Information Logistics Strategy –

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Abstract
Although managerial issues of data warehousing and business intelligence received considerable attention in recent years, the strategy process has not often been investigated. This is particularly true for the recently proposed, more holistic concept of information logistics. This paper discusses the state of the art of information logistics (IL) strategy and proposes a framework of analysis which combines supply chain oriented decomposition with functional decomposition. As a foundation for proposed strategy components, current IL strategy practices are analyzed by means of a survey. The findings show that IL strategy seems to be linked to company size, governance type (business line vs. business process), and IL organization. Supply chain oriented IL strategy components (sourcing, delivery, portfolio) gain less attention than IL solution development and maintenance strategy components.

1. Introduction
A large number of studies prove the undisputedly high relevance of business intelligence (BI) and data warehousing (DWH) [1, 15, 27] for information management. Meanwhile, analytical information systems represent an essential component of the enterprise application landscape and claim a considerable share of the IT budget. Organizations however are no longer primarily concerned with establishing analytical information systems. They rather face the challenge of continuously operating and further developing these systems according to changing business requirements and emerging potentials of IT innovations. In this regard, two crucial aspects are still widely neglected: First, a comprehensive view on the entirety of BI/DWH initiatives does not yet supersede a focused partial or project-specific view. Second, neither the long investment cycles nor the infrastructure character of such systems is adequately considered.

If we abstract from differentiations which result from deployed technologies (data warehouse, data marts, OLAP etc.) and focus on the conceptual, cross-project and cross-application character of corporate information supply, information logistics can be defined as follows [30]: “Information logistics (IL) comprises the planning, control, and implementation of the entirety of cross-unit data flows as well as the storage and provisioning of such data. In order to differentiate IL and operational data integration, only those data flows are considered to be IL components which support decision making. If data is used for decision making in the same organizational unit where it originates, such flows do not fall under our IL definition because in this case, most of the managerial challenges do not occur.”

Since IL usually consumes significant resources and creates significant business potentials, it has to be treated as a key business asset. Hence it is crucial to align IL with business strategy, both regarding its development and its operations. Based on Henderson and Venkatamaran’s seminal analysis [12], IT/business alignment can be understood to comprise four major perspectives: “Strategy Execution Alignment”, “Technology Transformation Alignment”, “Competitive Potential Alignment”, and “Service Level Alignment”.

While the IT infrastructure for IL (DWH and BI, respectively) has been researched for nearly twenty years and while information supply processes have been investigated more recently [e.g. 14, 29], IL strategy is not often addressed (see Section 2). This might be due to the fact that the traditional DWH/BI understanding is often associated with (development) projects or with certain application scenarios, while strategy is usually associated with larger units, often the entire enterprise, and with a long planning horizon.

Based on the above IL definition and on Earl’s definition of IT strategy [5], we understand IL strategy as a concept to systematically pursue long-range, enterprise-wide, aggregate goals for IL in sync with IT strategy and business strategy. According to Rüegg-Stürm [22], such a concept is characterized by
two perspectives: The content-related perspective specifies the strategic positioning by defining goals - we designate it “positioning perspective”. A workable strategy may by no means be limited to mere statements on goals - it must also show concrete development path and ways to achieve these goals. We designate this perspective “implementation perspective”.

Like IT strategy and business strategy, IL strategy is challenging because a multitude of “local” goals (of specific units and functions) have to be coordinated, non-transparent und inhomogeneous solution “islands” have to be harmonized, redundancies have to be managed, and short-term targets have to be aligned with long-term planning. Moreover, since the business environment is more or less volatile, IL strategy has to be permanently adapted to business strategy amendments, IT strategy updates, and technology innovations.

The remainder of the paper is organized as follows: Related work on IL strategy is discussed in Section 2. Section 3 presents our IL strategy components framework proposal. In Section 4 we examine the relevance of these IL strategy components by the means of a practitioner survey. Current IL strategy practices and their dependencies regarding parameters such as company size are identified as well. In Section 5 findings based on the survey results are presented. Section 6 summarizes our findings and outlines future research in this field.

