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A Steria Report

Business Intelligence:

Are European companies ready for Big Data?

European *biMA®* Survey 2012/13

in collaboration with

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BARC

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Business Intelligence:

Are European companies ready for Big Data?

European *biMA®* Survey 2012/13

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Foreword

The debate about Big Data has once again made Business Intelligence (BI) the CIO's top priority. Moreover, the discussion extends far beyond the BI publications or conferences dedicated to the topic. The business press, in particular is full of content looking at the business potential arising from the growing volume, variety and velocity of data. Getting to grips with the new perception of BI in the wake of Big Data is the primary objective of the ***biMA®*** (Business Intelligence Maturity Audit) survey 2012/13.

As with previous editions, the current ***biMA®*** survey raises the curtain to reveal the reality that companies are facing today, how they evaluate the market developments and what they perceive as major opportunities and challenges with regard to BI. Using the results of the survey, we will put the Big Data hype into context and discuss the growing awareness of BI as it impacts top-level management.

This is the fourth version of the ***biMA®*** survey, following publications in 2004, 2006 and 2009. The survey participants include contributions from 20 different European countries. With 668 participants, this is one of the largest BI surveys in Europe.

The methodology used is based on the ***biMM®*** (Business Intelligence Maturity Model) and the ***biMA®*** (Business Intelligence Maturity Audit). Developed by Steria over the past 10 years and optimised in numerous client projects, the model and the audit ensure a structured analysis and the comparability of results over time.

We recommend that you use the results of the survey to test and enhance your own BI strategy.

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Executive Summary

As a result of the wide-ranging debate about Big Data there is a growing interest in Business Intelligence (BI). This provides good reason for undertaking our *biMA®* study and using it both to illustrate market developments and to understand the current BI landscape. In addition to classifying Europe's BI position in a BI-specific maturity model, this BI user study identifies current and future challenges and trends. It considers how companies provide their employees with information that is relevant for decision-making.

With more than 650 participants from 20 countries and a wide range of industries, the *biMA®* study 2012/13 is one of the largest European studies on BI.

The methodology used is based on the *biMM®*, a BI-specific maturity level model that is established and accepted in the marketplace, and the *biMA®* analysis method that builds on this model. Both instruments were updated before the study was conducted and therefore take into account the latest market developments. The BI maturity model supports a holistic BI assessment by defining five levels of BI maturity from a "Functional", "Organisational" and "Technological" perspective.

The five levels of BI maturity have been defined as follows:

Level 1: Individual Information (see page 75)
Level 2: Information Silos (see page 76)
Level 3: Integration of Information (see page 78)
Level 4: Information Intelligence (see page 79)
Level 5: Information-driven Enterprise (see page 81)

1.

EUROPEAN COMPANIES' BI IS STAGNATING

Business requirements are increasingly demanding but efficient technical implementations are lacking

Companies are approaching the subject of BI much more professionally than was the case in the first study in 2004. Isolated individual initiatives and the subsequent standardisation and harmonisation initiatives have contributed to BI being positioned as a critical success factor for most organisations. The increase in significance of BI, however, means that information requirements are increasingly complex and growing in number. These requirements are challenging the established technical and organisational structures, necessitating a profound paradigm shift in both. This shift has not yet happened. The *biMA®* study 2012/13 confirms this notion by revealing a stagnation in the maturing of many BI environments at level three (Information Integration) and a failure to reach level four (Information Intelligence). Companies rarely succeed in embedding BI across all areas of their organisations in such a way that BI can become a critical success factor for the business model.

2.

DATA QUALITY IS THE ACHILLES HEEL OF BI

Although data quality represents the foundation of all BI analysis, it is precisely this building block that companies carelessly neglect.

38 % of companies say that data quality is their key BI challenge. The defective design of data governance is a major factor that explains why there has been little improvement in data quality since the last study. There continues to be insufficient standardisation of processes and responsibilities to ensure data quality. In 34 % of companies there is no regulated process for data quality management and 31 % state that data problems tend to be detected only randomly. A further 28 % of companies consider that there is a lack of transparency about the level of data quality.

Master data and metadata management in particular tend to be rather neglected. 38% of companies report that dedicated master data management, which ensures current and consistent customer, supplier and product data, does not even exist. It appears that the issue of BI is not yet perceived as having enough significance to merit BI needs being taken seriously into account in the design of operational systems (master data management specifically). Furthermore, there is a lack of transparency about the availability and quality of the data.

This is partly because a link between the functional and technological metadata is not possible, or that the relevant metadata is not available in a consistent or aligned form.

Overall data quality therefore represents the Achilles heel of BI. Defective data puts a question mark on all the decisions and investments made using it.

Data quality appears to be the biggest problem in the BI environment for **38 %** of companies

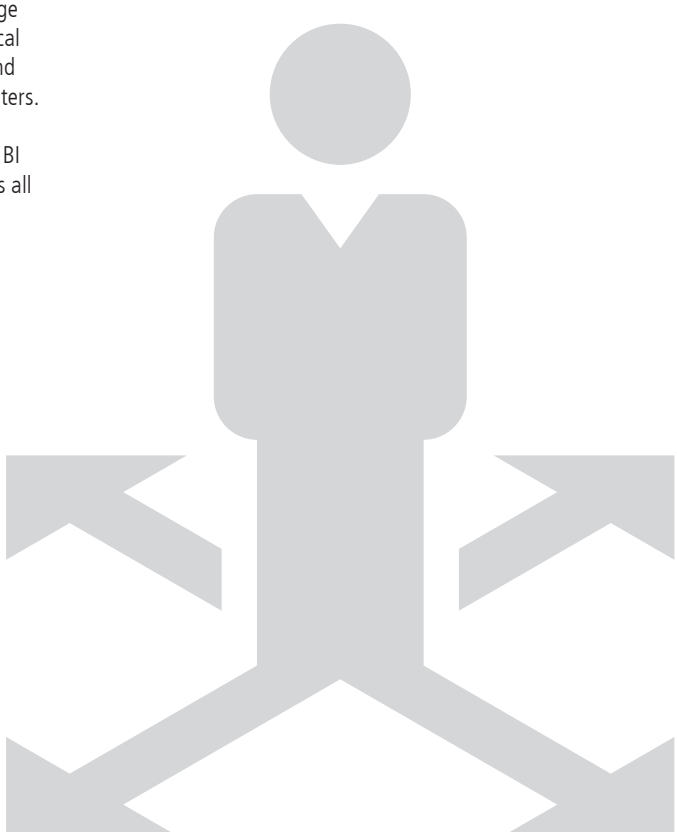
3.

THERE IS A BATTLE FOR BI EXPERTS

While skilled experts (increased demand for data scientists) are increasingly needed to deliver sophisticated analytics at short notice, there is a battle for BI experts with the relevant skill set.

24 % of companies state that they do not have an adequate level of internal BI expertise

This lack of internal BI competencies is making life difficult for companies: 24 % state that they do not have an adequate level of internal BI expertise. This is not surprising as BI experts have to acquire a wide range of knowledge and skills. Ideally, they must have analytical methodology skills, technical expertise and a detailed understanding of business matters. As it is rare for one person to have all of these skills, companies should consider a BI Competence Centre (BICC) that integrates all of the skills and abilities in one team.



4.

THE POTENTIAL OF BUSINESS INTELLIGENCE IS RARELY REALISED

In Europe, **83 %** of companies use BI predominantly to support internal reporting

Companies are not fully exploiting the analysis potential of their BI systems. In Europe, 83 % of companies use BI predominantly to support internal reporting. For example, only every second company makes targeted use of BI systems as a planning tool to calculate budgets or to create prognoses of future business developments. Many companies therefore do not make full use of the potential of their often expensively purchased and developed analysis tools.

83 %

5.

COMPANIES ARE LACKING BI STRATEGY AND GOVERNANCE

28 % A BI strategy is in place only in of the companies surveyed

70 % of study participants state that their company has not established BI governance

Only 28 % of the companies surveyed had a BI strategy in place. Yet this is a key requirement for the sustainable alignment of BI activities with corporate goals. It means that there remains an isolated, project-driven approach. In fact 70 % of the study participants state that their company has not established BI governance. Consequentially, there is no holistic coordination of BI activities. In addition, the surveyed companies felt the quality and information provided was unsatisfactory given their expectations and the investment made.

Many companies are ignoring the integrative and comprehensive nature of BI. They are using the standard IT structures and processes for their BI landscape, which tend to support single operational systems and business processes. For example, 44 % of the surveyed companies rely on the standard IT demand management process. At best this approach only provides a local, rather than enterprise-wide picture and doesn't take into account the often contradictory requirements of different BI stakeholders. Furthermore, too often there is no BI-specific implementation process in place.

In summary, the specific requirements of BI are not sufficiently met by organisational designs, leading to a lack of cross-departmental consistency, flexibility and reliability.

6.

THE FUTURE BELONGS TO FLEXIBLE BI SOLUTIONS – FAREWELL TO ONE SINGLE SOURCE OF TRUTH

Existing BI systems frequently fail to offer the flexibility to respond to changes in the market environment. Indeed, users of BI systems feel more and more restricted. They wish they could help themselves to the various data sources and application modules to create custom and ad-hoc reports and evaluations.

Self-service BI functions (51 %) and agile development methodologies (30 %) are therefore high on the list of survey respondents' BI needs for the future. But when it comes to agility, companies see particularly significant room for improvement.

The top BI needs for the future include self-service BI functions 51 % andagile development methodologies

30 %

There is a rising number of user groups and a consequentially growing heterogeneity of information requirements. In combination with the desire of users to receive much faster, more focused and more customised information even at the most detailed granularity level. This increases the pressure on companies to reach maturity level four (Information Intelligence). This level sees significantly more decentralised approaches compared with the classic paradigms of BI such as the "single point of truth".

The growing number of BI demands results in a struggle to implement the ideal physical data integration in terms of a single point of truth in an enterprise data warehouse (EDWH). The required user agility leads in part to the isolated collection of requirements and the implementation of data silos.

The introduction of self-service BI tools and "sandboxes" that complement the BI environment (current use 13 %, planned use 27 %) are among the approaches adopted to satisfy users' needs.

Companies are increasingly focused on virtualisation as a concept for making the architecture more flexible whilst maintaining an integrated view of the data provided by distributed BI systems (from 15 % today to 23 % in the future). This is one of few technical options for transforming the existing BI landscape into one logical analytical ecosystem where the data is stored physically in a growing number of versatile analytical platforms. In particular, in-memory databases (data and queries are held in a RAM or processor cache) will play a much greater role (current use 33 % growing to 66 %) in the future.

BI environments are changing into an analytical ecosystem

7.

THE BIG DATA AGE HAS YET TO ARRIVE

In addition to large data volumes (volume), Big Data is all about handling various polystructured data (variety) and, if possible, real-time data preparations and analyses (velocity) which are subject to frequent changes. Surprisingly, companies are not yet dealing with all three of these challenges. Scaling options relating to rapidly growing data volumes only represent a serious problem for 8 % of companies. But this mainly relates to companies that already have large data volumes. A lack of support for polystructured data types is only a challenge for 4 % of companies. (Near) real-time data as the basis for operational BI was also only stated very rarely as a problem (9 %). Therefore only 7 % of participants grade Big Data as very relevant.

Only **7 %** of participants grade Big Data as very relevant

In fact, Big Data's characteristics (velocity ranked 13th, volume ranked 14th and variety ranked 15th as challenge) are valued far behind challenges arising from insufficient data quality.

In reality, many companies are still at the "infant" stages when it comes to data volume. In two out of three businesses, the BI solutions put to use have to manage less than ten terabytes of data. Only 6 % of businesses process data volumes in their data warehouses that exceed the 100-terabyte mark.

Moreover, it is clear that the persuasive use cases for Big Data are currently lacking. On the one hand the range of stated use scenarios does not indicate clear favourites; while on the other hand, the most frequently stated use case (28 %) "deeper and more precise understanding of the business" is the basic idea that defines BI and not a Big Data-specific trend.

It is interesting in this regard that employees in business areas have higher expectations of Big Data than the IT employees. 30 % of IT participants, but only 27 % of business participants, characterise Big Data as a hyped-up issue. There are big differences in the assessment of the significance of Big Data for deeper and more precise business understanding (business 31 % vs. IT 23 %) and improved customer segmentation (business 30 % vs. IT 23 %). It appears that business users associate Big Data with comprehensive analysis options for web data and social networks in order to take a massive step towards a 360° understanding of the customer.

30 % of IT participants and 23 % of business participants characterise Big Data as a hyped-up issue

It can be assumed that data volumes in the analytical world will grow significantly in the future. The reasons for this are longer data histories, a growing need for fine granular data and new, polystructured data sources; The new functional "killer application" for Big Data will undoubtedly soon be invented.

This is the same for mobile BI and collaborative BI. Despite everybody talking about Big Data, mobile BI and collaborative BI, compelling use cases are still to be defined. The question of sustainable innovation or hype will be answered by compelling applications soon.

Many topics like social media analysis, BI in the cloud, the use of geographic data for business purposes "location intelligence" are also under discussion but are still not widely used and many companies are still looking for the practical application benefits.

CONCLUSION

The transition from BI maturity level three (Integration of Information) to level four (Information Intelligence) is difficult to make. This step is, however, extremely important. This is because the increasing heterogeneity of user groups, as well as their need to be provided with information in a clearly focused and individual manner, increases the pressure to scale to this maturity level.

However, no progress has been identified in this respect lately. Companies rarely succeed in embedding BI across all areas of the company in such a way that it can become a critical success factor for the business model. In today's tough economic climate, being able to handle Big Data will become crucial for the organisation's competitiveness, innovation and growth.

Consequently, there is a requirement for action. Big Data, as a current and frequently discussed topic, emerges as a catalyst here and increases the need to find new solutions for known BI challenges.

The following six recommended courses of action can be derived from the results of the study:

- Put data quality right at the top of your agenda.
- Reconcile the professionalisation of your BI infrastructure operation with the user expectation for flexible BI solutions.
- Increase the agility of your BI environment.
- Establish BI-specific structures and processes.
- Don't feel unsettled by the current hype surrounding Big Data, but do check the relevance specifically for your company.
- Approach the subject of Big Data tactically and stage-by-stage taking the following steps:
  - First, carry out awareness training, creating an understanding that Big Data is not simply about handling "more data" in the established format. It is much more about creating new structures.
  - The above requires use cases that are relevant both legally and in terms of time and content. They must have functional benefits that justify investment in technologies and the expansion of expertise, not the other way around.
  - Check use cases for Big Data from other sectors in terms of their relevance to your company and identify potential Big Data sources.
  - Assess your use case via a proof of concept (PoC) with regard to its added value and not exclusively to technical feasibility.
  - In the medium term you need to focus on a BI service portfolio with predictive and prescriptive analytics instead of reporting of past events.

Objective, methodology and demography

BI refers to collecting, preparing and providing data in order to control, manage and plan organisations

Definition and objective

BI has had an established role in the world of information technology for many years and is no longer simply understood as a technical solution for standard reports on past events. The range of uses for BI is growing continuously and this has resulted in complex corporate BI environments. The intensive discussion around Big Data and analytics demonstrates that the search for relevant information in the flood of data will become a challenge. BI remains an issue with top priority for CIOs, CFOs and CMOs.

The *biMA®* study 2012/13 is now the fourth survey (after 2004, 2006 and 2009) to investigate the development and status quo of the BI user market. In addition, the survey identified current and future challenges faced by companies in supplying their employees with information. Steria conducted this year's study in cooperation with the Business Application Research Center (BARC).

As in previous studies, the methodology used was based on the *biMM®* and the *biMA®* that builds on it. Before the study began, the description of the maturity levels was updated to take into account the latest developments in the BI market as well as proven best-practices. The questionnaire for the *biMA®* study 2012/13 covered all the major *biMA®* investigation fields. As such it provides a sound basis for the determination of the BI maturity levels of the participants' BI solutions with regard to the three *biMM®* perspectives (Functionality, Organisation and Technology).

Demography

The online user survey was conducted in Europe between November 2012 and January 2013. The survey was advertised by Steria and BARC via their own and other channels. Participants were also found via social networks, specialist websites, various newsletters (TDWI, BeyeNetwork) and conferences. The questionnaire contained a total of 41 questions that were either single or multiple choice. Participants were asked to answer the questions and to assess the relevance and target achievement on a scale from 1 (low) to 5 (high).

One of the largest European studies on BI with **668** participants

In total, 668 participants took part in the survey from across Europe. 47 % came from Germany, Austria, Switzerland (DACH region), 18 % from France, 13 % from Great Britain, 10 % from Scandinavia and 8 % from Poland *(see Figure 1).* As some questions were optional, the total population for each question may vary from the total number of study participants

Companies from all industries

As in previous studies, the participants came from a wide range of industries *(see Figure 2).* The IT sector (22 %), manufacturing (18 %) and the public sector (13 %) were highly represented. The "Other" category included construction, property, publishing and law. The high percentage for the IT sector is largely due to consultants answering for their customers in this industry.

Companies of all size

The company sizes by employee numbers *(Figure 3)* and annual turnover *(Figure 4)* reveal a relatively homogeneous distribution. This study therefore covers a representative sample of company sizes.

Analysing the origin of the study participants by department reflects a balanced relationship between IT and business departments *(see Figure 5).* The participants were also asked to state the scope on which they provided information for the survey. Only 13 % of those surveyed related their answer to their department, the vast majority assigned it to a division, group or corporate perspective. Therefore the remaining analyses will assume the perspective of the whole company.

Even distribution between IT and specialist department

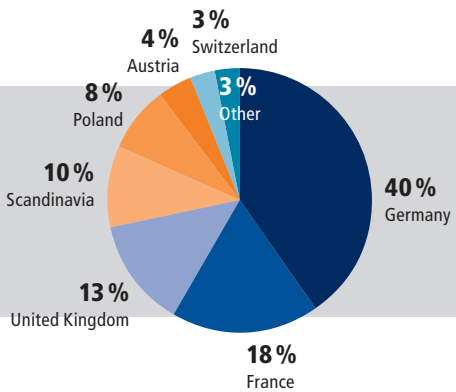


Figure 1: Country distribution (n=668)

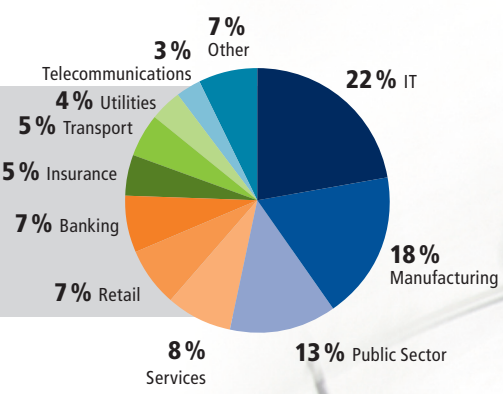
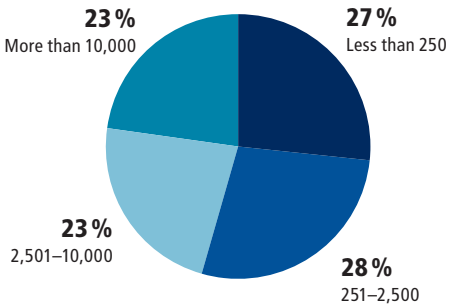


Figure 2: Industry distribution (n=668)



Company size (employee numbers) (n=580)

Current estimates by BARC analysts state that IT budgets for 2013 will see stagnant to moderate developments within the limits of the macroeconomic situation in Europe (<3 %). The BI budget is generally up to one fifth of the IT budget; no cuts in investments for data management, analysis, reporting and planning are expected. Increased investment in self-service tools but also data management components and analytical platforms are currently being made and will continue to be made. The complete BI budget in the companies is shown in *Figure 6.* It is interesting that large companies with more than 10,000 employees have significantly higher budgets for BI.

