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# The ICT convergence discourse in the information systems literature - A second-order observation

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# THE BUSINESS INTELLIGENCE COMPETENCE CENTRE AS AN INTERFACE BETWEEN IT AND USER DEPARTMENTS IN MAINTENANCE AND RELEASE DEVELOPMENT

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## Abstract

*The growing relevance, scale, and complexity of Business Intelligence (BI) entails the need to find agile and efficient solutions for the coordination of maintenance and release processes – under consideration of the heterogeneity of the involved units on the IT and the business side. The finance industry with its mature BI infrastructures and its highly turbulent business environment is a forerunner for these developments. Based on a survey among BI users in the finance sector, relevant problem areas in the BI service provision are identified and structured. A series of qualitative interviews among banks and insurance companies is used to gain further insights into approaches for dealing with the related issues. The studies uncover several advantages of a central "BI Competency Centre" (BICC) as well as levers for effectively structuring the interfaces between BICC, IT, and user interface.*

*Keywords: Business Intelligence, Empirical Study, Governance, Service Orientation*

# 1 RELEVANCE

In recent years, Data Warehouse (DWH) based infrastructures for management support have grown tremendously in relevance, scope, and scale. The integrated approaches they are built upon are usually referred to as *Business Intelligence* (BI). In more and more cases, BI reaches out to all business functions and managerial levels and is turning into an integral segment of the business (Baars and Kemper 2008). On the one hand, these developments open up significant business potential. On the other hand, however, they come at the price of increasing costs and a constantly rising technical and organizational complexity. These challenges need careful management that includes a thorough reconciliation of technical and application oriented requirements (Hughes 2008, Miller 2006). The issues are more severe in the domain of BI than in the operational IT because BI applications are required to embody ever changing business semantics and versatile analytical needs (Finger 2008, Moss 2006). Many organizations have reacted by establishing specialized units for running and supporting BI solutions – central BI "centres of competence" (BICCs). In general, BICCs act as linking pins between the user side and the infrastructure provision (Miller 2006, Unger & Kemper & Russland 2008). However, it is yet unclear under which conditions a central BICC is to be preferred over a decentralized approach with BI units spread across different user departments, how to distribute competencies among the user, IT, and the BICC side, and how the respective interfaces need to be crafted under consideration of the constant stream of system modifications and re-designs (Eckerson 2006, Geiger & Hill & Ton 2007, Strange & Hostmann 2003).

When tackling this issue, the literature on IS (de)centralization provides a rich body of rationales for deriving the spectrum of basic organizational options. However, the respective sources are not geared at the particular characteristics of the BI domain and are thus hardly applicable without further modifications (Boddy 2005, Gordon & Gordon 2004, Haag 2003, Inmon 2005, Inmon 2006, Kimball 2002, Laudon & Laudon 2005). It is yet unclear what the core priorities are in the BI domain with respect to the involved users, the IT and the BI units (Kleese & Winter 2007). There are also several relevant BI characteristics to be considered, e.g. the need to built data structures that feed both unit specific analyses and cross-departmental reporting applications, or the blurry distinction between "routine" changes (e.g. modifications of established data sets, often in form of so called "data cubes") and more far reaching requirements (e.g. in case such modifications involve the integration of new source systems or require a higher load frequency).

This contribution deals with these issues by deriving a service-based concept for the distribution of tasks within the systems maintenance and the release development phases of BI solutions. It gains insights from application oriented research conducted with insurance companies and banks. Financial organizations have been pioneers in the realm of BI for a long time and thus come both with a rich experience base and comparatively mature solutions (Kleese & Winter 2007). Furthermore, external pressures are especially salient in this industry due to the volatility of the business environment. As will be discussed in the final section, most of the core conclusions are expected to be invariant to industry peculiarities because the underlying qualitative rationales are not affected.

Due to the novelty of the phenomenon in discussion, the research is of an explorative nature (Schwab 2005, Yin 2009). It encompasses an explorative quantitative study on the prioritization of BI maintenance and release development processes as well as a series of interviews in the finance industry that provides insights into the options, possibilities, and challenges of their organization. The results motivate the draft of a concept that aims at overcoming remaining shortcomings of a BICC approach by distinguishing three classes of services.

# 2 CONCEPTUALIZATION

The presented results focus on the financial sector. The *financial sector* is commonly understood to encompass all those organizations that are primarily dealing with the allocation, management, acquisition and investment of monetary resources and thus with all kinds of matters related to money and the financial markets (Howells 2007). Among others, companies in the finance sector include full service banks, insurance companies and investment trusts (Moormann 2007). The relevance of BI in

these organizations is driven not only by the fact that information is usually a core product but also by a number of pressures both from the regulatory and from the market side. Recently, developments like the subprime crises (Blundell-Wignall 2008) or the growing number of natural disasters are additionally fostering the need for an agile reporting and analysis infrastructure that provides a comprehensive overview on internal and external developments – based on integrated data pools. (Moormann 2000). It does not come as a surprise that finance sector organizations, and banks and insurance companies in particular, are among the most avid users of advanced BI infrastructures. The finance sector can thus be treated as an epitome for current developments in the BI domain (Kimball 2002, Moormann 2007).

