Templates – Instruments for Standardizing ERP Systems

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Abstract:

Today's large companies face significant challenges in the integration of differently configured ERP systems which have evolved within the last decade. These systems impede the flow of information along the value chain which is vital for supply chain management and holistic controlling processes. They also create implementation inefficiencies since learning and scale effects are not taken advantage of. Therefore, establishing standards for the harmonization of independent and distributed systems would have a profound positive competitive impact. This article describes the Template Handbook, a standardization approach which was developed and implemented in a project with a multinational company, the Robert Bosch Group. ERP templates establish interoperability by identically configuring individual ERP systems within a company. They are enablers for the automatic exchange of information between ERP systems and the multiplication of know-how obtained from multiple ERP implementations. A vital component for the development and the roll-out of the templates was the method which was elaborated in the project.

1 Introduction

Business in the information age depends to a large extend on the availability of accepted standards (see, for example, [1]). They significantly reduce the coordination requirements between business partners and are the basis for establishing integrated information flows. The availability of Internet standards, such as HTML or TCP/IP, has been a main enabler in the evolution of electronic commerce (EC) since the early 1990s. In providing specifications for the interconnectivity of information systems, which stretch across system platforms and user communities, they allowed the integration of heterogeneous sectors within an economy. Generally, we can distinguish two main thrusts towards standardization: business requirements and technological integration [2].

Business requirements have changed fundamentally in the information age: large, established conglomerates are breaking up, innovative companies are emerging rapidly, and customer and process-orientation are becoming increasingly critical. Companies such as Walmart or Amazon.com derive competitive excellence from a thorough management of information and goods across all instances in their value chains. The management of these relationships is at the heart of Business Networking [3, 4] and encompasses optimized supply chain planning, execution and control across multiple actors on the one hand and optimal processes to the customer (electronic catalogues, order entry etc.) on the other. Efficient coordination among suppliers, manufacturers, customers and supporting services is a critical success factor in Business Networking and requires an integrated flow of information across all partners. From a technical perspective, this requires integrated information flows across all partners. This means that planning, order and control information need to be visible in real time within the entire business network.

Although the last decades have brought about significant technological improvements today's information systems are still a far cry from this network-wide real-time visibility of information. The diffusion of enterprise resource planning (ERP) systems, such as SAP's R/3, Baan's ERP or Peoplesoft's BPCS has led to a higher level of internal integration. These systems are now being extended to include external partners. However, taking a

closer look at the status quo of internal integration we find that ERP systems are fragmented and distributed especially within large, multinational companies. This stems from the high complexity of each ERP implementation project and the required investments in terms of time, capital, and manpower. Consequently, various individual ERP systems have evolved for different production sites, sales offices etc. Although, the distributed systems may use the same software products (e.g. R/3), they usually are configured individually with processes and master data being set up differently. Consequently, the exchange of information between systems is difficult and specific interfaces are needed for establishing an integrated flow of information.

Standards for the configuration of the individual systems provide significant benefits in two dimensions. Firstly, the standardization of data, functions and processes leads to integrated information flows and permits improved processes, e.g. global credit limit checks, supply chain management and improved drill-down possibilities in financial reporting. Secondly, scale effects in the implementation of ERP systems allow reductions in the cost and time required to configure an ERP system.

Therefore this article describes templates as a standardization approach for ERP systems within a company. We consider the internal standardization of information systems as a prerequisite for further external standardization.

2 Definition and approaches to standardization

2.1 Definition and dimensions of standardization

A broad variety of standards have developed in the field of information technology. Standards are available at various levels and originate from different standardization bodies. Although it would be desirable from a technological standpoint to have a single accepted standard worldwide, the variety also reflects the heterogeneity of the individual industrial sectors and the different power constellations within industries [5]. In the following we define standards as *objects which are shared and accepted within a specific community*.[1] Therefore, standards have three important dimensions (Figure 1):

- *Objects* of standardization are hardware or software components with the latter comprising standards for data, functions, and processes.
- *Communities* are organizational and geographical in nature. Standards can be accepted within a single or between multiple organizations. From a geographical perspective national, international, and global standards are distinguished [8].
- *Standardization bodies* are closely related to the community and include private companies (e.g. Microsoft, IBM), industry organizations (e.g. X/Open), national (DIN, BSI), international (ETSI, EWOS) and global (JTC1, ITU, IETF) bodies.