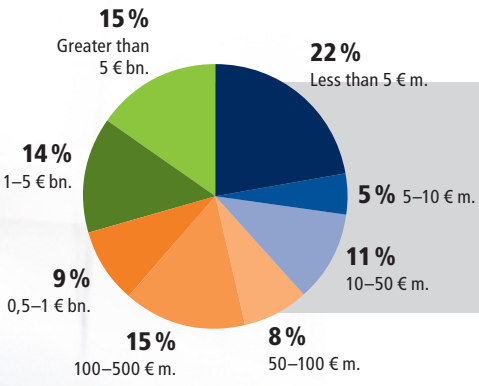


Figure 4: Company size (annual turnover) (n=533)

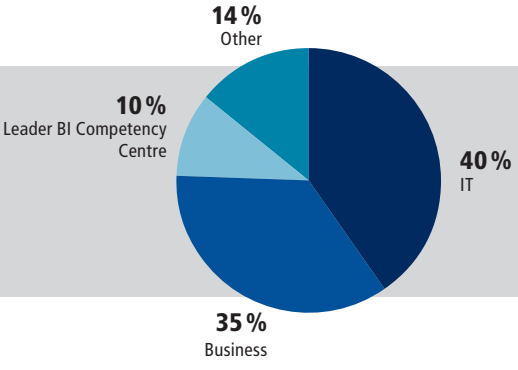


Figure 5: Study participants by department BICC (n=479)

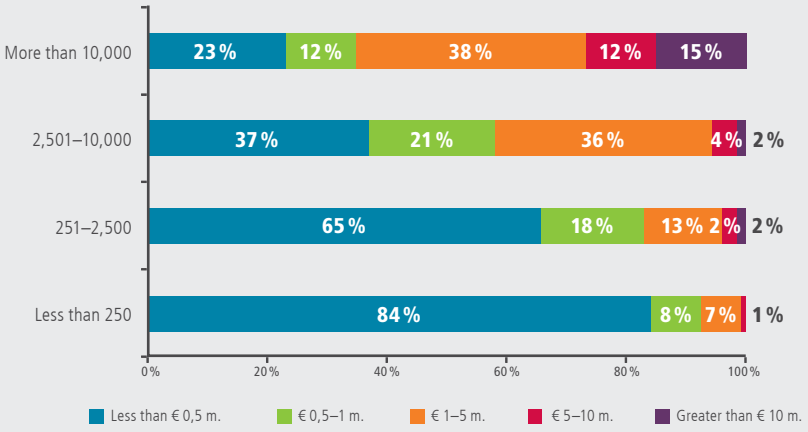


Figure 6: Total budget for BI by company size (employee numbers) (n=459)

Companies are increasingly investing in new software and hardware and less in developing existing solutions

The average distribution of the BI budget shows that around one third of the budget is used for solution development *(see Figure 7)*. Compared with 2009, a reduction of 15 % was recorded for development in the DACH region. Companies in these countries appear to have successfully saved costs here. Whereas the pro rata expenditure for operation has remained approximately the same, expenditure on software in the DACH region has increased from 13 % to 24 %. There are concerns that BI environments have become even more heterogeneous and complex as a result of uncoordinated investment in software. Increased hardware investments – in particular as a result of the increased use of appliances – can be interpreted as an attempt to meet the demand for higher performance *(see Parts 1 and 6)*.

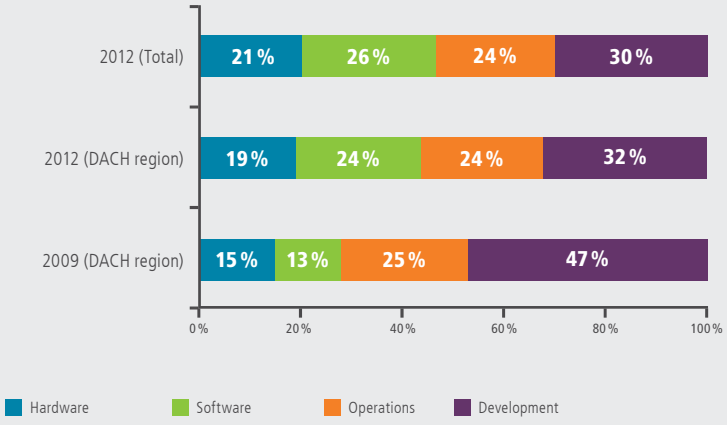


Figure 7: Budget distribution overall and in the DACH region (n=varies)

Part 1

Data quality remains the key challenge – the Big Data trend has not yet arrived

The expectation of operational and economic benefits from BI systems has risen significantly over the past few years. Dynamic and global markets make it difficult for companies to plan reliably and sustainably and to detect economic risks and opportunities in good time. In order to take control of this situation, there is a whole range of more or less new technologies in the BI environment: social media analyses, operational BI, self-service BI, and Big Data technologies are just a few examples.

This chapter identifies the challenges and trends that not only determine the discussion but are also being tackled and implemented by the companies surveyed. What are the greatest BI challenges and trends that they face? Which trends do companies expect to provide the greatest benefits? What about implementation? Are there particular approaches being taken in the BI environment? Or will there be no paradigm shift at all in the future?

38 % of companies have a data problem

Companies have been unable to master the same challenges for years

Table 1 shows the current biggest BI challenges for companies. At 38 % inadequate data quality is the biggest problem. The lack of a generally accepted BI strategy (33 %) and the lack of adequate processes and responsibilities for BI (21 %) are other key challenges. There is an association between poor data quality and the lack of standardised processes. A deeper analysis shows that participants with no regulated process for data quality management (DQM) list data quality as a challenge (40 %) much more frequently than those who state that binding standards and guidelines exist for recording and updating data (24 %). This connection is reflected at several points in this study.

A lack of internal BI competencies is also making life difficult for companies: 24 % of companies state that they do not have an adequate level of internal BI expertise. This lack of BI experts is not surprising as they have to acquire a wide range of knowledge and skills. Ideally they must have analytical methodology skills, technical expertise and a detailed understanding of business matters.

BI experts remain in short supply

	Total	<5 TB	5–10 TB	10–50 TB	50–100 TB	>100 TB
Insufficient data quality	38 %	38 %	43 %	34 %	24 %	38 %
No generally accepted BI strategy in place	33 %	41 %	32 %	32 %	41 %	44 %
Internal BI competencies insufficient	24 %	31 %	18 %	30 %	31 %	6 %
Very complex BI landscape	23 %	19 %	15 %	34 %	31 %	38 %
No BI sponsor in top management	21 %	23 %	28 %	26 %	17 %	19 %
No adequate processes and responsibilities for BI available	21 %	24 %	18 %	19 %	21 %	19 %
BI dœs not offer a consistent company-wide view	19 %	20 %	22 %	26 %	14 %	13 %
Lack of flexibility in implementing the requirements	17 %	14 %	15 %	17 %	10 %	19 %
BI systems are not adopted by users	17 %	20 %	17 %	8 %	7 %	6 %
Lack of performance of reporting and analysis tools	14 %	13 %	12 %	8 %	21 %	25 %
Costs/benefit ratio out of proportion	13 %	10 %	10 %	13 %	14 %	0 %
Insufficient functionality from a user's perspective	10 %	5 %	13 %	13 %	17 %	13 %
(Near) real-time requirements are not adequately met	9 %	11 %	8 %	4 %	14 %	6 %
Scaling options due to large increase in data volume	8 %	6 %	7 %	8 %	17 %	13 %
Lack of support for polystructured data types	4 %	4 %	2 %	8 %	0 %	6 %

Table 1: Biggest challenges for BI by data volume (n=474)

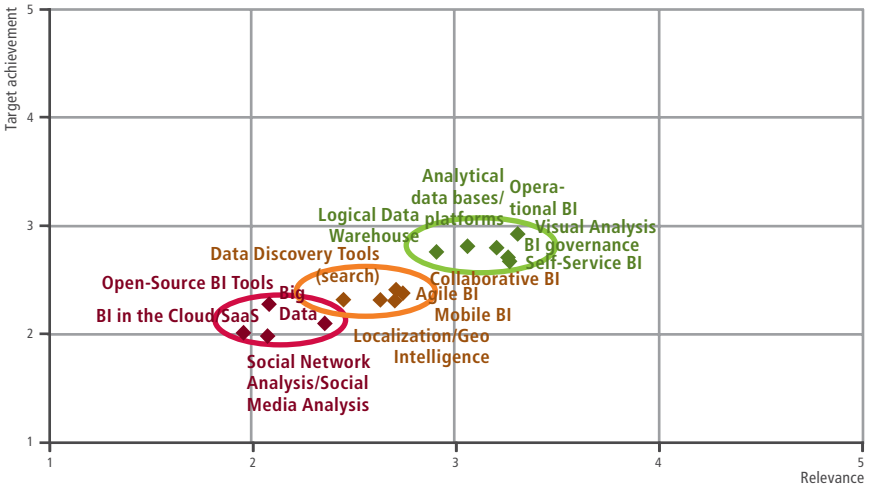


Figure 8: Relevance and target achievement of BI trends, scale from 1 (low) to 5 (high) (n=470)

Many of the hotly discussed issues have yet to become a reality

As it is rare for one person to have all of these skills, companies should consider a Business Intelligence Competence Centre (BICC) that integrates all of the skills and abilities in one team.

A look at the challenges that companies have, or have not yet resolved, is equally interesting. This applies in particular to the Big Data issue. In addition to large data volumes (volume), Big Data is about handling various polystructured data (variety) and real-time data provision for analysis purposes (velocity) which are subject to high change frequency. Surprisingly, companies are not yet dealing with all three of these challenges. Scaling options relating to rapidly growing data volumes only represent a serious problem for 8 % of companies. But this mainly relates to companies that already have large data volumes. A lack of support for polystructured data types is only a challenge for 4 % of companies. (Near) real-time data as the basis for operational BI was also only stated very rarely as a problem (9 %). Similarly, only 7 % of participants grade Big Data as very relevant *(Figure 10).*

The Big Data age is yet to arrive – volume, variety and velocity are not yet viewed as big challenges

Looking at the challenges with regards to the total data volume of the BI environment reveals some interesting correlations. These relate to complexity, growing data volumes, performance and user acceptance. The complexity of the BI system environment increases naturally with the data volume. Those companies managing large data volumes that already have problems with the volume tend to complain more frequently about poor BI solution performance. Interestingly where these problems increase with the size and complexity of the BI environment, higher user acceptance of the solution is likely to be encountered. This is believed to be associated with large and complex systems that offer users more comprehensive analysis options or the ability to find appropriate data material for special analyses as a result of the range of data.

A whole range of subjects are setting the BI world alight. There is a lot of discussion about these issues but the actual relevance and implementation rate is still limited. This is clear from the high number of trends located in the lower left quadrant shown in *Figure 8.*

By comparing the relevance and target achievement level of various BI trends, the results of the *biMA®* study 2012/13 identify the areas in which companies see the greatest need for action.

Most trends, such as social media analyses or BI aaS, have not yet come to fruition

The trends can be assigned to three groups that are characterised in *Figure 8.* The first group covers such issues as social media analysis, BI as a service (BI aaS), open source and "location intelligence" throughout. These subjects are hotly discussed in the specialist press but currently have low user relevance and distribution.

The second group covers the Big Data issue that is discussed in detail in the media and such other subjects as data discovery tools, collaborative and mobile BI. It is particularly true concerning these issues, and for Big Data in particular, that everybody is talking about Big Data but at the current time there are few use cases. The most hotly discussed issue of Big Data has only achieved medium relevance (2.45). For this group of subjects it will soon become clear whether they will make the jump from mere "talking points" to implementation in reality.

The third group is characterised by both relatively high relevance and high target achievement. Such subjects as operational BI, analytical platforms, visual analysis, BI governance, self-service BI and logical data warehouses are grouped here. The strong demand for operational BI shows that there is apparently a high need to support and automate operational business processes better using adequate analytical information. Self-service BI is also very important as the existing BI systems apparently do not have the flexibility to serve the information requirements that occur in the short-term. It is clear the BI systems that have evolved over time are inadequate to meet today's needs for agility both from a technological and organisational perspective for the current dynamic of the global markets.

BI users increasingly want technologies that offer them more flexibility and self-service functionalities

A differentiated analysis of the BI trends reveals that business departments assess the relevance and target achievement on average higher than their IT counterparts. The business department indicates higher expectations in particular for BI in the cloud (department 2.1; IT 1.75), analytical platforms (department 3.26; IT 2.97) and Big Data (department 2.83; IT 2.66). BI as a service offers users greater flexibility for accessing the solution and new functions; they expect analytical platforms to provide shorter query times, whilst the analyses become more complex and Big Data provides a deeper understanding of the business. BI governance is equally important for IT and the business department (department 3.23; IT 3.33) although the business grades target achievement slightly higher (department 2.83; IT 2.66).

Business departments have a higher expectation of BI aaS, analytical platforms and Big Data than IT

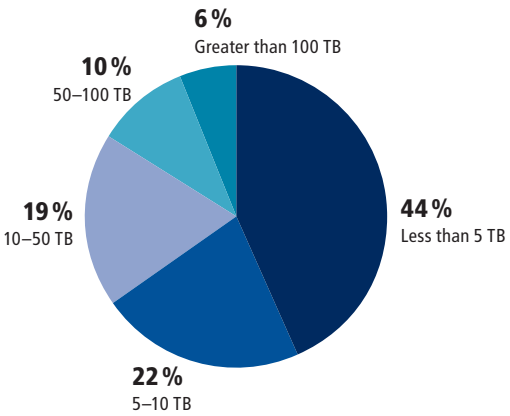


Figure 9: Total data volume of the BI environment (n = 282)

Large data volumes are rarely available

The low total data volume of BI environments *(see Figure 9)* is evidence for the still low relevance of Big Data in day-to-day company life. So only 16 % of companies have total data volume over 50 terabytes, which is the level generally associated with big data. Most companies are storing significantly less than this figure. The majority are even storing less than 5 terabytes in their analytical databases (44 %). It can, however, be assumed that the data volumes in the analytical world will grow significantly in future. The reasons for this are longer data histories, a growing need for fine granular data and new, polystructured data sources.

Nonetheless around 50 % of participants consider the Big Data issue to be relevant. There are however still no clear favourites in terms of business benefits. Rather a wide range of potential uses are possible. These include a deep and precise business understanding via improved market trend analyses and customer segmentation, as well as improved planning. The high ranking of the Big Data application for "improving business understanding" indicates that the much

New functional "killer application" for Big Data not yet in place

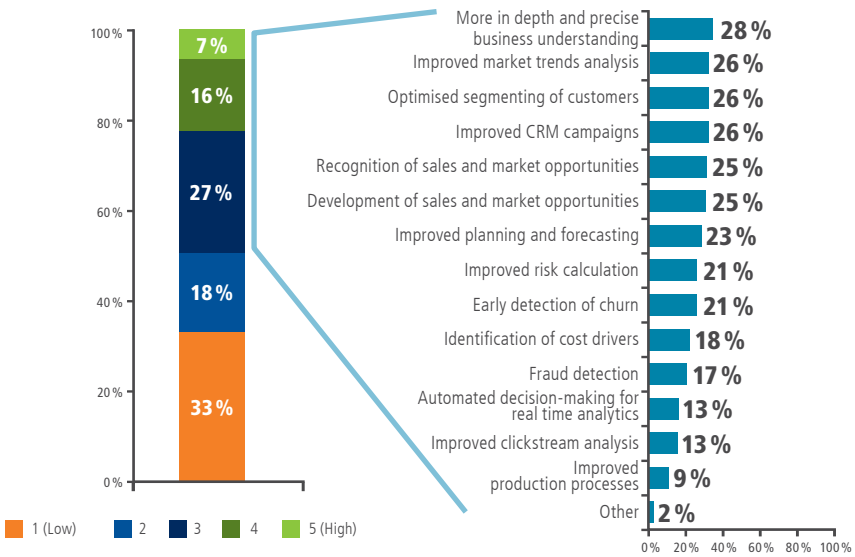


Figure 10: Relevance of Big Data, scale from 1 (low) to 5 (high) and use of Big Data technologies (n = 428)

Big Data refers to methods and technologies for the highly scalable recording, saving and analysis of polystructured data

publicised promises of BI are now being projected on to big data. The new functional "killer application" for Big Data undoubtedly still has to be identified.

Interestingly, 30 % of IT participants, but only 27 % of business participants, characterise Big Data as a hyped up issue. There are big differences in the assessment of the significance of Big Data for deeper and more precise business understanding (business 31 % vs. IT 23 %) and improved customer segmentation (business 30 % vs. IT 23 %). It appears that the business users associate Big Data with comprehensive analysis options for web data and social networks in order to take a massive step towards a 360° understanding of the customer.

The traditional model of the physical integration of all data within a "single point of truth" is still demanded but fails as a result of the complex requirements

The creation of a "single point of truth" is extremely important for the participants *(see Figure 11).* The creation of a single source of truth by storing all relevant data in one physical location and avoiding redundancies represents, for many companies, something of a Holy Grail for BI. The survey participants expect its relevance to increase further. It is interesting that the user companies apparently still trust the traditional models and will build on these in the future even if they have not met previous promises and have proven to be rather utopian ideals.

This paradoxical understanding about the "single point of truth" can be demonstrated specifically by the observations made in *Part 6.* This indicates the image of a heterogeneous architecture made up of virtualisation, distributed processes and combined repositories that one can describe as an analytical ecosystem. The difficulties that previously existed in producing a "single point of truth" are heightened once again. The impression we have of companies attached to an unrealistic dream that can only be implemented at massive expense becomes ever clearer. It would be advisable to look in future to more flexible solution concepts for data integration that are more appropriate for the situation.

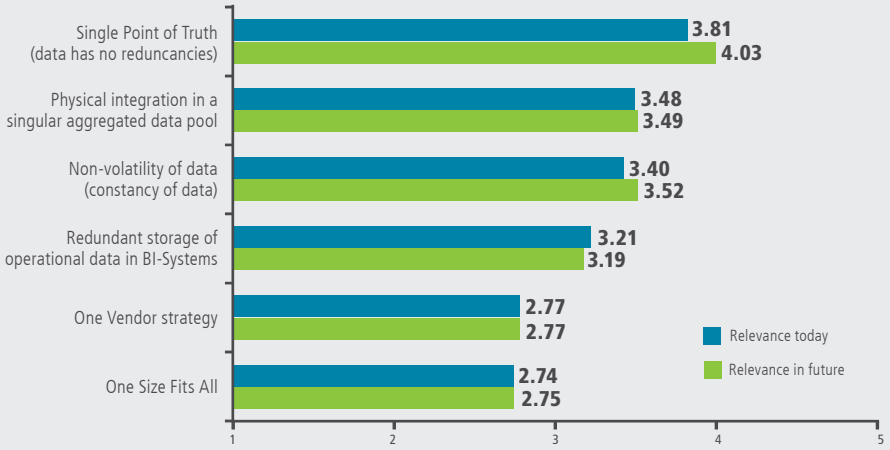


Figure 11: Relevance of paradigms for BI systems, scale from 1 (low) to 5 (high) (n=470)

Part 2

The maturity level model at a glance – *biMM®*

The concept of the maturity level models has now spread to a whole range of disciplines. Information systems maturity level models are used to describe life cycles and assess quality standards. So maturity level models help to create transparency about the current status of the market or, in terms of benchmarking, allows comparisons with other companies in the industry or the complete market. Maturity level models are also used to derive strategic implications for future potential actions on the basis of the current, individual positioning in the model.

Steria developed the Business Intelligence Maturity Model *(biMM®)* to describe the typical BI maturity levels in companies and organisations. The model is based on knowledge from the BI community, university research and the experience of Steria consultants.

