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**Considerations on Information
System Strategies
Based on an Empirical Study**

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The study of the relationship between company-specific goals and information system strategies is the subject of a relatively new field in the area of strategic planning known as strategic information management. The author's primary aim is, on the basis of an empirical study, to make a contribution to the theoretical foundation of the development of information system strategies.

1 Introduction and Goals of the Study

The development of information system strategies can take place neither at the conference table nor behind closed doors. The development process is strongly influenced by making active use of knowledge from inside and outside the business. The necessity of taking various knowledge sources into account is often overlooked. Experience shows a marked tendency either to concentrate on the realization of the technical infrastructure of (proposed or existing) information systems or to rely exclusively on one supplier (e.g., the leading firm in the market). This may be justified in individual cases, but generally it leads to a very limited strategic plan.

If strategic information management is the entirety of measures defining the global, long-term development of the information infrastructure in the business, then questions arise from such heterogeneous areas as organization, systems analysis, logistics, marketing, finances, research and development. Hence, interesting new developments and experiences can hardly be kept up with in all those areas continuously.

There is no question today about the importance of strategy for company management. Strategy, strategic management and strategic planning are among the most common phrases to be found in management literature and practical management. In almost all definitions and clarification attempts the formulation of strategies is understood as the problem of forming and balancing the relationship between the company and its environment. The complexity of strategy planning leads to demands for process models as well as methods and tools that reduce complexity.

On the basis of an empirical study we give some insights in the strategic planning of information systems and the use of information technology in practice, compare the findings with current theoretical foundations and make a contribution to future development of information system strategies.

2 Information System Strategies in Practice

2.1 Survey Methodology and Description of the Sample

The goal of the study was the collection and evaluation of data on information infrastructures, on procedures employed in planning, and on the development and content of information system strategies. For this purpose a questionnaire was developed concerning existing conceptions about information system strategies. These conceptions were based on comparative analyses of the literature, field studies, and discussions with experts.

The study collected data on 1200 Austrian companies. The criteria for contacting these companies were either that information technology plays a significant role in assuring their business success, or that the company's business area suggests experience in information strategy planning (e.g., software and consulting firms).

A total of 94 companies answered the questionnaire for a return rate of 8%. This low return rate can be ascribed only partially to secrecy policies of those companies, which did not respond. Instead, we expect that many of the surveyed companies simply did not have any information system strategies or experience in the development thereof. Verbal inquiries also made it clear that the strategic importance of information processing frequently had not (yet) been perceived.

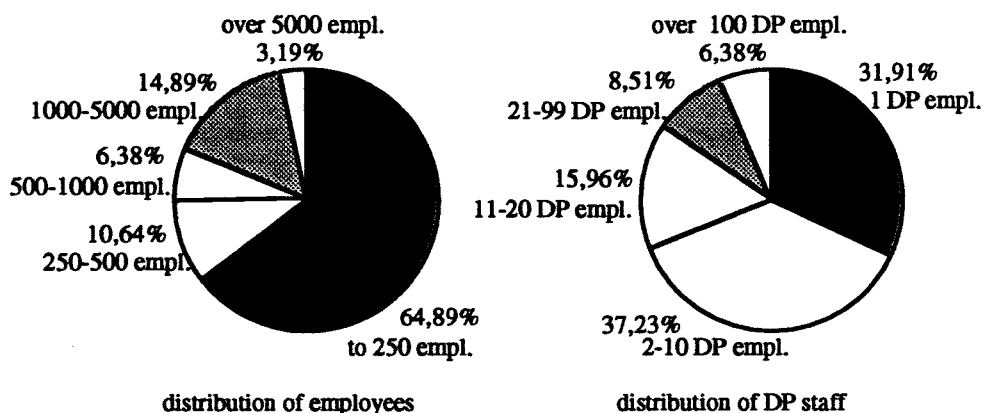


Fig. 1: Characteristics of surveyed companies

Figure 1 shows the characteristics of surveyed companies concerning the number of data processing (DP) personnel and total personnel.

The survey companies were grouped in classes for the systematic analysis of data, the representation of survey results, and the acquisition of new insights on the results gained so far. The following classes were defined:

Class		Number	%
A	total	94	100
B	industrial and trade	52	55
C	software firms	24	25.5
D	consulting companies	18	19
E	community-managed and state-owned companies	8	8.5
F	<= 250 personnel	61	65
G	over 250 personnel	33	35
H	<= 10 DP personnel	65	69
I	over 10 DP personnel	29	31
J	companies with information strategies	50	53
K	companies without information strategies	44	47

2.2 Information Infrastructure of the Surveyed Companies

The information infrastructure is considered to be the sum of all facilities and measures that support activities related to information and communication in a company, i.e., the company's information function. The information infrastructure has no purpose of its own, but serves as a medium in the fulfilment of organizational goals.