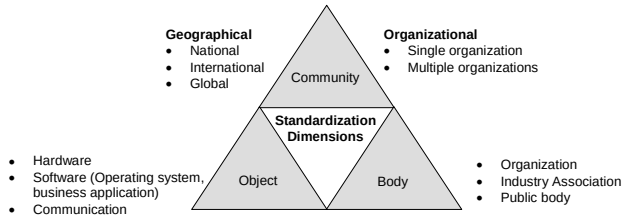

Figure 1: Dimensions of standardization

These dimensions are useful in analyzing standards that are on the marketplace. Standards which have had impact in the marketplace concern proprietary or 'de facto' approaches to system platforms such as the PC or DEC VAX, to operating systems such as DOS or Windows, to communication such as IBM SNA or DECNet and to business software such as SAP or Baan. Open standards are not owned by any single business or vendor and include approaches such as X/Open, the OSI model, and the Internet standards [9]. Starting from the late 1980s, the focus of businesses towards standardization has changed with the growing diffusion of open standards towards the upper layers (i.e. layers 4 to 7) within the ISO/OSI model. The standardization of interconnections among systems used to be a key issue. Today, they are taken for granted and for companies the standardization of processes and master data is becoming the critical issue to enable a automated exchange of contents among the systems.

2.2 Requirements of inter-process integration

Integrating information systems means establishing communication between these systems. From the perspective of the well-known communication model a common language is required which has four levels (Figure 2). As long as the communication involves human participants, there is a high degree of flexibility in interpreting the intended meaning. However, this form of integration is hardly efficient in the context of ERP where productive and high volume data have to be re-entered manually in the system. Therefore, the following will only focus on inter-process integration, i.e. the direct coupling of applications. A prominent example for inter-process communication is EDI. Information is not only transmitted electronically but also processed automatically in the receiving IS. Other forms of communication, such as

[1] This definition uses elements of Cargill [6] and Buxmann [7].

human-computer interaction, are not within the scope of this article.

Inter-process integration requires that all aspects of the communication are identical between both systems. As Kubicek (1992) showed, the ISO/OSI model has to be extended to include all necessary aspects. In addition to the communication services which are still covered by ISO/OSI, another three layers are required which mainly stem from communication theory [10]. In the first place, a common syntax is required which defines the order, length and the type of data being exchanged. But the definition of a common syntax is not sufficient for an automated integration of systems. In addition, semantic is needed to assign real world subjects and notions to the transmitted characters. Semantics add a certain meaning to individual data fields (e.g. the data field „price“ is more accurately specified by the filed „currency“ and an automated interpretation of the content, like „CHF“ as „Swiss Francs“, is enabled). The basis for such interpretations are key fields that today are mostly defined by each company itself. Some attempts have also been made to reach a broader geographical community. For example, the European Article Number (EAN) not only specify a 13-character syntax but also make sure that each article has a unique identification number. By referring to this unique number, meaning is added since it always leads to the same article name. Without open semantic standards an automated exchange of information among anonymous business partners will remain illusive because it will require a human interpreter.

The third element - the pragmatic element - is optional and a feature of sophisticated workflow systems. It makes sure that transmitted data has not only been understood but that subsequent actions are triggered. For instance, the ERP would automatically issue an invoice once a product has been delivered.

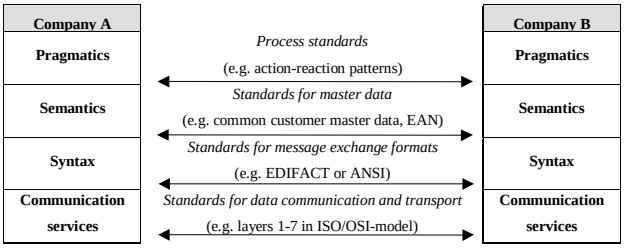

Figure 2: Standards on different levels in the communication model

2.3 Approaches to close the ‘Organization Gap’

Standards are key to inter-process integration. In their early study [11] Benjamin et al. reported that insufficient availability of standards has been the most important barrier to interorganizational integration. Up to date, standards are mostly available for communication services and for the syntactical level (Figure 2). Standardization on the semantical level has been set up in some industries by industry associations, e.g. the EAN codes in the food industry or the ISBN numbers for publications, or by independent providers, e.g. the Dun & Bradstreet (D&B) company numbers.[2] Standards on the pragmatical level are only available within companies and solutions which span across multiple organizations still remain to be established. The neglect of semantical and pragmatical issues in such standards as EDIFACT has been referred to as ‘organizational gap’ [12].

