.

Other, larger companies are active in the industry and operate with other and more expensive techniques than those of MH. Five smaller competitors are active on the Swedish market, most of them are located in Southern Sweden. MH has a market share of the Swedish market of approx. 30% and has a steady and positive development. MH is exporting to other Scandinavian countries and also to the UK. A Dutch and an English company are selling to Sweden.

The competitors have another drive technique of the elevators and are positioned on a price level considerably higher. Competitors have shown an interest in the MH technique but no license agreement has been made.

4.5.2 Directive

In 1989-90 it was evident that the demands emanating from the EUC concerning standardization of the products were hampering the business of MH. Mr. Sundström, who at this time was the sole owner of the company, had to spend considerable time and energy to follow the development of standardi-
zation and to participate in standardization meetings. His knowledge of Eng-
lish was limited. He indicated in 1989 that he was considering selling his
company because of his shortcomings in the standardization process.

The lifts are covered in two EU Directives, the Machine Directive and the
Elevator/Lift Directive, part I, Electrically Driven, Part II Hydraulically
Driven, Part III Elevators under Reparation or Maintenance and Part IV,
Other Lifts, which latter includes and concerns products from MH. This
Directive is the most comprehensive and includes all major components.
Many persons believe that directive and standard mean the same thing,
which is not true. Standard is a voluntary agreement to facilitate the follow-
ing of the Directive. Sweden was, according to Mr. Sundström, way ahead in
the European technology of lifts of Chain Drive type but our technology was
not included in the European norms EN 81-1 and EN 81-2 from the begin-
ning. It is indicated that the problems Mr. Sundström encountered delayed
the advancement of MH on the market. In connection with a revision of the
European norms an opportunity was offered MH to present their particular
technology for standard development.

4.5.3 Standard development in industry; corporate
standardization strategy

The technology of MH was based on a Guided Chain Drive System which
had not been included in the earlier established standards. This particular
situation presented a difficult situation for MH as their products would not
be allowed on the market without a standard to follow.

As indicated above standardization of lifts had already started when MH
became aware of the situation. The norm EN -81 had been in use as a safety
standard since 1979. It was adapted to the safety demands of The Elevator

EN 81 points to technical solutions to meet the demands in the Directive.

Elevators from before 1997 do not always meet the safety demands of EN
81. Over time the technology in an industry, through research and develop-
ment, is increased. But the standard development does not necessarily follow
the same pattern or design. In this particular case it is especially evident.

In the beginning of the negotiations it was not entirely clear which Di-
rective should be applied, the Machine Directive or the Building Products
Directive. In the Elevator Directive the MH driving technique was not in-
cluded. Companies basing their activity on a technology not encompassed in
the standards could be totally excluded from the market. In the standardiza-
tion negotiations all driving techniques of today are represented. In the beginning a Swedish standard had to be developed and in the next step, a European or CEN standard. Through standardization, when most of the technique is published, it is easier to enter into the business, President Sundström declared, and at the same time admits that over the years he has changed opinion regarding the standardization activity.

Motala Hissar AB was certified according to ISO 9001 early in 1990 and the products have a type certification according to Directive MD98/37EC of the European Union.

For the first five years Mr. Sundström had a negative attitude towards standardization of his products, mainly because of lack of resources and insufficient knowledge of other languages. With the resources and knowhow of Kone Company the situation is now different. But, Should a new Directive be published without our technology we would be excluded from the market. That was one of the reasons why I sold the company, he stated.

In the 1970s work started both within ISO and CEN on new standards for elevators. Within ISO the work focused on dimensions and within CEN of safety. The standard EN 81 was published in 1987 in two versions, one for cable driving and one for hydraulic driving. This standard was introduced also in Sweden with some modifications. In 1990 the industry organization Kran och Hisstandardiseringen, IKH, was established.

Standards are normally revised every fifth year. In the beginning of 1990 a revision of the European lift standard was due. This opened a possibility for MH to present their product with a standardization demand. As the Directive was written at the time, the drive technique with chains was excluded and the major competitors, with large and expensive elevators were not interested in opening for a new technique. MH worked at this stage with considerable lobbying for their special technique.

MH joined the Swedish standardization organization IKH (Crane and Elevator standardization) and TC 10/WG 4, Low speed elevators. In the work of this Committee the Swedish Government is represented by The National Administration of Buildings, Housing and Planning /Boverket/ and the Authority for Environmental Protection (Miljöskyddsverket). The chairman of the CEN technical committee has visited MH.

Mr. Gunnar Hagelin of Kone has assisted MH with the strategy, advice and translations required in connection with the standardization negotiations. Mr. Hagelin found the elevator technology rather simple and regretted that the structure of the standard was based partly on the measurement of the elevators and partly a safety standard, plus the ISO standard. One standard
regarding the measurements was necessary for international trade. The new standard would allow for more product development while, as an example, the German standard did leave only minor space for development. If a new technology for elevators had been developed outside the existing standard system, it had been impossible to have the new technology included in the standard. With the new standard proposal space is offered for product development. Mr. Hagelin was of the opinion that the influence of regulations on the construction process had been overlooked in general. Technologically elevators were not particularly advanced, Mr. Hagelin, remarked, but rather elementary. And the scientific competence within the groups working with this technique was not particularly developed and their background was rather narrow. Experience had been gained from elevators but in other areas knowledge was limited.

In the negotiations the name of Kone was of little importance, according to Mr. Hagelin, as it was the competence of the delegates which counted most. It was absolutely necessary for MH to get their technique of driving mechanism included in the new standard EN 81 - 4, Mr. Hagelin stated, as it would otherwise be the end of MH. He had noted that in between the producers of similar products a mutual idea of understanding is rapidly created. But the cooperation also follows national borders, like e.g. the Scandinavian countries.

The work in the WG and WT was not very productive, in the opinion of Mr. Hagelin and he felt that EN 81 was old-fashioned but acceptable. It will in a near future again be revised. Sweden was now recalling its earlier standards and regulations.

All European countries were represented in the negotiations and half of the delegates represented Government Administrations and the other half represented the manufacturers - nobody from the users. Mr. Hagelin had a background in the construction industry and the only delegate to have experience of building and housing construction. When the first demands were received from the EUC we were unable to interpret the instructions and our committee was closed. New directives were demanded and received after a while from CEN TC 10 to WG 2, Mr. Hagelin pointed out. We encountered some problems because of inexperience within the group and strong vested interests from the participating corporations. In the WG the delegates know each other well and work goes with a friendly cooperation and in the WT it is always the quality of the arguments which count, according to Mr. Hagelin. President of TC 10 was the standardization director of Kone, residing in Brussels. In the first negotiations the work was started without necessary
directions from EUC and CEN, Mr. Hagelin mentioned, and the working group was even resolved.

The parent company, Kone, is active in standardization in many areas, Mr. Hagelin confirmed. The standard system was generally more important than the patent system, he felt. In the negotiations it is necessary to be well prepared and from the Swedish side we have influenced the work substantially, especially concerning adaption for persons with impaired mobility. In the marketing the safety aspects were important and reference to standard was essential. As a result of standardization many of the products within the group had been changed. It had been necessary for Kone to participate in the standardization process as the company would have otherwise been prevented to influence the standards. Regular seminars were organized within the corporation for information about standard development to marketing employees and corporate buyers.

The increased demands on the products, as a result of standardization, will make some competitors leave the industry, Mr. Hagelin concluded. And it will be difficult for the small and medium sized companies to survive. The demand for documentary support in connection with the sales will be expensive and hard for the smaller companies to sustain.

Within Kone standardization was a top management issue and part of product development department where the company was very strong, according to Hagelin. Standards were a way to prove that something was correct.

In the opinion of MH the traditional elevators were poorly adapted to consumer needs. The height in the elevators was 180 cm while normal room height was 300 cm. MH presented their views in the Swedish Committee (Working Team) and later in the CEN TC 10. The standards have been substantially influenced by MH, according also to Mr. Sundström. Today we have to accept and follow the rules applied in Europe and worldwide, he says.

A standard for the MH products had been prepared and approved in Sweden. This proposal was presented to the CEN TC 10 WG 3 WT 2 and is now a European standard. In that connection we were obliged to accept some new Regulations. The big and important manufacturers may in different ways delay the process. The Swedish competitors had another driving technique which was already included in the standard.

“Now, standardization is a very important activity for the company,” Mr. Sundström stated later. Over the years since 1988, MH has realized this more and more but due to their unique and special technique they felt being ig-
nored in the beginning. However, through participation in the standardization, their network has been considerably enlarged and the company had gained in competence. In addition, the cooperation in the standardization group has functioned extremely well, much to their own surprise.

The leadership quality of the Chairman in the working group has not been of deciding importance. The participating individuals, mostly the presidents of the companies, have cooperated well. The cooperation in the standardization network has not influenced the pattern of competition. Only one smaller competitor has not participated in the cooperation. The standard demands have made smaller companies disappear from the market. With the presentation of their technique MH felt that there is a risk that their products might be copied. But through the two patents, now acquired by Kone, some protection was offered.

Should there be no standard for the product every installation would have to be controlled in every detail, screws, calculations etc. It would demand one week’s work or more. With the standard documents the inspection is done in two hours. No company in the business may operate with such a barrier. And at the same time the major actors, manufacturers of large and more expensive elevators, do not facilitate for a newcomer.

As a consequence of standardization the production is also more rational, still without influence on the prices, declares the President. And he feels that standardization has had a positive effect on the discipline within the company. Through standardization their final products reach a higher quality level, Mr. Sundström believed.

Most of the standardization work has been delegated to Mr. Bernt Jarnmyr, over twenty years in the company and now Technical Director. Standardization is often on the agenda of the meetings of the Management Group and a considerable volume of knowledge and experience and confidence have been gained by the company and its personnel. From the standardization conferences Mr. Jarnmyr reports to his Product Development colleagues. A program for continued product development has been developed and the new President is engaged in the process. Also, the support by Kone specialists, especially through Mr. Hagelin, has been of vital importance for HM.

Without a European standard for their products MH would not have access to the market. In view of the fact that Sweden is well advanced in social welfare MH has gained a lot of experience in this particular area. This knowledge has been useful at the introduction of their products in the other Scandinavian countries. It is also an advantage when exporting on a larger
scale all over Europe. The exporting efforts have been adapted to the progress of standardization. In the marketing of their products MH cooperate closely with architects. Through the standardization the MH products will find another market in form of older houses with narrow space for traditional lifts. Today lifts are frequently exported and imported products. MH believes that it is the most internationally oriented company of the standardization group. In the first place they work with their own organization on the Scandinavian market and with the support of the sales organization of Kone Inc. Through Kone they have a worldwide market. Standardization in this particular product area would in the future open for increased competition geographically and product wise.

With the New Approach Directives standardization came into focus as a turbulent surprise to most of the European SMEs, including MH. In addition Sweden had decided not to join the EC at the first opportunity and the legislative EC train was already in rapid movement.

The European industry was obliged, according to the EC Directive to start developing appropriate standards. When the first standards for personal elevators were developed the product technic of MH was not included. This meant that the products would not be allowed on the market.

For MH it was a matter of life or death to have their technology included as a standard, in the judgment of the owner. The negotiations were not without problems. Today the staff of MH has experience and knowledge to handle the standardization issues.

As a result of their efforts new markets have been opened to MH in other European countries and in a few years time, the number of employees has been doubled. Based on the now established standards Motala Hissar may cover 90% of the European market with their products.

In Figure 4.5.1 it is illustrated how the company changed product strategy from Field X to Field Y in order to remain on the market. The technical step for MH was minimal but the formal standardization all the more important. No direct competitor is indicated as there is no competitor with the same technical base. Competition comes from other types of driving devices. Standardization normally means that the product is improved in one form or another.

In this case the movement from Field X to Field Y was minimal in product design and no direct competitor based on similar technology is on the market. In this case the technical level of the product is already established in Field X.
4.6 Case six; S:t Eriks AB, Uppsala

4.6.1 Company history, products manufactured and industry structure

S:t Erik’s was established in 1888 and the first By Laws are dated in 1890. The company celebrated its 100 year anniversary in 1988 and it enjoys a wide and positive reputation. In the beginning Dutch tile stoves was the major product. The company is to-day producing and selling precast concrete paving units, kerbs and other concrete products as well as machinery for making of such blocks. Over the years a number of additional products related to the construction industry, mostly clay bricks have been manufactured.

S:t Eriks was a privately owned company in the building industry until 1944 when HSB (Association of Apartment Owners’ Financial Agency) became the new owner. In 1961 Mr. N A Hellström, the company Vice President, became the owner and entered into a joint venture in 1966 with the Investment company Företagsfinans AB. This financing group acquired the entire company in 1971. In 1979 a competitor, Precon AB, Falkenberg,
Sweden, and two private investors were invited to become part owners of S:t Eriks. In 1983 Precon AB acquired all shares of the company. Within the Precon-group the subsidiary units were divided into sections and S:t Eriks became on such sector with Mr. Björn Lööv as head of the sector. Only two years later the AB HNJ-Intressenter became new owners, now with Mr. Björn Lööv as President and the company could for several years operate with a steady and positive development. Considerable investments in machinery and buildings were accomplished.

The construction company Diös AB acquired S:t Eriks in 1994. A few years later, in 1998, another construction company, Peab AB, bought S:t Eriks. In 2006, however, the company returned unto the ownership of the original family and context and belongs to Skandinaviska Bygglelement AB, which produces and markets concrete products for housing and infrastructure for roads and railroads with elements for walls and roofing, stairs, cable tunnels etc. The company has production and sales outlets in many places around Sweden and is exporting to the other Scandinavian countries.

In 1965 S:t Eriks had approx. 300 employees and in 2008 approx. 150 persons (S:t Eriks 100 år; Ord & Form, Uppsala 1988;; 20081228) Through rationalization and divesture of certain activities, like transportation services, the number of employees has diminished from the middle of the 1990s. S:t Eriks at that time consisted of a merger of eight Swedish manufacturers and one Norwegian company. In 2006 Mr. Lööv worked for the company again to a limited extent as consultant.

S:t Eriks has over the years had several owners but the corporate life and profile have at all times been strong. In view of the weight of the products, transportation costs are considerable thus inviting to local production in many areas of the country. The competition has been strong but through an active product development program and early adaption to new customer demands, new ideas, often from other countries, and investments S:t Eriks has most of the time been ahead of competition.

In 1995, the consumption of concrete paving blocks amounted to 0,3 m2 per person in Sweden compared to over 1,3 m2 in the continental countries in Europe. There are some 10 - 12 manufacturers in Sweden and 250 - 300 in all of Europe. International competition is limited because of the transportation cost. A Danish company was at the time selling in Sweden. A European trade organization for concrete block manufacturers has been established. The size of the European industries varies. A British company is five times larger than S:t Eriks, as an example. It seems, however, that S:t Eriks has been well known in Europe. Even if S:t Eriks was a leading company in
Sweden they were only a nominal actor in a European perspective. Cementa AB was also major company in the Swedish industry of concrete block manufacturing.

4.6.2 Directive

More by coincidence, and later by information from CEN, it was learned in 1982 that a European standard was under development. Considering the New Approach, Sweden would be obliged to retire existing standards when a European, CEN standard, based on the Building and Construction Directive, BCD, of December 21, 1988 would be published.

In the European industry branch of S:t Eriks it was felt that another philosophy reigned regarding the concrete products. Mr. Lööv got in touch with BST and demanded that the European standardization organization should be approached. A Swedish subcommittee was established with Mr. Lööv as chairman. The so called Cassis de Dijon-principle does not apply to goods which are covered by an EU Directive. (Byggproduktionsdirektivet skall tillämpas i Sverige; The Building and Construction Directive, BCD, will apply in Sweden; Boverkets Nyhetsbrev – Byggande, 14 January, 1994, Serie 1994:2).

4.6.3 Standard development in industry and corporate standardization strategy

For many years it was a tradition in the building industry that the architects prescribed the use of rectangular, but not quadrangular, pavement blocks, also called half blocks. This caused a number of blocks to crack or otherwise be damaged at the installation. It was not totally clear to the architects that the flexibility tenacity (MPa) could vary from one manufacturer to another. It was generally accepted that for streets and parks a thickness of the blocks of 60 mm would be applied or normally 50 mm and otherwise 40 mm. Within the industry group of producers an information campaign to explain the problem was launched towards the architects but to no avail. Some of the concrete pavement block producers, including S:t Eriks, created a new group of manufactures and decided to present a program for a new standard, based on an older document (SKTF handl. nr 6; Steen, 1988).