The information infrastructure can be structured as follows (Heinrich/Lehner 1990):

- The components of the information and communications system: these can be grouped into material components (e.g., hardware, system and application software, data, media, documentation) or immaterial components (e.g., tools, methods, standards); if the grouping used in system planning is applied, the differentiation of data system, methods system, work organization, communication system, and security system results;

- The persons who are responsible for the tasks of the information infrastructure (internal and possibly external personnel);
- The building space that is available for the personnel and the components of the infrastructure;
- The relationships between the components and the persons: here we can distinguish a static (type and extent of networking, structural organization, project organization) versus dynamic (process guidelines, co-ordination guidelines, priority regulations, responsibilities for acquisition, reporting, etc.) view of relationships on the one hand and internal versus external relationships on the other hand.

The analysis of results on information infrastructures was aimed at studying the diffusion and uses of available technologies. Since this approach permits the determination of yet unused technological potential, the result is a close relationship to the process of strategy formulation and the content of information system strategies.

The following detailed survey results on information infrastructure are grouped, analogous to the structure of the questionnaire, into hardware, operating system, software development, programming languages and tools for end users, databases and data management, and networking. Deviation from the above grouping, that is, the orientation toward a primarily technical view of the information infrastructure, is due to the importance of technical components for information system strategies. Another reason is the questionnaire itself as a survey instrument, which is limited in its adequacy for detailed data collection for other components of the information infrastructure.

Hardware

	A	B	C	D	E	F	G	H	I	J	K
central minicomputer											
%	31,9	28,8	54,2	11,1	37,5	32,8	30,3	23,1	51,7	40	22,7
num	30	15	13	2	3	20	10	15	15	20	10
central mainframe											
%	50	69,2	37,5	11,1	100	32,8	81,8	40	72,4	52	47,7
num	47	36	9	2	8	20	27	26	21	26	21
standalone PC											
%	60,6	67,3	41,7	66,7	100	55,7	69,7	55,4	72,4	60	61,4
num	57	35	10	12	8	34	23	36	21	30	27

	A	B	C	D	E	F	G	H	I	J	K
decentral minicomputer											
%	27,7	25	41,7	16,7	50	26,2	30,3	20	44,8	34	20,5
num	26	13	10	3	4	16	10	13	13	17	9
PC linked with host											
%	55,3	75	45,8	11,1	100	41	81,8	44,6	79,3	62	47,7
num	52	39	11	2	8	25	27	29	23	31	21
PC network											
%	38,3	43,3	37,5	27,8	50	34,4	45,5	29,2	58,6	50	25
num	36	22	9	5	4	21	15	19	17	25	11
hardware from various manufacturers											
%	54,3	59,6	66,7	22,2	87,5	49,2	63,6	44,6	75,9	64	43,2
num	51	31	16	4	7	30	21	29	22	32	19

Operating System

	A	B	C	D	E	F	G	H	I	J	K
Unix											
%	22,3	11,5	50	16,7	37,5	24,6	18,2	16,9	34,5	32	11,4
num	21	6	12	3	3	15	6	11	10	16	5
MS-DOS											
%	75,5	78,8	75	66,7	100	72,1	81,8	72,3	82,8	78	72,7
num	71	41	18	12	8	44	27	47	24	39	32
other operating system											
%	55,3	57,7	75	22,2	87,5	45,9	72,7	43,1	82,5	66	43,2
num	52	30	18	4	7	28	24	28	24	33	19

As might be expected, the Unix operating system is in use primarily in software companies. The diffusion of MS-DOS as the operating system for PCs is uniformly high and needs no explanation. The identification of other operating systems usually relates to a manufacturer-specific OS for medium to large-scale computers. Due to the dominance of PCs, other operating systems are not so widespread in smaller companies or consulting companies.