Attempts to close the ‘organizational gap’ in inter-process communications have to discuss two aspects in general (Table 1). First, the number and type of systems involved are relevant. Normally, joint semantics and pragmatics are no problem within a single ERP system. Additional systems can be other internal ERP systems or external systems, e.g. the ERP system of a supplier. The second dimension distinguishes two possibilities for standardizing semantics [e.g. 13]: either the same codes and master data are used or matching tables are established ex ante which map among the individual codes. Clearly, using identical objects is a more efficient and tighter way of integration, but requires the restructuring or re-customization of existing systems as well. In the following, a solution for the tight integration of ERP systems will be described (shaded area in). Other possibilities are proposed and are being developed in the EDI community (e.g. Basic Semantic Repository, automated negotiation), but will not be dealt with in this article [cf. 14].

	Matching tables	**Same objects**
Single ERP system	-	Joint master data
Multiple ERP Systems	Converters	Network code
External Systems	Matching service (e.g. the translation engine from GEIS)	Industry code (e.g. D&B numbers)

Table 1: Options to close the ‘Organization Gap’ in inter-process communication

[2] Information on the D&B numbers (DUNS) is available at http://www.dnb.com.

3 The Template Handbook

In the following a solution for achieving standardized objects among multiple ERP systems within a company or conglomerate is presented. This Template Handbook represents a method for the semantical integration of individual ERP systems and yields significant benefits in implementation and improved business process performance.
When implementing a new ERP system, the demand for the standardization of processes and data, within a business unit or geographical region, is already well known. The Template Handbook aims to go one step further and look at a network of business units , geographical regions and also many ERP systems. For this purpose the Template Handbook provides methodical support which was unavailable before.

3.1 Research methodology

The Template Handbook was developed in close cooperation with the partner companies of the Competence Center inter Business Networking (CC iBN) at the University of St. Gallen (Table 2). CC iBN is part of the Institute for Information Management's research program 'BE HSG' (Business Engineering Hochschule St.Gallen). This research program considers information management as an applied science with the research objective being the practical problem-solving capabilities of its models and procedures [15]. It primarily follows the principles of action research [e.g. 16]. The Template Handbook was developed together with the partner companies in regular workshops and represents a pilot project with Robert Bosch GmbH in Germany. In this project numerous interviews and workshops were undertaken with representatives from both the IS and the application side.

- Bayer AG (Germany)
- Deutsche Telekom AG (Germany)
- ETA SA (The Swatch Group, Switzerland)
- HiServ GmbH (former Hoechst IS dpmt., Germany)
- F. Hoffmann-La Roche Ltd. (Switzerland)
- Riverwood International Corp. (USA)
- Robert Bosch GmbH (Germany)
- SAP AG (Germany)

Table 2: Partner companies of CC iBN

3.2 The idea of a template handbook

The implementation of ERP systems is a major challenge for companies. For different technical and organizational reasons, multinational companies need many different ERP systems, e.g. different R/3 systems for plants and for sales offices. In view of the complexities of each implementation project different ERP systems have evolved with incompatible processes and / or master data. Consequently, each business process is limited to a specific area.
Insights gained from different practical partner company projects show that semantical standardization is one of the most important issues when implementing ERP systems in multinational companies. Semantical standards enable an automated information exchange between the many different ERP systems (Bosch for example has more than 30 productive SAP systems) supporting the business processes. The problem is in that there are different methods which support the implementation of ERP systems (e.g. SAP's ASAP method) but not the *standardization* of such systems. An organizational gap needs to be closed in this area as well.
System templates are a solution for defining semantical standards for multiple applications. Such templates make sure that all applications receive a common customizing and a common set of master data. This is achieved, if templates are developed centrally and then rolled out to the different systems.