Already in 1978-79 an industry standard had been developed in Sweden with four classes of tenacity in kN 6, 9, 14,5 and 25,5. In that way the architects need not worry about the thickness of the blocks.
The Organization for Standardization in the Construction Industry BST, Byggstandardiseringen) was approached in 1978 by the group of concrete block manufacturers and demanded to know the interest in their standard proposal. After some discussions the proposal was accepted in 1984, practically without any changes and a new standard had been developed for concrete blocks, ground stones and street border stones. The problem with the damages at the construction sites disappeared. It was particularly stressed by Mr. Lööv, President of S:t Eriks, that this standard allowed for continued product development. Some of the products could also be reduced in weight. In our group of concrete block manufacturers all competitors were members, which contributed to underline the serious ambitions of the efforts. When the Swedish standard was developed S:t Eriks had to make some changes in their production method and products to adapt to the demands of the standards and customers’.

For the organization of a functioning system it was also essential to have some form of organized control of the manufacturing operations. At that time, early 1980s, S:t Eriks turned to KRB (Kontrollrådet för Betongvaror; “Control Council for Concrete Products“; in 1993 changed to BBC Betong och ballast certifiering) an accredited bureau for production control. In that way all prefabricated concrete products could be continuously tested and everybody followed the standard. It is evident that this document was a great advantage and of importance to the Swedish concrete block industry and that many mistakes had been eliminated. The advantages were particularly felt by those who daily worked with the products, the reduction in material quantity, (one cm of concrete standard block weighs three kilos).

S:t Eriks took the initiative to the development of a Swedish standard within their particular industry regarding the products as well as control of production and production methods. Based on their good experiences from these steps they lifted the level of quality of standardization also by joining the BST/SIS.

4.6.4 Participation in standardization negotiations

Negotiations according to the CEN instructions were initiated. For S:t Eriks and the Swedish BST/TK72, experts on different subjects and areas were called in for assistance. The negotiations were difficult with international differences, mainly based on climatic variations.

In the beginning of the work of the CEN/ TC 178 the Danish delegation was asked to represent Sweden in the negotiations. After a while it was real-
ized that the Swedish model was not properly presented and BST/SIS joined the negotiations. Generally, however, cooperation among the Nordic countries is frequent against the background of culture, climate and technology, like Austria often joining Germany and Ireland supporting England. The Swedish subcommittee, called BST/TG 72, worked with CEN/TC 178 WG 1 and 2 which at that time had 14 countries as members out of 18 possible. The legal possibility to influence the process was not strong since Sweden only had 2, 6% of the voting potential. This was pointed out to Sweden in the beginning of the deliberations. In the negotiations every country was represented by 2 - 3 experts who discussed the technical problems and demands. After 3 - 4 meetings the model of the Swedish standard was allowed to be presented and according to Mr. Lööv a great debate was launched. The German representatives had a negative attitude and wanted to preserve old solutions. Another problem was the animosity between France and Germany which countries were unable to come to an agreement. England also had a problematic attitude and was supported to some extent by Germany. The Scandinavian countries with France constituted one group of opinion, UK had a middle position and then Germany, Austria, Holland and Belgium created a third unit. Switzerland did not express an opinion. From the Swedish side it was stressed that it was impossible to continue the process under existing organizational conditions. Even at the third or fourth meeting the participants had to start again from the beginning and no progress was made.

At the end of 1994 the proposal had been distributed to the member countries for comments and in February, 1995, the final proposal was presented. It was evident; however, that Germany still tried to stop the proposal, the Swedish delegates believed. A perspective towards 1997 was more realistic. The essential elements in the standard concerned the strength of flexure, measure of tenacity, what kind of wear the block would sustain, with what type of measurement and also resistance to frost and salt as the block may get burst by the frost.

At this time the negotiations had lasted more than four years and the participants were still far apart. Also the CEN organization had reacted and demanded that the standards be finished. In this situation the Chairman has an important function and from the Swedish point of view the delegates were unaccustomed to negotiations of a similar duration. When the delegates from certain countries cannot arrive at an agreement they are normally replaced by other delegates, often a new Professor - expert, replaces another and declares and presents new ideas to follow.
In the meeting of 1995 04 26 within the BST/TK 72 in Sweden it was concluded that a problem of information existed towards the customers and that the producers should be more active with their communications. The members of TK 72 were of the opinion that Sweden usually was ahead in Europe when the quality demands were evaluated. In the meetings of the committee the Secretary, Mr. Seling, Secretary of the Technical Committee, often addressed questions to the Chairman, Mr. Lööv. The latter pointed out that Sweden has had a well-functioning standard for many years but that it may now be time for further development. In the TK 72 meetings the financial budget was often discussed and also on this day. A certain deficit was apparent. As a consequence some testings would be postponed and the translation of the standards postponed. S:t Eriks had contributed with 200,000 SEK per year and this amount is included in the demand to the Government for financial support. The company, however, was not compensated for any of their expenses. The Chairman Mr. Lööv and the Secretary of the Committee had different opinions as to the contents of the budget and the distribution of means between the Committee and BST. Other possible financial contributors like the Civil Aviation Board (Luftfartsverket) and the Military Construction Administration FortF) should be contacted, according to the Secretary. He also underlined the importance of testing. The Chairman concluded that everyone wanted a standard but nobody wanted to pay. The Chairman also regretted that a representative for the users of the products had left the Committee. It was considered important that all sides were represented. The President of BST, Mr. Göran Stensgård, was called in for further discussions regarding the finances during the TK meeting. He explained the situation and view of his organization and a solution was found. It was necessary to have a solid base to allow for as much government support as possible, the President explained. New Bylaws for the organization were in progress and in the future supporting members and corporations would be obliged to pay for the membership in the Committees. The demands were considerable for the services of BST/SIS and more committee project managers were required. The contribution from the government had been reduced from 50 to 30% of the project costs.

During the TK meeting the discussion regarding the CE mark demanded considerable time and many participants represented the view that a strong financial position could influence the standardization work. “You buy a Technical Committee and forget about the users”, someone declared.

The CE-mark may be placed on a product if the product can be manufactured in accordance with a standard which is in agreement with the Building
Directive. The President of BST referred to the Book of Rules and pointed out that there is a system demanding comments from all other International Standard Organizations. However, a multinational corporation with many subsidiaries could influence the work in many countries. From the government side the Administration for Roads and Highways/ Vägverket/ and the Administration for Building, Housing and Planning /Boverket/ spend considerable amounts on standardization.

In the CEN TC 178/WG 1, and 2 meetings, Mr. Lööv was leading his international group with Mr. Per Landberg, Cementa AB, Mr. Ulf Seling, BST, Project Secretary, Mr. Ulf Watz, S:t Eriks, originally from Cementa AB, and Mr. Anders Andalen, SP, as members. The technique for testing of presence of frost had been developed by Mr. Göran Fagerlund. As a result this type of damage now disappeared due to the existence of a scale of measurement. The participation of the experts varied and was particularly required for language reasons. In the original standard it was stated regarding frost that the concrete blocks should be capable of resisting to frost. From the Swedish point of view it was necessary to have a scale of measurement for this parameter.

One meeting with the Committee took place in Uppsala, Sweden, with a presentation by S:t Eriks of their technique of production and control. As a consequence many participants changed their views regarding standardization solutions. When the proposal was circulated in 1995 to all member organizations the volume of comments was considerable and demanded a number of modifications. The reactions from the corporations were directed especially towards DIN but no changes were demanded. It was evident that within Germany and their corresponding Committee, the differences of opinion had been considerable. The Germans handle the standardization projects in great detail and a standard in Germany normally has a higher status than traditionally in Sweden, Mr. Ulf Seeling of BST/SIS pointed out.

The comments were scrutinized by the WG and divided into seven Task Groups which worked in parallel organization with e.g. demand levels, testing methods, manufacturing and delivery control etc. When the European standard was accepted all manufacturers had to invest in testing equipment. (Seling, Ulf, Markbeläggningsprodukter, /Paving Units and kerbs/BST Nytt 1/1994p. 10). For S:t Eriks the development of new standards demanded relatively small costs in production investments. For other participants in the negotiations proved rather costly. In the opinion of Mr. Seling of BST/SIS, work within TC 178 had not been particularly efficient, much due to the fact that guidance from the EU Commission as well as from CEN had been miss-
The Building Directive did not suffice and in order to make it operational it was necessary to make six Interpretation Documents. It was the EU ambition to have the standards finished by 1993 to liberalize trade with products all over Europe but the final demand or delivery of mandates were delayed. In late 1994 four mandates had been issued to TCs within CEN, nonhowever concerning TC 178, according to Mr. Seling. He found the situation somewhat frustrating, especially for those who were seriously working with the belief that with the Building Directive as a base they would arrive to a level where the CE-mark could be applied. It seemed however in vain, he believed in early 1995. Just a small part had been achieved, he felt. The building Directive was the worst document produced, in the opinion of Mr. Seling, and everybody was upset for the lack of a final mandate comprehending the total task and the frequent postponements with the mandate. Committees in other areas had been initiated earlier than the Building Committees started and they were financially supported by the EU although the final mandate had not been received. The Swedish ambition was to have the Swedish or Scandinavian standard accepted as the European standard. It appeared that a number of products would disappear from the market with the new standard.

S:t Eriks had the ambition to continue their export of machinery equipment for concrete products all over Europe. At the time markets had been opened for S:t Eriks in other Scandinavian countries. As indicated above, the transportation cost of concrete blocks is high in comparison to value and a distance of 250 - 300 km between the production units is considered to be the limit. Mr. Lööv acknowledged that during the negotiations he gained considerable knowledge of the competitors and of other matters. The network between the delegates of different categories had been considerably enlarged.

According to the Swedish model, a control system was required with rendering of statements of different parameters. In this way the high quality manufacturers do not need to compete with the suppliers of products of inferior quality. As indicated above S:t Eriks had for a number of years an agreement regarding system control with BBC (formerly KRV). The weighing scales and the cement/sand mixing station have to be approved as well as the management of the station. The possibility to measure the parameters is especially important in connection with public procurement as the standard becomes as binding as a law. This also means that other forces enter into the standardization process. The status of the standard is elevated by the compulsory application which also means that the negotiations become more
complicated. The products are made more identical and each company wants to have their own ideas as standard while other companies do not want a standard at all. This could be seen as a general picture of European standardization. Everybody is fighting for his own ideas and rules and desires to maintain traditions.

With the establishing of the standardization documents the construction of production units elsewhere is strongly facilitated, according to Mr. Lööv. All essential conditions are declared and constitute an enormous source of knowledge at construction of a new plant.

It was of great concern to Mr. Lööv that the possibilities for further product development must remain, even in a new standard. In this connection S:t Eriks has been leading in Sweden and in Europe. A similar system has been in existence in France, although not particularly well developed. From France an interest has been expressed in the method of S: t Eriks. The company has made an agreement with an exporting company with a view to export machinery of their construction.

The financing of the standardization work was a source of great concern. S: t Eriks had paid their own cost themselves. In addition, these costs are included in the budget on behalf of BST when they apply for government grants. S: t Eriks also paid a fee to BST. It would be desirable that the customers/users would be engaged in the standardization process but the customers would refuse to pay. This also has had as a consequence that smaller industries had not been able to participate in the process which might cause their disappearance. This view is supported and expressed in a letter of April 25, 1995, by the branch colleague Taggen AB (President, Mrs. Kerstin Nilsson) to Mr. Ulf Seling of BST/SIS. The latter has pointed out that the best time to get financial support is when people are angry and want to stop a proposal to standard.

If Sweden had not participated in these negotiations our views and experience had not been observed and markets and employments would have been lost. The standard has generally influenced the industry towards more trade internationally, in the opinion of Mr. Seling.

In the beginning it was believed that the level of ambition was to arrive at a point where the application of the CE-mark would be a general procedure. The CE mark may be used when the product is in accordance with a standard that corresponds to the Construction Directive. Sometimes it is a complicated situation when the building product is attached to or concealed, like insulation, in the structure of the building, according to Mr. Seling.
The Chairman of TC 178 was an Englishman who had to remain neutral, Mr. Seling pointed out. In between the meetings he had sessions with the Chairmen’s Panel. This Panel is composed of the Chairmen of the WGs and representatives from the Editorial Committee, one Englishman, a Frenchman and a German as the three major languages must be respected. A Secretary is connected plus two more persons, Mr. Seling and a Belgian with previous experience as Chairman of TC. The composition of the delegations from the different countries did not vary to any larger extent during the years and Mr. Seling underlined the importance of cooperation within the Committee and also the social aspect connected with the negotiations. He was confident that the Swedish concept for the standard would be accepted on European level. It was a useful standard in Sweden. Strong objections and views presented with high voices have come from all delegations but sooner or later everyone came to reason, according to Mr. Seling.

One of the reasons for participation in standardization is the possibility to follow the development, technically and marketwise, and the exchange of knowledge with other experts, Mr. Seling underlined. The participants get an idea in what direction the development is moving, international connections and knowledge of competitors.

Mr. Seling has worked with many other TCs and had a long experience in standardization. He felt that from an organizational point of view it takes too long to establish a standard. It was also clear to him that some companies would disappear from the market as a result of changes and investments required by the standards. He had also noted some ambitions and tendencies to include controlling elements in the standards which would prevent foreign competition.

4.6.5 Corporate standardization and marketing

The organization BST/SIS represented an umbrella organization with several sections for different building products. These were published in the catalogues, brochures, lists etc of the BST/SIS and this became an advantage for the members of the subgroups. It was used extensively for marketing of the products of S:t Eriks. In all their documents S:t Eriks explains and places the standards as a base for their marketing documents and marking of the products.

S:t Eriks early developed a dynamic standardization strategy. The participation and leading position in the standard development has been valuable
for S:t Eriks and has reinforced their position on the market, according to their President at that time.

At the end of the negotiations the European standards had been established, and to a great deal influenced by Sweden. The market had been opened also for export of machinery and equipment. S:t Eriks had received inquiries for substantial amounts. At the same time new owners had entered into the management of S:t Eriks and preference was given to production and marketing of their traditional concrete products.

From figure 4.6.1 can be seen that the actors in the industry all had to improve their products in order to comply with the rules of standards in field Y. S:t Eriks (S) was in a leading position which was maintained also after standardization and for the competitors, (C0), improvements in their products were required. Through standardization the products of the competitors in one step became more similar to those of S:t Eriks.
4.7 Case seven; SPM International AB / SPM Instruments AB, Strängnäs

4.7.1 Company history
The company was started in the beginning of the 1960s when a group of consultants working with machine technology developed a method for the monitoring of ball and roller bearings and machine conditioning elements. At this time the control of machine conditions was synonymous to listening to different sounds with the help of a stethoscope or a screwdriver. If an irregularity, vibration or pulsation, was distinguished it was normally beyond remedy. The SPM Instruments AB was formally established in 1970. The activity was based on patent applications and patents worldwide concerning Shock Pulse Measurement. These had been awarded to the Norwegian Elvind Söhoe inventor and entrepreneur. SPM was originally a subsidiary company to a Norwegian Consultants group. In the beginning, the essential component in order to measure vibrations was acquired from Denmark and applied in the SPM Instruments in a new and unique manner.
The vibration problems had so far been particularly severe within the shipping industry where the cargo room pumps often could break down without prior notice. In a rotating machine of the manufacturing industry the ball and roller bearings are important elements and a failure could cause serious damage. With traditional technique it was possible to establish the presence of vibrations but impossible to determine the cause. This however, was the advancement with the SPM method.

4.7.2 Products manufactured, industry structure

The products of SPM are constructed in such a way that in the database of the instrument, reference may be made to the standards of roller and ball bearings. In the development of the SPM method, as it eventually became known, it was necessary to assemble over a long time a large quantity of data concerning changes in the measuring values in roller bearing performance. In view of the large number of types and manufacturers of bearings this was a complicated process. Bearings have a limited life span and must be replaced at certain intervals to prevent damage. After another period of two years of experience the first rules for evaluation of measurement signals which Söhoel succeeded to isolate, were established. Still to-day important resources are spent on development of these rules within the SPM company as well as within the industry. Mostly, hardness in steel is measured in a “Brinell”-scale just as the SPM-scale is used to measure the condition of rolling elements in machines.