Software Development

	A	B	C	D	E	F	G	H	I	J	K
in-house development of software											
%	76,6	76,9	100	44,4	100	68,9	90,9	66,2	100	90	61,4
num	72	40	24	8	8	42	30	43	29	45	27
outside development of software											
%	39,4	53,8	20,8	22,2	87,5	32,8	51,5	41,5	34,5	34	45,5
num	37	28	5	4	7	20	17	27	10	17	20
use of standard software											
%	78,7	82,7	70,8	77,8	87,5	80,3	75,8	75,4	86,2	78	79,5
num	74	43	17	14	7	49	25	49	25	39	35

The extreme uniformity of statements regarding the use of standard software points to an increase in the acceptance of finished solutions wherever this is

practicable. Furthermore, clearly most companies use a combination of in-house development, outside development, and standard software. In large companies and companies with DP departments, however, in-house development clearly dominates.

Programming Languages and Tools for End Users

	A	B	C	D	E	F	G	H	I	J	K
use of 3rd generation programming languages											
%	70,2	75	83,3	38,9	100	62,3	84,8	63,1	86,2	72	68,2
num	66	39	20	7	8	38	28	41	25	36	30
use of 4th generation programming languages											
%	39,4	30,8	66,7	27,8	50	41	36,4	33,8	51,7	46	31,8
num	37	16	16	5	4	25	12	22	15	23	14
use of object-oriented programming languages											
%	20,2	15,4	33,3	16,7	12,5	24,6	12,1	16,9	27,6	26	13,6
num	19	8	8	3	1	15	4	11	8	13	6
no tools for end users											
%	6,4	9,6	0	5,6	12,5	6,6	6,1	7,7	3,4	4	9,1
num	6	5	0	1	1	4	2	5	1	2	4
user tools on central computer											
%	48,9	53,7	62,5	16,7	75	57,4	60,6	33,8	82,8	58	38,6
num	46	28	15	3	6	26	20	22	24	29	17
user tools on PC											
%	63,8	63,5	66,7	61,1	87,5	57,4	75,8	55,4	82,8	70	56,8
num	60	33	16	11	7	35	25	36	24	35	25

The use and diffusion of conventional programming languages remain clearly dominant. Newer language concepts have enjoyed use only in software firms and companies with larger DP departments. User tools, on the other hand, are being used in almost all companies. The diffusion of such tools on PCs and mainframes is balanced.

Databases and Data Management

	A	B	C	D	E	F	G	H	I	J	K
no database system											
%	16	23,1	4,2	11,1	12,5	13,1	21,2	21,5	3,4	6	27,3
num	15	12	1	2	1	8	7	14	1	3	12
hierarchical database system											
%	33	38,5	33,3	16,7	62,5	26,2	45,5	21,5	58,6	36	29,5
num	31	20	8	3	5	16	15	14	17	18	13
relational database system											
%	56,4	44,2	87,5	50	62,5	60,7	48,5	49,2	72,4	70	40,9
num	53	23	21	9	5	37	16	32	21	35	18
data management with storage exclusively on mainframe											
%	22,3	23,1	33,3	5,6	37,5	19,7	27,3	24,6	17,2	26	18,2
num	21	12	8	1	3	12	9	16	5	13	8
data management with central and decentral storage											
%	69,1	80,8	66,7	38,9	100	62,3	81,8	61,5	86,2	74	63,6
num	65	42	16	7	8	38	27	40	25	17	28

data management with exclusively decentral storage (e.g., on PCs)

	A	B	C	D	E	F	G	H	I	J	K
%	8,5	3,8	8,3	22,2	12,5	11,5	3	10,8	3,4	6	11,4
num	8	2	2	4	1	7	1	7	1	3	5

Hierarchical databases have declined in comparison to relational databases. The combination of central and decentral data storage dominates data distribution; extreme forms of exclusively central or decentral data storage are exceptions.

Networking

	A	B	C	D	E	F	G	H	I	J	K
use of a local area network (LAN)											
%	44,7	46,2	54,2	27,8	75	39,3	54,5	32,3	72,4	58	29,5
num	42	24	13	5	6	24	18	21	21	29	13
terminal connection to mainframe											
%	66	82,7	70,8	11,1	100	52,5	921	43,8	93,1	70	61,4
num	62	43	17	2	8	32	30	35	27	35	27
no external networking											
%	36,2	34,6	29,2	50	37,5	42,6	24,2	49,2	6,9	30	43,2
num	34	18	7	9	3	26	8	32	2	15	19
external networking with district offices											
%	43,6	53,8	41,7	16,7	50	32,8	63,6	27,7	79,3	50	36,4
num	41	28	10	3	4	20	21	18	23	25	16
connection to information services											
%	20,2	25	25	0	75	11,5	36,4	6,2	51,7	24	15,9
num	19	13	6	0	6	7	12	4	15	12	7
networking with suppliers											
%	11,7	11,5	20,8	0	37,5	6,6	21,2	0	37,9	20	2,3
num	11	6	5	0	3	4	7	0	11	10	1
networking with customers											
%	21,3	15,4	50	0	25	26,2	12,1	13,8	37,9	30	11,4
num	20	8	12	0	2	16	4	9	11	15	5

The degree of networking still tends to be very low. The use of internal networks (for example, LANs) has become widespread, as has networking with affiliates or associates among decentrally organized companies, but this does not indicate extensive use of the possibilities that are opened by networking. Networking with areas external to a company (customers, suppliers, etc.) are rare.