3.3 Components of a template handbook

Templates are well known from office packages such as Excel or Word and denote predesigned documents that contain formats, styles or formulas. Besides office applications, templates are known from two other areas. First, programming languages such as C++ use libraries which offer frequently used functions, e.g. pull-down menus. Second, there are systems built with the aid of CASE-tools that are called Application Templates [17]. However, the latter only target the development of new systems and, as a consequence, do not address the organizational gap. Therefore, the standardization of data, especially of customizing data and master data in ERP systems, still remains a topic for research.
For this purpose, the project group has defined ERP templates as *concepts or models for the standardization of processes, functions, and data that could be implemented in a physical (ERP) system*. Templates may as well be a 'piece of software', which can be distributed automatically on different systems, or some paper documents, e.g. manuals, which have to be implemented manually. The major components of ERP templates are:

- Preconditions for the set-up of the ERP's configuration settings (e.g. the settings in the SAP R/3 implementation guide),
- Preconditions and recommendations for the common definition of master data,

- Test procedures, demonstrations, training documentation,
- Maintenance procedures, and
- External validation from authorities, customers, ISO 9000 etc. (if required).

To enable and ensure a multiple re-use of templates from different organizational units, establishing a *documentation* is highly relevant. This documentation should cover the following aspects:

- 'Marketing' documentation (What can the template do?)
- Functional description for the implementation team (documentation of the template components; How does the template work?)
- Implementation guide (for roll out and localization; How to install the template?)
- User guide (How to use the template?)

Finally, toensure operation of a template maintenance and consistency are critical. First, *maintenance* is relevant after the 'going live'. Maintenance tasks include: error management, training, update, further development and release management. Depending on the type of template, the responsibility for the maintenance, and the maintenance procedures itself, may vary. Bosch, for example, has defined 4 types of templates: Standards (e.g. master data or customizing settings), processes (e.g. an order process), products (e.g. a whole plant system) and copy examples. The Template Handbooks includes an activity and result document to define the company specific maintenance procedures for templates. Second, the consistency of a template is important among different business units or geographical systems. At the moment, the only possibility to solve this problem is to set up strict company politics concerning the use and manipulation of templates. For instance, the IS department of a company has set up rules that refuse any support for the business units if a template gets changed locally. In the future, ERP vendors, such as SAP, will provide tools that will support the tracking of a template in distributed environments.

3.4 Activities in template design and roll-out

The Template Handbook is a method for the development and the roll-out of templates. The main activities of the method are shown in Table 3. For each activity, a result document is produced which can be used in projects and there are also techniques that help to fill out a result document. Examples of the main result documents and techniques are presented in chapter 4.

Template development
1. Organize template development
2. Document conditions for the template deployment
3. Document template process
4. Analyze the output exchange of the template process
5. Define customizing settings (overview)
6. Define authorization concept
7. Define customizing settings (detail)
8. Document templates add-on's
9. Define data storage guides
10. Test template
11. Prepare functional description
12. Set up maintenance procedures
13. Write user documentation
14. Prepare implementation guide
Template roll-out
1. Initial template selection
2. Implement template locally
3. Set up localization concept
4. Conduct local template tests
5. Local approval of the template

Table 3: Major activities of the template method

3.5 Who should design and use a template handbook?

Templates can be used in large multinational companies as well as in smaller companies. However, the development process is very different. In *larger companies*, templates are designed to ensure minimal standards for the configuration settings in their ERP systems. Meanwhile, the development of a template method (or handbook) is mainly a IS/IT driven project, whereas the development of a specific template (e.g. for the 'make to stock' processes in plants) calls for a profound understanding of the company's business processes and the ERP system that supports these processes. Therefore, people from the different business units (for which a template is to be designed) and from the IS/IT department of a company have to work closely together in order to define the content of a template.

In *smaller companies*, templates are used in a very different way. Such companies need templates for a faster – and therefore cheaper - implementation of the complex ERP software products. In these cases the term 'industry sector templates' is preferred. Such templates are pre-configured ERP systems that may be implemented in different companies of a specific industry sector. The

development of a template is normally not done in these cases by the company that will use a template, but by a consulting firm or by the manufacturer of the ERP software.