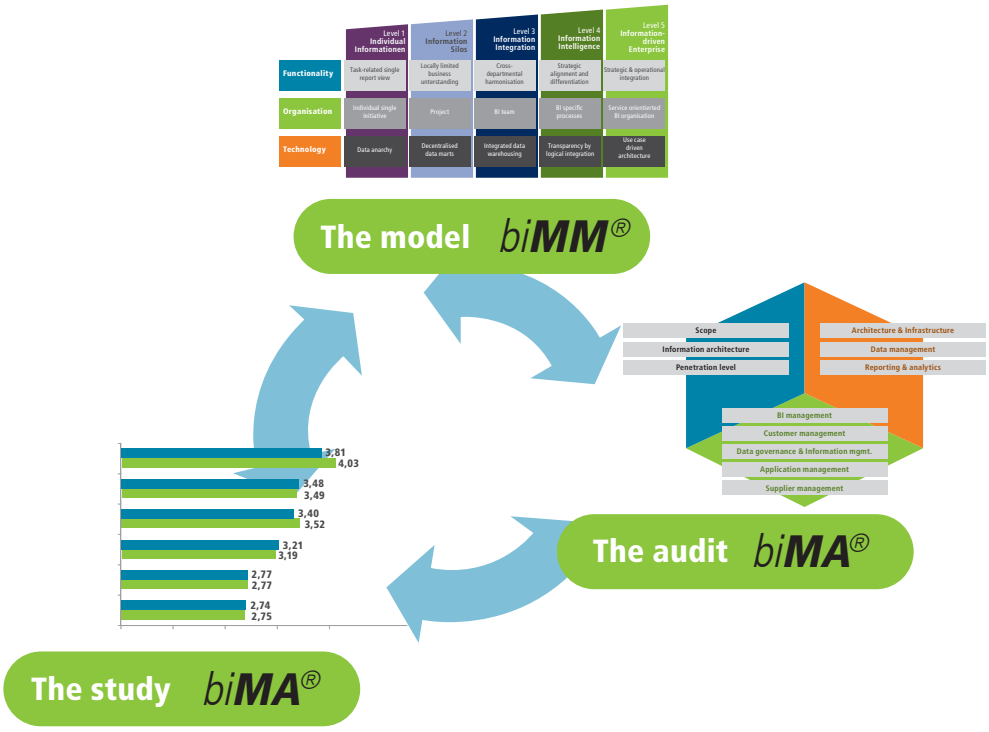


Figure 12: Trinity of model, audit and study

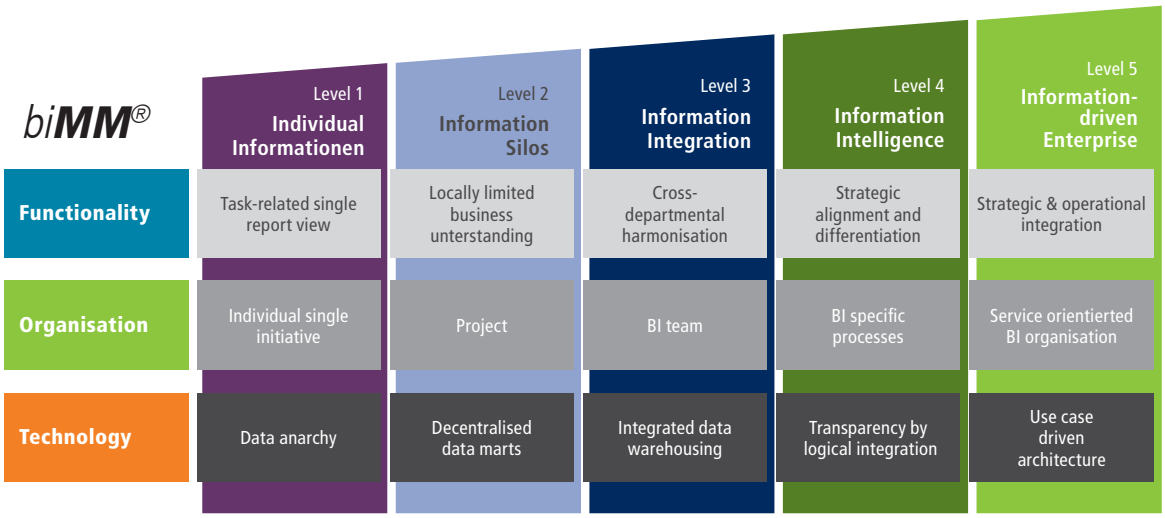


Figure 13: Overview of Business Intelligence Maturity Model (biMM®)

The use of *biMM®* as a standardised assessment framework in all *biMA®* studies and BI audit projects ensures both the objectivity and comparison of the results, as well as the up-to-date nature and appropriateness of the model itself.

In its design *biMM®* takes the lifecycle of BI initiatives into account and defines five maturity levels that represent idealised stereotypes *(see Figure 13)*. Starting from a mostly chaotic condition in level one, *biMM®* postulates increasing standardisation and centralisation via level two towards level three. At level four there is increased integration of BI into the corporate processes. Here special BI processes ensure the alignment of BI with the corporate goals compared with the more local orientation at lower maturity levels. At level five, BI is a critical success factor of the business model and analytical information forms the basis for the decision-making processes at all levels.

The understanding that BI is not simply a technical issue is gradually gaining hold in the market. In fact the focus must be on functional use cases so that BI investment generates sustainable benefits. The effective alignment of BI projects to corporate goals and efficient processes for development and operation require special organisational conditions that a specific BI organisation must create. Consequently, *biMM®* defines levels of BI maturity with regard to three perspectives: "Functionality", "Organisation" and "Technology".

In *Figure 13* the *biMM®* is described with its three perspectives and five maturity levels. Typical characteristics of the different maturity levels are described in detail above:

Functionality

The "Functionality" perspective considers the type, scope and quality of the information provided by the BI systems. The use of information relating to the penetration of BI in the decision-making processes at the strategic, tactical and operational level and the BI dissemination in the company are covered in this perspective.

The following investigation fields structure this perspective:

- Scope:
  Use of the BI solution by a wide range of users; support for the relevant usage areas and business processes; provision of the relevant and necessary information

- Information architecture:
  Provision of a trustworthy, consistent basis for information that is adequate to the task as per the defined use cases

- Penetration level:
  Level of integration of the analytical information provided to support decision-making in business processes

Maturity level one "Individual Information" of the *bi**MM***® describes a condition in which analyses are produced as required and personally by individual people. The technical maturity level is characterised by non-reproducible snapshots of data – often on the basis of operational systems – being used to support current tasks. The lack of any standards is problematic here. The quality of the data on which decisions are made is unclear and there is no generally valid definition for calculating the indicators.

Maturity level two "locally limited business understanding" is characterised by an initial harmonisation of the technical definitions at the local level (for example within departments). This enables analysis to be shared department-wide. In contrast to level one, analytical information is used in defined use cases and analyses of past information now takes place.

In level three "cross-departmental harmonisation" a widespread use of analytical information is desired for core activities. Cross-departmental harmonisation of the indicator definitions is necessary and a "single point of truth" is propagated in the form of an enterprise data warehouse (EDWH). Analysis now deals with the cause and effect interdependencies.

Level four "strategic alignment and differentiation" pursues the objective of providing analytical information focused on particular processes. At this maturity level analytical information is established as a corporate asset that is to be protected and developed further. The alignment of the BI initiatives with the corporate strategy is particularly important at this level. This level also offers opportunities for differentiation in order to be able to flexibly react to changing information requirements at the local level. These include in particular self-service offerings, "pre-packaged solutions" and decentralised metrics with a defined range of validity.

BI initiatives with comprehensive, strategic and operational integration have the highest maturity level (five). Here information becomes the basis of all decisions and therefore a critical success factor for a company. This requires common functional semantics that avoid misinterpretation and inconsistent statements, as well as the linking of strategic and operational control information. An information-driven company places emphasis on the design of the expert processes so that the information provided by the BI is used effectively in the decision-making processes (if necessary by automation).

An overview of the key characteristics of the individual maturity levels for the "Functionality" perspective is provided in the following *Figure 14.*

Task-related single report view	Locally limited business understanding	Cross-departmental harmonisation	Strategic alignment and differentiation	Strategic & operational integration
• Static snapshots of operational data • No standardisation, business uncertainties due to heterogeneous semantics • Large, non-transparent redundancies and inconsistencies • Usage by few individuals • Situational usage • No clear defined and direct support of operational business processes	• Backward-looking reports and analysis by means of historical analytical data • Well-defined and consistent business semantics with regard to system or department • The BI systems contain overlaps and the resulting redundancies and inconsistencies are largely known • Usage within departments • Well-defined manual use of BI information in few use cases	• BI systems provide a focused view on relevant business activities • Data domains and metrics which are harmonised between several organisational units • Well-known overlaps with regards to content exist in the BI systems. A consistent enterprise truth is the aim. • Integrated use of information by several organisational units • Identification of interdependencies, based on analytical information • Manual access to analytical information during the execution of business processes	• Process focused perspective • Enterprise-wide key figure model • Support of agility by decentralised metrics while ensuring consistency of enterprise-wide metric systems • Analytical information is considered as corporate asset and can be used in operational applications • Use of pre-packaged solutions for defined use cases • Provision of information is focused on the support of specific processes • Monitoring of business processes by means of analytical right-time information • Displacement of standard reports by ad hoc analysis and advanced analytics	• Enterprise-wide consistent business semantics • BI as the foundation of all decisions • Information delivered by BI is core to all decisions and therefore has critical impact on the business success • Usage by all organisational units and across all hierarchy levels • Short reaction times (low decision latencies) • Integration of strategic and operational control information in terms of a complete CPM control cycle • Automated business processes use analytical information (active decision support)

Information architecture – Scope – Penetration level

Figure 14: Maturity levels in the functional perspective

Organisation

Aspects of the structural and process organisation as well as the governance necessary for the technological and functional set-up and operation of a BI environment are explained in the "Organisation" perspective. The characteristics of this perspective are summarised in the following investigation fields:

- BI management:
  Strategic alignment, setting the BI service and product portfolio, overall BI governance, controlling the profitability of the BI initiative
- Customer management:
  Advice and support for internal and possibly external BI users, coordination of the requirements process and stipulating the BI services
- Data governance & information management:
  Ensuring the relevance, quality, consistency, security and up-to-date nature of the information provided
- Application & infrastructure management:
  Design of the development process and operational organisation for the BI applications
- Supplier management:
  Ensuring the efficient and effective provision of the necessary services (in particular external resources, licences, hardware) for developing and operating the BI applications

The organisation of the production and use of analytical information is chaotic in nature at maturity level one "individual single initiatives". Typically without regulation and in isolation, employees use the information available to them as required. As a result of the lack of definitions and data quality rules, the analysis generated has low credibility and frequently contradicts itself.

Level two "project" gives the BI development a framework which can, however, vary individually for each project and generally does not consider the operation of the solutions produced. A weakness here is the fundamentally temporary character of projects that does not take into account the inherent volatility of BI solutions. In addition, the isolated, unaligned implementation of the individual requirements opposes the integrative character of BI.

At maturity level three there is a concentration of BI activities in one or more, and possibly decentralised BI teams. These permanent teams ensure the alignment of the BI initiative with the IT strategy. They are responsible for the development and operation of the BI environment and ensure the consolidation and prioritisation of the requirements.

At level four the particular requirements of BI lead to a BI-specific organisational model. While at level 3 standard IT processes ensured stability, at level 4 specific BI processes cater for enterprise-wide consistent and holistic information. This organisation now takes into account the tension between IT's desire for standardisation and industrialisation and the business demand for the greatest possible flexibility.

Level five characterises the "service-oriented BI organisation". BI is offered in the form of services from a defined portfolio of BI services. Binding processes and roles have been established to provide the service. The generally recognised importance of "data" as an asset and the increasing congruence between the operational and analytical system world is expressed by the fact that the relevant roles involve both the business and IT sides and act across systems.

An overview of the key characteristics for the individual maturity levels for the "Organisation" perspective is provided in *Figure 15.*

Individual single initiative	Project	BI team	BI specific processes	Service-oriented BI organisation
• Chaotic character: no BI-specific roles and organisational units • No information about costs and benefits for reporting • Analysis is conducted ad-hoc, not coordinated, and initiated by single users • The level of data quality is not transparent, problems are rather accidentally identified • Data analysis is driven by situations and is conducted isolated by single employees • Informal process organisation, no standardised and documented methodology	• Isolated project responsibility on business side • Relevant processes are established and are applied frequently • Project-related and cost-oriented profitability calculations • Informal structures for support and coordination of requirements • Increasing autonomy of the business side (power users) • Analysis of source data during the development stage • Project organisation aligned to (further) development • No regular operations with well-defined availabilty • Engagement of external specialists	• BI-specific, where required decentralised IT organisational structure with well-defined responsibilities • BI is aligned to the IT strategy • IT focused, standardised, and documented processes are established • Charging based on simple allocation rules (e.g. used CPU time or storage) • Requirements process according to IT governance • Controlled availability • Data owners/stewards exist on business side; however, formal processes are missing • Separation of development and operations • Guidance by ITIL • External assignment of projects • Well-defined IT supplier portfolio	• BI specific governance processes are established and controlled quantitatively • BI development aligned to BI strategy and BI roadmap • Benefit-oriented profitability calculations for the BI programme • Well-established BI programme management • BI products with fixed prices and SLA • Proactive validation and positioning of new methods and technologies • Business and technical data owners exist. Rights and duties are mandatory according to a data governance • DQM with predefined quality levels and closed loop process with/to data suppliers • BI specific, where applicable agile development methodology • BI services with high availability • Business-oriented issue management • Well-defined BI supplier portfolio	• Mandatory processes are established enterprise-wide and integrate IT as well as the business side • Continuous process improvement, based on monitoring and innovation • A well-defined BI service portfolio with service-oriented cost allocation exists • The data ownership with business and technical data owners/stewards is enterprise-wide effective – for analytical systems as well as for operational systems • Integration of data scientists in order to support top management decisions • Complete model driven design process for BI • Best-fit sourcing
BI mgmt – Customer mgmt – Data governance & information mgmt – Application mgmt – Supplier mgmt				

Figure 15: Maturity levels in the organisational perspective

Technology

The "Technology" perspective focuses on the quality and flexibility of the architecture. This is combined with a focus on the fundamental infrastructure, quality and functionality of the BI solution for reporting and analysis purposes, data architecture and data integration, as well as the extent of the standardisation of the components involved. The characteristics of the "Technology" perspective are specified within the following investigation fields:

- Architecture & infrastructure:
  Efficient interaction and design of the technical components and tools within the BI environment

- Data management:
  Data management and integration, data quality, metadata and master data management and their BI-specific design

- Reporting & analytics:
  Reporting, analysis and planning functions, as well as distribution routes and formats supported by the BI solution

The first maturity level envisages "data anarchy" from a technical perspective as there is no dedicated data storage to support decision-making. The data required to create the reports is extracted and prepared manually for each situation by the relevant operational system. Analysis based on historical data stocks is therefore possible as long as the operational systems contain historical data. The data analysis generally takes place with high manual effort, individually and without the use of dedicated BI tools. Data provision and analysis takes place using classical components of office software (spreadsheets, presentation software and word processing).

Maturity level two "decentralised data marts" envisages the creation of information silos without integration in a cross-departmental context. This level is typically characterised by the use of multiple tools, development paradigms, databases, etc across different BI systems. From a company perspective this produces redundancies in the technologies and duplicate functions in the tools used. Data storage is generally implemented in the form of independent data marts that are frequently operated directly by the business departments without clear separation between productive and development systems. In addition to tools for standard and ad-hoc reporting, OLAP tools are also available for the analysis.

Level three "integrated data warehousing" postulates the implementation of a consolidated, scalable data warehouse environment that is ideally oriented to the enterprise data warehouse. The aim is to harmonise all of the decision-relevant data in a few or one central data store(s) and save it there in an integrated manner; this is then used to provide data for different applications ("hub and spoke" architecture) in a decentralised manner. The centralised approach is usually accompanied by the standardisation and modularisation of the previously highly heterogeneous tool and technology environment of the BI solution. So there is generally a wide range of BI functions available. The data management and provision processes are typically automated and standardised.

Maturity level four "transparency through logical integration" focuses on flexibility. In general, special use cases can no longer be implemented in the centralised approach of the previous level with the result that other analytical platforms supplement the existing data warehouse environment. There is a conscious decision to not integrate the data physically. However, in order to create data transparency, cross-section tasks, such as metadata, data quality management and master data management, are professionalised.

Level five "use case driven architecture" links to the use case-driven service concept. Here individual services can be offered on the basis of orchestrated architecture elements. This implies that data access is possible across all layers and data pools. At this level the traditional operational and analytical system limits finally disappear and the polystructured data is completely integrated.

An overview of the key characteristics for the individual maturity levels for the "Technology" perspective is provided in *Figure 16.*

Data anarchy	Decentralised data marts	Integrated data warehousing	Transparency by logical integration	Use case driven architecture
• No dedicated systems for data provision and data analysis for decision support • Analysis is based on operational systems or file exports • No dedicated BI tools • Use of traditional office software (in particular spreadsheet calculation) • Manual analysis with individual formatting • Manual data exports • Manual and not standardised data transformations	• Analysis on independent data marts with its own data storage (stove-piped systems) • Heterogeneous tool landscape and technical infrastructure • Sporadic separation between production and development infrastructure • Information analysis in standard and ad hoc systems • OLAP tools offer data analysis options • Automated data integration and report generation • Manual data quality checks • Paper-based metadata	• Data consolidation in data warehouses or in a dedicated enterprise DWH • Reuse of functions, based on standardisation and modularisation • Consolidated tool and infrastructure portfolio • Dedicated production, test, and development environments • Automated report generation and distribution • Standardised spectrum of BI functions in standard/ad-hoc systems • Stabilisation by automated data population and DQM tools • Use of a metadata repository with focus on technical metadata • Centralised management in BI for relevant master data	• Agile decision support in a dynamic market environment, based on self-service BI and analytical sandboxes • Support of dedicated right time warehousing • High availability of BI systems • Use case oriented BI tool portfolio • Focus on dedicated CPM technologies • Transparent information offerings by logically integrated core entities • Highly scalable support of polystructured data • DQ automation • Linkage of business and technical metadata • Use of operational master data management • Integration of analytical data in operational systems • Justified and transparent data redundancies	• Flexible overall solution, based on orchestrated architecture elements • Convergence of operational and analytical standard applications • Operational BI • Virtualisation of the infrastructure • Logical integration for transparent data access across all layers and data pools • Integrated processing of polystructured data

Architecture & infrastructure – Data management – Reporting & analytics

Figure 16: Maturity levels in the technical perspective

Part 3

Status quo of the maturity levels of BI environments

Functionality (3.2) has the highest maturity level followed by Technology (3.0) and Organisation (2.8)

The results of the study show that the maturity levels of the BI solutions are not significantly different across the three perspectives of "Functionality", "Organisation" and "Technology" (see Figure 17). "Functionality" currently achieves the highest maturity level with a value of 3.2. The "Technology" perspective is just behind with an average maturity level of 3.0. The "Organisation" perspective comes off worse with a maturity level of 2.8.

On average the companies achieve maturity level three in the three perspectives

On average BI solutions are therefore at maturity level three "Information Integration" in each perspective. This level is characterised by the claim of creating a company-wide BI environment with far-reaching standardisation and integration of the tool and technology environment, data and functions, as well as regulated availability. With regard to "Functionality", a cross-departmental harmonisation of the functional semantics (e.g. key performance indicator definitions) is desired, while the establishment of one or more decentralised BI teams is desired in the "Organisation" perspective.

The country comparison only reveals slight differences

The country comparison reveals a highly uniform distribution of maturity levels overall and in particular for the "Technology" perspective *(see Figure 17).* But there are a few interesting differences that should be highlighted. Poland and Great Britain are behind in the "Organisation" perspective, whereas France and Scandinavia have particularly good scores here. In addition, France and Great Britain have slightly lower scores for the "Functionality" perspective, whereas the DACH region scores particularly well here.

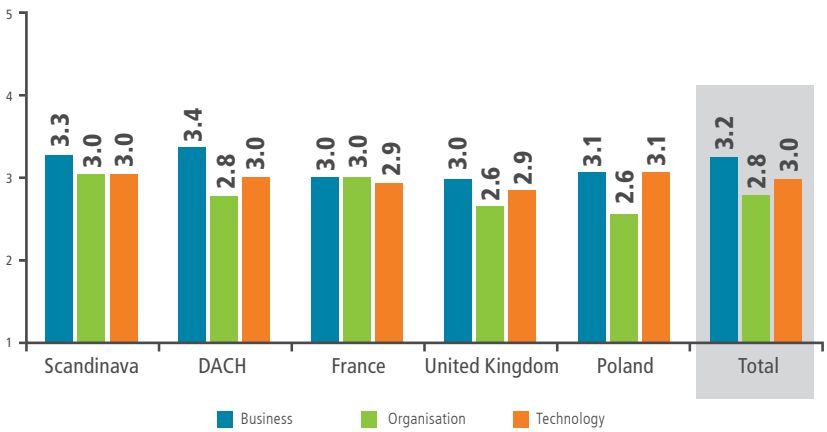


Figure 17: Maturity levels in the three perspectives by country and total (n=480)

The maturing of BI is stagnating

The majority (59%) of companies in the "Functionality" perspective are currently at maturity level three ("Information Integration") *(see Figure 18).* The second and fourth levels (8 % and 33 %) form the outer edges of the maturity level scale because the first level is no longer represented and the fifth has yet to be achieved. It is noticeable that in the "Functionality" perspective an above average number of companies have already reached level four and only a very few are still stuck at level two. It becomes clear from a functional perspective that the ever wider BI user community is placing increasingly complex requirements on BI, but these are not being adequately addressed at present either from an organisational or a technological perspective. In this regard it is not surprising that many BI initiatives are currently (again) being initiated in the different business departments which support special BI use cases with their own infrastructure and data supply.

In the Functionality perspective it is much easier for companies to reach level four than in other perspectives

The majority of the survey respondents' BI solutions (53 %) are currently at maturity level three for the "Organisation" perspective *(see Figure 18).* Around a quarter of companies are still at the second level of maturity. The rest are distributed across the first and fourth maturity levels (4 % and 16 %), whereas none of them are at the fifth level. When compared with the other two perspectives, a higher than average number of companies are at maturity levels one or two. Only a very few companies take BI-specific processes into account organisationally and modify their structures and processes to the specific BI requirements (level four). They are either oriented to the IT standards (level three) or there is still a project-related organisational form in use (level two).

The "Organisation" perspective represents the key to a successful BI programme by providing transparency on all BI initiatives. By establishing central coordination, the alignment of BI with the overall corporate goals and the BI strategy can be assured in the long term, thus supporting the sustainable benefits of BI investments.