SPM Instruments AB, in Strängnäs, Sweden, is a company in the high technology area. In 2010 they had a turnover of approx. 200 SEKM and employed 200 persons. This can be compared to 160 employees in 1991 and a turnover at that time of 40 SEKM.

At the early years of operation a large number of employees were required for direct information to the customers and product development. These tasks of information were later transferred to local representatives. During the starting years SPM was the only producer of a method for shock puls analyses. On the market today SPM encounters a number of competitors, some of them of a larger size in turnover and number of employees. These companies, however, have additional products which do not compete with SPM. The SPM method and scale is the dominating technique.

In the beginning of the activity, a large part of the resources was devoted to product information on the market. To-day, the competitors help to develop a larger market but the SPM management underlines that they are only a
small player. Four - five international competitors are on the market, each employing 400 – 500 persons. The large SKF Corporation is also one of the major competitors as well as Rockwell Corp. The SPM technique was of interest to SKF. A few years ago SKF acquired a competitor to SPM to enter into the market. There are now several minor companies on the market as well.

The development of SPM has been steady and profitable. Through extensive product development, new products are continuously presented and a wider product program is planned. The original patents, issued in 1969 have expired but additional patents and patent applications support the market position. It is believed within SPM that it is an easier voyage to be best-in-class with competitors than being alone with an excellent technology which has to be explained over and over again to the customers. This they find also to be an advantage with standardization. It gives you a definition of what you are doing and the definition gives you support, in the opinion of SPM.

A Scandinavian Association for Vibration Technology (Skandinaviska Vibrationsföreningen) exists with some 600 members, among them SPM.

4.7.3 Standard development in industry and corporate standardization strategy

Within SPM the interest in standardization of their own products has not been a priority. On the other hand the relation with standards on ball and roller bearings has been very important. These initially informal standards, but today ISO standards, are known and applied all over the world and are used by SPM as reference. An old standard EN 1032 for Mechanical Vibration has existed for some time and will become SS-EN 1032. The amendment was made in order to correspond to the forthcoming ISO 2631-1 (MMS-info Nr 5 June 1997). SPM was certified with ISO 9001 in 1995 and ISO 9001-2000 in March, 2003. Among customers and suppliers in the network, it simplifies to use these standards as a reference when measuring the condition of the machines. As indicated above, the standards of bearings are available in the data base of the SPM Instrumentss. The bearing standards are voluntary and everybody acknowledges its merits. The data is today electronically available. The competitors of SPM have to measure the bearings and make a specification when evaluating the measurement values.

SPM strategy has been based on intensive technical development and large investments in marketing. In the evaluation of SPM the SPM standard has become the standard of the industry. According to SPM, their products
have been copied by some competitors. This activity SPM has tried actively to prevent. Many products are put on the market with the SPM name, although they are not made by us, the SPM management states. Normally, our trade name also offers some protection for SPM, they believe.

Through an early start, first mover, product development and customer training and support, a situation “similar to a standard” has been developed on the market - The SPM standard. It is a situation, SPM believes, similar to the Italian scooter “Vespa” which became synonymous to the scooter motorcycle or “Masonite” for wooden boards. The manager stated, that we are not interested in working in committees or networks and to give our knowledge away, but maybe, in the long run we may have to reconsider.

SPM works with products relating to certain special product markets where the standard demands are exceptionally high, i.e. offshore-drilling industry. It is absolutely compulsory to follow the rules of standards otherwise the suppliers are excluded. Also some industries, like the British mining industry, have their own rules, different from other international rules, and it is difficult to penetrate this particular niche-market. In addition there are German and U.S. testing rules which partly are identical but still with some differences.

4.7.4 Participation in standardization development

Sweden has for a long period of time participated in the international efforts to establish a standard for vibration and shock. The work is conducted within ISO/TC 108 CEN/TC 231 and (SMS group 259) today SIS/TK 111, Mechanical vibration and shock. The importance of participation in the standardization work is underlined by the fact that when the European standard is established the Swedish standard must be withdrawn unless in conformity with the CEN standard.

The establishing of a standard for the SPM method would mean to give away a large amount of know-how, according to the company. In the SIS/TK 111 more than 20 companies are represented and some government agencies. SPM has never participated in and never commented on the standardization proposals. In CEN/TC 231 Sweden has been represented by two persons who have both recently left their positions, one for retirement and one for a new position in another area. Through their presence Sweden has influenced the standards. The Secretary of SIS/TK 111, Mr. Niklas Jungerth, who has many years of experience in standardization regarding vibration, regrets the situation and also underlines the problematic financial situation.
which forces companies to exit from the standardization work. In that way they lose contact with the development and the market. New members do enter, however and the number of members remains fairly stable. SKF Corporation is not on the list of members in the vibration standardization. The Secretary of SIS/TK 111 has found that the members participating in the standardization process have a considerable advantage both with product development as well as in marketing. No regular meetings are scheduled for the time being (2007) and TK 111 functions more or less as a mailbox. Sometimes the companies are also obliged to change their own products in order to be in conformity with the standard and investments are required as rather extensive product changes may be required.

A minor but important cornerstone in the SPM company standardization strategy is the ISO 9000-EN 29000 which was adopted in the early 1990s. It was mentioned that for definition purposes it was an advantage to have a limited quality governing system like ISO 9000 even if we could develop a better system ourselves within the company, SPM has found. The ISO 9000 was developed to be a “reactive” instrument and not an “active” document. For SPM quality and quality systems are equally important, especially in marketing. A company representative pointed out that the ISO 9000 system has certain disadvantages. It is too defensive and does not generate progress. One advantage, however, is that the concepts are known. In view of the quality discussions and ambitions within SPM, the management is also familiar with the American Military System AQ-AP, which has been applied for some years also in Europe. Within the SPM company the management is also familiar with the Total Quality Management, TQM, system which is based on the Malcolm Baldridge concept, developed in the United States but first applied in Japan. In the perspective of these systems ISO 9000 would represent a minor cornerstone according to SPM. Other important systems, like QS 9000, have been developed by the U.S. Automotive Industries, which have examined and certified their suppliers. In view of the progress with ISO 9000 and other standards the automotive industries are nowadays more and more satisfied with external standard rules. In different areas of vibration a number of standards exist.

The SPM method has similarities with the ISO 9000 philosophy regarding quality although the SPM method is more complete with a mechanical instrument to measure deviations.

In the first interviews with SPM it was underlined that there was a substantial amount of internal knowledge embedded in the SPM products and for that reason a standard for their products was not deemed necessary or
desirable. As a consequence of the cooperation with SKF regarding roller and ball bearings, for which products standards do exist since many years, SPM came closer to the standardization process. It was thus remarkable to learn in recent interviews and research that standards had been established, directly connected to the use of SPM products. The company did not want a standard for their own products but would find it useful if standards were developed for the system units of measurement. Therefore, SPM has developed a special system with marketing communication tools to standardize the work with their instruments. In the beginning of the activity the SPM technique measured trends but it has now been advanced to measure more exactly the diagnostic curves presented by the instruments on screen or on paper.

In recent years such a development has occurred and today the industry, including SPM, works with ISO 2372, ISO 10816, ISO 18436, all giving the basic rules regarding what and how to measure. In addition, a large number of standards exist in the area of vibration. The acceptance of the testing norms of the European countries is important in the view of SPM and the interest in machine conditioning is increasing.

4.7.5 Standardization and marketing

In view of the technical connections of the products of SPM to those of SKF Company a cooperation between this company and SPM was established early in the activity of SPM. Based on this cooperation SPM Instruments gained access to vital data for the product development but also an organization for marketing of their products. From the technical view it was essential for SPM to have knowledge i.e. of the diameters and number of rollers and balls in the bearings. At this stage SKF also indicated an interest to acquire the patent. The intellectual property rights were, however, not for sale. A three year agreement of cooperation was signed between the two parties and SKF accepted the responsibility for the marketing rights as well as after-sales service worldwide.

SPM invested heavily, for its size, in new production facilities for the future supplies to SKF, based on market estimates. SPM decided to manufacture most of the components themselves in their factory. External components were acquired only when available as standard components. To some extent, SPM acted as a manufacturer and supplier to other companies in order to arrive at the advantage of production in a larger scale.
At the evaluation of the cooperation after three years it was concluded that the parties had different views on the potential of the market. The prolongation of the agreement of cooperation was cancelled. The first period of activity was characterized by extensive product development and investment in production facilities.

SPM had now taken upon themselves to market their own product. During the years 1975 to 1985 the activity was focused on establishing market connections and training of own sales force and service personnel. In view of the novelty of the concept and products, relatively large amounts were invested in training and information material. A professional school facility was established at the factory site in Strängnäs. To develop the Swedish market a cooperation was established with the consulting company Idhammar Konsulting AB, Södertälje, Sweden. This company was specializing on machine condition monitoring and cooperated with SPM in seminars and information campaigns.

To cover the major international markets, SPM chose as a strategy to develop their own subsidiaries in major countries. Thus in 1986 SPM had seven subsidiaries in different countries and a sister company in the United States. Sales amounted to approx. 65 SEKM. SEK and totally 140-150 persons were employed, of whom 60-65 in Sweden (Lindqvist, 1991). In 2005 the sales amounted to approx. 140 SEKM and 126 persons were employed. Fully owned subsidiary companies were established in Finland, Austria, Norway, England, Belgium, the Netherlands, Singapore, and in the United States and also with a majority ownership in a company in Italy. Even after the termination of the exclusive sales agreement with SKF constructive relations were maintained and SPM was permitted to sign cooperation agreements with SKF units in Australia, Canada and New Zealand. For the U.K. and German markets small daughter companies were established through transferring temporarily employees from Sweden. Their task was primarily to identify and select local distributors, as well as training of these. When mission was accomplished the subsidiary companies were closed. During the initial years SPM also cooperated with the Swedish Johnson Group on international markets (Lindqvist, 1991). To-day SPM has eleven companies on foreign markets and distributors in some 50 countries. The company participates in trade shows worldwide.

The market is global and growing for SPM although it must be realized at the same time that the home market has a limited potential. The marketing organization is to a large extent developed to provide education and training
combined with the sales. The need for training in Quality Management is considerable and also requires considerable investments.

It is interesting to note that the SPM method has become a concept on the market and the technique and norms of measurement adopted as the market standard. In the beginning SPM had to prove to every customer how much he or she could gain in real value while using the SPM method. In 2006 the company was finalist in the contest for the Plant Engineering Product of the Year Awards.

Everybody is today concerned with standards in the industry. Over the years it has become more and more important to SPM that a new system should be established with international acceptance of means of testing and standards. The management underlines that for a company of their size they have spent exceptionally much on product development to arrive and surpass a critical level or critical mass in technology and volume. But SPM also believes that if their products were described in detail in a standard document it would be easier to establish a competing activity. As a supplementary product SPM has a vibration measuring device which is constructed according to an ISO standard and anyone can look at the document in any country and start manufacturing the product. Therefore we are forced to position ourselves on a higher level than standard level and this we have done continuously, SPM maintains. “A company like ours cannot remain on standard level, we must stay ahead and above“, the manager points out and refers to Philips Corporation in the Netherlands, which placed a new and better recording cassette on the market and forced the smaller companies to retreat their products.

At present SPM sees no need to have their measuring instruments standardized but sees as a great advantage that standards for vibration are developed.

There is an increasing interest to perform machine maintenance work in connection with remote control and the SPM system seems to well correspond to the demands of modern and new technology.

The early management of SPM chose to start with a geographically wide marketing program. Subsidiary sales companies were established in many countries. Agreements with agents/representatives were also made in a number of countries. This was followed up with extensive information to representatives and major customers, also including training programs. In such a way the company SPM became well known and the method became known as the SPM standard.
In the beginning SPM were alone with their technology. Today several competitors, some larger in size, are on the market although SPM is the major producer. The competitors often present products similar to those of SPM, but on those occasions SPM is already introducing a new product generation, they believed.

The SPM strategy is characterized by intensive technical development of their products and large investments in international marketing, especially through training seminars and lectures. SPM has followed and been successful with the strategy of being a first mower and has maintained their position ever since the beginning of the activity. Like all other companies being studied SPM is certified according to ISO 9000 and makes use of existing standards in their general activity. The method of SPM is developed to be applied to different hardware or instruments where the evaluation of data gives a type of software. In that way there is a similarity or an approach of the SPM system towards the ISO 9000 philosophy.

SPM sees no need to have their shock pulsed measuring method standardized. However, they see a substantial advantage that standards concerning vibration and components are developed.

SPM has decided to adopt a passive role in standards development. It is organized only to monitor the running system and waits for the best moment to eventually present a proposal to standard. So far, the company has chosen to concentrate on superior product development, extensive international coverage and training of employees, agents and customers.

On the other hand the company leaves to others to compete and waits for the best occasion to enter the market with a new compatible, superior and hopefully, better product, according to its strategy. SPM does not promote a standard for their main method or products and they do not follow any other product on the market. Their standard policy is in a way neutral as they utilize standard products in a product or method for which there is no standard.

When a company is far ahead with a unique product, there is a strong pressure on the rest of the industry to make its equipment compatible. This has been the case for SPM. This might lead to the private and collective good of standardization. For the leading company standardization might be regarded as a private sacrifice.

Baskin et al. point out that a decision not to standardize implies a decision to seek a unique, controllably market.

It would of course be interesting to speculate what would happen if a standard was established involving the instruments of SPM shock pulsed measuring instruments. Probably, the competitors would gain in market
shares and the prices be reduced. On the other side the total market would expand and SPM gaining as part of the increase in the total combined marketing efforts. They could reduce the substantial marketing costs and product development expenses at present and in that way maintain the profit level. With their solid knowledge base they would probably present new products and new applications to maintain and regain a leading market position. The risk of new and strong entrants into the industry is limited A competitor (C) is indicated but with dissimilar products.

In Figure 4.7.1 below, SPM is positioned high in Field X with no standards existing and no direct product competitor. As SPM is working with unique high technology products they are in a high position in the model. In marketing the SPM company works intensively with quality information and training directed towards distributors and customers. If there had been a standard in the industry SPM would have been positioned high on the scale in the Field Y segment. SPM is focusing on a measuring method with particular instruments, while competitors, i.e. like SKF, have other products as their main lines. If a standard would be developed SPM (S) would move into Field Y, probably without any product changes or extra development costs.

*Figure 11 Model of standard development process; SPM*
 CHAPTER 5. Analyses of the corporations

In this chapter

13 issues related to standardization are identified and analyzed, based on the descriptions of the corporations and their activities in chapter 4. The choice and selection of these issues is grounded on the empirical presentation in that chapter. The seven corporations and their roles and participation in standardization were likewise presented.

5.1 The model

The 13 issues which were identified, are grouped in three categories, Background for standardization, Standardization process and Outcome from standardization process. This grouping is empirically based. The background is assumed to affect the process which then affects the outcomes. This three-stage model is illustrated in figure 5.1 below. The model refers both to the corporate level and the market level. The model is based on the empirical descriptions of the seven corporations in chapter 4. The 13 issues dealt with in the model are related to the theoretical framework developed in chapter 2. The model illustrated in figure 5.1 serves as a framework for the analysis of the seven cases. Some of the 13 issues could be placed in more than one of the three stages but the discussion of them will be conducted in the stage chosen.