2. IL strategy state of the art

In order to assess the state of the art of IL strategy, both scientific and practitioner-oriented publications have been analyzed. As the definition of IL is quite recent and is, as a consequence, neither used by older work nor by all current researchers/practitioners, the related concepts of BI strategy (more often used) and DWH strategy (less often used) are also included in the state of the art analysis. Nevertheless, due to consistency reasons, we use the term “IL strategy” for the remainder of the article, except when directly citing sources with different terminology.

Whilst there are several articles published by consultancies, research and advisory firms as well as software vendors, only little work can be attributed to the scientific community – which is remarkable considering the long tradition of BI/DWH research and its relevance to companies. Although a wide range of (also scientific) publications about IT strategy in general exists, not much has been published on the transfer of such concepts to BI/DWH. Based on the literature research, we systemized the approaches addressing strategic issues for information logistics as follows: Practitioner-oriented contributions to IL strategy are discussed in Section 2.1. Since there is to the best of our knowledge no scientific work which explicitly addresses IL strategy, no respective section is included. Section 2.2 discusses contributions which have been developed for other areas of IT management, however are related to IL strategy. These publications have been contributed by academics as well as practitioners. Based on the discussion of related work, we specify the IL strategy research gap in Section 2.3.

2.1. Practitioner approaches to IL strategy

Several practitioner publications propose IL strategy components (e.g., [10, 11, 16]). When comparing these proposals, it is evident that there is no common understanding of IL strategy (or BI or DWH strategy, respectively). Losey [16] describes “enterprise data warehouse strategy” by means of a list of questions which have to be answered. The strategy therefore consists of deliverables like a mapping to business strategy, scope statements, critical success factors, several partial strategies (e.g., information delivery strategy, meta data management strategy) and an implementation roadmap. This approach is representative for a mix of artifact types (in this case: goals, partial strategies, principles and guidelines) which are then regarded as being IL strategy components – a popular approach in practitioner-oriented publications. According to our understanding (cf. Section 1), it is not sufficient to differentiate certain artifact types in order to define or maintain an IL strategy. We consider it much more important to differentiate content-related IL strategy components for certain portions of the IL supply chain or for certain functional areas of IL “production” (cf. Section 3).

Gonzales [11] approaches BI strategy in sketching a so-called strategy document. He lists the issues which should be addressed by such a document: conceptual view, data architecture, technical architecture, and implementation view. The document can and should be revised and extended continuously. It is meant to serve as a roadmap. Friedman and Hostmann [10] arrange the BI strategy within a BI framework and propose a list of development activities at a very high level.

Another type of practitioner-oriented publications addresses procedure models for the IL strategy definition process (e.g., [3, 9, 25]). These proposals usually adapt the generic strategy development process by adding practice-oriented suggestions for the IL context. Many authors point out that IL strategy should be aligned with business strategy and that
its goals have to be derived “top down” (e.g., [13, 16, 25]). Again, a systematic and comprehensive methodology is missing since in most cases the findings reflect practical experience.

A third class of contributions present findings about IL strategy by means of case studies and case examples (e.g., [18, 23]).

2.2. Approaches addressing selected aspects of IL strategy

In addition to the aforementioned practitioner-oriented work, several publications contribute specific partial issues in the context of IL. In some cases, the main focus is on other topics like IT strategy, but IL is somehow covered. In other cases, publications claim to contribute to IL strategy - but a close analysis reveals that IL is not addressed exclusively.

Examples for related issues that address IL strategy as well are:
- technical issues like optimal DWH architectures (e.g., [4]),
- business-related issues like deriving an information architecture (e.g., [24]), or
- organizational issues like governance (e.g., [28]) and/or organizational structure (e.g., [7, 32]).

IL strategy is also, at least cursorily, addressed in several articles dealing with the support of business strategy or business objectives by means of BI (e.g., [21]), or in contributions on strategic information systems (e.g., [24]).

2.3. Research gap

To the best of our knowledge there are no scientific publications that address IL strategy (BI or DWH strategy, respectively) explicitly and comprehensively. Academic contributions describe either the strategy development process (e.g., [13]) or particular issues with limited scope. Most practitioner contributions result from single or few case experiences so that findings tend to be arbitrary or lack a systematic and comprehensive approach.