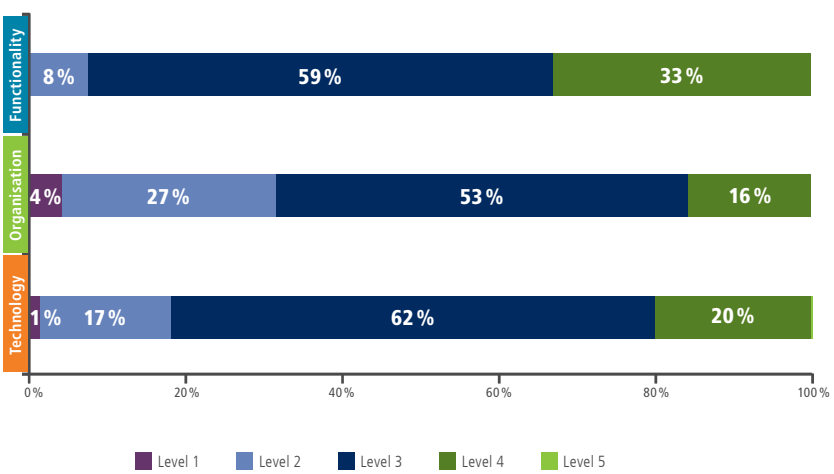


Figure 18: Maturity level distribution in the three perspectives (n=480)

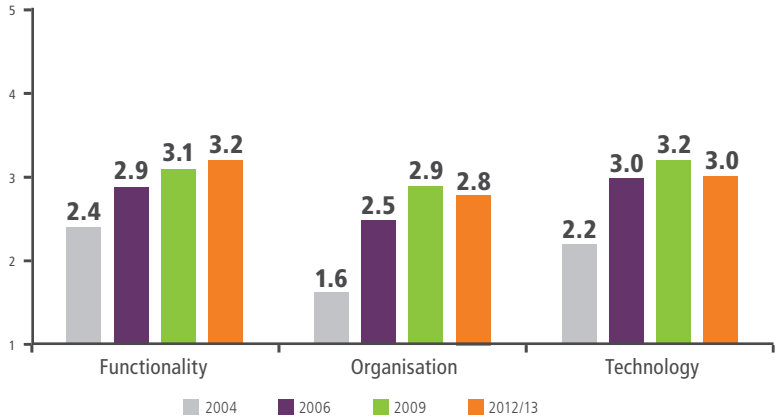


Figure 19: Maturity level in the three perspectives: Comparison 2004, 2006, 2009 and 2012/13 for the DACH region (n=different bases)

The maturity level of the "Technology" perspective resides between "Functionality" and "Organisation". In contrast to the "Organisation" perspective, significantly more (62%) companies have reached maturity level three in the "Technology" perspective *(see Figure 18).* However, companies are finding it difficult to reach level four. There is an ideal level three scenario in which we see complete integration of all data sources to form a central architecture with a high level of procedural, technical standardisation in order to satisfy all the BI requirements. However, on closer inspection this scenario has proved to be a complicated and frequently unsuccessful ambition. It can be compared with Don Quixote's fight against windmills. The discovery process and deciding up to which level the centralised approach should be used for which data and architectures appears to be problematic. The same applies to the decision on how a flexible and agile BI architecture should be designed to provide users with adequate self-service functions.

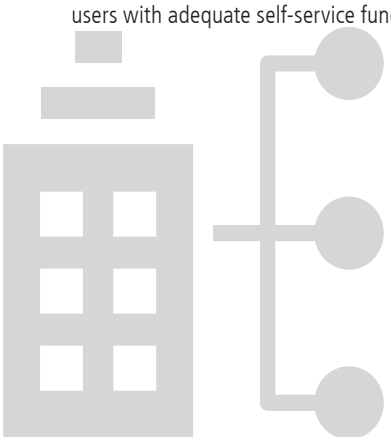


Figure 19 shows the history of the three perspectives for the DACH region. Despite a slow-down in 2009 there had been a continuous increase in all perspectives. Now, however, we are seeing a certain amount of stagnation occurring. The narrowing of the three perspectives in 2009 has not continued. Rather the perspectives are moving further apart. It is noticeable in particular that the parallel progress of the "Functionality" and "Technology" perspectives no longer exists. The progress in the "Functionality" perspective leads us to conclude that the acceptance of BI to support specific issues has risen continuously over the past few years with investment in expanding the functional uses. The area of use of BI was extended by additional corporate departments using the BI solution (horizontal expansion). But companies have not really been able to exploit the potential arising from analytical assessment options. There is still room for improvement, particularly when it comes to the beneficial use of the information provided within the business processes, (vertical expansion) *(see Part 6).*

The "Technology" perspective no longer progresses in parallel with the functionality perspective

The "Organisation" perspective has on average a current maturity level of 2.8 and, as in 2004 and 2009, has therefore the lowest value of the three perspectives. Whereas in 2009 the companies still saw a relatively large development jump, a slight fall can currently be seen. This indicates an increased number of unaligned departmental BI initiatives. In 2009 the focus was on setting up and expanding the BI organisation. This resulted in standardisation and centralisation accompanied by professionalisation of the development and operation of the BI solutions. The development and operational implementation of the concept of the Business Intelligence competence centre (BICC) has been discussed intensively in recent years but has frequently become bogged down in implementation, not least due to political reasons. Consequently such subjects as the BI strategy, BI governance, ensuring the relevance and up-to-date nature of the information provided etc. have not been driven forward further in the organisational arrangements.

The objective to establish the technical prerequisites for expanding the functional usage of BI has not been met. Although the analysis functions have been expanded moderately, there has been no improvement in the areas of data quality and master and metadata management whatsoever. The technical architecture has frequently proven to be too rigid to provide the flexibility and agility demanded by users. That is why different departments and users frequently use decentralised BI solutions. The maturity level is slightly lower when compared with 2009, meaning that the "Technology" perspective has lost the top position among the three perspectives it has occupied since 2006. Without doubt there is a wide range of varied and innovative technologies on the market. However, companies are lacking the concepts of and ability to integrate the technical innovations in their existing BI environment in a consistent manner that meets all of the requirements. This assessment matches the statements on budget distribution *(see Figure 7)* whereby in particular the newly added software tools (e.g. data discovery tools) tend to increase the complexity level of the existing BI environments and thus reduce the technological maturity level.

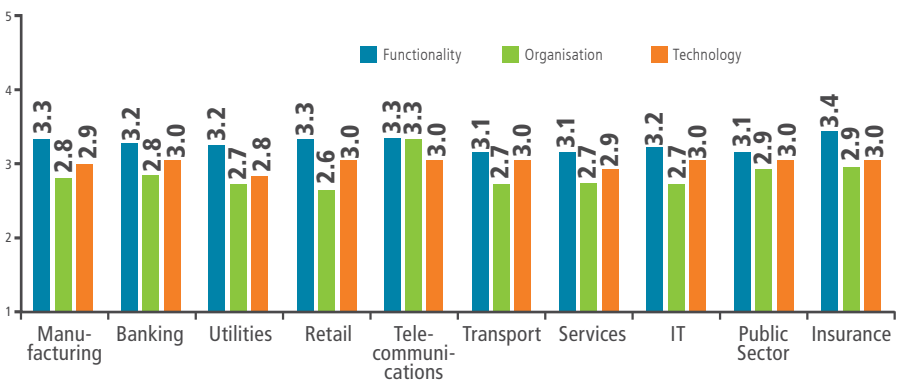


Figure 20: Industry-specific maturity levels (n = 480)

Significant industry-specific differences have almost disappeared completely

From as early as 2009, the industry-specific differences in BI maturity were diminishing within the German-speaking countries. In 2012, these differences have nearly vanished according to the European survey. All industries are currently at level three "Information Integration" in the various perspectives. Even in particularly competitive and data-intensive industries, such as the telecommunications industry where there are individual very progressive companies, on average there is a similar result within and between the industries.

The horizontal distribution of BI has progressed further than the vertical penetration

Looking at the distribution of maturity levels with regard to the different investigation fields *(see Figure 21),* the comparison of scope and level of process penetration is particularly striking. Whereas 69 % of participants have reached at least level four with regard to BI's scope, only 45 % have reached level four when looking at the process integration of BI. Horizontal distribution across the application areas of BI has progressed much more strongly than vertical process penetration. This means It can be concluded that BI's emphasis is on the provision of versatile information while data's application and seamless integration in business processes is widely neglected.

When producing and distributing BI information, it's still volume over quality

Within the "Organisation" perspective the investigation fields "Data governance & Information Management", and "Apllication & Infrastructure Management" are far behind the others. In these two investigation fields, close to 50 % of participants have not yet reached maturity level three. The comparatively poor results for the

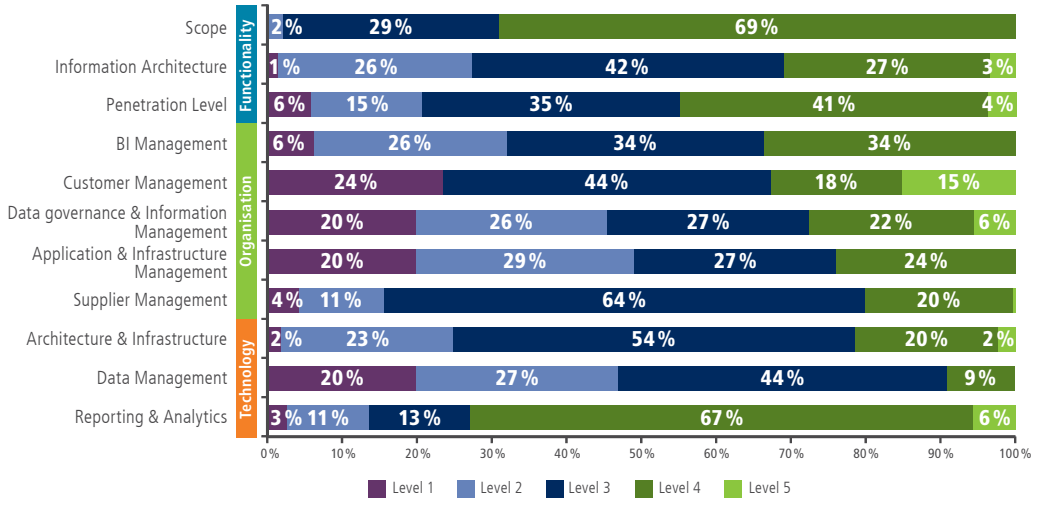


Figure 21: Maturity level distribution by investigation field for all perspectives (n = 478)

Data governance & Information Management investigation field imply that the organisational measures in place are not taking good enough account of securing the relevance, quality, consistency, security and up-to-date nature of the information provided. It is clear that the subject of DQM is not adequately addressed by the BI organisation due to incomplete or non-existent specific BI governance. The below average grade for the application & infrastructure management investigation field is based on the frequent use of non-BI specific development processes and non-standardised BI operation organisations. This can be observed in particular for BI initiatives that are created and operated non-centrally and separately from IT.

The data management investigation field shows the greatest room for improvement from the "Technology" perspective. This is due to the number of companies that have not yet standardised and industrialised their data integration. Notably, they are seriously neglecting master data and metadata management. Indeed, dedicated master data management frequently doesn't even exist, yet it is vital for ensuring current and consistent data. There is also a lack of transparency with regard to the availability and quality of data within the "Technology" perspective data management investigation field. One of the reasons for this is a failure to link both the functional and technical metadata.

Moving on to the architecture & infrastructure investigation field, we can see that many companies now have a mature technical infrastructure. However, their investments in BI infrastructure are put at risk by the lack of effective BI governance. The potential danger here is that the analysis provided by the BI systems is only as valid as the data on which it is based and the benefit derived from BI stands and falls on well thought out data management.

Part 4

Functional potential of BI solutions is not being fully realised

The "functional" perspective takes a look at the scope if BI within the enterprise, the level of BI's integration in the business processes and the information architecture. This chapter provides a detailed presentation of the analysis results for each of these investigation fields.

BI too often limited to traditional reporting

The "scope" investigation field covers questions about the supported application areas (use cases), the various user groups and the improvements pursued by performance management initiatives.

Companies only make restricted use of BI

As in previous studies, the participants were asked about the processes supported. It is not surprising that the majority of the companies surveyed still use the BI solution for internal reporting (83 %), thus maintaining its top position from 2009 *(see Table 2)*.

In many companies BI is identical with internal reporting

There is then a significant gap before we get to planning and budgeting (52%), sales control, divisional/group controlling (each 50 %) and corporate management (48 %). It is notable that the range of applications of BI correlates with the company's size. Whereas small companies primarily use BI systems in very specific areas, such as planning and budgeting, sales management and internal reporting, large companies generally make much more comprehensive use of their BI environment.

Above all, the opportunities for analysing existing (internal and external) data within risk management are not being seized. This also applies to the use of simulations in order to improve the decision-making process and provide analytical evidence of opportunities and threats.

Information potentially available in BI for additional use cases is not being gathered

Inadequate use of the options provided by BI in cost and profit accounting

Significantly, it is known that BI applications offer extended functionality and enriched data compared with the ERP applications in place. Despite this, BI is seldom used to support internal accounting processes, such as profitability analysis.

Fewer than half of the large companies surveyed used BI for external reports. Potential synergies for improving finance processes are not exploited. For example, companies accept duplicated effort in the the report creation process. Furthermore, automation potential often remains unused.

Internal and external reporting still remain in technically different worlds

	Total	Less than 250	251–2,500	2,501–10,000	Over 10,000
Internal reporting	83 %	79 %	89 %	84 %	78 %
Planning and budgeting	52 %	40 %	53 %	53 %	59 %
Salesforce management	50 %	50 %	50 %	49 %	49 %
Division/corporate controlling	50 %	30 %	47 %	54 %	66 %
Business management/ balanced scorecards	48 %	39 %	42 %	53 %	56 %
External reporting	38 %	30 %	33 %	43 %	46 %
Profitability analysis	38 %	35 %	33 %	42 %	40 %
Contribution margin analysis	37 %	31 %	37 %	40 %	40 %
Customer management	37 %	39 %	35 %	36 %	38 %
Quality analysis	30 %	24 %	29 %	30 %	39 %
Risk management	29 %	25 %	21 %	31 %	40 %
Business consolidation	29 %	16 %	23 %	36 %	39 %
Production management and control	27 %	18 %	28 %	22 %	37 %
Campaign management	25 %	28 %	22 %	23 %	28 %
Simulation	19 %	10 %	17 %	20 %	28 %
Compliance (e.g. Basel II, Solvency II)	16 %	10 %	13 %	18 %	25 %
Other	3 %	4 %	3 %	0 %	5 %

Table 2: Supported application fields or business processes by company size (employee numbers) (n=473)

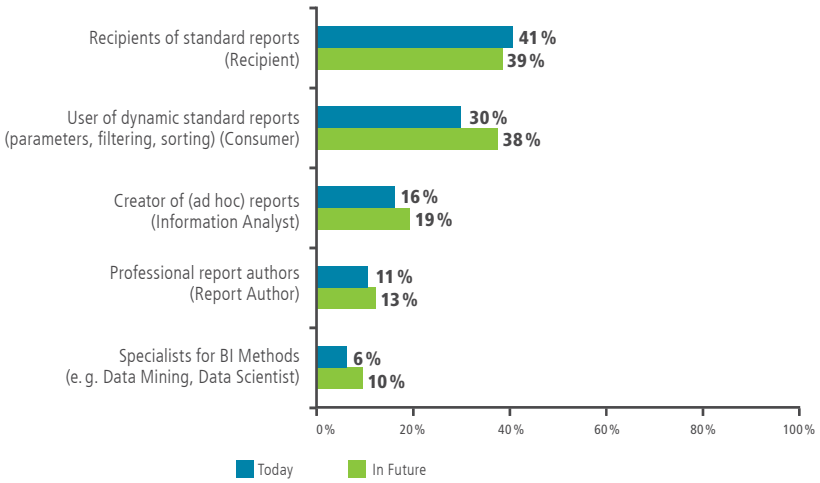


Figure 22: User groups (n = 246)

The current and future distribution of various user groups is shown in *Figure 22.*

There is a moderate trend towards more self-service users

Most BI users still receive static standard reports. This means that they are simply passive report recipients (41 %). But the participants forecast a future trend of more independent and active use. This result reflects the determined efforts to move towards self-service BI. So slight growth is expected in all categories that permit or require more or less independent analysis. The need for BI specialists is estimated at correspondingly high levels. They conduct complex analyses on the basis of statistical processes, a deep understanding of the company-specific issues and available data to produce decision-making templates that meet management requirements. The percentage of data scientists who support management decisions as internal consultants with proactive data analyses is expected to almost double – from currently 6 % to 10 % in future. It remains to be seen whether these plans will actually be realised. This is especially so because well-educated data scientists are currently an extremely scarce and expensive resource in the employment market and companies are complaining about a lack of internal expertise (24 %).

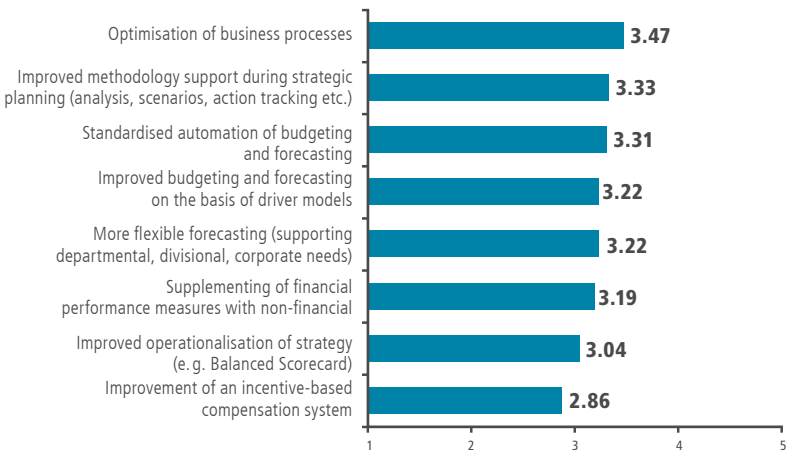


Figure 23: Desired improvements using performance management initiatives, scale from 1 (low) to 5 (high) (n=275)

The objectives a company sets for performance management were studied within the field of operation investigation *(see Figure 23).*

While improving business processes is considered to be the main target of performance management initiatives (3.47 points out of 5), only slight variations between the other objectives can be detected. The low relevance grade for operationalising strategy and checking target achievement (e.g. using balanced scorecards or incentive-based remuneration) and other factors is interesting. This indicates that the entire closed loop from strategic planning via operational implementation to incentive-oriented control is not yet being afforded the appropriate importance. Improvements in the individual elements of the closed loop, not just on the BI side, are clearly prerequisites of any improvement to the end-to-end process.

The focus of BI initiatives is on operational process improvements

Whereas in the past the issue of strategy implementation, for example with a balanced scorecard, was still viewed as a top issue for BI use cases, the trend is shifting towards standardising and automating processes, improved operational process control and using analyses for strategic planning.

Limited use of BI information as part of the incentive system

The comparatively low importance given to the design of the incentive system, the lever for motivation and improving performance, is significant. BI offers the basis for data to define the relevant KPIs and functionalities needed for the tracking and analysis of target achievements.

Data quality still inadequate

Within the investigation field "information architecture" redundancies, inconsistencies and data quality are being assessed. The participants were therefore asked whether several BI solutions were used and if so, whether they had content overlaps (duplication). The results are shown in *Figure 24.*

Just under 30 % of companies only use one BI system, but on average companies use 3.6 (arith. mean) or 2 (median) BI systems. If several BI solutions exist, 50 % of these have large amounts of similar data. However, these crossovers are not transparent in 20 % of companies. It should be noted that half of the companies have no or only slight information redundancies.

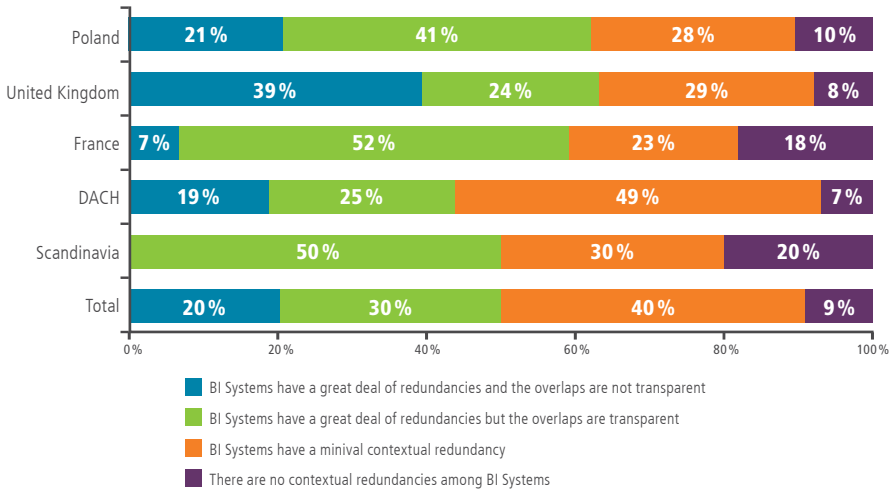


Figure 24: Content crossover of BI systems by country (n = 332)

With regard to the country distribution, clear differences in the intersections of the BI systems and the degree of transparency on redundancies can be observed. Whereas the majority of companies in France and Scandinavia have transparent content crossovers, in Great Britain there is a particularly large set of companies (39 %) with crossovers in the BI systems that are not visible to all. Thus in terms of BI governance, we can see that it is established much more frequently in Scandinavian (81 %) and French companies (47 %) than in British ones (36 %).