Before going into the separate issues reference is made to the discussion in chapter 2 on four levels into which standardization can be described (page xx). This differentiation is relevant for the analysis of standard policy and standard strategy. In table 2 in chapter 2 the four levels are described with internal standardization on the first level, tactical considerations on the second level, standard strategy on the third level and standard policy on the fourth and highest level. The companies can at the same time be active on all four levels.
Figure 12  Issues in corporate standard strategy development

**Background for standardization**
- Standard policy. Importance of standardization as perceived by management
- Technical position in the market
- Standard strategy. Standardization knowledge within corporation at start of standardization
- Conditions for market access and position
- Standardization in what period of life cycle

**Standardization process**
- Organization in the process. Company representation in standardization committees/WGs; Use of external consultants.
- Corporate engagement/commitment in the process
- Problems in the process
- Lobbying and decision making process

**Outcome from standardization process**
- Exit or entry of competitors, development of markets and prices. Has marketing been changed as a result of standardization?
  Has new markets been developed as a result of standardization?
- Adaptation of products to new standards. Has own products been adapted to new standards?
- Degree of influence on developed standard. Has the company influenced established standard?
- Change in price after standard development
5.2 Background for standardization

Data for Background

In the first part of the Background for standardization, policy and strategy applied by the companies are regarded as activities conducted on four standard levels.

The young and smaller companies have started their activities on the first level, with internal and standard operating procedures (SOP). This has been seen in all of the younger companies from Motala Hissar, S:t Eriks and SPM. Daloc started early with advanced standardization programs and conduct their activities on the highest level, 4, with pronounced and clear strategies and policies. This applies also to the three large companies Ansell Healthcare, Bulten and VCE which all regard and use standards as an important competitive tool. For Motala Hissar it became a necessity to present their technology.
<table>
<thead>
<tr>
<th>Case</th>
<th>Standard Policy</th>
<th>Technical position on market</th>
<th>Standard Strategy</th>
<th>Conditions for market access and position</th>
<th>Standardization at what period in life cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attitude</td>
<td>Importance of standardization as perceived by management</td>
<td>Engagement</td>
<td>Standardization knowledge within corporation at start of standardization?</td>
<td>Yes</td>
</tr>
<tr>
<td>Ansell</td>
<td>Leading attitude and Compulsory</td>
<td>Compulsory</td>
<td>Leading actor</td>
<td>Heavy engagement in standard production; standards used to gain competitive advantage</td>
<td>Yes</td>
</tr>
<tr>
<td>Bulten</td>
<td>Leading attitude and Compulsory</td>
<td>Compulsory</td>
<td>Major actor</td>
<td>Major actor on standardization in general application</td>
<td>Yes</td>
</tr>
<tr>
<td>Volvo CE</td>
<td>Leading attitude and Compulsory</td>
<td>Compulsory</td>
<td>Leading actor</td>
<td>Heavy engagement in standard production; standards used to gain competitive advantage</td>
<td>Yes</td>
</tr>
<tr>
<td>Daloc</td>
<td>Active attitude and Compulsory</td>
<td>Compulsory</td>
<td>Major actor</td>
<td>Heavy engagement in standard production; standards used to gain competitive advantage</td>
<td>Yes</td>
</tr>
<tr>
<td>Company</td>
<td>Strategy</td>
<td>Market Position</td>
<td>Leadership</td>
<td>Strategy Implementation</td>
<td>Products</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>Motala</td>
<td>Reactive and Life or exit</td>
<td>Segment leaders</td>
<td>Watching and participating in standard development</td>
<td>No</td>
<td>Mature products for new markets</td>
</tr>
<tr>
<td>S:t Eriks</td>
<td>Active attitude and Market adoption</td>
<td>Major actor</td>
<td>Change in approach with new management</td>
<td>Limited</td>
<td>Mature products for new markets</td>
</tr>
<tr>
<td>SPM</td>
<td>Wait and see attitude and Irrelevant</td>
<td>Dominating position</td>
<td>Standards important; Not on own product</td>
<td>Limited</td>
<td>New products</td>
</tr>
</tbody>
</table>

Standards required; Leading position within technical segment

Standards established; Leading position within industry:

Strong and costly R&D
5.2.1 Standard policy

Attitude

The organizational structure for European standardization is now established. ISO works with a total international perspective. With the creation of the European Union and CEN/CENELEC/ETSI, with Swedish membership, the number of actors in standard policy matters has increased substantially. Standard policy concerns activities in standardization on a high level, with a number of actors from different corporations involved, including governments, public agencies, federations of industry and trade, lobbyists, suppliers and customers to the corporations (Grindley 1995, Hesser 2007, p. 455, p 557, Baskin et al. 1998, p 53). (See also Kleen, 1999, page 88). Definitions of standard policy and three other levels in corporate standardization have been discussed in chapter 2.

Over the years Swedish organizations and corporations have been active and efficient in standardization. Sweden became a leading country in Europe in standardization as measured by the number of Secretariats awarded the different countries (de Vries, 1999, p. 51).

Standard policy from the perspective of the corporation level, described in chapter 2 as the highest in corporate standardization, is measured by corporate attitudes. The attitudes are derived from interviews with key personnel in the corporations and other actors and organizations. A leading attitude implies that the corporate management sees standardization as very important and that standardization must be in focus for the corporation on all levels. Four of the seven corporations had this attitude and capacity.

Ansell, with a leading attitude saw participation in WGs and TCs as important and as a platform to introduce their corporate technology. The company had already before the New Approach been active in standardization and was nominated for membership in their WG and later also to the chairmanship in their WG.

Bulten, with a leading attitude was known to CEN and was invited by CEN to participate in the development of European standards for fasteners. The proposals by Bulten and its European colleagues to a new European standard were based on ISO standards and when accepted, easily converted into CEN standards adapted to the New Approach. For the fasteners, Sweden maintained the ISO Secretariat, later extended with the CEN duties. We can here see ambitions by both Bulten and VCE to lead the industries towards an international world standard, ISO.
Volvo Construction Equipment (VCE) also with a leading attitude through lobbying and international cooperation, had already established working relationships with the WG administrators concerned and got the secretariat position. Also from the position of the chairmanship in the WG for construction equipment, VCE continued the work with extension of general cooperation between the companies in their trade within the European Construction Equipment Companies (CECE).

The door manufacturer Daloc-Futura had an active attitude towards standardization with a strong engagement in the WGs and Swedish TC. The larger companies, including the fourth company Daloc, had resources to commit a large number of employees to standard development and administration. Complicated rules concerning safety, smoke and fire made Daloc Futura concentrate on early development of new products, often in combination with testing. Internal testing and development in their factories was a method of gaining experience for the personnel. Systematic study of national and international standards was a source of information for Daloc and a basis to remain competitive.

S:t Eriks had twice taken the initiative to new standards, once to a Swedish standard in 1980s and later to a CEN standard in 1994-45 and had an active attitude. The President of S:t Eriks became the chairman of the Swedish TC and the company contributed to financing of the Swedish TC.

Motala Hissar, with a reactive attitude, was informed that an EU-standard was required for their product had only one way to go unless the company wanted to change the production program.

SPM, with a wait and see attitude, had not changed its attitude towards standardization and continued its strategy with substantial product development and training of personnel and customers, but with no standard.

**Importance of standardization as perceived by management**

The original owner of Motala Hissar (MH) Mr. Sundström, realized that corporate products was a matter of life or exit. The products had to be included in the CEN register as EN-approved.

If not, he would not be allowed to compete. No adaption work on the products was necessary but presentation as an EN-product had to be documented.

Management of all companies, except SPM Instruments, have had a positive attitude towards standardization. The position of SPM is unique. The reaction of the President (p. 1.) of the company manufacturing railway components is spectacular but gives a strong signal regarding the effects of
standards. Managements of the cases in the study saw the New Approach not only as compulsory but also as a possibility. For Motala Hissar adaption to a new standard was necessary in order to stay on the market. A change of management in S:t Eriks meant that only half of the standard results came to use in the company. A valuable platform for standards on their products had, however, been established. The President of SPM felt that standards would be irrelevant to his company. No competitor was at present in position of knowledge and experience to contribute to further development. Whenever standardized components were available for their own products, they were used by SPM.

5.2.2 Technical position in the market

*Bulten* had for more than one hundred years been engaged as a major actor in their industry of fasteners, in ISA, DIN, ISO and CEN Secretariat as well. In these positions they had built a considerable insight in technical and market development. They had seen and been affected by the shifts in international industry structure and trade of their products. Through drastic reductions in the manufacturing program, *Bulten* was now concentrating on special products and customer related products. In view of the engagement by their Presidents and the positive results they achieved, *Daloc-Futura* and *S: t Eriks* became major actors. This was observed on the market also by their activities to present regularly new products for testing and practical use.

The ambition of these estimates should be seen in relation to the activity of the company in standardization contexts. I consider the information thus collected as indications. It is evident, however, that the corporate efforts in standardization have contributed to a leading position on the market. As was mentioned in the case descriptions in chapter 4, all companies, also *Motala Hissar* had a leading position in their segment of the standardization procedure.

5.2.3 Standard strategy

**Engagement**

In this study there are three corporations with Heavy engagement, one as Major actor on standardization in general application and the three other corporations differing between Watching and participating in standard development, Change in approach with new management, and Standards important, but not own standard. Standard strategy is focusing on decisions
meeting individual companies while standard policy concerns the entire industry. Ansell Healthcare with Heavy Engagement developed a wide standard policy where standardization was applied throughout the world. On the standard strategy level the company was engaged in national standard processes like TCs and WGs of CEN and corresponding activities on other larger markets like ASTM in the U.S. The CEN/ISO standards were used by Ansell in an increasing number of countries. The decisions on the standard strategy level involve engagement in regional or national processes and leading the standard making procedure.

VCE also showed Heavy engagement, similar to Ansell Healthcare, although the number of products was considerably lower and the products technically more complicated. The safety and financial aspects were also more present and important to all actors. In cooperation with other manufacturers VCE also tried to develop international rules which might be regarded as strategic compliments to standardization (CECE).

Especially through the engagement in ISO, Bulten, as a Major actor, had for a long time been a world leader in standardization. The company had early been aware of trends in technical development and changes in market demands. Against this background Bulten had developed its strategies. Sometimes new production machinery would appear, sometimes new products were introduced and sometimes new competitors from low cost countries would appear. In some instances Bulten took the lead and successfully introduced new standards on their major markets, Sweden and other Scandinavian countries.

Some of the products Bulten helped bring to the market, later were transferred to low cost countries and implied lethal competition to the original producing countries. The period of reconstruction and adaption of new conditions was long. Closeness to customers and special attention to customer specialties was important.

SPM Instruments, with a special standard strategy, Standards important, made extensive use of standardized components in their end products. They did not see an advantage with a strategy which included developing a standard for their own products. Even if markets were effective in setting standards for private goods, public intervention may be needed when there were high public costs of incompatibility, Grindley (1995) remarks.

Strategy in this connection is focusing on decisions meeting individual companies while policy concerns the situation of the industry as a whole. Ansell Healthcare developed a worldwide policy where standardization was applied. On strategy level the company was engaged in national standard
processes like TCs and WGs of CEN and corresponding activities on other markets like ASTM in the US. The CEN/ISO standards were used by Ansell in an increasing number of countries. The decisions on standard strategy level involve engagement in regional or national processes and leading the standard making procedure. To VCE the standard strategy is similar to that of Ansell Healthcare although the number of products is considerably less and the products more technically complicated. The safety and financial aspects were also more present and important to all actors. In cooperation with other manufacturers VCE also tried to develop international rules which could be regarded as strategic compliments to standardization (CECE).

_Daloc-Futura_ was a younger company than Bulten, _VCE_ and _Ansell Healthcare_ but had just as well been efficient in standard development. The company followed closely international standard development in its field as part of a corporate intelligence program. Extensive testing of their products was part of the programs of Daloc-Futura.

Standard strategy is defined in chapter 2 as a business management component. It is here measured by engagement in standardization, with three corporations with Heavy engagement, one as a Major actor and the three other corporations differing between watching and participating, change in standard with New Approach (NA). It has not been possible to define an ordinal scale for standard strategy even if Heavy engagement and Major actor imply stronger engagement than the three other engagement measures.

_Motala Hissar (MH)_ had over the years learnt of the importance of standards and development of standards. The company had applied a strategy of _watching and participating_ whenever their technology was in focus.

_S:t Eriks_ were successful in establishing standards for production of concrete blocks and also of manufacturing of the machinery equipment demanded for production. With new management it was decided to _change the approach_ and concentrate the activity on concrete products only.

_SPM Instruments_ with a strategy that standards were _important but not on own product made_ extensive use of standardized products in their end products. They did not see any advantage with a strategy which included development of a standard for their instruments.

**Standardization knowledge within corporations at start of standardization**

Through standards the major companies in this study had extended their original bases of knowledge. This had been the foundation of their activity
Through standardization Ansell Healthcare, Bulten, VCE, and Daloc-Futura had applied standardization as a management tool and towards with At Motala Hissar, S:t Eriks and SPM, knowledge of standardization was limited in the beginning.

It was noted that for the three minor companies standardization was a source of administrative and economic problems. Preknowledge of standardization was limited. Yet the Swedish NSO maintained that substantial resources were spent yearly on information to Swedish industries, members and non-members. In two of these companies standardization was in the hands of the Corporate Presidents. In Motala Hissar AB standardization later became one of the factors leading to the decision to sell the company to a major enterprise. Lack of knowledge of English and administrative burdens with standardization influenced the situation. Daloc-Futura AB had been involved in standardization during more than forty years and had during that time gained experience and skill in negotiations. For the Motala Hissar company the standardization process had been a matter of refining and restructuring their earlier technology in order to stay on the market. Considerable efforts through negotiations and lobbying were required to have their special technology approved as a standard. The resource exchanged in these negotiations was knowledge, while in traditional trade, products and money were exchanged.

Otherwise it may be stated that lack of knowledge of standardization on a general level was the reason for difficulties for Motala Hissar and S:t Eriks. On the individual level it was evident that many smaller companies were in need of knowledge, both with regard to existence as well as to application of new technology presented in the standard documents.

The announcement of the forthcoming New Approach made the companies Motala Hissar and S:t Eriks actively search for information.

5.2.4 Conditions for market access and position

In the perspective of standardization, according to the New Approach, standards were now required for all companies except for those of SPM Instruments. Ansell Healthcare and Bulten were still major actors in their industry. Especially Bulten had changed the production program from standard products to special products, often developed in close cooperation with the customers. For Volvo CE and Daloc standards were important in market-
ing of their products. The questions remained, how far can standards be developed, for example in areas like safety equipment and tests? The answers to these questions are complicated and sometimes sought in cooperation with other manufacturers and organizations like CECE, the European organization for construction equipment.

Daloc-Futura was still a leading company on the market and worked extensively with standards, according to the New Approach. New international markets would be opened.

The elevators from Motala, with their special technology, were also obliged to follow the standards. Otherwise the products would have to be withdrawn from the market. Standards had been a market and technical advancement for the company. The concrete products from S:t Eriks are now made according to a European standard. The technical equipment to manufacture the concrete blocks was made by the company itself and the new standard was here a positive advancement to remain a leading company in their industry.

In the perspective of standardization according to the New Approach standards are now required for all companies except for those of SPM Instruments. Ansell Healthcare has adapted their products and make extensive use of standards in their marketing and maintain a leading position. Bulten was still a major actor in their industry. It had changed the product program from standard products to special products, often developed in close cooperation with the customers. For Volvo CE standards were still important. The questions remained, how far can standards be developed and customers willing to pay, for example for safety equipment and tests? The answers to these questions were complicated and sometimes sought in cooperation with other manufacturers and organizations like CECE, the European organization for construction equipment manufacturers. In this organization VCE had further advanced issues which could hamper trade.

The elevators from Motala will have to follow the standards. Otherwise the products must be withdrawn from the market. Standards have been a market and technical advancement. The concrete products from S:t Erik’s were now made according to a European standard. The technical equipment to manufacture the blocks is made by the company itself and the new standard is here a positive advancement.

Strategy in this connection is focusing on decisions meeting individual companies while policy concerns the situation of the industry as a whole. Ansell Healthcare developed a worldwide policy where standardization was applied throughout the world. On strategy level the company was engaged in
national standard processes like TCs and WGs of CEN and corresponding activities on other markets like ASTM in the US. The CEN/ISO standards are used by Ansell in an increasing number of countries. The decisions on standard strategy level involve engagement in regional or national processes and leading the standard making procedure. To VCE the standard strategy is similar to that of Ansell Healthcare although the number of products is considerably less and the products more technically complicated. The safety and financial aspects are also more present and important to all actors. In cooperation with other manufacturers. VCE also tries to develop international rules which might be regarded as strategic compliments to standardization (CECE).