Hence the state of the art of IL strategy exhibits the following shortcomings:
1. Missing definition for IL strategy and its scope.
2. Missing systematic and transparent derivation of IL strategy components, respectively.
3. Various artifact types (such as goals, activities, partial strategies, principles and guidelines) are understood as IL strategy components but a foundational meta model or methodology is missing.
4. No clear differentiation between IL strategy and IT strategy.

This paper aims at contributing to closing the first and second gaps. First, we define IL strategy using different perspectives (gap 1, cf. Section 1). Second, we propose a set of IL strategy components based on findings from a survey (gap 2, Sections 3 and 4).

3. IL strategy components

Due to the complexity of company-wide strategy in general – and strategy in multi-national, large companies in particular – the decomposition into components which can be addressed separately is straightforward. Such a fragmentation aims at reducing the complexity on the one hand. On the other hand, the alignment with IT strategy and its components might be facilitated - provided that both IL and IT strategy distinguish the same or at least closely related components. The transparency of IT/IL strategy might also be increased by such decomposition.

We have chosen a supply chain oriented differentiation of IL strategy components. It is adapted from Zarnekow et al.’s “integrated information management” (IIM) approach [31]. The supply chain oriented differentiation of a sourcing component, a production (making) component, and a delivery component seems to match our understanding of IL. The “sourcing” strategy component should not be mixed up with sourcing in the sense of “loading data from source systems”. In the following we present the IIM in more detail and derive a decomposition of the IL strategy.

3.1. Supply chain oriented IL strategy components

The IIM model introduced by [31] describes the central management processes for IT service providers. These management processes are tailored to the production and use of IT products. The IIM model is based on the SCOR (Supply Chain Operations Reference) model. Adapted to the context of information management, two elements in the IT service production supply chain – IT service providers and IT service customers – are distinguished [31]. In companies, business units are typically IT service customers (demand side), while IT units act as IT service providers (supply side). IT units are usually also customers of IT services provided by external, but maybe also internal service providers. According to the underlying SCOR model, three core processes are distinguished: “source”, “make” (referring to the production), and “deliver”.

The source process includes all tasks necessary for managing service supplier relations. The deliver process covers tasks necessary for the management of
customer relationships. All tasks dedicated to the management of the IT service production are comprised in the make process. This process consists of three sub-processes (IT solution) portfolio management, (IT solution) development management, and (IT solution) maintenance management.

The coordination of source, make, and deliver processes is achieved by a govern process. Due to its general character, the govern process does not seem to be specific to IL strategy and is therefore not considered in this paper.

The underlying concept of a supply and service chain for IT products can be easily adapted to the context of IL. The organizational units which are in charge for IL, are usually positioned in the area of tension between IT services that have to be acquired from the outside, the production of own IT services and the interface to the service customers (mainly the business units).

The processes which address primarily the positioning of IL in a supply chain (i.e., the sourcing and delivery core processes and the portfolio sub-process) are quite similar to their counterparts in IT service production. The development and maintenance sub-processes however have to be adapted to IL specifics. We therefore decompose these sub-processes according from a functional perspective. The resulting sub-components (such as system architecture, data architecture, data modeling, etc.) reflect the core activities for implementing and maintaining IL solutions. For development and maintenance, the same functional decomposition should be made since the components should be addressed in a consistent manner in both stages. The proposed framework of analysis for IL strategy is illustrated in Figure 1.

![Figure 1: IL strategy components framework](image)

The adaption and use of the strategy components in the context of IL will be discussed in the following. For getting deeper insights about how such an adaption for supply chain oriented IL strategy components might look like, we interviewed IL experts about their assessment of IIM strategies. For being rather novel to the field of information management, the sourcing, delivery and portfolio strategies are regarded separately in Sections 3.1.1. through 3.1.3., respectively, while the various functional views on development and maintenance strategies are being covered in Section 3.2.

### 3.1.1. Sourcing strategy

The IL sourcing strategy specifies which IL products and services are procured by which organizational unit, from which vendors and on which scale. Not only issues like outsourcing (or even offshoring) are relevant; also the engagement of the organization’s internal IT for specific tasks or processes should be considered. Additionally it has to be defined whether a “make before buy”, a “buy before make”, or some hybrid strategy is to be implemented for certain IL products and services. The specifications made in the sourcing strategy are strongly impacted by organizational constraints (including internal resources) and design options.