4 The Template Handbook at the Robert Bosch Group

4.1 Development of the Template Handbook

The Robert Bosch Group is headquartered in Stuttgart, Germany and has operations in over 130 countries worldwide. In it's four business sectors automotive equipment, communication technology, consumer goods, and capital goods Bosch generates approx. 50 billion DEM in sales and employees approx. 189,000 people (1998 figures). At Bosch, many different ERP systems support the business processes. Most of them, more than 30, are using SAP's R/3. ERP systems are in place for different organizational units such as plants, sales offices, financial departments as well as for different geographical regions (e.g. Germany, USA, Asia). In order to enable new business processes and reduce the costs for ERP implementation projects, Bosch has decided to use templates for the:

- initial implementation of new ERP systems, and
- the deployment of new processes on existing ERP systems.

Regarding the dimensions of standardization (Figure 1) the Bosch templates were defined to support the global operation within Bosch (standardization community). The standardizing body was QI (Querschnittsbereich Informatik) which is Bosch's central IT department and serves all business its divisions. The objects to be standardized were configurations of the ERP systems as well as data structures and codes.

Because of all the experiences that Bosch had gathered in respect of its ERP systems, they were aware of the complexities besetting templates. Therefore, there was no doubt that an appropriate method would have to support the template development process. The development of the 'Template Handbook' (which in fact became the name of the method) was the subject of a joint project which involved people from CC iBN and up to seven people from Bosch. The people from Bosch came from its information management department and had a good knowledge either of the ERP systems or the business processes within different departments at Bosch. The template handbook was developed using the Method Engineering concept [18] which has already served for the successful development of other methods [e.g. 19]. As shown in Figure 3, the basic components of Method Engineering are:

- *Activities* which describe what has to be performed. The goal of an activity is to deliver one or several defined results. The procedural model of the method determines a sequence of activities.
- *Results* are produced or changed by activities. Various types of documents can be distinguished, such as tables, graphs or diagrams.
- *Techniques* which describe how to obtain a result. Every task has at least one corresponding technique. Techniques are guidelines for the production of results and can include best practices and lessons learned from prior projects.
- *Roles* which describe the responsibilities for a specific task. Within a method, people and organizational units assume certain roles which are a summary of activities from an actor's point of view.

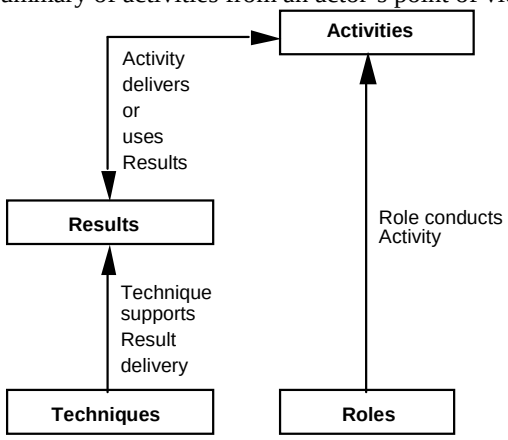

Figure 3: Components of Method Engineering (adapted from [18])

4.2 Overview and experiences

For Bosch, the two primary objectives in developing the Template Handbook reflect the motivations described in chapter 1. On the one hand, ERP systems should be capable of supporting Bosch's business networking requirements. An integrated flow of information between the individual ERP systems was the key to responding to this business need. On the other hand, the time needed for R/3 implementations was to be reduced through re-use of know-how. Table 4 gives a detailed view on the contents of the Handbook. Section A lists all the activities, techniques and result documents that were needed to develop a template. Section B comprises all activities, techniques and result documents needed to roll out a specific template to different ERP systems.