This contribution deals with the organizational interfaces between the participants involved in the maintenance and release development for BI solutions. Here "*maintenance and release development*" is understood to encompass all types of alterations on an existing solution (IEEE 2008). *Maintenance* is used for minor changes that can be dealt with in near-time within the established reporting structures. *Release development* adheres to the definition of a project. In the light of the presented aims, the scope of this research is confined to changes that are involving the user department and that lead to modifications relevant for and perceivable from the user side. Among other activities, this excludes backend optimizations, the versioning of data management tools or redesigns of transformation logic that is not visible from the frontend (Baars & Horakh & Kemper 2007).

The studies that led to this contribution are embedded in a larger research context that tackles BI organization and its IT support (Baars & Horakh & Kemper 2007, Horakh & Baars & Kemper 2008, Unger & Kemper & Russland 2008). The fundamental research objective was to identify viable options for the design of the interface between users, the BI units and/or the IT department in order to effectively cope with perceived shortcomings or to pursue desired enhancements. Due to the dearth of research into the subject, it was tackled according the paradigms of exploratory research (Schwab 2005) and addressed with two complementary studies that have been conducted in the first half of the year 2008: A descriptive, quantitative survey to get a first overview on fundamental priorities and a series of qualitative interviews that was geared at a more in-depth understanding of the subject matter.

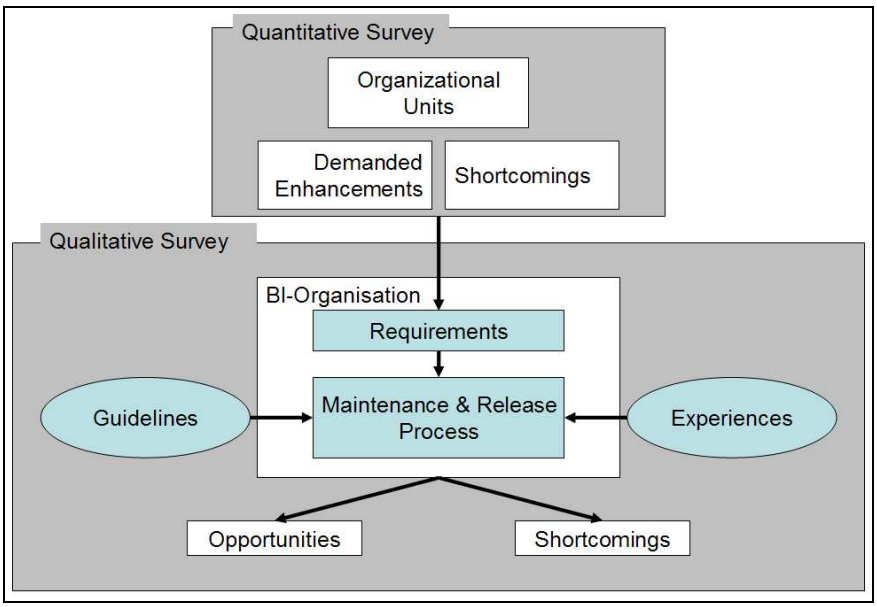


*Figure 1. Conceptual framework*

For both studies it was deemed necessary that the results would reflect the views of all involved *organizational units* (IT unit, specialized BI unit, user department) and to balance out their priorities. In the past, a few empirical studies and papers already tackled the subject of priorities and challenges for BI and they provide first insights into this issue (Computerworld 2006, Geiger & Hill & Ton 2007, Vierkorn & Friedrich 2008). Unfortunately, they are neither restricted to the finance sector nor aligned with the types of organizational units under discussion. This leads to the need for a genuine empirical overview that is primarily designed to compile and compare priority lists – regarding existing

*shortcomings* in the BI area on the one hand and *demanded enhancements* on the other. The results are used to structure and guide the further exploration which is achieved by the interviews.

A pivotal factor that needs to be introduced for a valid interpretation of the interviews is the *type of requirement* that is dealt with in a particular system change. It was expected that different types of requirements would lead to different ways of dealing with them and gaining an understanding of those relations was a major part of the study. The second group of insights deemed to be relevant pertained to *rules and regulations* that had been imposed and their respective relevance. To grasp relevant causal and temporal relationships, questions on the concrete *experiences behind the chosen design options* were introduced. All this should condensate in the actual design of *processes and projects for maintenance and release development*. The resulting conceptual framework is depicted in Figure 1.