Sourcing strategies can be categorized according to dimensions like internal/external, total/selective, single/multiple, offshore/nearshore, components, utility, software, solutions, and processes. Klesse and Winter [14] identify different IL service provider types (depending on the vertical integration of IL and the business integration of the service provider) which imply fundamentally different sourcing strategies.

The sourcing strategy is also influenced by company-wide guidelines regarding the vertical integration of IT and regarding “make vs. buy” principles.

### 3.1.2. Delivery strategy

The IL delivery strategy specifies the interface between service provider and service customer, i.e., all tasks necessary for organizing relationships between service providers and their IL service customers (adapted from [31]). The focus of the delivery process is to transform the IL customer’s requests into internal requirement specifications for IL service development and IL service production. In the context of IL, therefore, especially the way of delivering IL products to business units and the IL product marketing have to be addressed. In detail the following tasks must be carried out (adapted from [31]):

- Strategic positioning in the market and competitive ranking: Adapted to IL, this means to decide if IL products/services will be offered on the external market as well (e.g., as reports). In addition, the financial positioning of the IL service
Strategic alignment of the offering portfolio: The IL product/service portfolio should be in line with customer demands. To reach this goal, customer requirements and achievable customer benefits must be specified. As a consequence, the IL service provider relies on an active communication with business units (i.e., service customers). To enable deep understanding of customer demands and benefits, the IL service provider team must include sufficient business knowledge.

Pricing Strategy: Questions dealing with the price positioning, price distinction, pricing logic, and product/service bundling are to be addressed depending on available budgets and the charging models (budgets, virtual money, real money) effective in the respective company.

Communication strategy: The communication strategy establishes the IL service provider’s communication goals and target groups. The vision of IL to promote cross-unit thinking and data exchange aims for a similar target, i.e., to raise awareness of IL products/services in the company by means of suitable communications and marketing.

Distribution strategy: It has to be specified how and through what channels IL products/services are made available to customers. This includes the fundamental decision whether IL products/services are available to the customer in push or pull mode. The pull mode attains increasing attention by business units in order to access analytical information autonomously and in time (“self-service” instead of IT unit reliance).

3.1.3. Portfolio strategy. The IL portfolio strategy defines the guidelines for developing the portfolio of IL products and services, i.e., which products and services are offered (adapted from [31]). The corresponding strategy process addresses the following tasks:

- Identification of product/service segments: The portfolio strategy must identify sustainable high-yield product/service segments. In particular, the requirements derived from the business strategy should be taken into account in order to match IL product/service supply and demand at the best.
- Evaluation and positioning of product/service segments: Usually portfolio analysis methods are deployed here. Together with possible generic strategies, they might be transferred into the IL field. On the one hand it is an option to position the IL service provider as a specialized unit for specific IL products/services. Another option is to act as a service integrator for the entire range of relevant IL applications and to act as the single contact for the business regarding all IL related issues (“one stop” strategy).

Such a way of thinking – to provide products and services “proactively” and without explicitly articulated customer need – might be innovative and unfamiliar for the IL service provider, since traditional BI/DWH projects are mostly reactive and driven by customer requirements.

3.2 Development and maintenance IL strategy components

As mentioned above we have decomposed the development and maintenance from a functional perspective. Since the implementation of IL can be regarded as a specific data management project, we adapted the DAMA-DMBOK Functional Framework [20] for that purpose. DAMA-DMBOK distinguishes ten data management functions which can also be observed in IL practice. In contrast to the supply chain oriented strategy components explained above, there are already many contributions which address IL (DWH/BI) specific development and maintenance strategies (e.g., [8, 26]). We therefore do not describe such functional strategies here.

4. Analysis

Based on the IL strategy components framework presented in Section 3, a survey was conducted in order to analyze the current realization status of IL strategy and the relevance of the proposed IL strategy components.