Activity	Technique	Result Document
A. Template development		
- Organize template development	Organization template development	Overview organization template development
- Document conditions for template deployment	Conditions for template deployment	List of conditions for template deployment
- Document template process	Activity chain(s) Template process(es)	Activity chain diagram
- Analyze the output exchange of template process	Context diagram template process	Context diagram of template process
- Define customizing settings	Settings for customizing (overview) and authorization	Preconditions for customizing (overview)
- Define authorization concept		Authorization concept
- Complete customizing settings	Settings for customizing (detail)	Preconditions for customizing (detail)
- Document templates add-on's		Overview template add-on's
- Define data storage guidelines		Documentation of storage guidelines
- Test template	Test of configuration settings	Test report
- Prepare functional description	Functional description	Documentation of template functionality
- Set up maintenance procedures	Maintenance procedures	Documentation of maintenance procedures
- Write user documentation	User documentation	Documentation for end user
- Prepare implementation guide	Implementation guide	Check list conditions for template deployment
		List of template add on's
		List of settings to be localized
		Change list for original objects
B. Template Roll-out		
- Select templates for local use	Local selection of templates	List of selected templates
- Implement template locally	Local template implementation	Experiences report
- Adjust template locally	Localization	Documentation of localization
- Conduct local tests	Local tests	Local test report
- Acceptance and release of template	Acceptance and release	Configuration settings

Table 4: Template handbook overview

The whole development process for the template handbook took about 7 month and is now (Spring 99) in the phase of practical testing with processes – that should run on different ERP systems within Bosch – being defined and documented using the Template Handbook. The main challenge was to define all the aspects of a template that must be documented in some kind of result document. The goal was to document the entire template life cycle, thus covering development, roll-out and distribution, maintenance, release management, and re-use. The second challenge was to align all the activities that were necessary to produce the result documents. It took about ten group meetings to define the content of the result documents and the needed activities to build these documents.

4.3 Example documents

As mentioned, the Template Handbook specifies a result document and a technique for each activity. Both will be illustrated using the first activity of the method ('Organize template development' from Table 4). The document 'Overview organization template development' is shown in Table 6. The guidelines required to complete the fields of the result document are specified in the technique which is termed in analogy to the activity 'Organization template development' (Table 5). The following paragraphs show the contents of this technique. All other activities, result documents and techniques of the method are documented like the example in this chapter. Altogether, the Template Handbook now consists of approx. 70 pages (for details see [20]).

Technique: 'Organization template development'
The first step of the method deals with the identification of the organizational framework needed for the development of a template. The following information is important:

- *Template name:* Definition of a unique name for the template. The name should reflect the future function of the template (a template may be developed for a whole system – e.g. a system for a manufacturing plant - or for a single process - e.g. billing).
- *Kernel system:* Definition of the operating environment for the template. Here the decision is made on what types of systems the template will run (e.g. plant or distribution systems).
- *Application type:* Detailed specification of the type (manufacturer and application name) of the application for which the template is developed (e.g. SAP R/3).
- *Release:* It is important to specify also the exact release number of the application type (e.g. 3.1.h).
- *Process-/function number:* Use, if available, the identification numbers for functions provided by the manufacturer (e.g. the SAP function numbers).
- *Development board:* In this row the persons (and organizational units they belong to) responsible for the development of the template are defined.
- *Review board:* Here the review board is defined (employees and organizational units). The review board has to crosscheck the content of the template with the overall conventions that exist in a company (e.g. naming or programming conventions).
- *Authorization board:* This row specifies who is responsible for the official authorization (final acceptance) of the template. Therefore, the names of the involved employees and their organizational units are mentioned in this row.
- *Pilot customer(s):* Definition of the pilot customer(s) of the template. Again the names of the involved employees must be defined and the organizational units they belong to.
- *Template roll-out:* Definition of the organizational units that must or could use the template. For each of these units, a decision on whether the template must be implemented locally (enter "M" for must) or whether the template could be implemented in a local system (enter "C" for could) - if the unit wants to do so - is needed.
- *Localization:* For each organizational unit that must/could implement the template a decision is needed on whether a localization of the template (e.g. changes in the customizing definitions in the template) is allowed

Table 5: Technique 'Organization template development'

Document:	Overview organization template development	**Date:**	12.12.98
Status:	completed	**Author:**	THU
Activity:	Organize template development	**Page:**	1