# 3 PRIORITIZATION – QUANTITATIVE EXPLORATION

The questions on the prioritization were covered as part of a wider online survey. As depicted in the conceptual framework, they encompassed an investigation of the type of BI organization, and of shortcomings and demands for enhancements regarding BI service provision. From about 11,000 addressees who were contacted via personalized emails, 1,519 followed the link to the survey web page. A total of 97 persons from the finance sector filled out all questions relevant for the discussed research. The sample was gathered from a list of experienced BI practitioners from IT departments (19 respondents), dedicated BI units (19 respondents), and BI user departments (59 respondents). Due to the explorative nature of the study, the results were primarily approached with descriptive statistics and used as a means for hypothesis generation rather than hypothesis testing (Schwab 2005). All results where checked with Chi-square tests for significance – based on a significance level of 10%. Due to the qualitative design and the sample size, differences in the results will also be discussed when they are not statistically significant but nevertheless lead to insights into potential differences among the groups. The *shortcomings* and *demanded enhancements* that were identified to be most relevant with respect to the overall study will be discussed in the following two sub-sections.

## 3.1 Shortcomings

Two questions addressed the *shortcoming* side of the framework: The participants were asked to select the three most pressing issues in for BI maintenance and release development respectively. The lists of 9 choices each were compiled based on BI literature and prior field experience. The differentiation of the results according to the type of organizational unit exposed diverging views on the shortcomings in **BI maintenance.**

Striking is the difference in the evaluation of *data quality* which was – in line with results from similar studies – the issue that heads the overall list of chosen shortcomings: Only a minority (16%) of the respondents from IT units considered data quality to be among the top-three relevant issues, while participants from user departments chose this item in almost half of the cases (46%). In contrast, the number for the BI units topped 60%. When evaluated with a Chi-square test, these differences also prove to be significant with respect to the chosen significance level (p=0.077). This result can be interpreted as an indicator for the distance of the IT staff from the use context on the one hand and the underestimation of data quality related efforts by the users on the other. In a BI unit, however, data quality related issues converge and culminate. A possible similar discrepancy might exist regarding the *diversity of the analysis systems.* This item was declared slightly more often to be a problem in the business departments than in the BI and IT units. A reason could be that tool integration is primarily driven by handling the frontend.

Interestingly, about a third of the respondents in the BI and business units selected *missing functionality* as a core issue while the result for IT is zero (significant with p=0.054). Again, this reveals a lack of insight of IT into the application side.

The IT seems to be a little more conscious of an *insufficient coverage of informational needs* (42%), which a slightly lower percentage of users (32%) and only a minority of the BI unit respondents (12%) considered to be an issue. A possible explanation could be that IT has an overview on all potential data sources while the user department is not yet fully aware of those possibilities. Being situated between

IT and user department, the BI unit has the best vantage point over the actual information supply and demand. A different result comes up for the *lack of integration into the IT-backend* which neither for the IT (16%) nor the user department (24%) ranks among the most frequently selected issues while still 32% of the BI unit saw this as a challenge. Although the results are not statistically conclusive yet, they again might hint at the tendency of the IT and business departments to underrate the conceptual challenges that go along with the integration of heterogeneous business semantics.

Regarding the **release development** for BI applications, 61% of the participants from the user side complained about an *unsatisfactory time budget [of the BI providers] to support the user departments*. In contrast, 28% of the IT and BI unit participants considered this to be of particular relevance (significant with p=0.067). This can be interpreted as another indicator for diverging priorities: The providers act according to a defined prioritization and under consideration of available resources. As lower prioritized requests have to wait, business departments are left unsatisfied. This goes in line with the occurrence of *development back logs* which are considered critical by all three groups with item selection rates that vary between 30% and 40%.

Not surprisingly, only a small group (16%) of participants from IT considered *lack of maintenance and release knowledge in IT* to be a problem. When contrasting this with the values for the user departments and for the BI units (together 36%), one can suspect that the IT might indeed overrate its abilities. Similar, about 20% of the BI and user units complained about a *lack of models for agile development*, while the number is a little lower for the IT side with 16%. Regarding the item *lack of management support,* the results are consistent across all groups (about 30%).

It is obvious that the views of the participants vary – and in some cases (data quality, functionality, time budget to support user departments) even significantly. Several answers indicate that the full impact of BI is most comprehensively grasped in the BI unit. This can not only be explained by the hinge function of the BI unit between the user and the IT side but also because of its degree of specialization. Ideally, the different priorities that surface in the answers are reconciled by flexible organizational concepts that – where possible – leverage the different awareness of issues among the groups.

### 3.2 Demanded enhancements

The second aspect of interest pertained to opportunities for enhancing the value of BI. The questionnaire covered this in two questions with 9 choices each.