The data for the analysis was collected by means of a questionnaire distributed at an IL/DWH conference held in Switzerland in February 2008. The event was attended mainly by practitioners. These practitioners were specialists and executives with primarily large and medium-sized companies in Switzerland and Germany. Prior to the conference, the questionnaire was pre-tested by experts and revised with respect to its comprehensibility. There was a dedicated time slot during the event to fill the questionnaire. The objectives, structure, and terminology used in the written survey were explained to the attendees.
4.1. Description of the data set

The conference was attended by 226 people. Consultants and software vendors were asked to fill out the questionnaire from the viewpoint of a client of their choice. A total of 160 questionnaires were returned. If a data set was incomplete or apparently inconsistent, the questionnaire was discarded. One hundred fifty one duly completed questionnaires were useful for the analysis, resulting in an overall return rate of about 66.8%. The data set is considered to constitute an adequate basis for an explorative analysis.

The survey was aimed at clarifying (amongst others) the following questions:

- What is the current realization status of IL strategy in organizations? Are there significant differences in the realization state depending on organization parameters like size, geographic focus, and industry?
- What organizational structures are associated with IL strategy?
- Which components are IL strategies comprised of?

4.2. IL strategy implementation vs. company size

On the one hand, only 9.3% of all companies have already implemented an IL strategy. On the other hand, the number of companies which are not even planning to implement an IL strategy is also very low (9.9%). Consequently most companies are currently planning (37.1%) or implementing (43.7%) an IL strategy.

Table 1: IL strategy implementation vs. company size

<table>
<thead>
<tr>
<th>Company size (number of employees)</th>
<th>Implementation level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-49 (n=14)</td>
<td>Not planned (9.9%)</td>
</tr>
<tr>
<td>50-199 (n=11)</td>
<td>Planning stages (37.1%)</td>
</tr>
<tr>
<td>200-999 (n=22)</td>
<td>Implementation stages (43.7%)</td>
</tr>
<tr>
<td>1000-4999 (n=33)</td>
<td>IL strategy implemented (9.3%)</td>
</tr>
<tr>
<td>&gt;5000 (n=71)</td>
<td>100.0% 0.0% 11.6%</td>
</tr>
</tbody>
</table>

As Tables 1 and 2 illustrate, the IL strategy implementation status varies with an organization’s size (expressed by number of employees and by geographic focus). Each column describes the distribution among the different realization stages for the corresponding company size (i.e., sum of each column is 100%). The results confirm the obvious assumption that the larger a company is, the more advanced the implementation of IL strategy is. While the majority of large companies (more than 5000 employees) is currently implementing IL strategy (54.9%), all other companies are predominantly in planning stages (between 40.9% and 48.5% depending on the company size) (cf. Table 1).

Table 2: IL strategy implementation vs. geographic focus

<table>
<thead>
<tr>
<th>Geographic focus</th>
<th>Implementation level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional (n=1)</td>
<td>Not planned (9.9%)</td>
</tr>
<tr>
<td>National (n=36)</td>
<td>Planning stages (37.1%)</td>
</tr>
<tr>
<td>International (n=112)</td>
<td>Implementation stages (43.7%)</td>
</tr>
</tbody>
</table>

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<td>Implementation stages (43.7%)</td>
</tr>
</tbody>
</table>

Table 2 exhibits the IL implementation status depending on the geographic focus (regional, national, or international). Due to the fact that there was only one organization acting regionally (n=1), the finding that 100% of regional firms have already implemented IL strategy is of limited significance. The results however show that more international companies have realized IL strategy compared to the average of all companies.

We also analyzed the potential correlation between industry and IL strategy implementation level. The IL strategy implementation level however seems to be industry independent.

4.3. IL strategy implementation vs. IL organization

As illustrated in Table 3, the IL strategy implementation status and the organizational form of IL are strongly correlated. For each realization level, Table 3 exhibits how many companies (in percent) have realized an organizational form according to the columns, respectively. Planning or implementing an IL strategy coincides with the establishment of one or several IL competence centers (CCs). While one or more IL CCs are established only in 26.6% of the companies which do not plan an IL strategy, the majority of the remaining companies have already implemented IL CCs (69.7% / 83.5% / 78.6%, depending on the implementation level).