2.3 IS-Planning and Organizational Responsibility for the Development of Information System Strategies

Differentiating between strategic planning and the development of information system strategies proves to be a problem. Conceptions differ even concerning goal setting or goal generation for information processing, as well as in

distinguishing information system strategies from tasks that precede, parallel, or succeed it. Selig's empirical study concludes that information processing tends toward medium-range planning rather than targeted strategic planning (compare Selig 1986). Using methodical support of planning as a measure, we see from the following data that the situation has not changed much. The number of companies that reported having company strategies was surprisingly high. This is contrary to evaluations stemming from personal interviews with contacts at the companies; these interviews revealed that written company strategies were an exception. We thus assume that responses on the questionnaire included company strategies that were not explicitly formulated, i.e., in written form.

Company Strategies and Strategic IS Planning

	A	B	C	D	E	F	G	H	I	J	K
existence of company strategies											
%	86,2	88,5	91,7	72,2	87,5	85,2	87,9	80	100	90	81,8
num	81	46	22	13	7	52	29	52	29	45	36
methods or software used for IS planning											
%	41,5	30,8	70,8	33,3	50	42,6	39,4	33,8	58,6	62	18,2
num	39	16	17	6	4	26	13	22	17	31	8
matching of IS planning and strategic company planning											
%	67	63,5	87,5	50	75	77	60,6	61,5	79,3	80	52,3
num	63	33	21	9	6	43	20	40	23	40	23
Information system strategy is important for the company.											
%	84	90,4	87,5	61,1	100	77	97	78,5	96,6	92	75
num	79	47	21	11	8	47	32	51	28	46	33
Information system strategies and experience therewith are present.											
%	53,2	44,2	79,2	44,4	75	52,5	54,5	43,1	75,9	100	0
num	50	23	19	8	6	32	18	28	22	50	0
methodical support in development of information system strategies											
%	20,2	13,5	33,3	22,2	37,5	21,3	18,2	16,9	27,6	38	0
num	19	7	8	4	3	13	6	11	8	19	0

Short-range IS Planning

	A	B	C	D	E	F	G	H	I	J	K
no response	20	11	1	8	0	14	6	18	2	7	13
monthly	7	3	3	1	0	5	2	4	3	4	3
quarterly	19	9	6	4	2	13	6	13	6	13	6
semiannual	19	10	6	3	1	11	8	14	5	11	8
annually	29	19	8	2	5	18	11	16	13	15	14
% no resp.	21,3	21,2	4,2	44,4	0	23	18,2	27,7	6,9	14	29,5
% monthly	7,4	5,8	12,5	5,6	0	8,2	6,1	6,2	10,3	8	6,8
% quarterly	20,2	17,3	25	22,2	25	21,3	18,2	20	20,7	26	13,6
% semiannual	20,2	19,2	25	16,7	12,5	18	24,2	21,5	17,2	22	18,2
% annual	30,9	36,5	33,3	11,1	62,5	29,5	33,3	24,6	44,8	30	31,8

Medium and long-range IS Planning

	A	B	C	D	E	F	G	H	I	J	K
no response	24	13	5	6	0	17	7	22	2	6	18
1 year	11	4	5	2	0	8	3	9	2	5	6
2 years	23	10	9	4	2	16	7	13	10	16	7
3 years	25	18	4	3	3	14	11	15	10	16	9
5 years	9	6	0	0	3	4	5	5	4	6	3
over 5 years	2	1	1	3	0	2	0	1	1	1	1
% no resp	25,5	25	20,8	33,3	0	27,9	21,2	33,8	6,9	12	40,9
% 1 year	11,7	7,7	20,8	11,1	0	13,1	9,1	13,8	6,9	10	13,6
% 2 years	24,5	19,2	37,5	22,2	25	26,2	21,2	20	34,5	32	15,9
% 3 years	26,6	34,6	16,7	16,7	37,5	23	33,3	23,1	34,5	32	20,5
% 5 years	9,6	11,5	0	0	37,5	6,6	15,2	7,7	13,8	12	6,8
% > 5 years	2,1	1,9	4,2	16,7	0	3,3	0	1,5	3,4	2	2,3