With respect to the **maintenance** side, a functional requirement holds a top rank: 63% of the dedicated BI units demanded *more degrees of freedom in the data analysis applications*. This wish was not shared uniformly: On the user side, only 47% selected this item (and only 21% in IT). A possible interpretation is that the BI side rated this issue from the information production perspective (generation of reports) while the answers of the users reflect a more passive, consumption oriented view. This would also explain why this result is not corroborated when it comes to the question of *data mining*: About half of the users (47%) demanded such systems but only 21% of the BI units and only 11% of the IT. On the content side, there was a perceived need for *analyses across business function* that was seen by both the BI and the user side (each about 40%) – but not in IT where only 16% selected this item. Obviously, BI users see demand for more in-depth and more far-reaching insights – although not necessary in tandem with more degrees of freedom or even a higher number of tools.

Shared wishes are a *higher degree of integration of external data* (around 35%) and *portals as single point of contact* (around 30%). Portals have a slightly higher importance for the BI while data integration is more important for the user departments.

With respect to organizational measures, a better *data quality management* dominates the answers of all three types of organizations. This result is consistent with the shortcoming side.

Regarding **release development**, the item *business departments should be given more room to implement their own solutions* is of special importance. This option was demanded by 49% of the participants from user side, and surprisingly still by about 25% of both the BI and the IT participants (a significant difference with p=0,050). Obviously, despite all proclaimed trends to concentrate IT

development, there is a remaining need for decentralized activities that is especially felt in the user departments. Mirroring this against the issues of backlog and unsatisfactory time budgets, a potential to find a shared solution to issues of fast and flexible development is discernable. It is equally noteworthy that *rules between business department and IT* is not once selected by respondents from IT units (16%) while user participants chose this in 44% of the cases (significant with p = 0,053).

On the structural side, an *integration of a BICC for future projects* was demanded by about 40% of the BI units and by slightly fewer participants from user departments. The fact that a BI unit has been established does not necessarily mean that it also takes over the role of a BICC and is tightly integrated into the company. The answers from IT only reached a mark of about 20% - a result that might again signal an underrating of problems by the IT. A similar situation can be found when it comes to the wish for *faster implementation* which is conceived to be a problem by 35% of the participants from business and BI units but only for 10% of the IT participants (significant with p=0.075).

*Service orientation* and *better data loading processes* were of some relevance, although the numbers are not particularly illuminating. Yet, the service orientation (in the sense of delineating, providing, and managing customer-oriented services in the sense of IT service management) is seen as a building block for the implementation of the concept that is derived here.

In conclusion, the results provide some ideas for designing the interface between the units: They indicate that there is a need for a differentiated, carefully governed division of labour that allows bringing together seemingly conflicting requirements regarding the management of data quality, fast reaction times, more responsibility for the user departments, and providing cross-departmental solutions. The BICC stands at the core of this.

# 4 DESIGN OPTIONS – QUALITATIVE STUDY

For the qualitative case interviews (Yin 2009), a total of ten companies from the finance sector with mature BI infrastructures were selected. Their business model, type of BI organization, number of users, and BI experience (measured in years of usage) is presented in Table 1. In each case, interview partners from dedicated BI units were selected – to capture the more holistic view of BI units that became visible in the survey. This encompasses both centralized and enterprise-wide BICCs (4 cases) as well as specialized BI units that report to a user department and are part of a decentralized BI approach (6 cases). Each of the interviews lasted between 60 and 110 minutes. The interview questionnaire contained qualitative, open questions that were structured around the conceptual framework that has been introduced in section 2.

| | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 | Case 6 | Case 7 | Case 8 | Case 9 | Case 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Business model** | International group of Banks | German group of Banks | Automotive Bank | Insurance company | Global Bank | Global Bank | Full Service Bank | Insurance company | Credit and mortage bank | Global Bank |
| **Type of BI-Organization** | Centralised BICC | Centralised BICC | Centralised BICC | Centralised BICC | Decentralised BI | Decentralised BI | Decentralised BI | Decentralised BI | Decentralised BI | Decentralised BI |
| **Number of users** | 900 | 1000 | 12 | 1700 | 500 | 3000 | 2500 | 700 | 30 | 200 |
| **BI experience (in years)** | > 25 years | 9 years | 6 years | > 13 years | 6 years | 6 years | 10 years | 7 years | > 10 yers | > 10 years |

*Table 1. Characteristics of examined cases*

As illustrated in Table 2 and Table 3, the results were aligned with the identified challenges and opportunities for enhancements. Marked with a "-" are cases in which the identified challenges still remain unsolved or where the opportunities are not yet grasped while the "+" indicates the availability of an approach to deal with the various subjects. It is noteworthy that most of the companies with a centralised BICC (cases 1-4) have found at least partial solutions to most of the problems. In fact, it can be derived from the interviews that centralised and decentralised BI departments follow different strategic trajectories: The centralised BI departments show a strong focus on questions of efficiency while their decentralised counter-parts are primarily occupied with the fulfilment of the business departments' requests. Units that report to user departments naturally have weak points when it comes to the consolidation of the *diversity of analysis systems* or tackling a *lack of integration into the IT-*