Obviously there is a trend to establish several IL CCs: Companies which are currently planning or implementing an IL strategy exhibit a higher percentage (42.9% and 47.0%) of “several CCs” in contrast to companies which have already implemented an IL strategy (35.7%). The survey does not allow any conclusions about the causality between CCs and IL.
strategy. Some organizations have established CCs first and created an IL strategy later, and vice versa.

Table 3: IL strategy implementation vs. IL organization

<table>
<thead>
<tr>
<th>Implementation level</th>
<th>One centralized CC (n=47)</th>
<th>Several CCs (n=62)</th>
<th>No CC (n=42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not planned (9.8%)</td>
<td>13.3%</td>
<td>13.3%</td>
<td>73.3%</td>
</tr>
<tr>
<td>Planning stages (37.9%)</td>
<td>26.8%</td>
<td>42.9%</td>
<td>40.4%</td>
</tr>
<tr>
<td>Implementation stages (43.1%)</td>
<td>36.5%</td>
<td>47.0%</td>
<td>16.7%</td>
</tr>
<tr>
<td>IL strategy implemented (9.2%)</td>
<td>42.9%</td>
<td>35.7%</td>
<td>21.4%</td>
</tr>
<tr>
<td>All (Average)</td>
<td>31.1%</td>
<td>41.1%</td>
<td>27.8%</td>
</tr>
</tbody>
</table>

The results of the survey illustrate that the establishment of an IL strategy comes along with changing governance structures (cf. Table 4). While companies without plans for an IL strategy mainly follow governance structures according to the business line organization (46.7%), the majority of companies in planning or implementation stages with implemented IL strategy have established governance structures according to business processes (37.5% / 51.5% / 50.0%).

Table 4: IL strategy implementation vs. governance structures

<table>
<thead>
<tr>
<th>Implementation level</th>
<th>...business lines (n=58)</th>
<th>...business processes (n=63)</th>
<th>Others (n=14)</th>
<th>Not specified (n=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not planned (9.8%)</td>
<td>46.7%</td>
<td>6.7%</td>
<td>33.3%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Planning stages (37.9%)</td>
<td>39.3%</td>
<td>37.5%</td>
<td>7.1%</td>
<td>19.6%</td>
</tr>
<tr>
<td>Implementation stages (43.1%)</td>
<td>34.8%</td>
<td>51.5%</td>
<td>6.1%</td>
<td>7.6%</td>
</tr>
<tr>
<td>IL strategy implemented (9.2%)</td>
<td>42.9%</td>
<td>50.0%</td>
<td>0%</td>
<td>7.1%</td>
</tr>
<tr>
<td>All (Average)</td>
<td>38.4%</td>
<td>41.7%</td>
<td>9.3%</td>
<td>10.6%</td>
</tr>
</tbody>
</table>

4.4. Implementation of supply chain oriented IL strategy components

Referring to the IL strategy components framework proposed in Section 3, we also examined the relevance of the various components.

Tables 5 and 6 list the IL strategy components which have been mentioned by the respondents. For each implementation level, Tables 5 and 6 exhibit the percentage of companies which address the respective strategy component. E.g., 30.3% of the companies which are currently implementing an IL strategy address the sourcing strategy component within their IL strategy (cf. Table 5).

As depicted in Table 5, the sourcing, portfolio, and delivery strategies do not get much attention in organizations so far. In average, roughly one third of the organizations (30.4% for source strategy, 34.8% for portfolio strategy, 28.3% for deliver strategy) is taking into account these strategy components.

Table 5: Implementation of supply chain oriented IL strategy components

<table>
<thead>
<tr>
<th>Implementation level</th>
<th>Sourcing</th>
<th>Portfolio</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning stages (37.9%)</td>
<td>30.4%</td>
<td>44.6%</td>
<td>41.1%</td>
</tr>
<tr>
<td>Implementation stages (43.1%)</td>
<td>30.3%</td>
<td>39.4%</td>
<td>19.7%</td>
</tr>
<tr>
<td>IL strategy implemented (9.2%)</td>
<td>28.6%</td>
<td>35.7%</td>
<td>7.1%</td>
</tr>
<tr>
<td>All (Average)</td>
<td>30.1%</td>
<td>41.2%</td>
<td>27.2%</td>
</tr>
</tbody>
</table>

In detail, the sourcing strategy gets more or less the same attention across all organizations. Consequently there seems to be no indication that the relevance of the sourcing strategy is currently changing or will do so in future. Some differences depending on the realization status of IL strategy, however can be stated for the portfolio strategy and the delivery strategy.