Template Name: Purchase Demand Release		
Kernel system:	- Plant systems (all plants within Europe) - Sales systems (multi-divisional sale systems)	
Application type:	SAP R/3	
Release:	3.1. h (and higher)	
Process/Function number:	BANF	
Template boards	Organizational unit	Name
Development board	- IS department	A. Miller, F. Smith, C. Barns, O. Meier
	- Plant representatives	H. Wilson, W. Walters
	- Sales representatives	S. May, K. Muller, B. Gerber, L. Hill, P. Floyd
Review board	- IS department	H. Hansen
	- Plant representatives	K. William
	- Sales representatives	P. Klein
Authorization board	- CIO	U. Lee
	- Vice president plant management	P. Guinness
Pilot customer(s)	Plant Strasbourg, France	J. Bartoli
	Plant Philadelphia, USA	W. Clark
	Sales Office Munich, Germany	B. Gross
	Sales Office Hong Kong	E. Wu

Template roll-out (M = must, C = Can):	Org. Unit 1	Org. Unit 2	Org. Unit 3	Org. Unit 4	...
	M	C	M	M	...
Localization (yes/no)	Y	Y	N	N	
Copying model (yes/no)	N	N	N	N	
Authorization date	Frankfurt, January 24, 1999				

Table 6: Example of a result document

5 Benefits of templates in a pharmaceutical company

Another example for the deployment of templates in multinational companies is taken from the pharmaceutical industry. In the case of this company, the pressure to develop templates was a direct function of the growing globalization of its business. The company is organized in multiple divisions which are located in various parts of the world. In order to better conduct the divisional businesses, the company moves from existing, historically grown, local systems to global systems. Contrary to the former, which are cross-divisional, the latter provide global information flows within a specific division. The main objectives of this strategy were to:

- Establish consistency and integrity of group reporting,
- Ensure consistency with divisional business strategies (process view, integration, globalization),
- Enhance project flexibility (improvement in terms of time, costs and risks), and to
- Foster opportunities for sharing and re-use of knowledge.

In order to achieve these results, establishing standards for processes, data and systems configuration's settings was a prerequisite. The necessary templates were developed by divisional competence centers for two areas. First, the company has developed a company core, that defines the common elements for all SAP R/3 implementations across geographical sites and divisions, e.g. group master data, chart of accounts, organizational elements, etc. This core guarantees the support of the group reporting rules, definitions and accounting principles and ensures consistent and efficient reporting. The uniqueness of data is ensured by assigning different number ranges to the divisions.

Based on this core, the company developed further templates for each division which were called 'Divisional Kernels' (Figure 4). These templates are pre-configured ERP systems (mainly SAP's R/3) and reflect common processes in a division based on best practices. They are used for implementing systems within the different regional and local businesses of a division. The objectives of the divisional templates are to:

- ensure globally/regionally homogenous systems which facilitate different global/regional processes,
- support local process improvements, and
- reduce implementation time and costs.

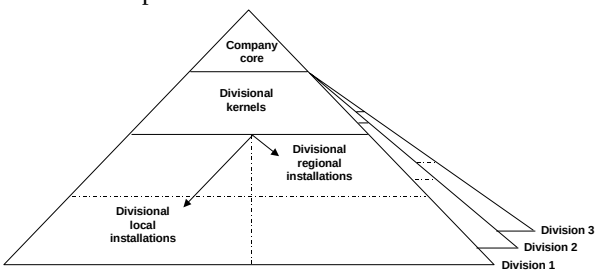

Figure 4: Distribution of the company core and the divisional kernels

As Figure 5 shows, between 40% and 80% of a local system's configuration is defined by templates (FI: financials, SD: sales and distribution, MM: material management, PP: production planning; FI, SD, MM and PP are modules of the R/3 system). Thus, templates were the important instrument to achieve global standardization among the different ERP systems. Having common, standardized systems in place tends to increase the efficiency of business processes and sustain strategic control and process improvements. Common systems and standardized implementations also tend to make for faster implementation and consequently, lower implementation costs.