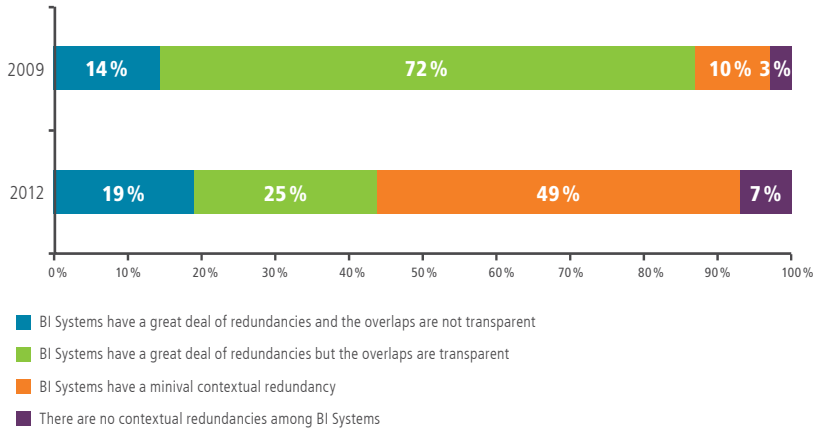


Figure 25: Comparison of content overlaps of BI systems in 2009 and 2012 for the DACH region (n=varies)

There are ever fewer companies with large content crossovers in BI systems in the DACH region

There is also extremely positive development in the DACH region *(see Figure 25)*. Whereas in 2009 there were still large redundancies in over 86 % of companies, in 2012 it was reported to be just 44 %. The consolidation and standardisation measures now implemented have clearly borne fruit.

	Total	Skandi-navia	DACH	France	UK	Poland
Completeness	3.15	3.62	2.89	3.66	3.66	3.57
Clarity	3.15	3.55	2.74	3.81	3.84	3.90
Comprehensive	3.13	3.62	2.73	3.85	3.65	3.98
Uniform representation	3.08	3.85	2.68	3.80	3.64	3.79
Timeliness of data	2.98	3.81	2.49	3.81	3.74	3.72
Accuracy	2.97	3.55	2.43	3.82	3.77	3.93
Credibility/reliability	2.90	3.71	2.36	3.90	3.65	3.68
Relevant/value added	2.81	3.41	2.21	3.72	3.88	3.76
Total	3.02	3.61	2.57	3.80	3.73	3.79

Table 3: Quality of information supply by country, scale from 1 (low) to 5 (good) (n=469)

How companies assess data quality is shown in *Table 3.* With an average value of 3.38, companies are moderately satisfied with their data quality. This indicates that data frequently only has limited value for decision-making. While companies grade the relevance and credibility of their data positively, they view the issues of data completeness, comprehensive use and clarity more critically. There is therefore a need for improvement above all in the complete and transparent recording of corporate data. There is a clear difference of opinion between countries: participants from the DACH region grade their data quality significantly higher than companies in the other regions. This applies in particular to relevance and credibility. Both the centralised approach to data management and the time-consuming, intensive alignment process in the design phase, which represent a trade-off with flexibility, appear to pay off *(see Parts 4 and 5).*

BI process integration still low

With regard to analytical information, there is currently no common usage *(see Figure 26).* Around one third of companies exclusively use the information in the department in which it was generated. Another third also share the information with other departments. Only the last third treat the information gained as a corporate asset by providing it centrally and promoting its exchange at the same time. The country comparison however reveals interesting differences. Whereas companies in Poland, Great Britain and France tend to follow a decentralised approach, companies in the DACH region and Scandinavia tend to have central systems. The central provision of information is found in 43 % of companies in the DACH region and in 39 % of companies in Scandinavia. This compares with significantly less centralisation in Poland (22 %), Great Britain (20 %) and France (25 %). If one rela-

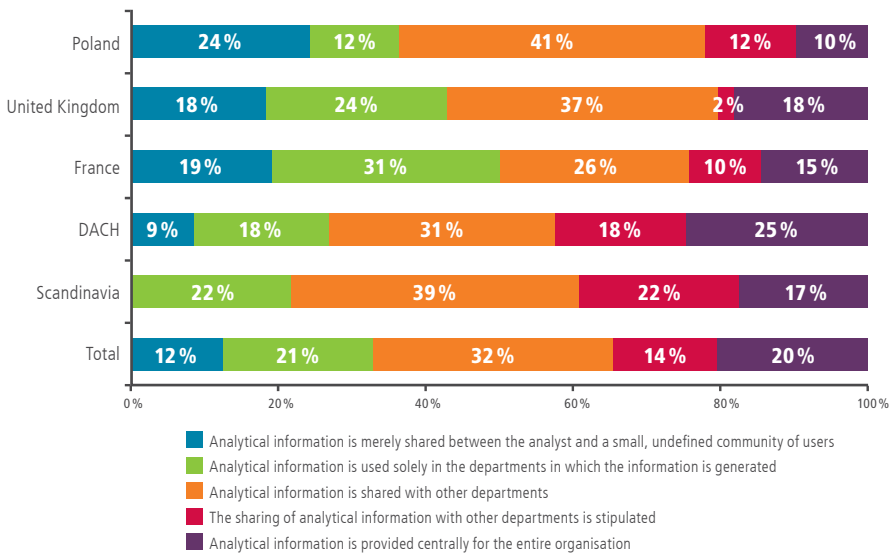


Figure 26: Comprehensive use of analytical information by country (n = 469)

tes these results to the data quality findings, it is clear that the central approach in the DACH region is associated with high data quality.

A BICC, a BI strategy, or BI governance have an extremely positive effect on the use of analytical information

As is clear from *Figure 27,* there is also an association between the exchange of information and the existence of a BICC, BI governance and a BI strategy. If there is no BICC, BI governance or BI strategy, around 40 % of companies only use the information locally via a limited group of recipients, or at best their own department. If in, contrast, there is a BICC, BI governance or BI strategy, in around 40 % of companies there is central provision and the promotion of information exchange.

The participants were also asked how their company uses BI information for managing or implementing business processes *(see Figure 28).*

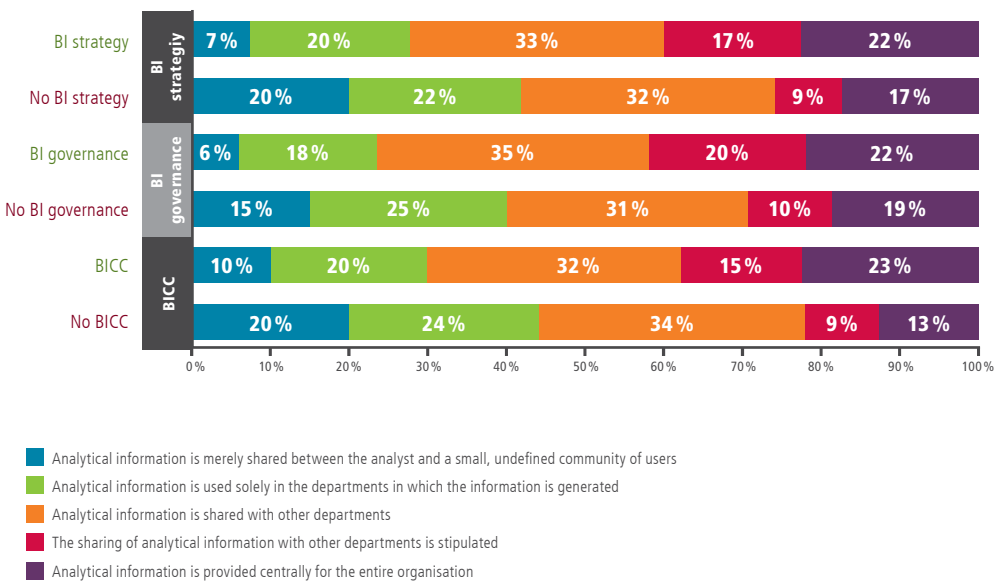


Figure 27: Association between comprehensive use of analytical information and existence of BICC, BI governance or a BI strategy (n=varies)

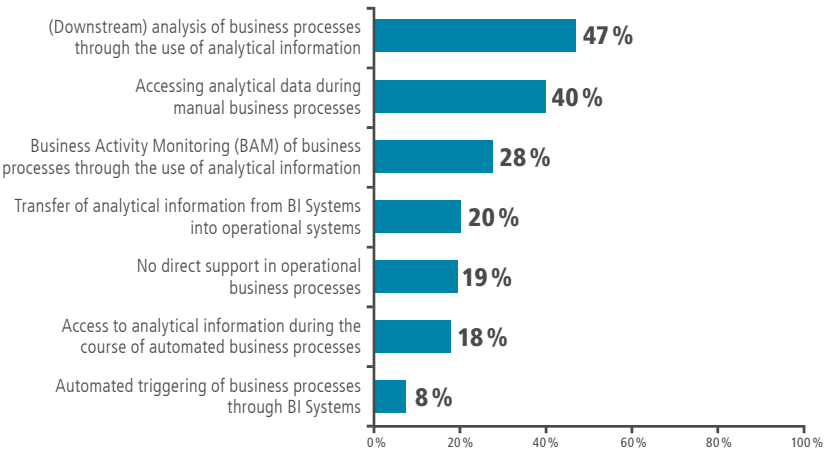


Figure 28: Implementation forms for operational BI (n=288)

Companies only implement the closed loop model of corporate performance management incompletely in spite of the available technological opportunities

It can be seen that the approach of returning analytical information to the operational sys-tems has low dissemination (20 %). The automatic triggering of business processes by BI systems only occurs in individual cases (8 %). Companies mainly use their BI solution for producing reports, analysis, monitoring business processes and as a means of supporting manual business processes. This matches the finding made in *Part 4* that companies' use of the closed loop model of performance management is inadequate.

Table 4 shows that the majority of companies have a standard planning process supported by BI solutions (46 %) in place. The findings also show that the actual business processes lack the necessary flexibility to respond to plan deviations. Budgeting and planning mainly remain manual processes in companies where there is no complete integration of the BI solution. Companies' business processes therefore make ineffective use of the functionality available in the BI solution.

Fewer than half of the companies use pre-defined structures in planning. This gives rise to limited automation within the processes and results in a great deal of planning effort.

Performance management processes in the companies do not provide the necessary flexibility

Reporting and budgeting are used as standard processes without decisive process innovations

Self-service BI is assumed to be of high significance but in practice is often not used to its full extent. Decision-making potential is still not being exploited in terms of improving processes and creating information autonomy for report users.

A holistic, integrated forecasting BI concept is not implemented consistently

The majority of the companies suffer from inflexibility in the forecasting, scenario modelling and action planning processes. Here, BI applications have the potential to offer decisive improvements with regard to automation and adaptability of models to changed environmental conditions.

46 %	Established standards (objects, structures) and templates for budgeting and forecasting exist
43 %	Reporting is available as a self-service process for the users
43 %	Management reporting includes financial, non-financial and qualitative information (specifically explanations of deviations, fields of action)
39 %	Content of management reports varies depending on each situation and the needs of recipients
25 %	Financial planning (especially cash flow) can be derived directly from budgeting and forecasting
24 %	Scenarios are planned during budgeting and/or forecasting
22 %	Budgeting and forecasting are not established as a standard processes
22 %	The forecast horizon is rolling or can be adjusted to meet the respective planning needs
20 %	Forecasting is independent of budgeting process (new planning vs. plan updating) objectives
19 %	The degree of detail and depth in forecasting can be adjusted dynamically
14 %	Forecast timings are determined individually and independent of environment dynamics
14 %	Deviations of key performance indicators from planned targets result in a forecast of the expected trends and subsequent action planning
9 %	Budgeting is a standardised process; no forecasting is undertaken during the year

Table 4: Design of performance management processes in the company (n=227)

Part 5

Organisational shortcomings still identifiable

The intense Business Intelligence Competence Centre (BICC) debate in recent years has shown that a key factor for BI success is an efficient organisational and operational structure beyond project boundaries. Such a structure brings functional and IT departments together in a cooperation that is clearly defined in terms of rights and obligations.

The tasks that need to be completed by a BI organisation are varied. Steria has provided a clear definition of the range of typical tasks with the BI governance Framework (bi**GOV**®). This model serves in the context of the *bi**MA**®* study to divide the "Organisation" perspective into the investigation fields of BI management, Customer management, Data governance & Information Management, Application & Infrastructure Management and Supplier Management. These investigation fields cover topics such as BI strategy, BI governance, cost allocation, data management, demand management process and implementation strategy. The findings from the individual investigation fields for the "Organisation" perspective are set out in detail below.

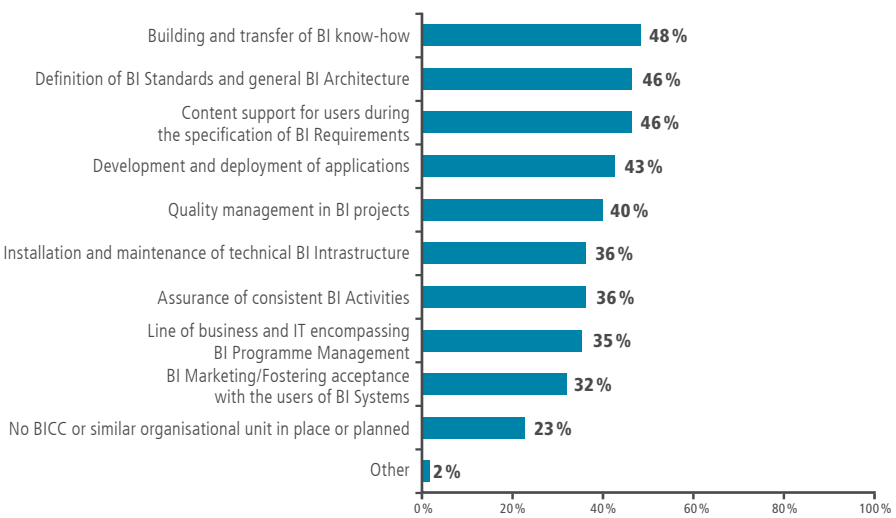


Figure 29: Tasks and competencies of a BICC (n=480)

No holistic view of BI due to lack of BI strategy and BI governance

The BI management investigation field deals with topics such as BI strategy, BI governance and other tasks relating to the holistic alignment, control and monitoring of BI initiatives.

There are BICCs in virtually every company now

The trend to establish BI-specific organisational structures and processes continues. Whilst only just under a quarter of the companies surveyed currently have no dedicated organisational unit (25 % in the DACH region, 23 % globally), in 2009, this figure was 38 % and in 2006, and 62 % in the DACH region.

The companies cited the organisation and development of technical and methodical BI know-how (48 %), the definition of BI standards and a comprehensive BI architecture (46 %), as well as support for users in terms of content in the specification and implementation of BI system requirements (46 %) *(see Figure 29),* as the three most important tasks and competencies of a BICC or similar organisational unit. 40 % of the companies surveyed also not only allocate a managing role to the BICC, but consider it the place where the BI solution is developed and implemented. By contrast, in only just over a third of the companies surveyed is the BICC responsible for the operation of the BI solution, the coordination of BI activities and BI programme management encompassing business departments and IT. The broad distribution of BI throughout the companies challenges the IT capabilities increasingly with numerous complex requirements. Consequently, BI marketing is pushed back into the background.

Analytical information from BI is readily described as a strategic asset. Therefore it seems absolutely essential to develop a long-term, aligned and holistic BI strategy. A BI strategy maps the implication of corporate goals for BI activities and aims to ensure the optimum supply of relevant, analytical information to the company. The *biMA®* study results show, however, that in practice, a highly mixed strategic understanding still prevails and that a BI strategy has not been established by anywhere near all of the companies.

A BI strategy is encountered significantly less often than a BICC

When asked about the implementation status and alignment of their BI strategy, just under half of the companies surveyed indicated that they had not formulated and implemented a dedicated BI strategy (49 %) *(see Figure 30).* However, most companies with a BI strategy ensure that this strategy contains not only technical aspects, but also functional aspects and defines a BI-specific organisation and development structure by providing BI governance from an IT and departmental perspective.

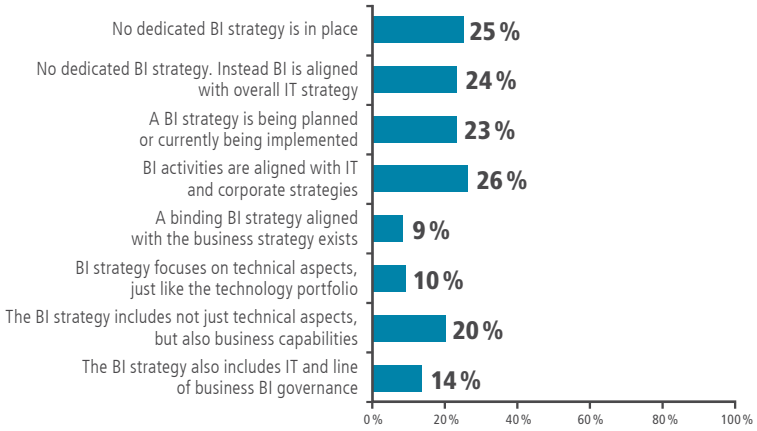


Figure 30: Implementation status and alignment of BI strategy (n = 480)

Only 9 % indicate that they have achieved the maximum maturity level in terms of a BI strategy, namely a binding BI strategy that is aligned with the corporate business strategy.

Quality and content are not the only crucial aspects that need to be considered when assessing the BI strategy. The approach used to define it and the degree to which the various BI stakeholders are involved must also be taken into consideration. In over half the companies (60 %), IT and business departments develop the BI strategy together *(Figure 31).* The need for IT and the business to work together therefore appears to have been recognised.

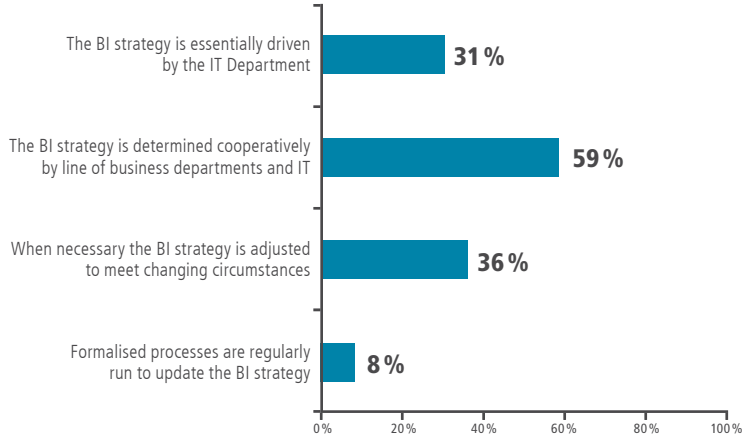


Figure 31: Strategy creation process for BI (n = 284)

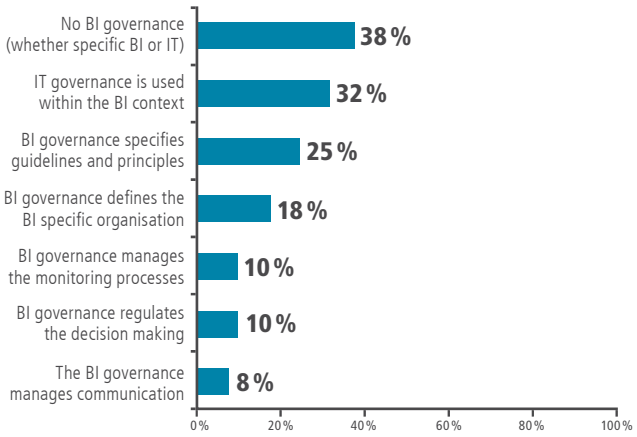


Figure 32: BI governance tasks (n = 429)

70 % of companies either have no BI governance or apply IT governance in a BI context

In addition to an individual organisational unit for BI and the presence of a dedicated BI strategy, the existence of BI governance is a fundamental indicator of a mature BI organisation. BI governance includes the design, establishment and management of guidelines and regulations, organisational structures and processes, roles and responsibilities, as well as comprehensive BI programme management. The aim is the consistent alignment of BI with the BI, IT and corporate strategy. Whilst an organisational unit for BI exists in approximately 75 % of the companies and approximately half have implemented or are planning a dedicated BI strategy, approximately only a third of companies have a dedicated BI governance structure. In cases where there actually is specific BI governance, this sets out preferential specific guidelines and principles for BI development *(see Figure 32).*

Figure 33 and *Figure 34* show the link between the BI strategy and the existence of a BICC or BI governance. If a company has a BI strategy, in some cases without a BICC (40 %) or BI governance (45 %), the opposite scenario is significantly less frequent (31 %) or even non-existent (11 %). This leads to the conclusion that companies first define a BI strategy that contains a basic arrangement of the organisation and governance structure. Detailed rights, obligations, roles and tasks are then set out in the BI governance and, in turn, implemented by the BICC.