There was no doubt about the importance of information system strategies among the responding companies. This is not surprising since their responding to the questionnaire demonstrates a certain level of interest in the subject. However, only about half of these companies actually reported having such strategies. One indicator of the importance of DP personnel as transmitter of knowledge seems to be that companies with more than 10 DP personnel are above average in their percentage of DP employees and are clearly higher than companies with a larger number of personnel. This fact and the indication of a low level of methodological and expert support in the development of IS strategies show that there is a need for improvement.

Figure 2 depicts the responsibility for the development of IS strategies on the part of personnel and organizations (Only companies reporting IS strategies are included in Figure 2). Although comparability is not always possible without ambiguity due to problems in terminology or company-internal assignment of positions, it can be seen that in most cases the development of IS strategies is handled by a single person or unit. Only seven companies reported that multiple organizational units co-operate in the development of IS strategies.

These results indicate a still inadequate perception of the interdepartmental nature of IS strategies. This is further supported by the responses on the establishment of a steering committee as a planning and co-ordination instrument, which does not yet seem to have attained widespread acceptance.

responsible unit	number reporting	cooperation
organization	2	
consultant	1	
head of computing center	1	•
head of ADP	7	•••••
head administrator	1	•
head accounting/controlling	2	••
project leader	1	
controlling	2	••
IP department	1	
company management	17	•••••••••••••••
information manager	1	•
technical manager	1	
chairman of board	2	
SW development manager	2	••
systems manager	1	•
information systems manager	1	
business manager	1	
DP specialist	1	•
planning team	1	•

Fig. 2: Organizational responsibility for IS strategies

The perception of a supporting function for information processing — a perception that impedes the use of data processing in the sense of competition orientation as much as does the lack of organizational prerequisites — apparently continues to be manifested in the low incidence of companies calling in outside support.

Steering committee exists.

	A	B	C	D	E	F	G	H	I	J	K
%	24,5	26,9	25	16,7	37,5	21,3	30,3	24,6	24,1	36	11,4
num	23	14	6	3	3	13	10	16	7	18	5

Outside support in the development of IS strategies

	A	B	C	D	E	F	G	H	I	J	K
no response	46	31	5	10	2	29	17	38	8	2	44
no outs. help	37	15	16	6	5	25	12	20	17	37	0
outside help	11	6	3	2	1	7	4	7	4	11	0
% no resp.	48,9	59,6	20,8	55,6	25	47,5	51,5	58,5	27,6	4	100
% no help	39,4	28,8	66,7	33,3	62,5	41	36,4	30,8	58,6	74	0
% outs. help	11,7	11,5	12,5	11,1	12,5	11,5	12,1	10,8	13,8	22	0

3 Classification of Empirical Findings: A Framework for Managing Information System Strategies

On the basis of the studies described we refine previous conceptions of information system (IS) strategies, develop guidelines that support any organization in managing its IS strategy and point out relevant activities to define evolutionarily the content of this strategy.

The challenge is how best conceptualize the role of information technology (IT) and information in business, how to identify the applications relevant to a particular strategic context, and how to reconfigure an organization to not only fully exploit available IT and information capabilities but also to differentiate their operations from competitors. Successful IS strategies solve business problems and thus an opportunity-oriented approach is preferable to a technology-oriented approach.

Pure information technology offers little strategic advantage. Advantage flows from using technology to leverage or exploit inimitable assets of the company - its history, reputation, culture, management skills, market power. This is linked to communication skills and the management of the information flow in the company. This includes the ability to translate diagnostic results into specific and knowledgeable information requests. The satisfaction of the latter, within acceptable time, cost and human ability constraints, requires the establishment of external and internal information systems associated with the active handling of information as a management resource of comparable importance to other factors of production.

3.1 Content of Information System Strategies

The elements normally comprising a strategic plan can be transferred analogously to information system strategies cf. (Hammer 1988). This results in the following suggested classification (Lehner 1989):

- model and applications of information function
- available and emerging technological possibilities
- strength/weakness analysis of own information infrastructure
- competition analysis and prognosis
- strategies and measures (plans of action)
- organizational consequences
- project portfolio

• cost/benefit estimation and finance planning

In formulating the questionnaire first a collection of previous conceptions about the content of IS strategy was categorized. The basis of the categorization was a collection of possible content taken from the literature, but which had not yet been brought into any systematic relationship (compare Lehner 1989). An ideal and an actual status were collected for each category (where Are strategies existed in the surveyed companies). The results of ideal and actual values are compared in the following evaluation.