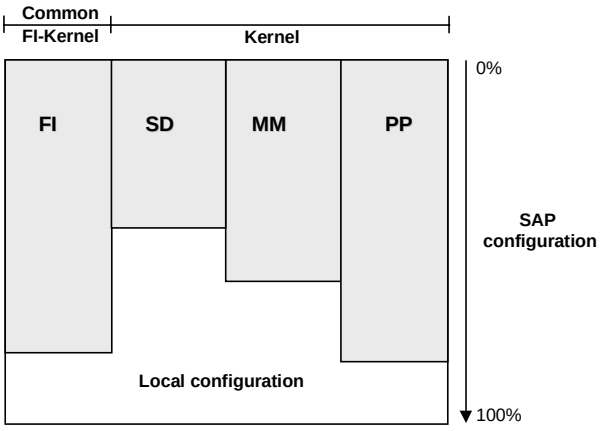

Figure 5: Pre-configuration rates (in % of the whole system) for the different templates

6 Conclusions

In this paper, we described templates as instruments for the standardization of ERP systems that is a strategic necessity for operating successfully in the information age. New business concepts such as business networking require an integrated view along value chain processes with established boundaries of businesses (e.g. corporate boundaries) becoming obsolete. Higher integration and especially automation of the ERP systems which are already in place are a critical success factors.

As our project activities have shown, templates are apt to generate major benefits in two areas. First, templates sustain integrated information flows and foster new process perspectives, such as one face to the customer, as well as enhanced controlling and reporting possibilities. Second, templates are instruments to reduce the costs of implementing and coordinating distributed ERP-systems inside large multinational companies. However, introducing, assessing and rolling out templates are complex processes which call for a systematic approach. This method was termed 'Template Handbook'.

Besides the complexity of the template development, other factors were found to have impact on realization. First, templates presuppose the existence of application architecture planning. For example, a corporate decision would be needed as to whether local cross-divisional or global divisional systems are to be implemented. This degree of (de)centralization governs the design of templates. Templates with strong cross-divisional components, for instance, may differ from divisional templates. This may be due to the probability of different production strategies (make-to-order, make-to-stock etc.) being used in cross-divisional than in divisional production set-ups.

Second, templates are associated with significant scale economics since the costs of standardization are higher for pilot users. Each implementation of the template will decrease its development cost and, due to learning curve effects, the cost for implementation. Consequently, organizations should strive for an as large number of implementations as possible, making sure at the same time that pilot users are not penalized for participating in the development of templates. Therefore, creating incentives schemes which reward pilot users should be considered.

Third, as all standards, templates have a strong political component. As Brousseau (1994) pointed out, standards tend to be confronted with the dilemma between universality and individuality. On the one hand, single, universal standards tend to yield the higher returns in efficiency, whereas on the other hand, the different businesses within a company require individualized systems for maximal flexibility. For example, financial managers and forecasting departments would prioritize standardized and centralized systems. Representatives from sales and production usually have a strong bias towards decentralized and individualized processes. Determining the amount of individual fields and codes which are added to a template depends to a large extend on the political power of the individual business units.

Given the political power to implement standards and a strategy for the development and re-use of templates, the templates designed and the systematic method applied have shown a practicable way of how to close the organization gap. At the same time, this depicts directions for further research. First, continued research will have to focus on how future (ERP) application architectures that are geared towards business networking will look like. A specially interesting will be to determine which parts of these architectures will be covered by templates. Second, the method will be extended to assist in answering the question as to what the optimal degree of standardization will be that a specific template should provide. Finally, in view of the growing autonomy and interdependence of business units, the possibilities of a hierarchical roll-out of templates will decline. Instead, it will be necessary to convince users to develop and use templates, and this will involve not only an appraisal of the costs but also a transparent demonstration of the benefits to be gained from investing in templates.

7 Abbreviations

BSI: British Standards Institute
DIN: Deutsches Institut für Normung
EAN: European Article Number
EDIFACT: Electronic Data Interchange for Administration, Commerce and Trade
ERP: Enterprise Resource Planning
ETSI: European Telecommunications Standards Institute
EWOS: European Workshop for Open Systems

GEIS: General Electric Information Services
IEC: International Electrotechnical Commission
IETF: Internet Engineering Task Force
ISO: International Organization for Standardization
ITU: International Telecommunications Union
JTC1: Joint Technical Committee of ISO and IEC for IT standards

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