Bulten has for a long time been a world leader in standardization. The company has early been aware of trends in technical development and changes in market demands. Against this background Bulten has developed its strategies. Sometimes new production machinery would appear, sometimes new products were introduced and sometimes new competitors from low cost countries would appear. In some instances Bulten would take the lead and successfully introduce new standards on their major markets, the Swedish and other Scandinavian countries. However, some of the standards Bulten helped bring to the market, later were transferred to low cost countries and offered a lethal competition to the original, producing countries. The period of reconstruction and adoption of new strategies was long. Closeness to customers and special attention to customer specialties became more important.

The general conditions for corporate standard development varied from company to company. The CEN organization was not prepared for the rapid development which was launched in the 1980s. The Directives for different product areas were not developed, in particular the Machine Directive and the Building and Construction Directive. For the major companies this opened lobbying possibilities in their favour. For Ansell Healthcare, the standard development program in Europe was started and coincided as part of political ambitions, in particular focusing personal health and safety. In negotiations Bulten and VCE took advantage of the existing ISO standards and were able to position themselves near traditional customer products.

Daloc, Motala Hissar and S:t Eriks had long ways to go but through hard work and determination they have arrived at positive results, viz. standards convenient for their traditional production.
5.2.5  Standardization in what period in product life cycle

Most of the products of the case companies are of mature age, with Bulten and VCE going back several generations. Normally standardization of a product takes place when the product is established on the market. The products might be small and simple. The production technology required, however, is well advanced and exposed to regular improvements. New special products are now often developed in cooperation between manufacturer and customer and no standard required. For Volvo Construction Equipment new products are presented yearly and other products could be used over generations. Ansell Healthcare work above all with new products which are regularly tested and marked. Also at Daloc-Futura new products are presented regularly, tested and according to standard, before introduction on the market. Motala Hissar and S:t Eriks had their products adapted to standards at later stages of the life of their products.

The young and smaller companies have started their activities on the first level, with internal and standard operating procedures (SOP). This has been seen in all of the younger companies from Motala Hissar, S:t Eriks and to SPM. Daloc started early with advanced standardization programs and conduct their activities on the highest level, 4, with pronounced and clear strategies and policies. This applies also to the three large companies Ansell Healthcare, Bulten and VCE which all regard and use standards an important competitive tool. Also, when the company is not a technical leader a strategic decision has to be made whether to be a taker of standard or not. Thus strategy is concerned with the decisions facing individual companies while policy concerns the consequences on the industry as a whole, comprising manufacturers, suppliers and customers as well, (Hesser 2007)), (Mansell 1995).

Of the seven product areas represented by the seven companies, they are all of mature age. Protective gloves, fasteners, construction machinery, steel and wooden doors, elevators, concrete building blocks and measuring instruments have been studied. One factor is in the forefront of all of the companies, product development, supported by standardization. In that way the industries are in position of new and old products. According to Baskin (et. al. 1998) the time for standardization is an understanding of a need on the market and the skill in entrepreneurial activity.

Traditionally, standardization was merited only if the revenues of standardization could be expected to exceed the costs. The revenues of standardization could be estimated by the money not spent, material not used and labor which has not be applied as well as time which has not been used. At a
conference on threads and fasteners in 1958 in Västerås, Sweden, standardization was underlined as an element of cost saving. At ABB, ASEA, at that time, standardization had been conducted for 50 years and the company was now preparing for the forthcoming European market (VLT, Fram för en världsgång, 1958 05 08) “Wanted: A world thread”. The EU- ISO/CEN perspective has moved the focus of standardization towards access to the market and health, safety, environment and rational production.

Ansell Healthcare, Bulten, VCE plus Daloc-Futura had been involved in standardization for a number of years. Ansell Healthcare, manufacturing and selling protective gloves in large volumes to many customer categories all over the world, had developed an international standardization strategy and made extensive use of standards in their marketing.

Through the long lasting involvement of Bulten in standardization of threads and fasteners Bulten was well known which facilitated their marketing as well as technical cooperation and licensing agreements in their industry. The transfer of a large part of the production of fasteners from Europe to low cost countries was connected to standardization (Vernon 1979).
5.3 Standardization process

Table 5 Standardization process

<table>
<thead>
<tr>
<th>Case</th>
<th>Standardization Process</th>
<th>Corporate Engagement</th>
<th>Lobbying is part of std. development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ansell</strong></td>
<td>ISO to CEN</td>
<td>Chair-men</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Buiten</strong></td>
<td>ISO to CEN</td>
<td>Chair-men</td>
<td>No</td>
</tr>
<tr>
<td><strong>Volvo</strong></td>
<td>ISO to CEN</td>
<td>Chair-men</td>
<td>No</td>
</tr>
<tr>
<td><strong>Daloc</strong></td>
<td>Directives</td>
<td>Participating</td>
<td>No</td>
</tr>
<tr>
<td><strong>Motala</strong></td>
<td>Information</td>
<td>Participating</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>S:t Eriks</strong></td>
<td>Information</td>
<td>Chair-men</td>
<td>(Yes)</td>
</tr>
<tr>
<td><strong>SPM</strong></td>
<td>Irrelevant</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

5.3.1 Organization in the Process

The problems that the companies met were mostly of limited character. For the smaller companies, Motala Hissar and S:t Eriks the cost, lack of language knowledge and information were severe obstacles belonging to areas where improvements now have been made.

*Ansell Healthcare* was aware of the forthcoming European standard project CEN. Based on knowledge from standardization in other parts of the world. The company Ansell invested heavily in acquisitions, production and
marketing of products which were supposed to be manufactured and marketed according to new legislation. They turned the problem of lacking testing facilities around and cooperated with the testing institutes to develop their equipment and methods. For Bulten and also to VCE the change from ISO to CEN standards was of great concern. Through skill and experience in the negotiations the organizations concerned managed to establish a majority for a CEN standard built on ISO standards. The strategic decisions by Bulten and VCE independently to work for the use of ISO standards to implement them into CEN standards was a rational step. The lack of testing equipment and missing Directives were questions of mistakes in timing which were later resolved.

For Daloc as well as for VCE the slow production of Directives from CEN was of great concern. Often the Directive were unclear and difficult to understand.

For Motala Hissar and S:t Eriks lack of knowledge of information, language problems and financial resources represented obstacles for the smaller companies.

Ansell Healthcare saw lengthy time procedures and unclear documents as problems for them in the standardization process. A problem was also the requirement to mark products with the year of production, this was costly and was an administrative burden.

For Bulten the change from ISO to the CEN minimal organization was in the beginning of great concern and regarded as a problem. For VCE there were problems with unclear and unclear documents.

For Daloc the slow and complicated production of Directives from CEN was a problem.

For Motala Hissar and S:t Eriks lack of knowledge on information, language problems and financial resources represented problem for them as small companies.

Standards were now developed through the request by CEN, based on CEN Directives and addressed to national SDOs. In this study I have in particular observed the Machinery Directive, Building and Construction Directive, which will be renewed as per of July 1st, 2013, (Boverket, 2013) and the PPE, (Personal Protection Equipment Directive) (CEN, 1994) (The New Approach, CEN). These new procedures have opened new perspectives for the industries to develop and to use standards as a competitive factor on the market. For SPM standards were irrelevant.
Company representation in standardization committees/WGs

On national level every company had a possibility to participate in the standard making committee, TC, with their own representative/s.

On international level the corporate representative could also be selected as a member of his country group representing his nation, but not his company. Ansell Healthcare, Bulten, VCE as well as Daloc-Futura were members of the committees and also of the CEN WGs. The action by Ansell to be represented by six American experts when presenting their experience and proposals to European standards was a remarkable strategic step. The timing with an expansion on the European market was well based and the standards eventually developed corresponded well with Ansell corporate standards and testing methods.

The importance of being informed of standard movements in an industry is evident by the example of Motala Hissar and S:t Eriks which companies both learnt late of planned or ongoing standard development in their respective industries. At S:t Eriks the ongoing standardization was observed by the President from a notice in a trade journal and Motala Hissar by chance observed a note regarding a program of revision.

The engagement as Chairmen of the WG on the part of Bulten, represented a long tradition.

Use of external consultants in the standard process

The use of consultants in standardization is in particular present in connection with two stages. The first is connected to standard making when a consultant has been selected to follow and analyze the discussions to determine the direction and the ambitions of the WG.

Ansell Healthcare invited both internal as external experts to participate in the meetings.

Bulten and VCE worked in a different way and established groups of companies with mutual understanding regarding proposals to standards. Through hard work at Daloc they contributed on their own towards the mutual goal of establishing functioning standards. Motala Hissar relied in the beginning on external advice as well as on assistance and cooperation with SIS and Kone Oy. The standards under development with S:t Eriks demanded expert knowledge from different technical areas. Thus, the President of S:t Eriks had a staff of 4 to 5 persons engaged in the development project, including a representative from SIS.
The second stage occurred when the first product would be manufactured according to standard. A standard had to be chosen as well as the quality. Expert knowledge was required. Some smaller companies would be satisfied with a product that just meets the standard with the lowest demands. For the competing companies the need of market information is essential to explain that product quality might vary from one standard to another. This situation had in particular been present among the smaller companies, e.g. competitors to Daloc-Futura. No production consultants were used by SPM.

Standardization costs money and influences the price of the products in varying degree. As an indication an average of the cost related to standardization would amount to 2 to 3 percent or more depending on the size of product and degree of adaption cost required. As stressed earlier, this is the most difficult part of standardization, to balance the content in the standard against the need and willingness of the customer to pay for product. With the rapid development for products in the area of health, safety and environment the cost for testing has risen and contributes to the withdrawal of many products from the market.

5.3.2 Problems in the process

Reasons for participation in standardization

During the course of this study for six of the seven companies (SPM excluded) in this study, standards have been established. Apart from other, general advantages of a standard, there is reason and meaning to follow the Directives and the EN- or ISO-standards.

When this tradition was continued as a result of the creation of EU/CEN Bulten was in charge of the Swedish participation as was VCE on Construction Equipment.

The Swedish Institute of Standardization (SIS) was glad to underline the large volume of information every year supplied free of charge to all Swedish Industries. At the same time it was just as important to stress that the information be observed by the industries concerned.

Based on EU Directives, observation and participation in development and use of new standards is also an activity within the other companies of the study, a routine with chief engineers responsible for the duty.

Standardization can be viewed in periods. The first goes back in history hundreds of years when man had only primitive tools and equipment to his disposition for entering into production and trade. In 1841 Whitworth pre-
Presented his proposal regarding threads and fasteners. In the beginning of the 20th century the first standardization organizations were established (BSI in 1906; DIN 1917, SIS 1922). Standardization was growing in importance when two World Wars disrupted the development. As mentioned above ISO was established in 1946 to replace ISA. Politicians and industry leaders were anxious to develop trade and had confidence in standardization as part of a structure of technology and trade to rebuild the World Economy. In 1964 CEN was created by the EC. Unfortunately this organization was not provided with the resources required. In the 1980th the European economy came to a slow down. Of the many steps that were taken to develop trade, standardization came into focus. CEN was reorganized and given responsibility and resources for constructive standardization. Experts from industry and trade were invited to, or asked to, participate in the practical standard development. Standards regarding health, safety and environment were given priority.

**Participation of foreign subsidiaries in working groups**

Another aspect of marketing was the influence of European standardization on the organization of subsidiary companies. With products standardized for all European countries, smaller organizations were required. Formal organizations with a large staff of members were no longer required and local employees were less expensive than staff members from the mother country. Also, the participation in the negotiations by internal and external experts in the corporate delegations facilitated the development and adoption of the new standards.

As a rule, mature, international corporations have an organization with sales companies in many countries. With European standardization, conditions are created for improved logistics. Also, products for the market become similar at an early stage. New logistics are applied with marking of the products, storage, documentation, communications, management of transportation with modern means.

*Ansell Healthcare* had reduced the number of employees in different countries and covered the markets with less distributors. One or two persons were present to stay in contact with distributors and for information to major customers.

In the Ansell Healthcare case a strategic cooperation was established regarding standardization between the American operations and their European organization. Knowhow and equipment was exchanged and experts from the two organizations participated in the standard development committees.
Also, internal experts in other countries were invited to participate in the development work in order to be informed of the forthcoming standards and of discussions and of competitive actions. Another strategic move was that their country executives participated in their respective national standard development committees and thus were able to influence the standard development also from this perspective and level. Also at VCE and Bulten the subsidiaries were invited to contribute with their experience. Standard development was a special constructive function between experts and no tendencies to tensions were revealed.

In Sweden the representatives of Ansell had participated actively in the standardization process and was in an advanced position to inform customers of forthcoming standards.

*Bulten* had *important subsidiaries* in Germany who were kept informed about the process.

Over time standardization had become an important activity in Volvo and *VCE* why a central coordinating office had been established in Brussels. This office was informed of the process but did not actively participate in the work of WG for construction equipment.

*Daloc-Futura* handled standardization *from their headquarters* in Töreboda. *Motala Hissar* also worked out of Motala with their standard applications or with support from Kone headquarters in Stockholm. *S:t Eriks* had no international subsidiaries. For the complicated steps in the process *S:t Eriks*, in cooperation with SIS, had technical specialists participate in the meetings. *SPM* had many subsidiaries in Europe but standardization took no part in their activity.

**Consensus decisions**

In the case of *Ansell* consensus agreements were reached rapidly. With the experience of Bulten consensus agreements were also rapidly reached. Many times agreements had been prepared before the formal decisions were taken.

For *VCE*, *the Company met* with up to 40 participants in the meetings. Work was organized in several smaller Committees where consensus was required before presentations in larger plenums.

In the case of *S:t Eriks* and concrete blocks, the process was slow and negative in the beginning. After a personal demonstration to all members in their respective TC, agreement was reached in consensus. Against the background of financial discussions the process was time demanding before consensus was reached in the Swedish national group.
Cooperation with national standardization organizations

With the establishment of the European Union the EU Commission also developed CEN/CENELEC as the major and appropriate European standard development organizations, SDOs. Six of the seven cases in this study had confirmed the practical functioning and efficiency of these organizations. This can also be seen as a complement to The International Standards Organization, ISO, established in 1946. Based on Directives, the industries, large and small, had been forced to undertake strategic changes to be able to compete and survive after standardization of their products.

Management of the Swedish SDO, SMS/SIS, expressed its appreciation of the cooperation and work of the larger companies. Together they had worked with extensive lobbying. On the corporate side all companies were satisfied with the excellent work the coordinating organization had performed. The Secretariats provided by the NSOs had been most efficient and worked with a long term perspective.

SPM, with their unique market position had a passive relation to the standard organizations.

They are, however, member of a Trade Organization dealing with vibration issues.

5.3.3 Corporate engagements/commitment in the process

Even if “engagement” is appearing also in this issue, it is a different kind of engagement than the engagement in Standard strategy. In this connection the engagement involves all levels of employees from management and down to the factory floor. In Ansell, management had a global perspective involving production as well as marketing and development of new products.

Bulten had through the years developed strong personal relations with their customers, especially regarding developing of new products. These were often developed in cooperation with customers and in that way the products could become a special product in the relationship with the customer. The reputation of Bulten invited to relations with the customers on many levels. Management had long term experience of standardization and supported with confidence the future efforts. It was estimated that as many 100 persons could at one time be engaged in the standardization process.

Also Volvo Construction Equipment had a large number of products. For some of the products they were the major producer in the world. A corresponding international standardization policy was applied. Management was well informed of and participated in standardization activities. A special
group of employees was responsible for spreading of information throughout the company. On lower levels special solutions were occasionally required. In Ansell and VCE the engagement was complete on all corporate levels.

At Daloc, management was most active and showed a strong involvement in standardization. This gave the direction in the whole company and inspiration in testing and development of new products. Thus the engagement of the personnel was encouraged and considered an asset in customer relations and product development,

The Management of Motala Hissar now followed the international development of standards and had over the years gained experience when searching information about standardization. Also, whenever need would be, the company could turn to the specialists in their parent company, Kone. However, through standards new markets had been opened which stimulated to further efforts on all levels.

In S:t Eriks the President saw a strong potential for increased sales of manufacturing equipment for standard products. With new ownership

Within the SPM Company, the owner and Management saw no need to get involved in development of a standard for their product. In their own production, standardized components were used as much as possible.