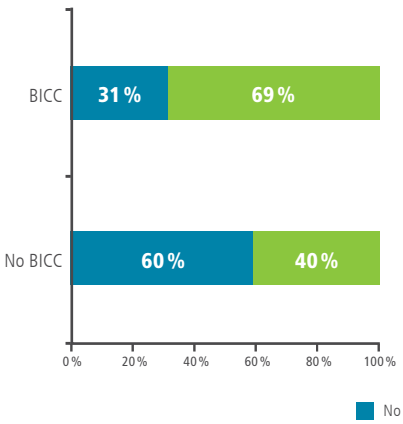


Figure 33: BI strategy according to BICC (n = 479)

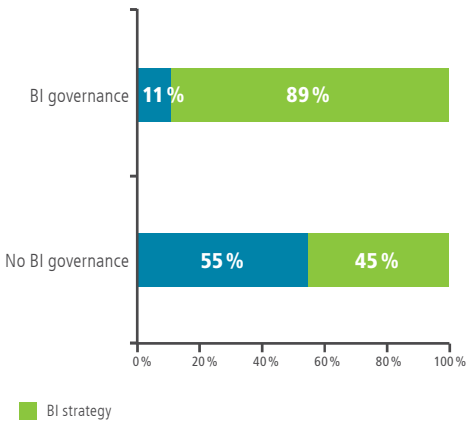


Figure 34: BI strategy according to BI governance (n = 428)

BI-specific allocation models have not yet become accepted

The allocation of costs in BI projects appears to be a problem. 36 % of companies calculate BI expenditure as part of the IT budget without showing BI costs separately *(see Table 5).* 33 % take account of costs only on a flatrate basis as part of IT operating costs. BI-specific forms of cost allocation, such as query run times or the number of reports called, currently play a secondary role. Many of the companies surveyed do not use typical key figures from the area of service management for cost allocation purposes. Such key figures include, for example, the number of incidents and the time required to correct an incident.

The companies clearly see no significant management effect in the distribution of costs and consequently they make the already challenging creation of a convincing BI business case more difficult. If, however, BI governance is already in place, a considerably more differentiated approach to costs and their allocation takes place. Allocation as part of overall IT operations where the costs are not shown separately is observed in a few cases (18 %). Instead, companies apply service models and use-based charging much more frequently.

	Total	BI governance not in place	BI governance in place
Part of overall IT operations without separated line items for BI	36 %	52 %	18 %
Flat rate charge of BI operations as share of IT operating costs	33 %	28 %	37 %
Execution times of database queries	12 %	1 %	23 %
Number of users (perhaps by user class)	12 %	10 %	15 %
Flat rate charge of ‚BI products' (e.g. sales controlling, campaign management)	12 %	7 %	11 %
Personnel time tracking	8 %	10 %	7 %
Number of reports executions	7 %	7 %	7 %
Number of incidents/problems	7 %	1 %	13 %
Number of servers/CPU/cores	6 %	3 %	10 %
Data volume used in database	6 %	4 %	8 %
Cost of correcting incidents/problems	5 %	1 %	7 %
Number of database accesses	4 %	1 %	7 %
Information billing: resource consumption accounting of dedicated BI Services/information assets	3 %	1 %	6 %
Transformation run times	2 %	1 %	1 %
CPU time charge	2 %	0 %	4 %
Other	2 %	3 %	1 %

Table 5: Cost allocation in BI projects overall and according to BI governance (n = 153)

Lack of BI orientation of customer management

The customer management investigation field includes questions about the advice and support given to BI users, in the sense of internal BI customers, as well as about coordination of the request process. The companies surveyed were then asked how request management is organised in their company *(see Figure 35).*

77 % of the companies surveyed use defined processes for request management to support the collection, formulation, evaluation, prioritisation and validation of requests designated for implementation in the BI solution. 44 % of the companies resort to general processes for IT request management. Only 33 % of the companies define a specific process for BI request management. This is either organised as a separate process in the company (18 %) or integrated into IT request management (15 %). Account is then taken of the particularities of BI. Not unsurprising is the fact that larger companies have a larger number of defined processes *(see Figure 35).* However, it is worth noting that the number of companies using general processes for IT request management increases with the size of company. At the same time, the number of companies resorting to BI-specific request management remains more or less the same irrespective of the number of employees.

BI request management is oriented primarily towards standard IT processes

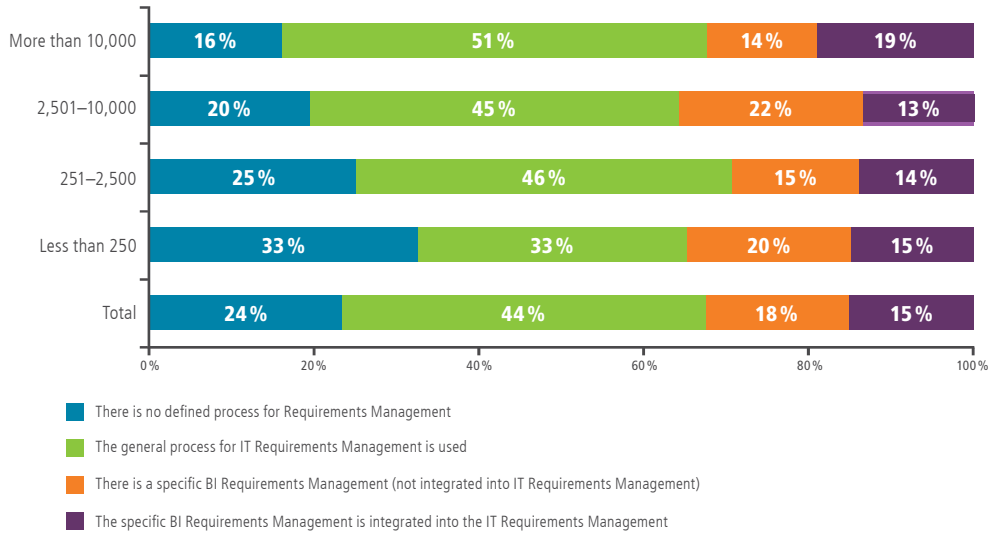


Figure 35: Request management in BI projects according to company size (n = 455)

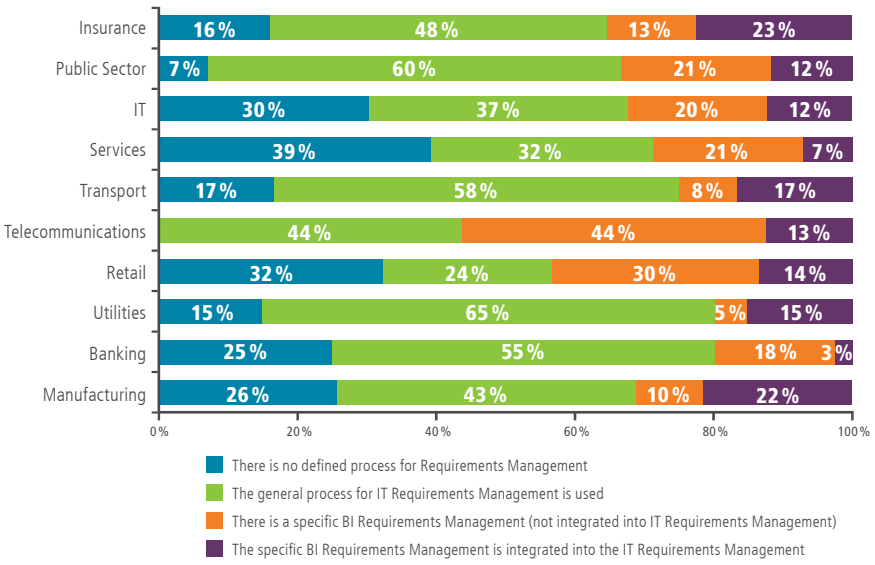


Figure 36: Request management in BI projects according to industry (n=455)

Telecoms companies and the retail industry stand out in the analysis of request management on an industry basis *(see Figure 36).* At 44 %, telecoms companies have by far the largest number of BI-specific processes for request management, followed by the retail industry (30 %). On the other hand, however, 32 % of retailers do not have any defined processes for request management. Both sectors are characterised by high competitive and data intensity. The rapid and flexible evaluation of customer and interaction data thus creates real competitive advantages. Furthermore, *Table 6* illustrates why it is advisable to organise request management as BI specific as possible. Company-wide use of analytical information increases with the BI-specific organisation of request management. Particularly striking are the figures for those companies that have not defined any kind of processes. They make much less use of their analytical information than companies with defined processes. If, by contrast, BI request management is BI-specifically organised and, moreover, is integrated into IT request management, the greater the likelihood is that companies will be in a position to use their information throughout the entire company.

	There is no defined process for Requirements Management	The general process for IT Requirements Management is used	There is a specific BI Requirements Management (not integrated into IT Requirements)	The specific BI Requiremtents Management is integrated into the IT Requirements Management
Analytical information is merely shared between the analyst and a small, undefined community of users	26 %	9 %	6 %	7 %
Analytical information is used solely in the departments in which the information is generated	16 %	26 %	18 %	18 %
Analytical information is shared with other departments	30 %	33 %	38 %	29 %
The sharing of analytical information with other departments is stipulated	13 %	12 %	14 %	21 %
Analytical information is provided centrally for the entire organisation	16 %	20 %	23 %	25 %

Table 6: Comprehensive use of analytical information according to request management in BI projects (n=446)

Data governance and information management still worthy of improvement

As explained in *Part 6* companies are not particularly satisfied with the quality of their data. Often, this is due to the lack of appropriate data governance and information management. In such cases, defined processes and responsibilities are missing.

A data ownership concept sets out, for example, the responsibilities for data objects to ensure consistent definition, data quality, availability and performance. *Figure 37* shows that data ownership is selected as a central theme in 76 % of companies. However, employees both from IT and the business departments are involved in data ownership concepts in only 27 % of companies. A look at the distribution according to country shows

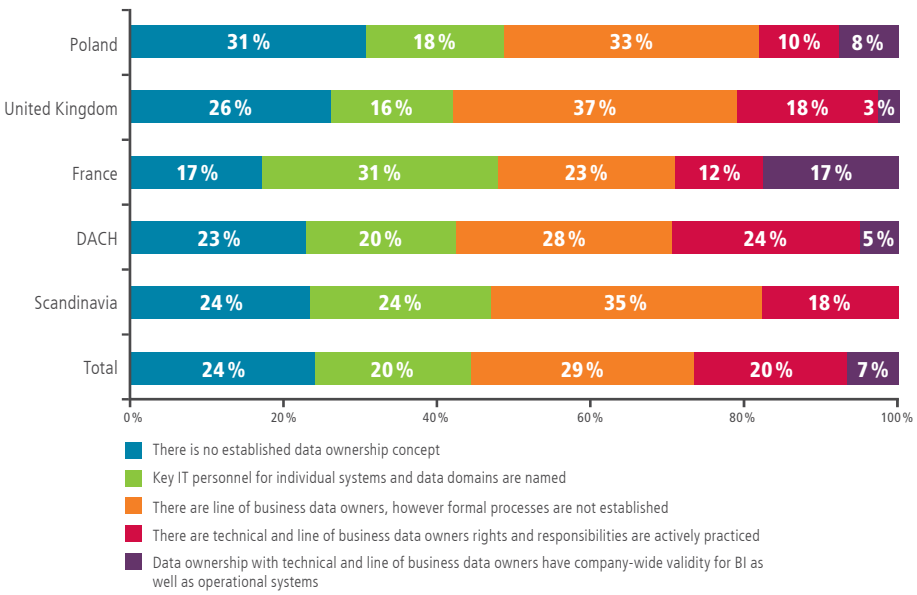


Figure 37: Data ownership according to country (n=403)

that with a figure of 29 %, data governance most often represents a joint task for IT and business departments in France and in the DACH region. With a figure of 17 %, a data ownership concept that is applicable throughout the company is clearly more often in use in France. This includes both operational systems and those used by the business for analytical purposes (analytical systems).

In addition to an obligatory data ownership, further measures to ensure data quality should be put in place. The adoption of these is, however, alarmingly low *(see Table 7)*.

34 % of the companies surveyed indicate that they have no regulated process for data quality management, closely followed by 31 % which indicate that data quality problems are identified in a rather haphazard fashion. It is therefore no wonder that the level of data quality is perceived as non-transparent and extremely inconsistent. The dissatisfaction of end users therefore results in particular from a data quality process that is not fully comprehensive. The pioneers in this respect are the Scandinavian countries. In 35 % of the companies surveyed from Scandinavia, data profiling is used within the

Unsatisfactory data quality is the direct consequence of a lack of processes and responsibility for data quality management

	Total	Scandi-navia	DACH	France	UK	Poland
There is no structured DQM process	34 %	10 %	35 %	23 %	54 %	35 %
Data quality problems are discovered accidentally	31 %	20 %	35 %	32 %	10 %	35 %
The level of data quality is not transparent and very heterogeneous	28 %	20 %	30 %	34 %	10 %	25 %
Data profiling during development is the basis for implemented error handling	19 %	35 %	15 %	17 %	12 %	13 %
There are clear IT Guidelines as to the level of quality as well as the utilised methods	16 %	30 %	10 %	15 %	10 %	5 %
Roles and processes are system or department specific	11 %	10 %	19 %	21 %	20 %	20 %
There are binding standards and guidelines for the capture and administration of data	11 %	10 %	12 %	13 %	2 %	18 %
Data quality is aligned using SLAs (Service Level Agreement) with users	11 %	15 %	6 %	6 %	7 %	13 %
In a closed loop approach data quality problems are identified in DWH systems and mirrored back to source systems where they are corrected	7 %	10 %	12 %	9 %	7 %	8 %
There are OLA (Operation Level Agreement) with those responsible for source data	6 %	5 %	4 %	6 %	5 %	0 %
Binding processes (perhaps a centralised Master Data Management) are in place company-wide and include IT as well as line of business departments	4 %	0 %	8 %	6 %	0 %	5 %

Table 7: Data quality management (DQM) in companies according to country (n=419)

development process. Furthermore, 30 % have clear IT guidelines regarding both the level of quality targeted and the mandatory methods used.

A look at the industries shows that telecoms companies are ahead in terms of data quality management: just 13 % have no data quality management system in place.

Lack of BI specifics in development and operational process

The organisation of development and operational processes for BI applications is the focus of the application & infrastructure management investigation field. Projects are given a framework using procedural models. This framework defines the processes and deliverables so that BI projects can be planned and managed in a uniform manner. This generally has a positive effect on the quality of the BI solution. Users are more satisfied and BI solutions are better accepted. The companies surveyed were therefore asked whether they resort to a specific procedural model for BI projects and if so, which one.

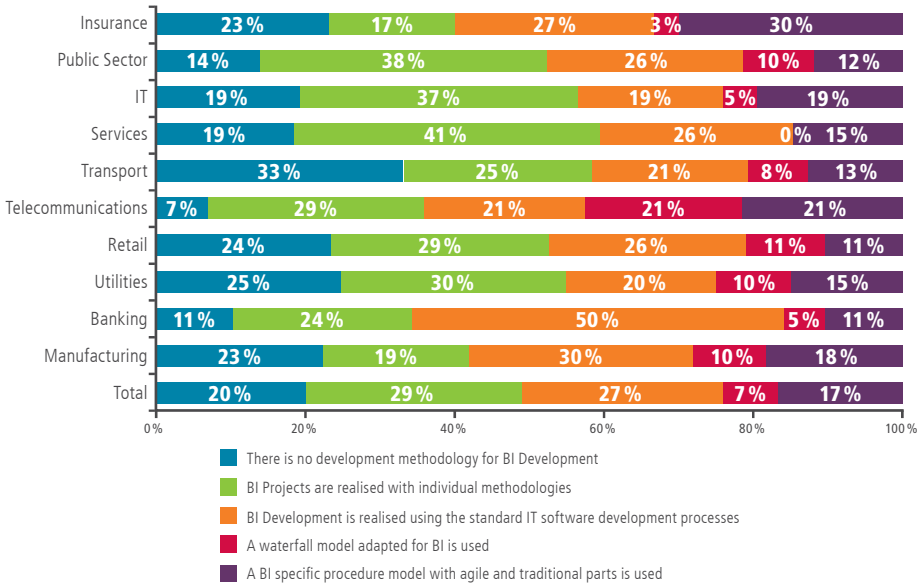


Figure 38: Procedural model for BI projects according to industry (n = 452)

Companies rarely achieve sustainable benefits through BI since BI is geared towards standard IT processes and structures

The majority of companies use a procedural model for BI projects (80 %) *(see Figure 38).* BI-specific methods, however, are still seldom used (24 %). Obviously, the companies still have difficulties in adapting their software development processes to BI specifics. Telecoms companies in particular resort frequently to BI-specific methods (42 %). Standard IT processes on the other hand are used most frequently in the banking sector (50 %).

New sourcing options in focus

The supplier management investigation field deals with the efficient and effective provision of the services required for the development and operation of BI applications. *Figure 39* shows how the tasks for development and operation are distributed in the companies.

Cost aspects are driving the search for new soucing options

In-house development and operation of BI solutions currently appear to be the predominant sourcing strategy. In the future, the companies surveyed are expecting greater use of shared service centres in addition to increased near- and offshoring, which appear to be developing into a real alternative in terms of BI.

Overall, current cost pressure is leading to companies turning to sourcing options beyond in-house solutions. The above-average use of near- and offshoring in the telecoms and services sectors must be highlighted. Telecoms companies began outsourcing the development and operation of IT to near- and offshore providers at a very early stage. It is no wonder then that they are more open to these alternatives for BI. Banks and insurance companies on the other hand are acting much more cautiously here.

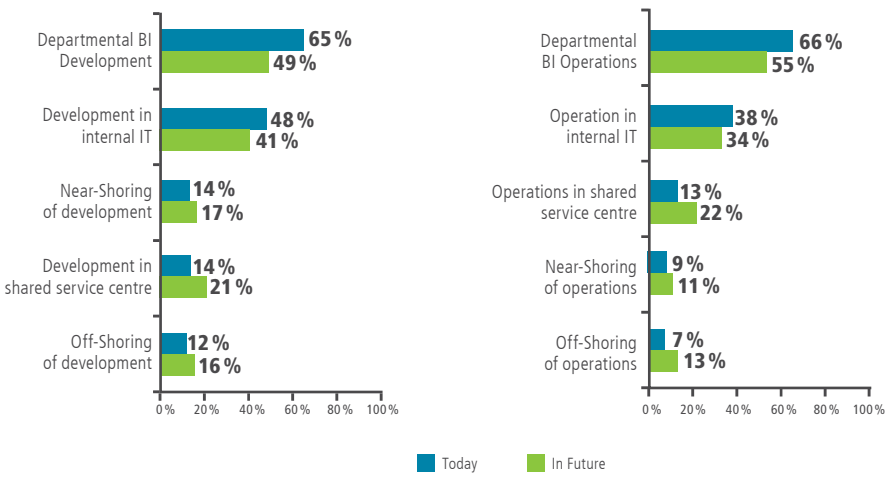


Figure 39: Responsibility for BI development/BI operation (n=419 and 394 respectively)

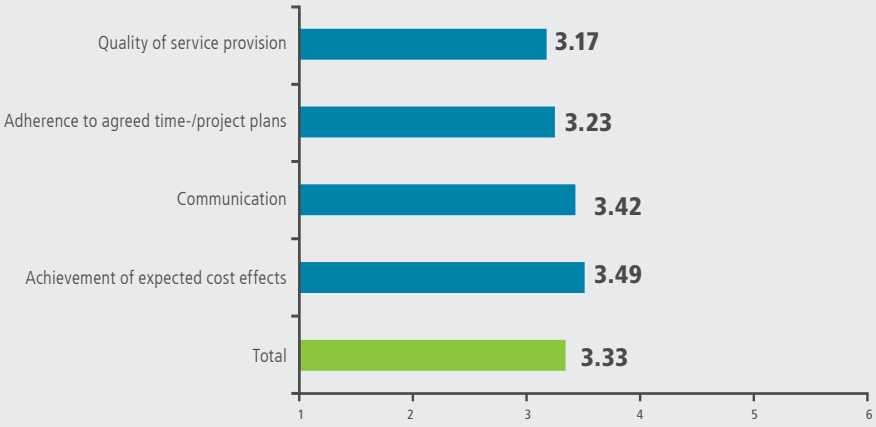


Figure 40: Satisfaction with near or offshore support, scale of 1 (very good) to 6 (poor) (n=95)

Companies already using near- or offshore initiatives were asked to evaluate their satisfaction with their initiatives in the context of the survey *(see Figure 40).* Interestingly, the companies express only limited satisfaction with near- and offshore support. This was assessed at 3.33 on average. In particular the often cited cost benefits of near and offshoring are, in many cases, not realised satisfactorily in practice (3.49). Whilst the companies surveyed in the telecoms sector award their near and offshoring initiatives a well-above average score (2.68), companies in the services sector are among the most dissatisfied (4.00). Telecoms companies clearly benefit here from their lengthy experience with near- and offshore projects. Thanks to their high level of standardisation, they are in a position to better formulate the requirements of their sourcing partners in near- and offshore locations, which in turn generates better results and consequently greater satisfaction.