	A	B	C	D	E	F	G	H	I	J	K
1. strategic goals											
ideal %	79,8	80,8	66,7	94,4	100	77	84,8	81,5	75,9	78	81,8
actual %	35,1	30,8	33,3	50	62,5	36,1	33,3	29,2	48,3	60	6,8
2. anticipated technological development											
ideal %	66	49,6	79,2	66,7	62,5	72,1	54,5	66,2	65,5	72	59,1
actual %	29,8	26,9	33,3	33,3	62,5	29,5	30,3	23,1	44,8	46	11,4
3. hardware policy											
ideal %	69,1	67,3	75	66,7	87,5	70,5	66,7	64,6	79,3	70	68,2
actual %	28,7	21,2	50	22,2	0	27,9	30,3	15,4	58,6	50	4,5
4. software policy											
ideal %	78,7	76,9	83,3	77,8	100	78,7	78,8	73,8	89,7	86	70,5
actual %	47,9	40,4	66,7	44,4	50	49,2	45,5	36,9	72,4	82	9,1
5. strength/weakness analysis											
ideal %	50	61,5	37,5	33,3	62,5	42,6	63,6	52,3	44,8	52	47,7
actual %	17	17,3	16,7	16,7	25	19,4	18,2	15,4	20,7	32	0
6. measures, action and finance plan											
ideal %	54,3	53,8	54,2	55,6	87,5	50,8	60,6	52,3	58,6	60	47,7
actual %	22,3	21,2	29,2	16,7	50	18	30,3	13,8	41,4	42	0
7. project portfolio											
ideal %	38,3	36,5	45,8	33,3	50	36,1	42,4	32,3	51,7	50	25
actual %	17	15,4	20,8	16,7	37,5	14,8	21,2	12,3	27,6	32	0
8. competition analysis											
ideal %	34	34,6	41,7	22,2	25	34,3	33,3	30,8	41,4	46	20,5
actual %	13,8	7,7	29,2	11,1	12,5	16,4	9,1	10,8	20,7	26	0
9. standards and methods											
ideal %	56,4	53,8	75	38,9	37,5	57,4	54,5	52,3	65,5	62	50
actual %	23,4	19,2	37,5	16,7	25	24,6	21,2	12,3	48,3	42	2,3
10. privacy and data security											
ideal %	67	71,2	70,8	50	75	65,6	69,7	61,5	79,3	68	65,9
actual %	26,6	26,9	29,2	22,2	12,5	24,6	30,3	23,1	34,5	46	4,5
11. centralization and decentralization											
ideal %	59,6	71,2	50	38,9	87,5	54,1	69,7	55,4	69	64	54,5
actual %	24,5	28,8	20,8	16,7	37,5	18	36,4	15,4	44,8	44	2,3
12. networking											
ideal %	70,2	75	54,2	77,8	87,5	67,2	75,8	69,2	72,4	68	72,7
actual %	28,7	26,9	29,2	33,3	12,5	26,2	33,3	21,5	44,8	50	4,5
13. other											
ideal %	8,5	5,8	12,5	11,1	25	9,8	6,1	9,2	6,9	8	9,1
actual %	3,2	3,8	4,2	0	12,5	1,6	6,1	0	10,3	6	0

In the evaluation of the content of IS strategies, no significant differences arise between individual groups. Competition analysis and project portfolio are generally seen as less important. Both were rated by less than 40%, which is significantly below other categories, which are almost all above 60%. For competition analysis, the problem could be the difficulty in obtaining usable data about competitors. For the project portfolio, there seems to be a majority opinion that this task belongs to the later process of strategic and administrative planning. All categories show a distinct deviation of the actual from the ideal status (see Figure 3). This leads us to conclude on the one hand that the importance of information processing planning and information system strategies has been recognized; on the other hand, this deviation demonstrates the inadequate level of awareness of the associated tasks. This result is thus consistent with the low questionnaire return quota, which leads us to conclude that IS strategies and concrete conceptions concerning the competition-strategic importance of information processing are present in but a few companies.