5.3.4 Lobbying

The two largest companies in the study, Ansell Healthcare and VCE had a long term strategy and resources to intensively evaluate factors likely to be critical in the future. In the case of Ansell, influencing administrators in matters like testing of finished products was also regarded as such a factor. In Europe no testing methods had as yet not been established when Ansell came into the picture. In cooperation with testing institutes Ansell invited specialists in the domain from the U.S. to Europe to inform of and demonstrate equipment used in other areas, e.g. the U.S. This gave the company a rapid start in comparison with the competitors. In the case of VCE the composition of the WGs was considered important. As Chairman of the WG or as Member you could influence the agendas and the Secretariate of the decision makers and lead the proposals in a way advantageous to your country and its industries.

Some companies presented as cases have influenced the standards developed by lobbying. This is also confirmed by their statements that they have been obliged to modify their own products only in a limited extent.
In the cases of Ansell and of VCE the competitors highly appreciated the work of the Chairmen. *Bulten* was also one of the oldest and most experienced companies in the industry and as such leading the development with a moderate approach. The product area for *Daloc* was complicated in connection with standardization and demanded close and *moderate* relations with local and international authorities. The skill demonstrated by *Daloc* in these connections impressed and helped Daloc to present their products on a high quality level. The moderate discussions surrounding S:t Eriks and Motala Hissar in connection with standardization were helpful to the companies. To SPM attention was drawn through the high level of technology and quality connected to their products.

Management of the Swedish NSO, SMS/SIS, expressed its appreciation of the cooperation and work of the larger companies. Together they had worked with extensive lobbying.

### 5.4 Outcome from standardization process

**Table 6  Outcome from standardization process**

<table>
<thead>
<tr>
<th>Case</th>
<th>Development</th>
<th>Has production been changed as a result of standardization</th>
<th>Importance of standardization as perceived by management</th>
<th>Change in price after standard development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ansell</td>
<td>Exit</td>
<td>Yes</td>
<td>Yes</td>
<td>Compulsory</td>
</tr>
<tr>
<td>Bulten</td>
<td>Exit/entry</td>
<td>Yes</td>
<td>No</td>
<td>Compulsory</td>
</tr>
<tr>
<td>VCE</td>
<td>Exit/Exit</td>
<td>Yes</td>
<td>Yes</td>
<td>Compulsory</td>
</tr>
<tr>
<td>Daloc</td>
<td>Exit</td>
<td>Yes</td>
<td>Yes</td>
<td>Compulsory</td>
</tr>
<tr>
<td>Motala Hissar</td>
<td>No chance</td>
<td>Yes</td>
<td>Yes</td>
<td>Life or exit</td>
</tr>
<tr>
<td>S:t Eriks</td>
<td>Exit</td>
<td>No (Yes)</td>
<td>(Yes)</td>
<td>Market adaption</td>
</tr>
<tr>
<td>SPM</td>
<td>.</td>
<td>No</td>
<td>No (Yes)</td>
<td>Irrelevant</td>
</tr>
</tbody>
</table>

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5.4.1 Development

**Degree of influence on developed standard**

The problems could to some extent be traced back by the EEC to the inappropriate distribution of the respective roles of the public authorities and standardization bodies. With the ‘reference to standards’ principle, the Council confirmed one of the conclusions from 1984 that standards would now constitute an important contribution towards free movement of industrial products. It became the strategy for the technical harmonization of laws and regulations mainly dealing with the safety of persons and products. From the cases it is especially noted that the role of the NSOs as a source of marketing information was important (The New Approach, CEN). These new processes have opened new perspectives for the corporations.

The strategic change from ISO to CEN represented for Bulten a decision built on EU directives and was mainly an adaption to existing ISO standards. In the cases of Ansell Healthcare, Daloc-Futura, Motala Hissar, and S:t Eriks the need to develop standards originated in new EU demands through Directives. The negotiators for Sweden and VCE succeeded in having the entire industry change most of the standards from ISO to CEN, thus saving costs and time.

**Exit or entry of competitors**

Another aspect of marketing, influenced by European standardization was the organization of subsidiary companies. With products standardized for all European countries, smaller organizations were required. Formal organizations with a large staff of members were no longer required and local employees were less expensive than staff members from the mother country. The participation in the negotiations by external experts in the Ansell delegation was unique.

From the cases it was indicated that as a result of standardization some companies were forced to exit from the industry. The new standards were established on a higher quality level which for some companies represented costs of adaption which they could not afford. From the major case companies it was indicated that some of the companies which had gone bankrupt had developed a habit of reappearing in new shapes and under new names. Through their strong involvement in standardization the major companies had all arrived at top positions. This indicated that their own products represented the highest quality level of the industry. They had been successful in
technical development and standard negotiations. It must in this connection, however, still be remembered that too high a quality might discourage customers to acquire the products.

Through standardization the marking of the products had been developed, as well as the accompanying written instructions. From one company it was remarked that they were shipping more paper regarding standardization than products. As a new aspect and as an unexpected consequence of standardization the producers were able to reduce the sales force in numbers. This coincided with a possibility to divide the market areas based on language instead of country frontiers.

Another aspect of marketing, influenced by European standardization was the organization of subsidiary companies. With products standardized for all European countries, smaller organizations were required. Formal organizations with a large staff of members were no longer required and local employees were less expensive than staff members from the mother country. The participation in the negotiations by external experts in the Ansell delegation was unique.

Has marketing been changed as a result standardization

All companies now refer to standards in their marketing and sales material. The time aspect regarding announcement of new standards was important. *Ansell Healthcare* was especially alert with announcing forthcoming new standards, supporting the announcements with explaining analyses and arguments. Seminars and conferences were arranged with distributors and major consumers. The feedback from these conferences was also utilized in standard development negotiations by the manufacturers. The new standards had facilitated trade and had opened new markets for the six companies studied, including the smallest company. For the industrial sector of construction machinery (VCE) still some obstacles to trade remain, in particular regarding product tests and certification.

One of the findings in this study is that as a consequence of the standard development process, prices have a tendency to converge. Products also look more and more alike. Over time this changes the marketing of the products as less parameters are available in the total sales effort. Standards represent the foundation of corporate operations especially in *Ansell Healthcare*. *Daloc Futura* and *VCE* also base their activities to a large extent on standards. However, the types of products are different compared to Ansell Healthcare, which also result in marketing of different character. The number of customers and number of products, price levels and distribution pat-
terns etc. are different. This is why and how the enterprises are obliged to handle their standardization strategy in different ways. For Finnveden-Bulten AB, standards had long ago become a way of life and standards play a fundamental role in all their activities.

**Has new markets been developed as a result of standardization**

For *Motala Hissar* new markets were opened outside Scandinavia. It merits to mention that *Volvo Construction Equipment, Bulten and S:t Eriks* all three companies invited their international colleagues in the WGs to regard and evaluate on the place the Swedish standard proposals. The executives were all successful in their efforts and it was particularly appreciated when the groups were received by a top executive of the hosting company. The organization and work set up by Mr. Grancrona in his WG was most efficient and impressive. It later served as an example for other WGs. Part of the efforts from VCE was early information on forthcoming standards and lobbying with regards to composition of WG, and establishing of Directives. In the three major companies and in *Daloc* management is strongly involved in standard strategy and development. A major ambition of standardization is to arrive at rational production in longer series. When increasing the quality of the standard some companies are obliged to invest in new equipment. At the negotiating table the major companies may argue and assemble a majority for an improved product. This may result in exit from the market of one of more competitors. This experience is particularly evident in the cases of the four largest companies, *Ansell, Bulten, VCE and Daloc.*-*Futura* The number of industries manufacturing gloves, fasteners, construction equipment and safety doors had diminished. The problems of the fastening industry worldwide, has been described in detail in the *Bulten* case. From one company it was especially underlined that many companies in their particular industry disappeared for a while only for reappearance with a new name. In the meantime the cost of unemployment was transferred to the taxpayers.

### 5.4.2 Change of production

Five of the seven companies (SPM not counted, Bulten see below) were obliged to change more or less their traditional product programs as a result of the New Approach. *Ansell Healthcare* had a large number of products which were developed, tested and placed on the market. The modifications for *Ansell* and *VCE* had been of minor character. For *Bulten* the situation was different. The company had passed a period of economic downturn
which had forced the management to stop production of their standard fasteners and concentrate on special fasteners. Bulten still remained the leading company in the industry and had the chairmanship of the Swedish TC and CEN/WG. When invited by CEN to develop a standard for fasteners according to their New Approach, the Bulten representatives presented a proposal mainly built on the already established ISO standard. The proposal was accepted and is now widely used.

A few years earlier, Bulten had left the German M-standard and introduced the ISO standard in Sweden and other markets nearby. This change had been most successful for Bulten. Many competitors were forced to leave the market. The company had earlier participated in developing standards for fasteners which were copied in low cost countries and used for mass production and sales to the Western world.

For Daloc-Futura, Motala Hissar and St:Eriks standards developed by the companies themselves became the EN-standard.

5.4.3 Importance of standardization as perceived by management. Has own standard been adopted?

In the Ansell Healthcare case a strategic cooperation was established regarding standardization between the American operations and their European organization. Know-how and equipment were exchanged and experts from the two organizations participated in the standard development committees. Also, internal experts from other countries were invited to participate in the development work. Their first ambition was to be informed of the forthcoming standards and of discussions and of competitive actions. Another strategic move was that their country executives participated in their respective national standard development committees and thus were able to influence the standard development also from this perspective and level. Also at VCE and Bulten the subsidiaries were invited to contribute with their experience. In the TCs standard development was a special constructive function between experts and no tendencies to tensions were revealed. Once consensus had been reached most of the companies were obliged to undertake minor adaption steps in order to have their type of product according to standard. In view of the close cooperation with the testing institutions, Ansell had access to early information regarding outcome of testing. Bulten and VCE normally prepared the work in the TCs through meetings or conferences beforehand with national committees or with their major industry colleagues. In the case of St Eriks it became necessary for their trade colleagues to change the
products to the new standard. Daloc-Futura was ahead with standardization in their industry and the requirements for adaption were of minor category. Motala Hissar had their own technology and neither the company nor its competitors were obliged to undertake any major adaption work. No standard touching on SPM was developed.

5.4.4 Change in price after standard development
(Movement of prices)

Standardization costs money and influences the price of the products in varying degree. As an indication an average of the cost related to standardization would amount to 2 to 3 percent or more depending on the size of product and degree of adaption and testing costs required. As stressed earlier, this is the most difficult part of standardization, to balance the content in the standard against the need and willingness of the customer to pay for the product. With the rapid development for products in the area of health, safety and environment the cost for testing has risen and contributes to the withdrawal of many products from the market and of technical character. The development and testing of a pair of double doors for a garage from Daloc-Futura could be more expensive and influence the cash flow.

Through standards, however, the trend is evident that over time the prices converge and the products look more and more alike.

Even if the debate concerning standards as trade barriers has faded and the waiting lines at Custom stations on the borders have disappeared, everything is not perfect. The views of the environment and safety aspects have increased the demands of testing of the products. These costs are in certain cases considerable. Also many authorities in one and the same country, each have their special requirements which strongly affects the price for the final customer market.

With the establishment of the European Union the EU Comission also developed CEN/CENELEC as the appropriate European standard development organization, (SDO). Some in this studies This can be seen as a complement to The International Standards Organization, ISO, established in 1946. based on Directives, after standardization of their products, the product cycles varied. The three oldest companies, VCE, Bulten and Ansell Healthcare had products of mature age, over 100 years. They had all influenced the standard development in their respective domain. Agreements on standards with their industry colleagues had been reached in consensus. For
the SMEs, Daloc-Futura, S.t Eriks, and Motala Hissar, more complicated negotiations were required before standards were agreed upon.

5.5 Summary and discussion

After the end of the World War in 1945-46, politicians, managements and standard experts met with a purpose to restructure trade. International trade was limited and home markets were the primary objects and the regulatory context. Europe was split up in new and old countries, each one with an ambition to protect their infant industries. With the Rome Treaty (1957) standards came into focus for industries, first by management as a means for efficient production and later by politicians as well as industrial management to facilitate trade. As European and world trade developed, standards became an important tool for many companies worldwide. Following a slowdown in the development of the European Internal Market, standardization was in 1980s given an even more extended role through the New Approach (CEN, The New Approach, 1994), Emerson, (1991). For management in European corporations the conditions for trade were changed and the industries exposed to new challenges. As soon as the qualities of a standard was apparent the market focused rapidly on it.

For the smaller companies the cost, lack of language knowledge and information were severe obstacles belonging to areas where improvements now have been made. For five of the seven companies the answer was affirmative. In the case S:t Eriks, new owners of the company decided to abolish the sales and export possibilities of the machinery equipment which had been adapted in size to the new standard of concrete blocks. For S:t Eriks the newly developed standard meant a reinforcement of their quality and more sales of concrete blocks. SPM still prefers no standard on their market.

The very fact that standards had been developed in an industry sooner or later had consequences on the industrial and trade structures. From the above cases it has been learnt that new standards may demand costly investments in new machinery, product adaption and development, labeling etc. If changes were needed, it could turn out to be a substantial cost for some companies. Especially smaller companies could not afford the investments and must exit from the business. The development in the fastener manufacturing industry had been spectacular with the shift from domestic orientation in the major industrial countries to large scale production in low cost countries, based on
new ISO and CEN standards. The patterns of production as well as to trade had changed. Through standards, know-how and information was made available and easily transferred. The development in the fastening industry has been spectacular.

While it was normal for the major, international companies to have a written standard strategy document, the smaller companies were facing a new situation with no particular strategy established.

Standards become known to the users also through information from CEN, ISO, SIS, trade journals, organizations etc. Through the participation in the negotiations knowledge is obtained regarding the direction of future standards. This information is sometimes forwarded to the market by the participating manufacturers or consultants against payment.

It was noted that for the three minor companies standardization also was a source of administrative and economic problems. Preknowledge of standardization was limited. Yet the Swedish NSO maintains that substantial resources are spent yearly on information to Swedish industries, members and non-members. In two of these companies standardization was in the hands of the Corporate Presidents. In Motala Hissar AB standardization later became one of the factors leading to the decision to sell the company to a major enterprise. Lack of knowledge of English and administrative burdens with standardization influenced the situation. Daloc-Futura AB had been involved in standardization during more than forty years and had during that time gained experience and skill in negotiations. For Motala Hissar company the standardization process had been a matter of refining and restructuring their earlier technology in order to stay on the market. Considerable efforts through negotiations and lobbying were required to have their special technology approved as a standard.

The resource exchanged in these negotiations was knowledge, while in traditional trade, products and money are exchanged.

During the time of this study, in six of the seven companies European standards have been developed. In the cases of Finnvelden-Bulten AB and VCE most of the new standards originate from ISO and were established before the CEN obligations. For the seventh company, SPM Instruments AB, still no standards are developed. The company maintains that through standardization know-how would be given away and innovation activity could be hampered. Standards were now developed through the request by CEN/CENELEC based on Directives and addressed to national Standard Development Organizations SDOs.
The development of standardization in the society has to a large extent been part of the general industrial and economic development. During the last one hundred years standardization has also had a stepwise development, beginning with a period when management of production was the prime ambition. The reduction of the number of varieties was also a target. In the middle of the past century, and reflecting the establishing of the European market, international trade aspects have also strongly influenced the picture.

Differences in the standardization traditions between countries and regions have been noticed and influenced the ambitions of the corporations to get involved in international trade. Thus standards promote transfer of innovations and knowledge over national borders.

Through standards the major companies in this study had extended their original bases of knowledge. This had been the foundation of their activity. Through standardization Ansell Healthcare, Bulten, VCE, Daloc-Futura and S:t Eriks looked towards the future and applied offensive standard strategies.

New standards in an industry could mean additional cost to the manufacturers with regard to adaption of products and product development. It was early evident within all three major cases as well as in the industry of Daloc-Futura safety doors, that many competitors had to exit from the industry. In the case of Bulten and VCE the consequences were particularly strong also on international level. Also in the trade of protective gloves many new international producers had tried to penetrate the EU market based on new standards and CE-marking. The quality demands and the long engagement in standardization by Ansell Healthcare helped the company to defend and improve its position. At the same time the distributors of their products referred to the new standards and reduced the number of suppliers and products in their assortment. Some distributors even started their own production in international locations based on the new standards.