*backend*. Moreover, centralised BI departments have also come up with ways to turn the discussed demands into reality. In the following sections, the different approaches are discussed in further detail.

| | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 | Case 6 | Case 7 | Case 8 | Case 9 | Case 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Shortcomings of running the system** | | | | | | | | | | |
| Diversity of analysis systems | + | + | + | 0 | - | - | - | + | - | 0 |
| Lack of integration of BI-solutions into the IT-backend | + | + | + | 0 | + | - | - | - | - | - |
| **Shortcomings of developing the system** | | | | | | | | | | |
| Unsatisfactory time budget of the BI providers to support the user department | + | + | + | + | + | 0 | + | - | + | - |
| Development backlogs | + | + | + | - | + | 0 | + | 0 | + | - |
| Lack of maintenance and release knowledge in IT | + | + | + | 0 | + | - | + | - | - | - |
| No models for agile development | - | - | - | - | - | - | - | - | + | - |
| **Type of BI-organization** | central | | | | decentral | | | | | |
| Legend: - unsolved, 0 not relevant, + approach available | | | | | | | | | | |

*Table 2. Challenges of BI and the availability of solutions in the cases*

| | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 | Case 6 | Case 7 | Case 8 | Case 9 | Case 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Demands for running the system** | | | | | | | | | | |
| Options for business departments to implement their own solutions | - | + | - | - | + | + | - | - | + | + |
| **Demands for developing the system** | | | | | | | | | | |
| Better processes for data loading | + | + | + | + | - | - | 0 | - | - | - |
| Integration of a BICC | + | + | + | + | + | 0 | 0 | 0 | 0 | - |
| Faster implementation | - | + | - | - | - | - | - | + | + | - |
| Service orientation | + | + | - | - | 0 | 0 | - | 0 | + | - |
| Rules between user department and IT | + | + | + | + | + | -/0 | + | - | - | - |
| Advancement of data quality management | + | + | - | + | - | - | + | 0 | - | - |
| **Type of BI-organization** | central | | | | decentral | | | | | |
| Legend: - unsolved, 0 not relevant, + approach available | | | | | | | | | | |

*Table 3. Demands for enhancement and the availability of solutions in the cases*

## 4.1 Challenges and approaches to deal with them

*Diversity of analysis systems*

In the study, an unhealthy diversity of analysis systems only occurred in companies with a decentralised BI organization. The central BICCs were able to impose regulations that constricted the range of tools to a defined set. Furthermore, they guided or supported the user departments when it came to developing new releases or adapting existing ones – and in the process managed to curb or prune uncontrolled growth.

Cases 1 and 2 are prime examples for imposing a defined and confined set of tools. The interview partners from these companies also emphasized the resulting opportunity for systematically building up know how about the maintenance and the development of the respective applications.

The picture is totally different for decentralised BI units which primarily adhere to the wishes of the separate departments: This approach fosters heterogeneity between different solutions. The company of Case 9 can act as an example for the resulting issues: The interview partner described experiences with handling the constant stream of new tools introduced – tools which all needed to be connected on the IT side and that brought about massive issues regarding the built up and maintenance of the required knowledge base.

*Lack of integration of BI-solutions into the IT-backend*

A centralised BICC also has advantages when it comes to the integration of BI-Solutions into the overall IT architecture. Because of their size and role they are able to react swiftly to BI-relevant

changes on the IT-backend. This can be illustrated with Case 2: Although BI and IT units were independent subsidiaries they established well defined processes to cope with changes on the IT-backend. Conversely, decentralised BI-Departments are usually neither important nor big enough to be integrated into the workflow of the IT-backend. This can even lead to a situation where relevant changes on the IT-backend are not communicated to the BI units at all. Examples are the companies in the Cases 8 and 10 which both struggle with insufficient information on changes of the backend infrastructure. Independently of the organizational variant, the integration into the workflows of the IT department is crucial.

*Unsatisfactory time budget of the BI providers to support the user departments*

A best practice for allotting time and space can again be found in the centralised BICCs: Implementing separate budgets for release development and ongoing maintenance tasks. This dual-budget approach has been implemented in all 4 BICC cases. Especially in Case 10, the lack of such a distinction was a root cause for all sorts of problems – even minor changes to the systems had to undergo the steps for the set up of a formal project. In consequence, dual budgets support flexibility.

*Development backlogs*

Backlogs have been dealt with successfully both in some centralised and decentralised units. As the answers on the experiences and the resulting rules and regulations show, a well defined requirements engineering alongside a communicated prioritization is the practice of choice. Such an approach had been implemented in all four BICC cases as well as in the companies 5, 7 and 9. In Case 9, this was complemented by the use of agile development methods that actually embedded developers in the department.