Part 6

The future belongs to technically flexible BI solutions

The architecture & infrastructure, data management and reporting & analytics investigation fields are included in the "Technology" perspective. The evaluation results for the individual investigation fields are shown in detail below.

Outlines of an analytical ecosystem in the cloud are recognisable

The architecture & infrastructure investigation field includes questions on technical architecture, data volume and the use of analytical platforms. *Figure 41* shows how the technical architecture of a BI solution is currently set up and how companies plan to develop this in the future.

The majority of companies surveyed have an architecture that includes one or more central physical data warehouses. Hub-and-spoke architecture with data marts and a central enterprise warehouse is the most common architectural approach (30 %). It is also the approach favoured by the highest number of companies as an ideal scenario for the future (40 %). However, at the other end of the spectrum there is a relatively large percentage of companies with no dedicated system for managing analytical data (17 %) or which resort to independent data marts without a central warehouse (27 % and 19 % respectively).

Tense relationship between central standardisation (hub and spoke) and decentralised flexibility (sandboxes) will increase in the future

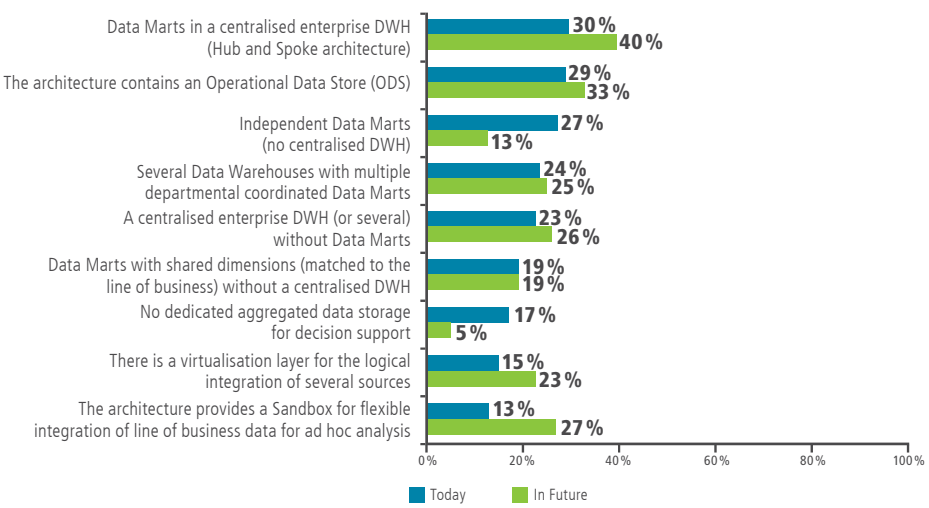


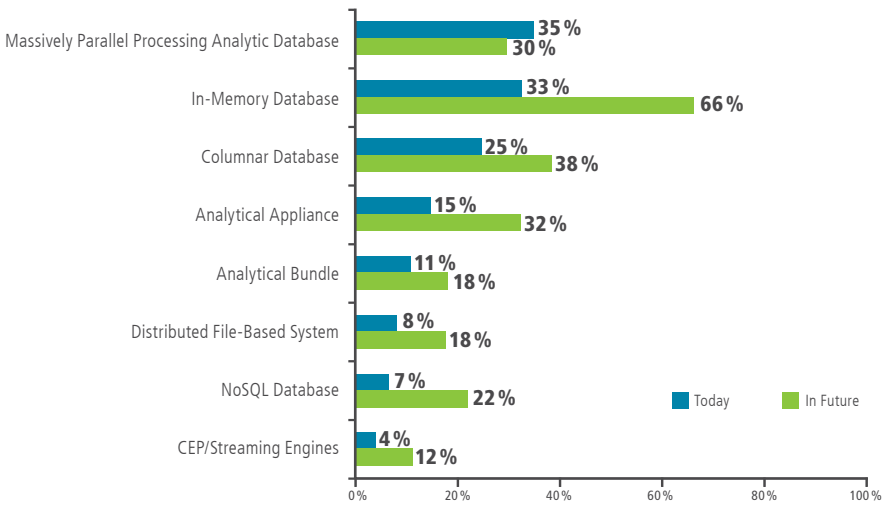
Figure 41: Technical architecture of BI solution (n = 285)

Also striking is the large number of projects planned that involve virtualisation layers and sandboxes. This may be attributable to the increasing demand for flexible data integration from additional data sources. The use of sandboxes, in particular, will increase significantly in the future. Companies are reacting to the requirements of BI end users who want individual as well as flexible data integration and analysis options.

A more specific analysis across country borders reveals that independent, decentralised data marts are most common in companies in the UK (39 %) and France (43 %) where these figures are above the average. Hub-and-spoke architecture is, however, often encountered in companies in the DACH region (36 %), again above the average. Looking ahead to the next few years, efforts to consolidate numerous data warehouses can be identified in France (40 %). In the UK on the other hand, future efforts will be concentrated on the logical integration of various systems through a virtualisation layer (35 %).

There is much discussion around new analytical platforms, particularly in the context of Big Data application scenarios. An analytical platform can be defined as a specialised platform for analysis-orientated data processing and not exclusively just for data management. Its sub-components are optimised either technically or functionally for analysis requirements. These platforms are based on different, but complementary, technological approaches.

The discussion around analytical platforms currently focuses on massive parallel processing (databases which, in cluster architecture, are able to massively parallel process complex queries), in-memory databases (data and queries are held in a RAM or processor cache) and columnar databases (data is stored in columns at a high compression rate). These technologies came out as the top three in answer to the question about which analytical platforms are currently being used. It appears that companies aim to use analytical platforms much more frequently in the future. This is especially so in the case of in-memory databases and it can be assumed that these will develop into a standard technology for BI (66 %). The country analysis shows an extraordinarily large amount of planned growth for in-memory databases in the DACH



BI environments will increasingly take the form of an analytical ecosystem

Figure 42: Use of analytical platforms (n=234)

region (76 %). This may be due to the successful marketing measures by the SAP software group in its domestic market. The overall high budget figures indicate that companies have great expectations in terms of this type of technology. Whether these expectations will actually be fulfilled depends a great deal on the extent to which the companies are successful in getting a grip on their various data quality problems.

Standardised and industrialised data integration remains the exception

The data management investigation field combines questions on data management and data integration, as well as on data relevance, metadata and master data management.

The biggest challenges for data integration are shown in *Table 8.* Here we can see that 41 % of the companies surveyed have a problem with performance. This may be a reason for the markedly large number of scheduled projects for investment in analytical platforms. That's because these platforms make a significant promise of

	Total	Less than 250	251–2,500	2,501–10,000	More than 10,000
Performance problems	41 %	40 %	35 %	45 %	45 %
Manual and individual Data Management	35 %	30 %	38 %	41 %	31 %
Technological diversity	34 %	22 %	34 %	41 %	33 %
Lack of reusability due to lack of standardisation	23 %	18 %	24 %	20 %	27 %
Only copies of complete datasets (no delta processes)	19 %	16 %	28 %	14 %	16 %
High cost of scalability	17 %	14 %	14 %	13 %	26 %
Automated Data Management utilising only scripts	15 %	16 %	18 %	17 %	8 %
Data Management in push approach	13 %	12 %	16 %	14 %	8 %
No dedicated batch windowfor data integration	10 %	8 %	8 %	13 %	12 %
Inadequate support of web services	8 %	14 %	4 %	6 %	11 %
Lack of rollback capabilities	7 %	10 %	10 %	8 %	3 %
Insufficient support for cloud virtualisation strategies	5 %	10 %	3 %	3 %	7 %
Lack of restart capabilities	4 %	2 %	5 %	5 %	5 %
Transactional security is not provided	4 %	8 %	8 %	5 %	3 %

Table 8: Challenges for data integration according to size of company (number of employees) (n=268)

rapid data integration in addition to rapid query performance.

A closer look at the data shows it's not only large companies that struggle with performance problems. This problem is just as common in smaller ones. This could be due to the smaller BI budgets for hardware in smaller companies. Furthermore, as shown in *Part 4,* there is a close link between performance and data volume.

The second most pressing challenge is manual, individual data management. Most lack standardised management processes, as a result of which systems are difficult to maintain and adapt. This prevents stable and flexible data integration. At the same time, this is one of the main reasons for the poor assessment of data quality *(see Part 7).*

Diversity of technology is a further frequently cited data integration challenge (34 %). This problem will continue to worsen if, as we assume, there is growing complexity in BI architecture due to the increasing number of new fields of application for BI solutions and the increasing use of analytical platforms. Companies need to take counter measures here using standardised and integrated data management platforms to ensure the required quality and transparency. This is the only way to prevent an increase in analytical silos containing non-transparent data.

There is a split picture with regard to the relevant data types for analysis. Virtually all the companies surveyed consider structured data to be extremely relevant. It is no surprise then that virtually all data warehouses and BI systems are designed specifically for structured data.

All other types of data are on average considered to have moderate or little relevance. There is a clear link here: the more structured the data, the more relevant it is. XML, log and geo data lead the group of other data types, whilst audio, video and text from social media are considered relatively irrelevant *(see Figure 43).* This is due firstly to the fact that only a few companies have the technical infrastructure to analyse unstructured data. Secondly, it is clearly difficult for

Structured data also continues to have significantly greater relevance than other types of data

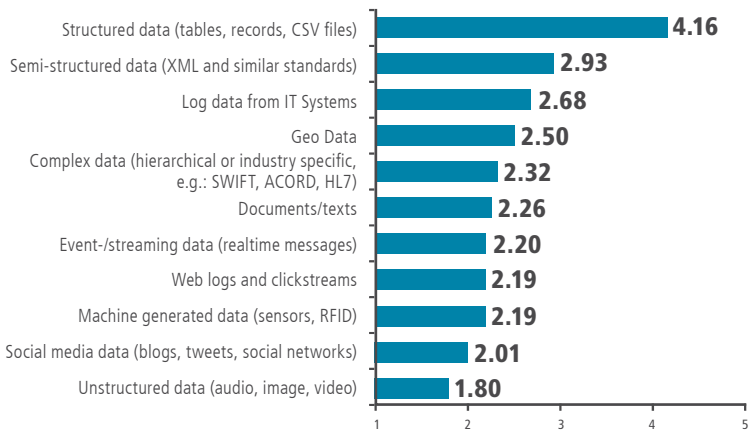


Figure 43: Relevance of data types for analysis, scale 1 (low) to 5 (high) (n=282)

Inadequate data quality originates from poor master data and metadata management

38 % of the companies surveyed do not have a dedicated approach to the maintenance of master data

many to identify business cases and effective scenarios in which to use these types of data. The use of information from social networks is a good example here. In spite of the huge attention in the media and among numerous companies, the specific added value in the data analysis must first be identified and a technical solution created to integrate large volume data streams. This may mean greater challenges than first assumed.

Master data contains a company's key basic data on business objects (customers, suppliers, products etc). It therefore influences all of a company's business processes. For this reason the management and organisation of this data is particularly critical in terms of success. Over a third of the companies surveyed (38 %) indicate, however, that they do not explicitly address master data management.

The dependence of analytical systems on operational systems means that inconsistent mas-ter data in the operational world leads to ever greater inconsistency in BI. Despite this, only 20 % of the companies surveyed use master data management for operational systems, with the percentage rising as the size of the company increases. Isolated approaches with a decentralised focus can also often be identified in the area of master data management. In a further 26 % of companies, each department deals with master data management individually and consequently unambiguous master data is not available across the company. The companies thus currently pay too little attention to master data management as one of the three pillars (in addition to data quality and metadata management) for ensuring the quality and transparency of analytical information *(see Figure 44).*

BI governance and BI strategy have an extremely positive influence on master data management

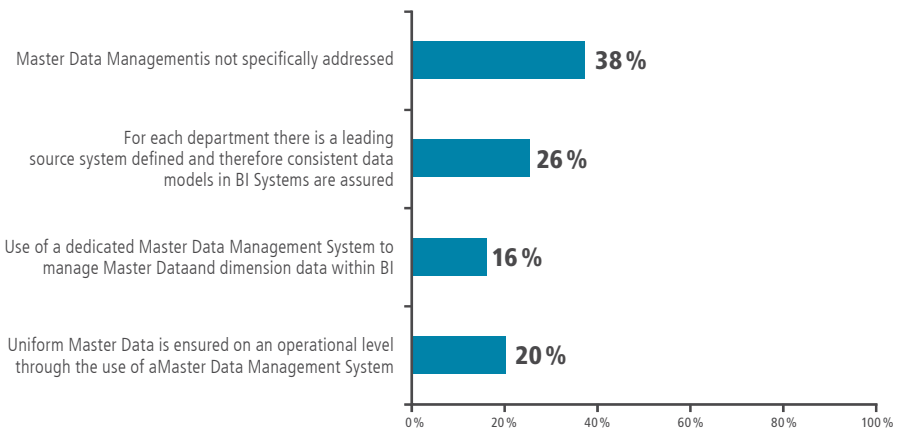


Figure 44: Master data management architecture (n=431)

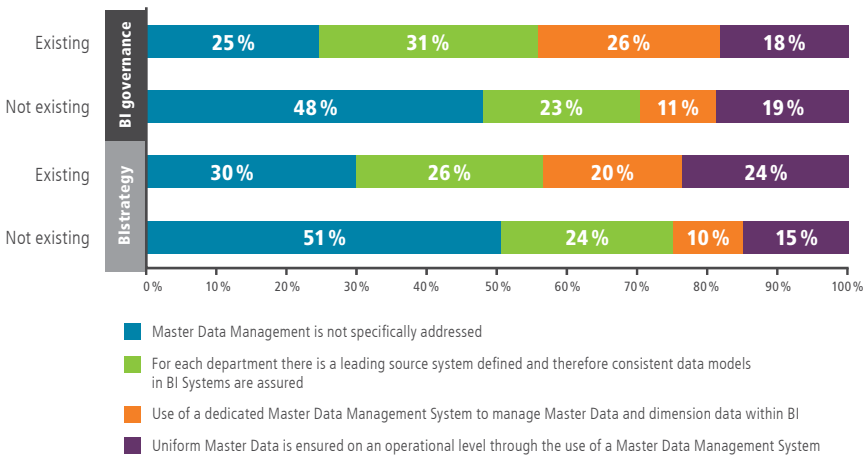


Figure 45: Master data management architecture according to BI governance and BI strategy (n=392 and 430 respectively)

It is clear that BI governance and a BI strategy have an extremely positive influence on master data management *(see Figure 45).* BI governance generally also includes a corresponding data governance programme and, as a result, often leads to a genuine improvement in master data management. If a BI strategy is in place then master data management potentially achieves greater scope – right through to integration into the operational environment (24 %). Finally, a BI strategy sets out, on the basis of a defined implementation plan, which sources in relation to individual master data are regarded as a golden source (at least) in the analytical world and who is responsible for correct mapping in the event of inconsistent master data.

From a user perspective, metadata ensures a better understanding of the information made available through BI. Moreover, it increases transparency and facilitates data access. The picture we have received of metadata management is similar to that of master data management *(see Table 9).* Just over half of the companies use metadata repositories

Metadata is information which describes the meaning, structure, origin and quality of data in information systems

	Total	Less than 250	251 – 2,500	2,501 – 10,000	More than 10,000
There is no metadata documentation	28 %	30 %	33 %	27 %	22 %
Paper based metadata documentation	16 %	18 %	20 %	10 %	15 %
Metadata is distributed among several repositories	29 %	16 %	20 %	38 %	40 %
Integrated metadata documentation within the individual BI System	27 %	26 %	27 %	19 %	36 %
Centrally available metadata documentation (e.g. glossary in a portal)	21 %	20 %	22 %	22 %	21 %
The line of business and technical metadata documentation is linked and is jointly analysable	8 %	7 %	7 %	11 %	8 %
There is assistance for information retrieval in place	11 %	9 %	12 %	10 %	11 %

Table 9: Metadata management architecture according to size of company (number of employees) (n=437)

Only **21 %** have central metadata documentation

that enable them to navigate through existing databases and analyse their links. Metadata management, however, offers the greatest added value if it is centrally available and thus also provides comprehensibly coordinated content. This applies in particular to the linking and integrated evaluation of functional (for example, semantic description of information artefacts), technical (for example, data types, origin and conversion rules) and operational (topicality of data and data quality) metadata. However, only 21 % of the companies make their metadata available centrally. Moreover, functional and technical metadata are only linked and able to be assessed together in 8 % of the companies. Ideally, users should be able to access the respective metadata directly in BI applications without switching to another software. Only in this way can holistic impact analyses be carried out in order, for example, to determine the impact of a change of interface on various reports at the front end. Only 27 % of the companies surveyed state that they make metadata available in this way.

Metadata management offers the greatest added value if it is centrally available and thus also provides comprehensibly coordinated content

The percentage of companies in which there is no metadata documentation is slightly higher in small and mediumsized companies. This is due in many cases to a lack of BI governance. The situation is slightly more advanced in larger companies. Metadata repositories are particularly common here and metadata documentation is often integrated into the respective BI system in an above-average number of cases. However, functional and technical metadata are not interlinked. Consequently, this metadata suffers from having multiple, non-integrated metadata repositories. Hence the conclusion that metadata management is still not given the value it actually needs as an undoubted factor in terms of success.

Limited use of analysis functionalities

Questions on the BI functionalities provided in terms of data evaluation are included in the reporting & analytics investigation field.

Front end tools now offer a wealth of functions that go far beyond traditional reporting or OLAP (Online Analytical Processing). The study shows, however, that the companies most often use the classic BI functions *(see Figure 46).* Advanced analysis techniques are currently still few and far between. The range of BI functionalities used is quite clearly aimed at standard BI users. Only in a few cases do the BI solutions offer sophisticated analysis tools for data scientists and this, in turn, reflects the often relatively low number of employees with this role and skill profile. A closer analysis of the different sectors reveals that geographical information is in demand particularly in the public sector (23 %). This is due to the fact that administrative authorities frequently offer services with a socio-demographical and geographical basis. Data mining is particularly common in the banking sector and in telecoms companies where it is used for marketing, risk and fraud analyses.

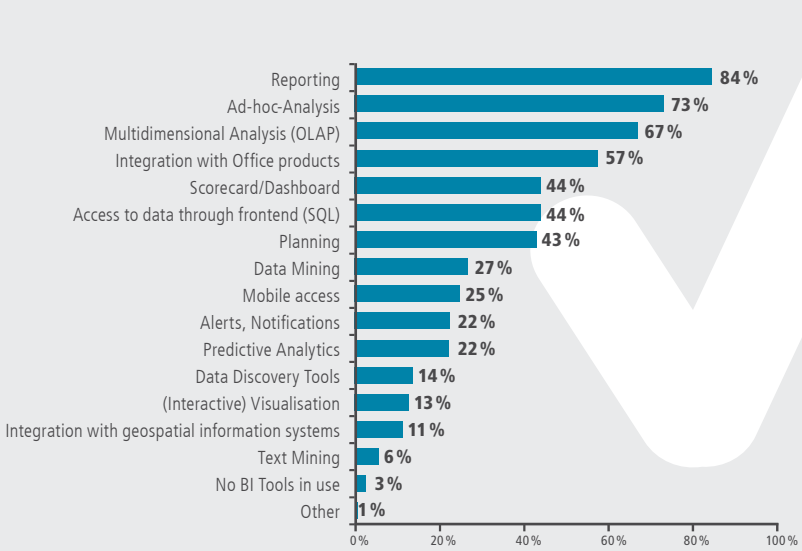


Figure 46: Supported analysis functions (n=432)

Conclusion and recommended actions

Corporate BI environments have changed a great deal since the first survey was conducted in 2004. Whilst continuous development was observed until 2009, a certain level of stagnation is now apparent. Companies continue to face many unresolved challenges in terms of information provision. The claim made in 2006 of establishing BI systems as an integral part of the strategic and operational management of the company has lost none of its currentness and relevance. However, the expectations in terms of BI are often disappointed. The pressure to achieve greater financial benefits through innovative applications using BI solutions and thus justify the investments made is also increasing.