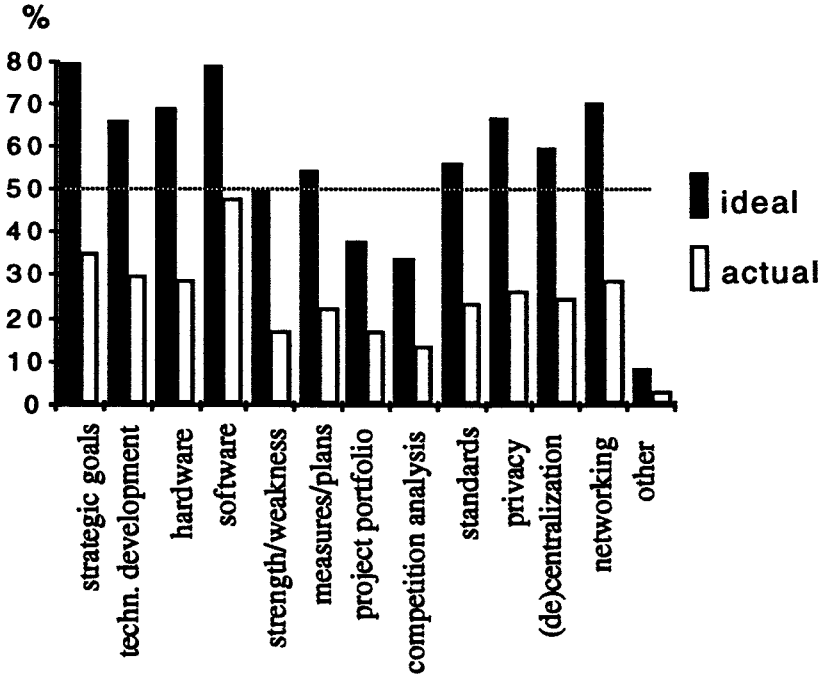


Fig. 3: Frequency of identified criteria

The category "other" (e.g., personal development, needs analysis, tools and development policy) was marked by only very few companies both for ideal

and actual status. This implies that the provided criteria met with general agreement.

These results suggest a general content for information system strategies. It is important that in the formulation of information system strategies, even when using this general framework, only fundamental statements, assertions, etc. are made. Refinement should take place only in the succeeding strategic and administrative planning. The model contains the following points:

3.2 Content of the Information Strategy Document

Attributes, preconditions and characteristics of IS strategies:

1 Organizational Environments

- relevant future market developments
- entry/exit barriers
- securing a technology advantage
- competition analysis
- technological developments and market trends

2 Information Technology in the Organization

- goals in the use of information media
- actual information infrastructure
- degree of diffusion of information technology in the organization
- efficiency of information infrastructure
- flexibility and adaptability of information infrastructure

2.1 Hardware Policy and System Software

2.2 Software Policy

2.3 Communication and Networking

2.4 Standards and Methods

- standards and methods
- guidelines for processing of individual data

3 Management and Organization

- competencies and responsibilities
- personal planning and development
- organizational changes

4 Strategic Role of Information Technology

- goal of information function
- strategic role of information processing in the company

future orientation of information infrastructure

5 Critical Success Factors

6 Strategic Objectives

7 Application Pool

pool of implemented (strategic) applications
organisation-wide conceptual applications model
data dictionary

8 Strategic Applications

future application areas
distribution of task execution
use of databases
data and knowledge management

9 Risk Assessment

technical security measures
legal protection
catastrophe plans

10 Miscellaneous

3.3 Evolutionary Design of IS Strategies

The IS strategy has to present perceived phenomena momentarily relevant to direct the realization of information technology to gain competitive advantage. As we cannot comprehend an IS strategy at a glance, the framework incorporates various perspectives successively increasing our perception of relevant phenomena.

The IS strategy has to present perceived phenomena to direct the use of information technology to gain competitive advantage. As we cannot develop an IS strategy without dividing the task in subtasks, the framework incorporates different views successively increasing our perception of relevant phenomena. The proposed framework consists of seven activities, which constitute a cyclic and evolutionary process of interleaved activities. The activities explore different perspectives and are carried out in parallel influencing each other, because findings in one area can cause the reinterpretation of findings in other areas. The activities and the connections between them are depicted in the figure above.

The analysis of (organizational) environments states those conditions and constraints that will influence the direction of the information strategy but

generally are beyond the control of the organization [Lientz & Chen 81; McFarlan 84].