*Lack of maintenance and release knowledge in IT*

The case studies support the assumption from the quantitative exploration that a centralised BICC is – due its very design as a mediator – best suited to get a comprehensive overview of both the user and the IT needs. BI units in user or IT departments usually do not see both sides of the coin. This leads to problems like insufficient budgets for creating sustainable concepts or the tendency of IT to prioritize changes on the BI systems very low, even if they have a huge impact on the company. The companies described in Case 8, 9 and 10 face these problems.

*No models for agile development*

Only the company in Case 9 applied a model for agile BI development that guided the release development. It is noteworthy that this company had introduced several standardized processes between the user department and the IT to curb efficiency losses and foster cost reduction. An issue that still awaits a solution is the handling of data integration processes. At best, a combination of agile BI development with defined processes and a BICC driven coordination is leveraged.

## 4.2 Opportunities to realize demands for enhancements

*Options for business departments to implement their own solutions*

As discussed above, the idea of supporting professional system development within the user departments can be achieved in a setting like Case 9 which is based on a high degree of decentralization. In case of a more centralised approach, a central BICC can open up carefully crafted options that allow trained members of the user department to design their own reports or analysis cubes. This solution relies on extending BICC competencies to trained power users. It has to be mentioned that only the BICC in Case 2 was able to offer training services for such purposes.

*Data quality management and data loading processes*

All centralised BICC had already been able to systematically introduce rules and guidelines to improve data quality management and data load. As discussed above, the decentralised BI departments in four out of six cases had not yet been equally integrated into the IT workflows. This aggravates the problems as it leads to a frequent lack of information.

*Integration of a BICC*

Even though they were not always familiar with the term, the centralised BI units found in the study conformed fully to the understanding of a central BICC. These units had created well-structured processes and responsibilities for data ownership or requirements engineering. A remaining problem for these BICCs is the time it takes to deliver solutions for the user side.

*Faster implementation*

The acceleration of changes and the increasing rate of release development projects still pose problems for all but two of the companies. Small and specialized BI units like the decentralised BI department in Case 9 with its own DWH have an edge in this regard because they can act immediately and without much coordination effort. This situation can barely be transferred to enterprises which are in need of a core data warehouse that spans department borders. Changes to the core DWH naturally take time as they usually involve a larger number of stakeholders. Up to now there is no solution implemented in the examined companies for churning out such modifications in a short time frame.

*Service orientation*

The central BICCs have all started to plan, develop or deploy dedicated BI services. The company in Case 1 has already developed several services, while the company in Case 2 is right in the process of service specification. In contrast, most of the decentralised BI departments have not even thought about introducing services – which is not surprising as they are woven together with user departments and will by design not push a higher degree of bureaucracy. The exception to the rule is, again, Case 9. Here BI development services are used as building blocks in the agile development model.

*Rules between user department and IT*

All those companies that have implemented a BICC have also defined a set of rules. Actually, implementing a BICC as an organizational entity naturally involves the definition of rules and responsibilities – the establishment of a central BICC fosters regulation. In contrast, companies with a decentralised approach struggle much more with the definition of rules because too many parties with heterogeneous systems and requirements have to be factored in. That does not mean that this is an impossible endeavour: two decentralised companies succeeded in that regard and came up with rules that govern the interface between IT and BI. The company in Case 9 only has rules for ramping up new applications while in Case 7 strict rules had been dictated by the IT side that had to be followed by all decentralised BI units. There is a catch: In Case 7, the development times are as slow as if they would be when following a centralised approach.

# 5 CONCLUSIONS

The presented results show that there is a particularly strong case to establish a central BICC which coordinates the BI tasks of maintenance and release development and that acts as a mediator between IT and user departments. Although it is certainly not impossible for decentralised BI organizations to enforce enterprise-wide stipulations that govern tasks like data quality management, clear requirement prioritization, a definition of allowed analytical systems or the integration with the backend systems, this is much harder to achieve in decentralized environments. Likewise, the IT cannot easily take over the role of a BICC as it lacks its “dual-view”. Actually, the very set up of a central BICC is not possible without the parallel introduction of at least some rules that define the interfaces between IT, user, and BI unit. The exception to this logic is Case 9 where the solution is facilitated by a narrowly confined scope of the supported solutions and a separated single-purpose DWH. Notwithstanding, the definition of agile release development processes based on defined services achieved in this enterprise has to be regarded as groundbreaking. This is of particular interest for changes that are required to be inserted relatively quickly – which is especially relevant for the finance sector.

Ideally, the need for agility can be reconciled with the rationales that foster centralization and regulation. Both Case 9 and the four BICC cases offer a powerful lever to tackle this seemingly impossible task: The definition of BI services and the design of BI service oriented management concepts. A map of self-contained services helps to break down the complex tasks of BI maintenance from a service-user perspective and to distribute the services across different units. By grouping the

services based on their different needs for centralization, a hybrid of a decentralised and a centralised approach can be designed. As the experiences with the backend-systems highlight, it is recommendable to also add "informational veins" which transport messages on events at the backend (e.g. changes in the source system) or at the application side (e.g. new analytical requirements) – implemented e.g. by supporting infrastructure workflows or interfaces that are adhering to the Service Oriented Architecture (SOA) concept. Flexibility on the technical side supports agility on the application side.