While only 7.1% of companies which have already implemented an IL strategy, explicitly address the delivery strategy, this percentage is increasing to 41.1% in organizations which currently are in the IL strategy planning stages. One possible explanation is an increasing attention recently paid to that strategy component.

The relevance of the portfolio strategy also varies with the IL strategy implementation status. As for the delivery strategy organizations in planning stages address the portfolio strategy with higher than average frequency.

4.5. Implementation of functionally oriented IL strategy components

It is notable that IL solution development and maintenance strategy components (and the according functional views) gain considerably more attention than the sourcing, portfolio and delivery IL strategy components (cf. Table 6). This observation is valid for all IL strategy implementation stages. The percentage of companies with such strategy components ranges from 35.5% for change management to 66.2% for system architecture (average percentages, respectively).
### Table 6: Implementation of development and maintenance IL strategy components

<table>
<thead>
<tr>
<th>Implementation level</th>
<th>System architecture</th>
<th>Data architecture</th>
<th>Data modeling</th>
<th>Hardware/Software</th>
<th>Data quality management</th>
<th>Meta data management</th>
<th>Master data management</th>
<th>Security/privacy</th>
<th>Project management/Business requirements mgmt.</th>
<th>Change management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning stages (37.9%)</td>
<td>65.5%</td>
<td>48.3%</td>
<td>43.1%</td>
<td>43.1%</td>
<td>55.2%</td>
<td>36.2%</td>
<td>39.7%</td>
<td>46.6%</td>
<td>32.8%</td>
<td>31.0%</td>
</tr>
<tr>
<td>Implementation stages (43.1%)</td>
<td>66.7%</td>
<td>59.1%</td>
<td>51.5%</td>
<td>45.5%</td>
<td>48.5%</td>
<td>42.4%</td>
<td>57.6%</td>
<td>33.3%</td>
<td>48.5%</td>
<td>37.9%</td>
</tr>
<tr>
<td>IL strategy implemented (9.2%)</td>
<td>57.1%</td>
<td>71.4%</td>
<td>57.1%</td>
<td>57.1%</td>
<td>71.4%</td>
<td>35.7%</td>
<td>42.9%</td>
<td>57.1%</td>
<td>42.9%</td>
<td>42.9%</td>
</tr>
<tr>
<td>All (Average)</td>
<td>66.2%</td>
<td>56.5%</td>
<td>49.3%</td>
<td>46.3%</td>
<td>54.4%</td>
<td>39.7%</td>
<td>49.3%</td>
<td>41.9%</td>
<td>41.9%</td>
<td>36.0%</td>
</tr>
</tbody>
</table>

In particular, the system architecture strategy component (66.2%), the data architecture strategy component (56.6%), and the data quality management strategy component (54.4%) gain most attention. The high relevance of the system architecture strategy component might be caused by the dependencies to the overall IT strategy, which in most cases addresses system architecture issues.

The significance of data quality management (DQM) is confirmed in other surveys, too (e.g., [6]). Remarkably, DQM is more often addressed in companies which have already implemented an IL strategy (71.4%) than in companies in the planning stages (55.2%). Therefore, the relevance of DQM increases over time— which corresponds to observations in practice that quality initiatives are often not started before diverse problems arise (either technically or on business side) due to underlying quality issues.

Meta data management, on the other hand, receives little attraction (35.7% up to 42.4%) depending on the IL strategy implementation status. This result is also confirmed by other surveys (like in [19]). Although meta data management is a popular issue in organizations, it seems difficult to address this issue in a strategic and comprehensive way.

Given the importance of these issues in the CIO literature (e.g., [17]), the low values for the change management strategy component (31.0% up to 42.9%) and for the project and requirements management strategy component (32.8% up to 48.5%) are surprising and should be investigated in future research. Finally, organizations often do not care too much about data security issues - an according strategy component is addressed in comparably few organizations (33.3% up to 57.1%).