The general assumptions of standardization as a means to reduce varieties and allow longer series of production have been evident in all companies, large and small.
CHAPTER 6. Conclusions and contributions of the study

In an effort to improve the economic development of the European Inner market the politicians in the 1980s turned to the phenomenon of standardization. A New Approach was developed. Initially, the EU Commission had left standard development in the hands of administrators. The performance did not reach the desired results. The practical standardization development was transferred into the hands of specialists, actors and stake holders on the market. The most important stake holders became the corporations and SDOs concerned. The ambition of the politicians was to develop one large, single market without trade barriers. It became an important and sensible matter for the enterprises, large and small, to interpret the signals from the European politicians, particularly regarding standards for products for health, safety and environment.

Companies realizing the value and necessity of standards participate in standard development committees and working groups. In standard negotiations the companies present their product knowledge and views and take part of the experience of competitors and specialists with the ambition to arrive at the best homogeneous product. The closer the established standard becomes to the product of the company, the less expenses are required for product adaption and the shorter the time for introduction of the product on the market. The resource exchanged in these negotiations is knowledge while in traditional trade products and money are exchanged.

In this study the organizational framework for standardization has been presented. The creation, use and problems of standards have been illustrated by studies of seven corporations. Six of the seven companies have actively participated in standard development in order to have their products admitted on the market. As is seen from the case descriptions the three largest companies were early actors in their respective industries and took strategic advantage of the standard movement. The advanced market position of the standard leaders gave them considerable advantages. Their actions also
sometimes strategically restricted new entrants into the industry as well as forcing others to exit.

I have shown how the drafting of European Standards proceeds and are applied in the cases of my study. One particular deviation has been observed, the SPM company, manufacturers of Vibration Control Instruments, Strängnäs, Sweden (Case number seven). No official standard exists in their industry and the company has a negative attitude towards developing standards for their products. The strategic consequence is expressed through an extensive sales organization and intensive product development in order to maintain their industry leading position.

The New Approach was developed in 1985 and constituted the base for European industrial development. For six of the case companies the directives concerned have been respected and followed. In some cases the lack of directives hampered the standard work.

Management in all companies has become aware of the possibility of information on competitors and other companies through Competitive Intelligence (CI) studies connected to standards. Through regular comparisons of the technical or managerial levels of the company and competitors with the technical standard level of the industry valuable information can be collected. I have shown that the model presented in Chapter 2.1 and illustrated in figure 2.1 was a useful tool when analyzing the standardization processes from the perspective of the case companies. I have seen no reason to change the model from my experience of using it.

In addition I have shown that companies taking an active part in standardization work have a real possibility to influence the forthcoming standard. The allocation of resources to standard activities has been a rewarding investment.

The detailed and systematic descriptions of the cases are in themselves a contribution of the study.

Through development of a standard the technology to manufacture and to handle the product is described in documents. In this way knowledge is made available and may be used world-wide. The cases on fasteners and protective gloves in the study describe the dramatic turns to which these products have been exposed. The centers of production have in parts shifted from one geographical continent to another.

Other cases, like that of Ansell Healthcare, have illustrated the importance of timing in connection with standardization. The company entered the European market in connection with the period when standards for their products were established within CEN programs. Later, through their strong
engagement in European standardization they worked extensively with information to distributors and customers on forthcoming standards while still marketing established but old standards.

The smaller companies described in the study encountered problems of different kinds but were nevertheless successful in their adoption to the new conditions as is also evident from the application of case model presented in chapter 2.1. Through active participation and deep engagement they were also able to influence standard development in a direction favorable to their main activity. The larger companies were early adopters of a standard strategy although the smaller corporations did not react until forced to by EU directives and market demands. In connection with standardization timing, information and planning are important components.

On corporate level experiences from the case studies indicate that standardization may facilitate a new type of marketing organization. With advanced use of standardization foreign subsidiaries in every country are no longer a necessity. An organization, without subsidiaries, but with a limited number of sales or product consultants covering special geographical areas, based on language, rather than country borders, seems to be emerging. Work is concentrated on information and training of distributors and customers.

One of the case companies, (case number seven SPM), is an example of a first mover in its niche and does not want a standard. They are technically in a leading position and work with a strategy of advanced technical development, wide market organization with extensive distributor and customer training.

The basic advantages of standardization from a management point of view, rational production, reduction in number of products etc have been present in all cases, except one.

A more modern trend is the transition of competence from larger companies to smaller enterprises as subsuppliers. Reference to standards has facilitated the transactions and increased innovation activities. Larger industries are requested by their customer, for example the automotive industries, to deliver entire systems and through the use of standards small and midsized enterprises become part of more advanced technology and stable relations and networks.

Another remark directed to management should be made regarding the application of extended standard planning concerning incoming components. It should be one point in the corporate strategy for management to observe that the construction engineers of the company make use of existing standards. This was especially underlined by the manufacturers of fasteners.
Standard wars may be expensive and in this perspective the managers often prefer to agree on standards by negotiation before going to the market. No regulating authority has been involved in the standard processes which shows that good results can be achieved without official interventions. The standard war between Europe and the U.S. in the 1970s regarding fasteners, (case two, Bulten) was settled in a positive way saving large amounts of money. We are here touching on one of the most important principles connected to standardization. It was the belief of the European negotiators that the standard based on the metric system would be an advantage for the society. Today, afterwards, we see the result and the impressive activity of standard development going on.

Public authorities refer in increasing extent to standards in connection with procurement. This is a trend which on a longer term could leave management in corporations behind the official institutions in the race regarding who should lead the development of regulations and standards. The work of the NSOs, in this case primarily SIS, has been successful and the cooperation with the industries well organized.

The interest of the public authorities in the use of standards may also be seen from another angle, that is, exchange of information and lobbying from the industries towards the administration. It may be observed in the cases how the successful companies have cooperated with different authorities.

Most of the problems with standardization indicated in the cases are of general or technical character such as timing of the standardization process or poorly written documents. In the cases of Daloc, fire doors, and Motala Hissar MH, elevators, some of the problems indicated in the case can be recognized. CEN has now gained a vast experience and most of problems of this kind have diminished. The prices for standards are still, however, a major source of complaint.

In summary, many organizations are involved in standard making and on different levels and with different geographical and professional orientations. Furthermore, the impression develops that trade and production on world level could become more efficient with increased cooperation between the major standardization and trade organizations. In major countries like China and the U.S. and on state level, a strategic view with more state involvement is apparent.

With the strategic and operational targets, including standardization, the corporation is aiming to strengthen the market position and profitability. The role of standardization is to reduce the cost, increase productivity and secure
the required quality of the products. These are items which should be included in the written, corporate strategy.

All companies in the study declared having a strategy on standardization, written or not written. Often the strategy is part of product strategy and product development. In view of the understanding of the importance of standardization after the New Approach each company should formulate a standard strategy. This should not only cover internal programs or products manufactured within the company but also give directions as to the use of standardized external components. It was evident from the case interviews that the construction engineers too often prefer to develop their own components. The cost of this habit has been illustrated. Management in many companies was not aware of this waste of resources. I have also illustrated the costly consequences of ignoring existing standards.

PS 1
The problem of transportation of steel between England and Sweden mentioned in the first chapter is solved. The products are shipped by train again.

PS 2
The trade logo of British Rail consists of two arrows showing the direction of travel in two different directions on double track railways. It is nicknamed “The Arrows of Indecision” (Google, 2012).
References

Adolphi, Hendrik, (1997), Strategische Konzepte zur Organisation der betrieblichen Standardisierung; DIN Normungskunde Band 38, Beuth Verlag GmbH, Berlin


American Airlines; American Airlines Flight 191 (1979); From Wikipedia,


Besen, Stanley M., and Johnson, Leland, L. (1986); Compatibility Standards, Competition and Innovation in the Broadcasting Industry; The RAND Corporation, November 1986

Blind, Knut, Jungmittag, Andre (2005) The Impact of Innovations and Standards on German Trade in General and on Trade with the UK in Particular; Fraunhofer Institut für System-technik und Innovationsforschung, Karlsruhe

Bousquet, Francoise, Fomin, Vladislav, Drillon, Dominique; Standardization: a Major for Competitive Intelligence, Paper presented at 14th EURAS Annual Standardisation Conference, Paris 2009, ABI Band 41

Bultfabriks Aktiebolaget Hallstahammar genom sjuttiofem år;(1948)

CEN, www.cenorm.be


CEN/CENELEC, (1990-04); Internal Regulations; Part 2: Common rules for standards work; Brüssel

CEN Revised Machinery directive (2006/42/EC); Guidance for technical committees to uphold European standards and to develop draft standards, date publis. BT N 7712 Rev 1 2007-02-15

Commission of the European Communities, (1988); Common Standards for Enterprises; CB-PP-88-A01-EN-C, Luxembourg

Commission of the European Communities, (1990); Commission Green Paper on the Development of European Standardization; Action for faster Technological Integration in Europe; COM (90) 456 final

Council of The European Union (2008), Council Conclusions on standardisation and Innovation; 2891st Competitiveness, Internal Market, Industry and Research; 2008 09 25


Farrel, J. and Saloner, G. (1985), Standardization, Compatibility and Innovation, Rand Journal of Economics, 16: 70-83

Finon, Dominique, Staropoli, Carine; (2001); The performing interaction between institution and technology in the French power industry: the electronuclear success, In Industry and Innovation, 8 (2), p.179-199; Univ. De Grenoble et Paris


Grindley, Peter,(1995) Standards Strategy and Policy; cases and stories,New York, Oxford University Press

Gummesson, Evert; (1988) Qualitative Methods in Management Research: Studentlitteratur, Chartwell-Bratt


Hesser, W. Mellink, Derk (1997); Standardization in the Marketing; A first research study at the use of standardization in the marketing; Universität der Bunsdeswehr, Hamburg

Hesser, Wilfried, Czaya, Axel, Riemer, Nicole; (2007), Development of Standards In Standardization in Companies and Markets, Helmut Schmidt University, Germany, Erasmus University of Rotterdam, Netherlands

Hesser, Wilfried, Czaya, Axel, Siedersleben, Wenko; (2007) Development of Standards In Standardization in Companies and Markets, Helmut Schmidt University, Germany, Erasmus University of Rotterdam, Netherlands

Hesser, Wilfried, Czaya, Axel, Siedersleben, Wenko (2007); General introduction to the Curriculum for Standardization in Companies and Markets, 1. Standardization in science and research (2007). Helmut Schmidt University, Hamburg

Hesser, Wilfried, Feilzer, Albert, de Vries, Henk, (2007); Standardization in Companies and Markets, Helmut Schmidt University, Germany, Erasmus University of Rotterdam, Netherlands

Hesser, Wilfried, Gautama, Rudy Sayoga (2007 p. 584) The European Union and its New Approach In Hesser, Wilfried, Feilzer, Albert, de Vries, Henk, (2007); Standardization in Companies and Markets, Helmut Schmidt University, Germany, Erasmus University of Rotterdam, Netherlands


Industridepartementet (Department of Industry) Promemoria In 96/2372/Bo 1996 11 18


Jutterström. Mats, Företagens EU-lobbying Tvärsnitt nr 1:2006; Veetenskapsrådet, Stockholm

Kone Corp., Annual Report 2006, Helsinki

Mansell, Robin (1995), Standards, Industrial policy and innovation; in Richard Hawkins, Robin Mansell, Jim Skea (eds) Standards, Innovation and Competitiveness, Edward Elgar, Aldershot, UK

Norén, Lars; (1987); Ny teknik i små företag; Ekonomiska institutionen, Universitet i Göteborg,


Ollner, Jan, (1988) The Company and Standardization; SIS Hb 124, Swedish Standards Institution, Stockholm,

Ollner, Jan; SIS 75 År; SIS 75 Years; .


U.S. Congress; (1990) Law regarding qualities and testing of Fastening Elements PL 101-592. U.S. House of Representatives, Committee on Energy and Commerce, Subcommittee on Oversight and Investigation; The Threat from Substandard Fasteners: Is America losing its Grip; Committee Print 100-Y, July 1988

Van Duren, Guido, Mechanical protective gloves, (200)


Vries, H.J. de Standards for the Nation; Analysis of National Standardization Organizations, Delft 1999


Vries, H.J., de (2001), Standrdization – Outline of a Field of Research, Erasmus University Rotterdam


Vries, H.J. de; Best Practise in Company Standardization: International Journal for IT Standards and Standardization Research; 4, 62-85

Vries, H.J. de; 2007 (In Hesser, Wilfried, Feilzer, Albert, de Vries, Henk, (2007); Standardization in Companies and Markets, Helmut Schmidt University, Germany, Erasmus University of Rotterdam, Netherlands
Vries, H.J. de, Blind, Knut, Mangelsdorf, Axel, Verheul, Hugo, Jappe van der Zwan; (2009) SME access to European standardization; Enabling small and medium-sized Enterprises to achieve greater benefit from standards and from involvement in Standardization; Rotterdam School of Management, Erasmus University, Rotterdam

Vu Tuan Anh, On the History of Standardization; In Hesser, Wilfried, Feilzer, Albert, de Vries, Henk, (2007); Standardization in Companies and Markets, Helmut Schmidt

Wilson, Charles J., (1971) Director of Engineering; Industrial Fastners Institute, Cleveland, OH Industrial Fasteners Institute Fastener System, Paper presented at the University of Wisconsin, Mechanical Fastening Technology,

Wilson, Charles J., (1973) Director of Engineering; Industrial Fastners Institute, Cleveland, OH, Industrial Fasteners Institute, A Study to Develop an Optimum Metric Fastener System; Cleveland; Ohio
Articles in magazines and newspapers

Brandposten, Nr 17, Dec. 1997, p.9); 19-20 Juni, 1999, p. 28 SP Swedish Technogical Research Institute, Borås

Fogningsteknik, Tidskrift, Nr 5/93, Nr 6, 1995, Västerås

Predicasts Sources, Geographic Breakdown; Standardisation Articles, Cleveland, 1993

SIS Swedish Standards Institute, Standard Magazine; 2005,Nr 03; 2007 Nr 2; and running Numbers Standard Magazine, SIS Nr 2, June 2007).