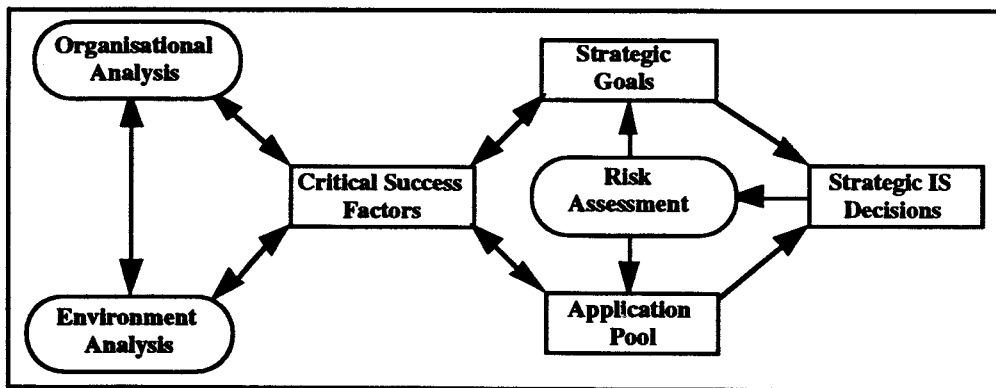


Fig. 4: Design process of IS Strategies

Comparison with survey categories: organizational analysis = 3, 4, 9, 10, 11, 12; environment analysis = 2, 8; strategic goals = 1; application pool = 7; risk assessment = 5. Don't know where to put 6 and 13.

The organizational analysis, especially of the existing information infrastructure, gives knowledge about quality and coverage of informational tasks through IT.

A critical success factor represents a component or an attribute of the information infrastructure that is necessary for the organization to successfully operate in the selected environment [Rockart 79; Boynton & Zmud 84]. The determination of critical success factors is the constructive process to locate relevant measures for the application of IT. This constructive process depends on the perspective of involved organizational groups and it is an iterative process carried out at different levels of abstraction.

The application pool comprises current and planned projects. The organizational data model helps to structure the application pool and to identify the potential of each project. The criteria used to evaluate the projects in the application pool are derived from the critical success factors. The operationalisation of the critical success factors and the classification of projects takes normally place during a workshop.

Strategic IS decisions:

A system can be strategically important for different reasons - it can be a source of competitive advantage or it can be a strategic necessity, necessary for the business but widely available in industry. Furthermore, we believe in an evolutionary theory of strategic development whereby ultimately all strategic systems become strategic necessities.

3.4 Characteristics and Restrictions of Information System Strategies

duration	frequency	
	ideal	actual
to 1 year	7	9
to 2 years	8	5
to 3 years	14	7
to 4 years	1	-
to 5 years	19	6
über 5 years	4	1

The average duration was among 2 and 3 years; ideal values were 3 to 5 years on average. It must be noted, however, that this is not at all a static period. Among other things, information system strategies have the function of assuring the adaptation of a company to its environment, so that an updates is to be made as necessary; thinking in time frames is to be seen only as reflecting the general long-range nature of information systems strategies.

3.5 Attributes of Information System Strategies

The attributes of information system strategies were prioritised based on an open-ended scale that began with 1 "very important", 2 "important", 3 "less important". The evaluation of responses produced the following ranked list of attributes, whereby the rank value is given in parentheses in the form of a weighted mean.

1. applicability (1.79)
2. future orientation (2.21)
3. up-to-dateness (2.81)
4. understandability (3.19)

Along with these four attributes the respondents had the possibility of adding others. The following additions, translated from their original German wording, were given once each (weighting in parentheses according to scale):

- verifiability by management (4)
- acceptance (4)
- harmony with company strategies (1)
- economy (5)
- understanding of overall company strategies (1)
- cost distribution/resource allocation (1)
- visions (4)

The following additions were made without specifying a weight: harmony with company strategies (twice), necessity of continuous development or update of IS strategies (several), and (once each) requirement of a finance plan, a feasibility study, co-ordination of ADP diffusion in the company, embedding in the company's guidelines, and the understandability for decision makers.

4 Summary and Conclusions

Most approaches to the development of information system strategies seek to use information and communication technology to secure or improve a company's competitiveness. In general the content of the information system strategies can neither be formalised nor enumerated as a check list. However, on the basis of the study data, previous conceptions could be refined and a framework could be proposed. This framework can serve as a basis for the development of company-specific IS strategies. Other results of this study are statements about attributes, preconditions, and characteristics of IS strategies. The results can serve both as a comparison with existing conceptions and as a foundation for information management.

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