Based on these considerations, it is proposed here to distinguish between three classes of services that are differentiated by the criteria *participating partners* and *possibility to be based on well defined and technologically supported processes*. This draft of a service based concept aims at exploiting the potential of decentralized self-services as far as possible without impeding the potential of a BICC to foster integration, governance, and efficiency. It is visualized in Figure 2.

| Automatable predefined services | Not automatable predefined services | individual |
|---|---|---|
| Modification of report layout<br>Ramp up of a front-end tool (from a set of defined tools)<br>Ramp up releases or fixes<br>New indicators based on existing data fields<br>Coordination and calibration of existing ETL processes<br>Integration of aggregates<br>Integration of unit specific data sources | Adaption of reports for several departments<br>Integration of analysis results into the backend („closed-loop")<br>Integration of new data sources that are potentially not unit specific<br>Tracking of changes in source data structures<br>Integration of new analytical tools | Creation of individual prototypes<br>New types of data load processes (e.g. near-time)<br>New types of source systems (e.g. with unstructured data)<br>Development of concepts to speed up processing times |
| IT & BICC | IT & BICC & Dept. | BICC & Dept. |

*Figure 2. Service classes and responsibilities*

*Class 1* refers to technical changes that can be tracked with workflow software and executed jointly by the IT department and the BICC in a semi- or even fully automated fashion. Examples encompass modifications to the report layout or in the calculation of performance indicators. This type of service needs to be handled at the provider side, but – due to its standardized nature – can be triggered from users in a self-service fashion. Streamlining such activities supports fast response times for standard changes while leaving data quality and backend integration tasks in the hands of the BICC. Furthermore, when system supported, it also fosters transparency e.g. regarding prioritization and front-end-integration – all of which are core concerns of the user side.

*Class 2* addresses tasks that have repercussions through the whole system and involve more than one user department. Even in case of being well defined, these tasks cannot be equally automated as they involve negotiation and bargaining activities. Also, the initiative for starting a Class 2 service might just as well come from the BICC, e.g. in case of identifying new opportunities regarding data usage. Separating Class 2 from Class 1 services further increases a transparent prioritization and backlog handling while at the same time utilizing the role of the BICC as a coordination and communication hub between the different departments and the IT side. A careful handling of Class 2 type services can be expected to facilitate data quality management, the integration of external data sources, and the systematic built-up of cross departmental solutions.

*Class 3* involves the maintenance and release development for individual solutions which are totally evading any kind of standardisation, e.g. the design of a prototype for a new class of analytical systems. These are separate projects which are naturally dealt with by a team of representatives from the user department and the BICC side. They might later trigger Class 2 or Class 1 services – when a designed system is going to be embedded in the overall BI infrastructure. Such services need to be dealt with altogether manually as there is no template to apply.

Figure 2 visualizes the three classes and gives some examples.

# 6 DISCUSSION AND OUTLOOK

Trailing the ever growing size and relevance of BI infrastructures, the subject of "BI organization" is likely to come further into focus as well. The presented results provide explorative insights into a particular variant of a BI organization: A dedicated and central BICC – a "Business Intelligence Competence Centre". As has been shown, the establishment of a central BICC can for several reasons support a more professional development and maintenance of BI solutions. Its weaknesses primarily lie in transparency and reaction times – as known from other centralized IT approaches. To address them, a concept has been drafted that distinguishes between three classes of BI services which allow for a differentiated and staged approach to professionalization.

The concept is understood to be a first building block to an agile and IT supported BI development. It is conceived to be built on a defined service management concept and to be technically supported by a SOA architecture. In further steps, the presented results need to be fleshed out, coupled with concepts for BI service management and SOA and be validated by the use of prototypes.

Limitations of the study lie in the need for deeper and more solid statistic evidence, in the requirement for additional qualitative validation steps, and in the confinement of the exploration to the finance sector. Regarding the empirical data, the presented results are understood as a rather broad first step which is not meant to provide final and comprehensive results. However, together with the conclusions derived from the qualitative study they deliver some grip for the design of a much more sophisticated quantitative empirical instrument. Besides, additional interviews might help to gain further insights into possible applications areas, particular restrictions and additional options regarding the implementation of the concept.

The sectoral limitation should also be scrutinized. However, while the finance industry indeed brings a specific set of BI requirements (e.g. real time data feeds from trading systems) and unique BI applications (e.g. for risk management or data mining), the presented arguments are equally valid for other businesses as well. An exception is the need for very fast development cycles. But in times of complex global turbulences it can be expected that on a mid term time horizon this type of setting will become relevant for most other businesses as well – with the finance sector again becoming the forerunner in the domain of BI solutions.