VLT, Vestmanlands läns Tidning, 1958 05 08) VLT, Fram för en världsgänga, 1958 05 08).
Appendix 1. The interviews

**General background information:**

Andersson, Hans, Managing Director, SMS, Sveriges Mekanstandar dishering Swedish Mechanical Standards Institution, Stockholm, 1994 12 07

Brekelmans, Cornelis, Deputy Head of Unit, Standardization, including industrial aspects of Electronic Commerce, European Commission, Directorate General III, Industry; Brussels, 1993

Diedrich, Åke, SMS, Stockholm, 1998 03 30

Ewander, Hans, Trade Policy Department; Federation of Swedish Industries, Stockholm, 95 12 07

Håkansson, Staffan, SAB Wabco N.V. President, Zaventem, Brüssel s, 93 10 20

Hebert, Sten, L M Ericsson, Chairman STANTEK, 93 05 26

Hesser, Wilfried, Prof.Dr-Ing.; Universität der Bundeswehr, Hamburg, 1997

Johansson, Helen A, Ministry of Foreign Affairs, Stockholm,. 2007 10 05

Karlsson, Lieberth, ABB, Manager, Quality Coordination Dept. 1993

Larsson, Sigbritt, Utbildningskonsulent, SIS, Stockholm, 1993, 1996 04 15

Lemmel, Magnus, Deputy Director-General; European Commission, Directorate-General III - Industry; Brussels. 1998 06 04

Mason, Howard G., British Aeerospace, Manufacturing Standardization Technology, Cannes, Conference, Mandelieu, 1995 11 08
Ollner, Jan, ex-President SIS, ex-V. President ISO, Stockholm, 2008 08 18

Reichel, Jürgen, Professor, Västerås, 1993 12 29

Repussard, Jacques, Secretary General, CEN, European Committee for Standardization, Brüssels, Mandelieu, 1993 10 20

Sanson, Stewart, Head of Information, Comité Européenne de Normalisation, Brüssels 1993 10 19 1996

Südow, Åke von, Vice President, ABB Corporation, Västerås; Guest lecture, MdH, 1996

Toth, Bob, R.B. Toth Associates; Strategic Services for the Industrial Infrastructure; Alexandra, VA; Hamburg, 1997 05 22

Wijkander, Evert, Avesta-Sheffield Stainless AB, Avesta, 1993 05 26, 2007

Wiklund, Bo, I-ETS, Stockholm 1994 09 19

**Case: Ansell Edmont n.v.**
www.ansellhealthcare.com

Andersson, Björn, Head of Division, (Work Environment Authority) (Miljöskyddsstyrelsen), Stockholm, 95 10 12

Drebusch, Sabine, Customer Service Manager; Best Manufacturing Europe N.V.B-Aartselaar, Düsseldorf, 1995 11 09

Eiland, Klaus, Dipl. Ing., Marketing Manager; Kermel, D-Moenchengladbach, Düsseldorf, 1995 11 08

Ehrner-Samuel, Harriet, Head of Department, Work Environment Authority, (Work Environment Authority), Stockholm 1995 10 12

Frisch, Stefan, Fachbereich Arbeitsschutz, Aussendienst; Dr. Kurt Korsing GmbH & Co, Köln; Düsseldorf, 1995 11 10
Gasman, Daniel T., Director, Global Marketing, Ansell Edmont Industries Inc., Atlanta, GA, (I) 1995 09 11

Heep, Andreas M., Industriefachwirt, Produktmanager, Kächele-Cama Latex GmbH D-Eichenzell; Düsseldorf, 1995 11 10

Jakobson, Björn, Peltor, Värnamo. 2007 04 14, 2007 05 15

Jonasson, Anders, Territory Sales Manager, Technical Advisor, Ansell Edmont, Europe, Country Manager Scandinavia, North Safety Products, Bankeryd; Stockholm, 95 02 22 / 2008 08 28 (I)

Khan, A. Moiz, Sysa Enterprises, PAK-Karachi; Düsseldorf, 1995 11 09

Kleinen, Harald, Gebietsverkaufsleitung Nord; Kächele-Cama Latex GmbH Eichenzell; Düsseldorf, 1995 11 09

Leffler, Joakim, Järnia AB, Ulricehamn 1993 06 03


Österlind, Leif, Managing Director, Peltor Försäljnings AB, Värnamo, Düsseldorlf, 1995 11 09

Quist, Jorgen, Nordic Area Manager; North Safety Products; DK- Hellerup; Düsseldorf 1996 11 09

Reinholdsson, Leif, Järnia AB, Ulricehamn, 2008 05 15 (Telefonintervju)

Rodot, Marianne, Technical Service Manager, MAPA Professionnel, F-Levallois-Perret; Düsseldorf, 1995 11 09

Roswall, Thomas, Järnia AB, Ulricehamn, 1993 06 10

Roy, Asis, Director, Krishna Lexpo Pvt. Ltd., IND-Calcutta; D-Düsseldorf, 1995 11 09

Ruckman, Per, Sales Manager, Järnia AB, Jerngruppen AB, Hjo, 1993 06 03
Staniforth, David T., Markeet Development Manager Europe, Ansell Edmont Europe n.V. (I) 1995 09 11

Timén, Erik, Area Sales Manager, North Safety Products, Jönköping 2008 08 28

Valentin, Noëlle, Safety, Fire, Protection Dept., Institut Textile de France, F-Lyon, 1994 11 14

Van Duren, Guido, Ansell Healthcare Europe, Technical Services Director, Brussels, Belgium (I), 1994 05 20, 1994 11 20, 2008

**Case: Bulten ; Finnveden.Bulten AB**
[www.Finnveden Bulten.se](http://www.Finnveden Bulten.se)

Andersson, Kurt, Product Service Technology, Finnveden-Bulten AB, Hallstahammar (I) 2007 12 15

Bataille, Jean, Union de Normalisation de la Mécanique, U.N. M, La Defence, Paris, 93 09 07

Bergner, Frank, M.B.A. Geschäftsführer, Richard Bergner GmbH Co, Schwabach, 95 12 01

Blomquist, Jerry, Marketing Manager, Sweden, Erni-Bolte A/S, Stockholm 1995 01 04

Dock, Gösta, Chefsingenjör, Bulten AB, Hallstahammar (I) 1994 12 29

Ellison, H.W., Former Technical Director, Standards Division General Motors Corporation, Detroit MI 1996 09 25

Hellwig, G., Dr. DIN, Secretary TC 185, Köln, 1995 11 16

Isaksson, Ingvar, MSc. Engineering, Product Technology, Bulten Automotive AB, Hallstahammar (I), 1994 - 2007 12 15

Karlsson, Anders, President, Bulten Automotive AB, Hallstahammar (I), 94 12 07

236
Köhler, Hermann, Prokurist, Bereichsleiter, KAMAX-Werke, Rudolf Kellerman GmbH & Co KG Homburg, Ohm, 1995 11 09

Larsson, Torbjörn, Västerås, Fästelement, Tidskrift Föngingsteknik, 94 12 07

Lindqvist, Klas, Project Manager; Sveriges Mekanstandardisering, SIS, Stockholm, 950104, 951220; 2008-9

Lindqvist, Magnus, Project Manager, Sveriges Mekanstandardisering, Enköping, 971115

Östlund, Folke, Marketing Manager, Bulten Automotive AB Hallsthammar (I), 980406

Péchenard, Joëlle, Responsable Technique, Affix, Association des Fabricants de Fixations Mécaniques, Paris, 950907

Strelow, Dieter, Dipl.Ing., Geschäftsführer, Deutscher Schraubenverband e.V. Hagen, 95 11 17


Wilson, Charles J, Director of Engineering and Management Services; Industrial Fasteners Institute; Cleveland, OH, 96 09 18


Wulf, Werner, Dipl.Ing., Leiter Konstruktion; Peiner Umformtechnik GmbH, Peiner, 1995 11 28

Case: Daloc FuturA AB

www.daloc.se

Eriksson, Thomas, Företagskonsult, Mariestad, 2007 04 16, 2008 08 13
Geete, Erik, BST- SIS, 1998 02 26, 2007 02 25
Johansson, Inga-Lisa, President, Daloc Futura AB, 1996 02 26 (I)

Olofsson, Ingemar, Teknisk Direktör. Daloc Futura AB (I) 1997 03 05

Rantatalo, Thomas, Boverket, Fire Safety NordiC AB, (before: National Board of Housing, Building and Planning, Karlskrona, Tel. interview

Soronis, Georg, PhD. MSc, Civil Engineer, Project Leader BST Swedish Building Standards Institution, SE-Stockholm, 1998 02 26

Stenström, Leif, Maxidoor AB, Frövi, 2001 02 16, 2007 03 19

Wikström, Ulf, Professsor, Generaldirektör SP,Technical Reserch Institute of Sweden, Borås, 1998 05 29

Case: Motala Hissar AB
www.motalahissar.se

Hagelin, Gunnar, KONE AB, Stockholm (I), 1994 10 21, 2007 06 14

Jarmmyr, Rolf, Motala Hissar AB, Motala (I) 1994 10 10, 1996 01 26, 2007 03 06

Nieminen, Ari, Ph.D., Manager Digital Satellite Products; Nokia Luxor Satellit AB, Manager, Motala Hissar AB, Motala (I) Tel.interview 2008 03 06

Sundström, Rolf, ex- President, Motala Hissar AB, Motala (I) 1994 10 10

Wachsner, Göran, Secretary IKH/SIS, Stockholm, 1994 11 25

Case: S:t Eriks AB, Swerock
www.steriks.se

Eriksson, Ceder, Sales Manager, S:t Eriks, Uppsala, Telephone Interview (I) 2007 04 07

Claessson, Jan, President, S:t Eriks AB, Uppsala, Telephone (I) 2007 04 07
Lööv, Björn, President, Swerock AB, S-Uppsala (I), 94 11 07, 98 03 13, 20070611

Seling, Ulf, Secretary, BST/SIS, Stockholm, 94 12 07, 1998 03 27 T

Silverfur, Rikard, SIS Stockholm, Telephone Interview, 2007 10 17

**Case: SPM Instrumentss AB**

www.spminstruments.se

Lagerbrandt, Roland, Utvecklingsteckniker, SPM Instrumentss, Consultant, Strängnäs (I), 1993 05 29, 2007 10 05, 2007 12 13, 2009 021 17

Jungerth, Niklas, SIS, Stockholm, Telephone Interview, 2007 03 19

Lindberg, Jarl Ove vd, SPM Instrumentss AB, Strängnäs (I) 1993 05 29

Lindberg, Stefan, vvd, SPM Instrumentss AB, Strängnäs, (I) 2007 02 08

Olsson, Alf, Secretary, Skandinaviska Vibrationsförbundet, Örebro, 2007 07 15

**Case: Volvo Construction AB, Eskilstuna**

www.volvoconstruction.se

Andersson, Jan-Olov, Secretary, WG 1, SMS/SIS, Stockholm, 94 11 11

Bachelin, Jurg E., Caterpillar Overseas S.A., CH-Geneva; Hannover 1995 11 21

Dussaugey, Cosette, Sécretaire générale adjoint; Construction et infrastructures, MPTS, Union des Industries d’Equipment pour la Construction, les Infrastructures, la Métallurgie, Paris, la Defense, 950907

Grancrona, Karl-Erik, Coordinating Safety Officer; Volvo Construction AB, Eskilstuna (I) 1994 10 11, 1994 11 16, 2009

Labitzke, Peter, Gesetzl., Bestimmungen QM Konstruktion, Komat’zu, Hamburg AG, Hannover, 1995 11 21
Mimer, Jan, Lawyer, Legal and regulations, Volvo Construction AB, Eskilstuna (I) 1994 12 08-09, 1998 01 28

Moberg, Lars-Göran, President & CEO, Volvo Construction AB, Eskilstuna (I) 1994 12 02

Norrman, Tyrone, Vice President and CFO, Finance and Treasury, VCE, Eskilstuna (I), 1994 11 16

Reinl, Gösta, Vice President, Volvo Construction AB, Eskilstuna, 1994 11 16


Sandovar, Alfredo, Secretary General, Committee for European Construction Equipment, c/o VDMA; Frankfurt/M, 1995 11 19

Schmidt, Werner; Maschinenbau-Ing.; TBG Technical Expert for Civil Engineering; Tiefbau-Berufsgenossenschaft, Hannover, 1995 11 11


Appendix 2. Interview guides

Interview guides, representatives of corporate cases

Date:

Name of company:

Name of interviewee: Position:

Address: Telephone:

Product area?
Company History?
Annual Report?
Ownership?
Number of employees?
Turnover? Market share?
Export share of sales?
Number of countries?
Subsidiary companies? National International

Industry structure

Nationally?
Number of competing companies in industry?
Size <10> < 50 > 50 < 250 < 500 < 1000 > empl.
Internationally?
Number of competing companies in industry?
Size < 50 > 50 < 250 < 500 < 1000 > 1000
Import and origin of international competition?
Turnover
Entry into industry - frequency? Connection with standardization?
Exit from industry - frequency? Connection with standardization?
Mergers - acqusitions in industry?

**Structure of marketed products**
- Machine/s?
- Instruments?
- Components?
- Finished Products?
- Number of products?
- Main product?
- Number of products involved in product standardization?

**Standardization situation in industry:**
- Existance of standards in industry?
- EU Directive Documents
- ISO Documents
- CEN Documents
- CE Mark Documents
- SS Documents

**Standarization management within corporation:**
- Internal standardization organization Responsibility
- Since when? Time perspective?
- History of own involvement in standardization?
- Motive for own involvement in standardization?
- Relation with national standardization organizations?
- Management view on standardization?
- Handling of information on standardization within corporation?
- Role of subsidiary companies in standardization?
- Use of standards in construction/production
- Use of standards in purchasing?
Use of standards in marketing?
Cost of standardization?
   in relation to corporate resources?
   in relation to product price?
Characterization of your strategy in standardization?
Written document?
Negative?
Activ?
Passive?
Cooperation with others in standardization?
With whom if so? Motive?

**National status of standardization in industry:**
Committe Secretariat/Chairman?
Efficiency of Chairman / Secretariat?
Committee membership; Documents?
Intensity of participation by interviewed company: Number of meetings?
Intensity of participation by competitors: Number of meetings?
Presentation of papers/proposals by interviewed company?
Presentation of papers/proposals by competitors?
Standards published- status? Revision?
Planned publication of standards?
Time required to develop standard in industry?

**International status of standardization in industry:**
Committe Secretariat/Chairman?
Efficiency/experience of Chairman / Secretariat?
Committee membership; Documents?
Intensity of participation? No. of meetings?
Interview Guide, administrative representatives

**Organization name:**     **Product area:**
**Interviewee:**          **Position:**
**Address:**              **Telephone:**

**Years and experience in position?**

**Standardization situation in industry:**
Membership by corporations?
Structure of standardization; nationally and internationally
Structure of companies in industry, Turnover? Number of employees?
Competition in industry, tendency?
Problems for smaller industries?
Organization/s for standardization? WG? TC?
Cooperation with CEN - ISO?
Legislation for standardization in industry?
Actual status in standardization? Number of standard documents?
Existence of standards in industry?
Time perspective; revision?
Duration to develop standard?

<table>
<thead>
<tr>
<th>EU</th>
<th>Directive Documents</th>
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<tr>
<td>ISO</td>
<td>Documents</td>
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<td>CEN</td>
<td>Documents</td>
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<td>CE</td>
<td>Mark Documents</td>
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<tr>
<td>EN-SS</td>
<td>Documents</td>
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Corporate participation and influence in standardization?
Swedish participations and influence in international standardization?
International influence on Swedish industries?
Financing? Advantages? Problems?
Participation by competitors? No. of meetings?
Presentation of papers/proposals by interviewed company?
Standards published?
Planned publication of standards?
Participation of own subsidiaries in international standardization.
Time required to develop standard in industry?
Type of information obtained through participation in Committee work.
Type of information given through participation in Committee work.
Power/Influence observed in committee work? Individually? Countrywise?
Criteria for success in committee work?
As a consequence of standardization.
  will own products be changed or has been changed?
  will competitors’ products be changed or has been changed?
Have you seen examples of planned efforts to force a competitor to change his product?
Will standardization drive development towards a situation of oligopoly within your industry?
Effects of standardization on small and midsized companies in comparison with larger companies?
How are the conditions for testing of products for standardization?
Experience of patents in industry standardization?
Influence of standardization on Product/ Technical Development?
General effects of standardization by participation in committee work?
General effects of standardization on non-participating in committee work?
Your position on the market in comparison with competitors?
Effects of standardization in own production?
Effects of standardization on purchasing?
Effects of standardization in own marketing? Customer reactions?

Additional information
Appendix 3. List of standard meetings and conferences attended

BST/TK 15 Brand/Fire; Kommittémöte nr 47 1998-03-03, Case Daloc, Stockholm
TK 72 Markbeläggningsprodukter/Concrete slabs, BST Stockholm, Möte 2/95; Det tjugoförsta mötet; 21st meeting, 1995 04 02, Case, S:t Eriks
DIN/TK 1993 11 21 Construction machinery safety, Hannover, Case VCE
CEN CENELEC ETSI Conference: Making the Most of European Standards, Brussels 15-16 November, 1994
CEN CENELEC ETSI Conference: European Standards, Obstacle or Opportunity for the Information Society? Cannes Mandelieu, 7-8 December, 1995
IWSR, Interdisciplinary Workshop on Standardization Research, Univ. of Federal Armed Forces Hamburg, 20-23 May, 1997
IWSR, Third Interdisciplinary Workshop on Standardization Research, Department of Standardization, Universität der Bundeswehr, 23-25 September 2001
EURAS, 13TH Workshop on Standardization, Kai Jacobs, Eva Söderström, Editors, Achener Beiträge zur Informatik, Band 40.
2008-08-22, University of Skövde, 2008
EURAS 14th Conference on Standardization, Paris, June 2009;
Standardization and Corporate Intelligence
CEN/CENELEC StandarDays, Brüssel, September 22-23, 2010