Focusing on companies which have already implemented an IL strategy, it can be stated that these companies address the supply chain oriented IL strategy components (sourcing, portfolio, and delivery) to an average extent or to an extent slightly below average. However, regarding strategy components of IL solution development and maintenance, these companies exhibit in most cases higher percentages than average (except system architecture, meta and master data management).

### 5. Findings

The analysis of the state of the art of IL strategy shows that internationally oriented, large companies are most advanced regardless of the type of industry. As a consequence, practices of such companies could serve as a reference for IL strategy.

Regarding the organizational form, IL strategy implementation status corresponds with the establishment of competence centers (the causality might go either way).

The survey confirms that the IIM components (including the additional functionally oriented components) are relevant for practitioners. Although respondents had a chance to propose additional components in a free text field, none were proposed.

A reason for the low importance of the “sourcing” component may be that IL in the examined, mostly large and international, companies is still mostly implemented without the support of outsourcing providers.

Regarding the functionally oriented subcomponents of the “IL solution development and maintenance” strategy component, systems and data architecture and data quality management are regarded most important by far.

Our survey shows (cf. Table 6) that system architecture, data architecture, data modeling, data quality management, master data management and hardware/software receive high attention, while change management, meta data management, security/privacy, project management and business requirements management receive significantly less...
attention. While security/privacy and meta data management belong to the traditionally more technical research areas in DWH/BI so that a sufficient amount of knowledge should be available for transfer into practice, change management as well as project management and business requirements management need to be supported better by managerially oriented IL research.

Regarding change management, “business-to-IT” approaches to situational instrument configuration for change projects [e.g. 2] could be a starting point. For adapting such approaches to IL, in particular the multi-project, infrastructure character of IL has to be taken into account. While common change projects might be regarded one-by-one, IL change projects are closely linked to IL infrastructure. An IL change management strategy component has to consider these interdependencies.

Regarding project management and business requirements management, a plethora of findings and best practices could be drawn from the general IT management and system engineering areas. For adapting such approaches to IL, the “information supply” potential character has to be taken into account. Available data is a potential that many business units might not be aware of. Supply is, unlike in traditional IT application areas, not only driven by demand, but also driven by available support potentials. An IL project management/business requirements management strategy sub-component has to consider this bi-directional character.

6. Summary and outlook

Although a wide range of publications about IT strategy in general, originating from academics as well as from practitioners, is available, IL strategy (including DWH/BI strategy) is rarely addressed. If IL strategies are addressed at all, either actual artifacts/documents are proposed without an integrating meta model/methodology, or the strategy making process is described without proposing specific and consistent result templates/structures.

Since it consumes a significant amount of resources and may constitute significant potentials for business, IL needs strategy. IL strategy must not be limited to hardware/software selection and architectural considerations, but should address the entire business scope of sourcing services, integrating acquired and self-made services into customer-oriented IL solutions, and delivering such solutions to create customer value.

Our survey of the state of IL strategy in practice reveals that IL sourcing, IL delivery and IL portfolio strategies are regarded as important strategy compo-

nents. The larger companies are, the more international their focus is, and the more their IL is organized according to the CC model, the more components of a supply-chain oriented explicit IL strategy they are likely to have deployed.

The IIM model provides a suitable conceptual foundation for structuring such strategy components, and also provides best practices from IT management which often can be easily adapted to IL. Regarding IL product/service development and maintenance, certain functional oriented strategy sub-components are differentiated in our framework. These strategy components are adapted from an established data management functional framework in order to reflect IL specifics. While traditional, more technically oriented sub-components such as system and data architecture are covered in most companies, business oriented components like change management and project/business requirements management are covered less frequently. Additional research is necessary to develop appropriate solution components based on existing fragments and experiences.

Based on a more complete comprehension of IL strategy and its components, the strategy development and update process needs to be addressed in future research as well. Instead of developing and updating business strategies, IT strategies and IL strategies in independent processes, dependencies and cycles need to be addressed. A comprehensive understanding of IL strategy and respective processes may also serve as a foundation for establishing maturity models, reference models and best practices.

References