## References


Baars, H., Horakh, T. and Kemper, H.G. (2007). Business Intelligence Outsourcing - A Framework. In Proceedings of the 15th European Conference on Information Systems (ECIS 2007), St. Gallen, Switzerland.

Blundell-Wignall, A. (2008). The Subprime Crisis: Size, Deleveraging and Some Policy Options, URL: http://www.oecd.org/dataoecd/36/27/40451721.pdf. Publication Date: 2009. Accessed April 8th, 2009.

Boddy, D. (2005). Managing Information Systems: An Organisational Perspective, Prentice Hall FT, New York, San Francisco.

Computerworld (2006). How Companies are Implementing Business Intelligence Competency Centers (BICCs). URL: http://www.computerworld.com/pdfs/SAS_Intel_BICC.pdf. Publication Date: April 2006.

Eckerson, W. (2006). New Ways to Organize the BI Team. Business Intelligence Journal, 11 (1).

Finger, R. (2008). Agile Business Intelligence und klassisches Data Warehousing: Einordnung in ein BI Governance Framework. In Advanced Project Management: Herausforderungen - Praxiserfahrungen - Perspektiven (Mayer, T.L., Gleich, R. and Wald, A. Eds.), pp. 113-130. LIT Verlag, Berlin et al.

Geiger, J. G., Hill, B. and Ton, J. S. (2007). Creating a BI Center of Excellence. Business Intelligence Journal, 12 (1).

Gordon, S. R. and Gordon, J. R. (2004). Information Systems a Management Approach. 3rd Edition. Wiley, Hoboken.

Haag, S. (2003). Management Information Systems for the Information Age. Irwin McGraw-Hill, Boston.

Horakh, T., Baars, H. and Kemper, H.G. (2008). Mastering Business Intelligence Complexity - A Service-based Approach as a Prerequisite for BI Governance. In Proceedings or the 14th Americas Conference on Information Systems (AMCIS 2008). Omnipress, Madison.

Howells, P. G. A. (2008). Financial Markets and Institutions. Prentice Hall Financial Times. 6th Edition. Harlow, Munich.

Hughes, R. (2008). Agile Data Warehousing: Delivering World-Class Business Intelligence Systems Using Scrum and XP. Universe, New York.

IEEE (2008). Software Maintenance. URL: http://www2.computer.org/portal/web/certification/ references/maintenance. Accessed March 1st, 2009.

Inmon, W. H. (2005). Building the Data Warehouse. 4th Edition. Wiley, Indianapolis.

Inmon, W. H. (2006). The Spiral Development Methodology in DW 2.0. URL: http://www.inmoncif.com/news/pdf/ methodologyFN.pdf. Publication Date: 2006.

Kimball, R. (2002). The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling. 2nd Edition. Wiley, New York, Weinheim

Kleese, M. and Winter, R. (2007). Organizational Forms of Data Warehousing: An Explorative Analysis. In Proceedings of the 41st Hawaii International Conference on System Sciences. IEEE Computer Society, Washington DC.

Laudon, K. C. and Laudon, J. P. (2005). Management Information Systems: Managing the Digital Firm. 9th Edition. Pearson/Prentice Hall, Upper Saddle River.

Miller, G. J. (2006). Business intelligence competency center a team approach to maximizing competitive advantage. Wiley, Hoboken, N.J.

Moormann, J. (2000). Die Digitalisierung des Bankgeschäfts. In Informationstechnologie in Banken: Optimierung von Geschäftsprozessen (Rebstock, M., Weber, G. and Daniel, S. Eds.), pp. 3-16. Springer, Berlin, Heidelberg.

Moormann, J. (2007). IT in der Finanzbranche: Management und Methoden. Springer, Berlin, Heidelberg

Moss, L. T. (2006). Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications. Addison-Wesley, Boston, Munich.

Schwab, D. P. (2005). Research methods for organizational studies. L. Erlbaum Associates, Mahwah, N.J.

Strange, K. H. and Hostmann, B. (2003). BI Competency Center Is Core to BI Success. URL: http://www.gartner.com/resources/116400/116413/bi_competency_center_is_core_116413.pdf . Publication Date: 22.06.2003. Gartner, Stamford.

Unger, C., Kemper, H.G. and Russland, A. (2008). Business Intelligence Center Concepts. In Proceedings of the 14th Americas Conference on Information Systems (AMCIS 2008), Toronto, Canada. Omnipress, Madison.

Vierkorn, S. and Friedrich, D. (2008). Organization of Business Intelligence: The advantage gained by companies using competency centers to coordinate their business intelligence initiatives. BARC, Würzburg.

Yin, R. K. (2009). Case Study Research: Design and Methods. 4th Edition. Sage Publications, Los Angeles.