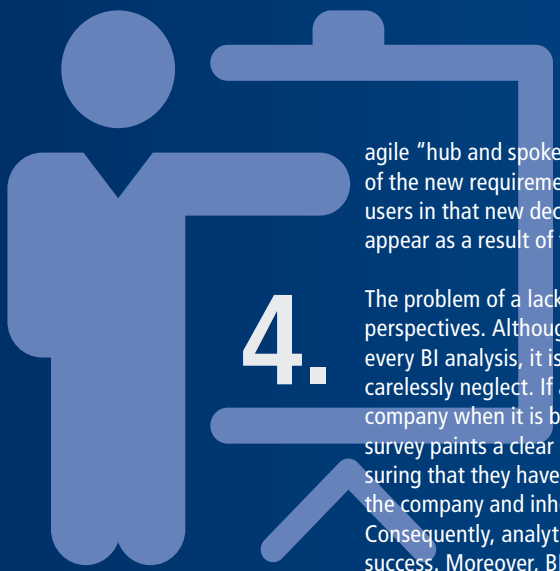
The pressure on BI managers arises both as a result of uncompleted tasks of the past and the uncertainty of how the information tsunami that is being reported everywhere can be controlled in the future.

Four problem areas have come to light particularly clearly in the context of this study:

1. It is clear that the number of BI users has increased. However, the handling of data by individual departments is still largely aimed at delivering answers to specific departmental questions, rather than providing more generic business advantage. Only sporadically does the information obtained (semi) automatically trigger further steps in operational business processes. There is still a great deal of potential here for intense process integration of analytical information. Furthermore, BI is aligned too seldom with corporate goals. The strategic use of analytical information is correspondingly low.

2. A series of organisational problems continues to exist. Processes and structures that are not tailored particularly to the requirements of BI are the most onerous. IT standards, whether for governance, request management, or the procedural model for development, are often used. Companies do not consider the particularities of BI and therefore do not exploit anything like its full potential.

3. Technically, the majority of companies are at the level of a distributed data warehouse environment. Consolidation efforts generally show only short-term improvements and the aim of full (physical) integration of all analytical databases into an integrated EDWH remains a noble, but unachievable, pipe dream. Furthermore, these centralised approaches are increasingly proving to be too rigid to satisfactorily meet the specific requirements of individual business processes and users. The less flexible and less



agile "hub and spoke" architectures do not always take account of the new requirements and special application scenarios of end users in that new decentralised isolated solution increasingly appear as a result of them.

The problem of a lack of data quality in companies arises from all perspectives. Although data quality represents the foundation of every BI analysis, it is precisely this building block that companies carelessly neglect. If analytical information only has value for a company when it is based on consistent and high quality data, this survey paints a clear picture. Companies invest far too little in ensuring that they have such a sound data basis – ideally throughout the company and inherently in the operational source systems. Consequently, analytical information contributes little to business success. Moreover, BI is wrongly made the scapegoat for shortcomings that lie within operational systems.

The following can be surmised from the above four problem areas: the transition from BI maturity level three to four is difficult to make. This step is, however, extremely important for companies. This is because the soaring heterogeneity of user groups, as well as their need to be provided with information in a clearly focused and individual manner, increases the pressure to scale this maturity level.

However, no progress has been identified here in recent years. Companies rarely succeed in embedding BI across all areas of the company in such a way that BI can become a critical factor for success. Companies have equally little success in using advanced analysis methods, implementing a mature (data) quality management system and in setting up a company-wide organisational and operational structure aimed specifically at BI needs. At the same time, fulfilling the IT requirement for standardisation and stabilisation and the functional requirement for greatest possible flexibility is a balancing act that only few companies master.

Consequently, there is sufficient requirement for action. Big Data as a current and frequently discussed topic emerges as a catalyst here and increases the need to find new solutions for known BI challenges.

The following six recommended courses of action can be derived from the results of the study.

Put data quality right at the top of your agenda. The primary aim of BI is still to provide reliable data. Data quality is therefore the supreme rule of thumb and can only be improved and maintained in cooperation with people, processes and tools.

Reconcile the professionalisation of your BI infrastructure operation with the user expectation for flexible BI solutions. Users want a high degree of freedom with analytical problems. Increasingly they want new data or methods in the short term to solve a business problem. Secondly, from an operational manager's perspective, a BI system must be operated with the required stability (as with any other application). This is the only way to guarantee process reliability, high quality standards and cost efficiency. The aim therefore is to create an analytical ecosystem which expands the existing BI environment and in so doing allows transparent access to various data pools. Here the physical integration of data is deliberately dispensed with. However, to maintain an overview of available data, cross functional tasks (in particular metadata management) must be professionalised, accepted and implemented as a topic crucial to success, not as an incidental one.

Increase the agility of your BI environment. Architecture and organisation have a significant impact on the ability to adapt to change more quickly. In particular, processes for collecting, prioritising and implementing new requirements create more flexibility. The temporary operation of individual data fields in "sandboxes" as well as the provision of self-service BI tools as required also ensure greater speed.

Establish BI-specific structures and processes. Since BI represents a sub-area of IT, IT structures and processes can initially be used directly for BI. However, existing IT organisational and management concepts cannot be transferred to BI on a like-for-like basis. This is due firstly

to the particularly close interlocking of functional and technical aspects in BI and secondly to the high frequency of changes. This results in BI-specific requirements. These need to be taken into account in the organisation of BI in order that the existing options offered by BI can be fully developed.

Don't feel unsettled by the current hype surrounding big data, but do check the relevance specifically for your company.

Approach the subject of Big Data tactically and stage-by-stage. First, carry out awareness training. Establish an understanding that Big Data is not simply about handling "more data" in the established format. It is much more about creating new structures. This requires use cases that are relevant both legally and in terms of time and content. And they must have functional benefits that justify investment in technologies and the expansion of expertise, not the other way around. Also check use cases for Big Data from other sectors in terms of their relevance to your company and identify potential Big Data sources. Then assess your use case via a proof of concept (PoC) with regard to its added value and not exclusively with regard to technical feasibility. In the medium term you need to focus on a BI service portfolio with predictive and prescriptive analytics instead of on reporting of past events.

Appendix: The maturity level model in detail

The *biMM*® (Business Intelligence Maturity Model) differentiates between five maturity levels which reflect the typical evolutionary path of BI within a company. Analysis and evaluation take place in all five maturity levels using BI-specific criteria from the perspectives of "Functionality", "Organisation" and "Technology".

The "Functionality" perspective evaluates the content and usage of the data. It considers the validity of the information offered by the BI solution, its use by individuals and the level of support for analysis and decision-making processes offered by the BI solution.

The flexibility of system design, the quality and functionality of the BI solution implemented, data architecture and the degree of standardisation of the components involved are at the forefront of the "Technology" perspective.

Finally, the "Organisation" perspective handles the embedding of the BI solution in the company's organisational structures and operational processes. In addition to the level of institutionalisation and formalisation of the BI processes, strategic and financial aspects of the BI initiative are also considered.

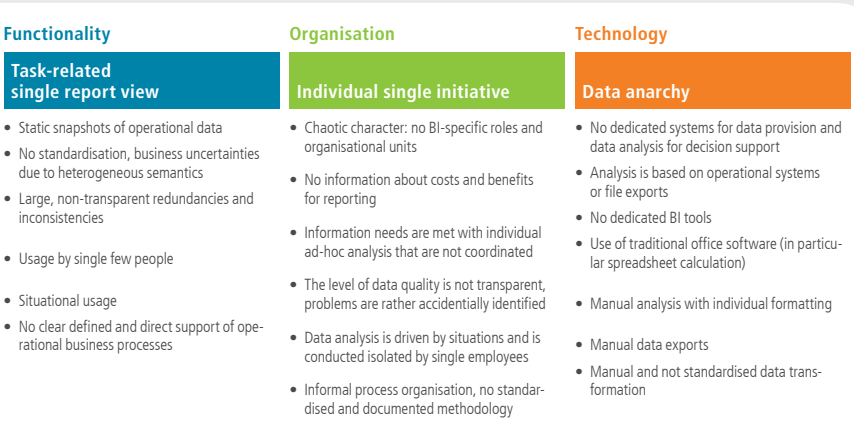
The respective distinguishing features of the five maturity levels, along with the advantages and disadvantages and their impact, are described in detail below. The motivation to reach the ensuing higher maturity levels is also discussed.

Level 1 – Individual Information

The starting point of many BI solutions is the need for specific business-analytics processes for supporting analytical information. However, this requirement is often not met by simple reporting systems due to the high levels of data redundancy and semantic inconsistencies in multiple definitions of key indicators.

The first level of BI maturity is characterised by isolated, uncoordinated analyses. This is based on operational systems and raw data exports by individual, often specialist employees, with their own specific information problems to solve. Consequently, it is not clear who uses what data and there is no transparency in terms of information requirements and usage. Furthermore, the lack of defined processes, responsibilities, organisational units and regulations promotes the emergence of standalone BI proponents each with their own preferred approaches. This conflicts with a reliable supply of information and diminishes the broad acceptance of analysis results.

The complete absence of definitions for functional semantics is particularly problematic and inevitably leads to contradictory evaluations and results in "decision paralysis". In the absence of independent analytical data management, no historical data is generally available and the scope for analysis is restricted



biMM® Level 1 – Individual Information

to the limits of individual operating systems. This level is therefore characterised by a large number of deficiencies such as redundancies, heterogeneity, lack of data quality and a high level of manual effort.

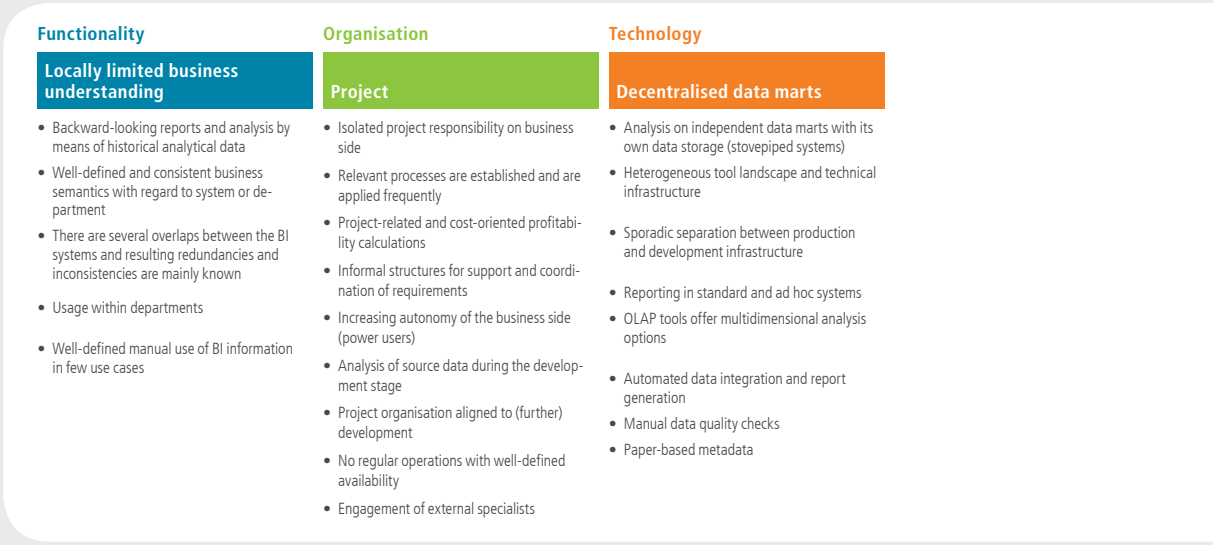
It is thus clear that the "Individual Information" level has significant shortcomings in terms of flexibility and reliability of information. This provides the motivation for the project-driven development of BI, providing the basis for the use of functionalities offered by professional BI tools. In addition to the provision of these tools, dedicated analytical data marts can then be set up. This allows business departments to carry out analysis of historical data processed and integrated from several sources.

Level 2 – Information Silos

Department-based BI systems geared towards a battery of functional questions are assigned to level 2 of the maturity model. These solutions are typically no longer characterised simply by individual situational use in the different business departments, but are regularly used across multiple departments. Furthermore, these systems now address defined (standard) use cases and provide users with far-reaching analyses of functional understanding as well as reporting functionalities.

In the respective business departments, these solutions form a largely redundancy-free and semantically unambiguous data room. Both the evaluation criteria (dimensions) and the key indicators are defined largely on a department-specific basis. Comprehensive department-specific evaluations are, however, often not possible or only possible to a limited extent due to a lack of standardisation.

From a company perspective, the establishment of these department-based information silos leads to redundancies and inconsistencies. This applies all the more when BI systems are (further) developed in isolated projects and no comprehensive BI governance exists. Consequently,



biMM® Level 2: Information Silos

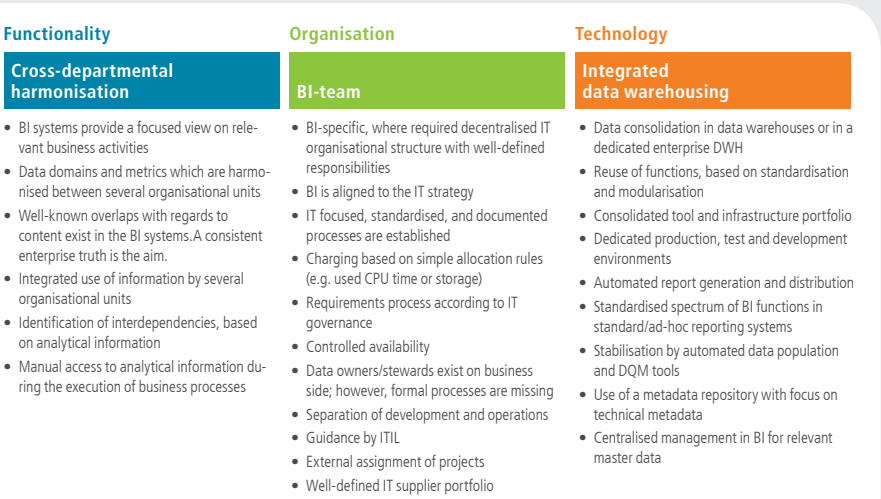
contradictory functional definitions and technological inconsistencies fail to be identified either during the functional design phase or during implementation.

Whilst central processes are established, the operation of developed BI systems is not uniformly regulated, but is decentralised and performed in many cases by functional experts.

The targeted use of special tools and the setting up of multi-dimensional, modelled, independent data marts increase analysis options and fulfil basic quality and stability requirements.

The functional requirement for companies striving for the third maturity level is the increased integration of databases. The aim of this is to provide a broad and consistent information base for evaluations across departments. From a technical perspective, the multiplicity of tools and infrastructures used independently in each project, as well as variously used methods and approaches, are key in terms of driving up costs. Synergies could be achieved here through joint use of infrastructures for development and operations, as well as through standardisation and accompanying centralisation.

In order to cope with the growing relevance of BI in companies, development and operations must also be further professionalised through appropriate processes and responsibilities. The synergies described are significant from an overall company perspective. From the perspective of the information silo owners, however, this further development is not necessarily useful. It is precisely this factor that makes the transition from maturity level two to maturity level three so difficult in practice for many companies, particularly if there is a lack of support from senior management.



biMM® Level 3: Integration of Information

Level 3 – Integration of Information

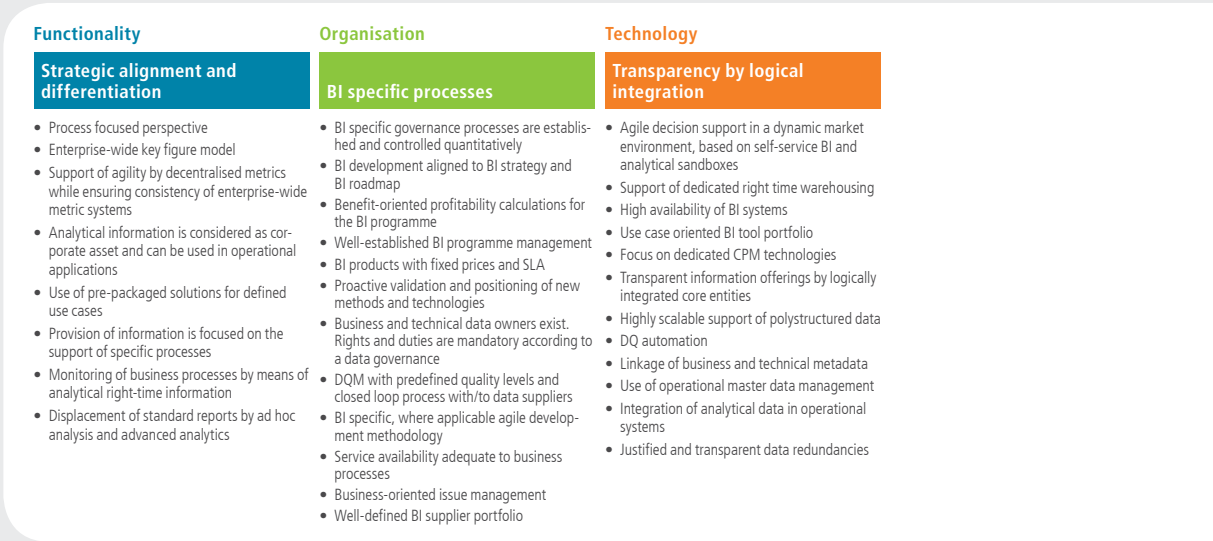
The step from Information Silos (level 2) to the Integration of Information (level 3) takes place as a result of the standardised use of functional, technical and organisational resources from disparate parts of the company. In order to create synergies and avoid redundant isolated solutions, analytical information should not only be accessible in the BI solution's originating environment (individual business department, organisational unit, etc), but should be available to as many departments as is reasonable. This would ultimately increase not only the number of users, but also the benefits of BI for the company.

From a functional perspective, greater and greater demands are typically being placed on BI. As a result, more fields of application beyond the traditional, historically-oriented internal reporting system are coming to the fore. This is particularly the case in the area of corporate performance management, such as support for complex planning processes. The BI solution is thus developing as a support mechanism for significant operational functions and decisions. The increasing integration of data into one or several data warehouses, as opposed to the previously separate departmental solutions, means that data can now be offered to users for analysis in a comprehensive functional context. This will often lead to new content being generated from analytical data.

In order to meet user requirements, the BI solution must be (further) developed and operated professionally at the "Integration of Information" level. This is achieved by setting up BI teams with defined roles, processes and responsibilities, as well as by separating development and operational tasks. BI is generally designed on the basis of IT governance which pursues the aims and follows the guidelines of an IT strategy. This ensures that BI projects are constantly in line with corporate goals and the company's business processes. Moreover, the availability of the BI solution is often administered through service level agreements (SLAs). These define the contractually agreed service performance, service features and availability.

A far-reaching standardisation of methods and technologies not only creates synergies, but also significantly increases the reliability of a BI solution. Data management and data provision processes are typically automated and professionalised in level 3. Consequently, the functionalities for ensuring transaction security, restart capability, rollback capability, recoverability and delta processing are fully integrated into ETL (Extract Transform Load) processes.

A further key attribute of level 3 is the addressing of former "side issues", in particular of data quality, metadata and



biMM® Level 4: Information Intelligence

master data management. Software tools are often used in the context of data quality management for automated collection, improvement and monitoring of data quality. The purpose of this is to achieve sustainable improvements in the quality of data in the BI system. Metadata is essentially managed in a repository largely to ensure uniformity and transparency in terms of functional content and technical processes. Functional, technical and operational metadata is, however, typically not yet linked at this level of the maturity model.

In the course of further development, simply distributing the BI information generally creates insufficient added value. Consequently, the pressure to provide users with information in a clearly flexible, focused and individual manner increases. It is also the case that the original requirement to make all data available in a consistent and physically integrated format cannot be fully implemented due to the diverse requirements of the varied business processes. Ultimately, (architectural) consolidation is generally initiated through centralisation, which is undermined time and time again by new exceptions and interim solutions. Increasing complexity of requirements and a broadening BI user base are drivers for further development within the "organisational" perspective.

Level 4 – Information Intelligence

If BI systems support the use cases defined under level 3, then at level 4 there is a focus on critical business processes that take specific account of analysis requirements. Thus the level of information-based decision-making support increases in all areas of the company and sophisticated analysis methods and tools significantly increase evaluation opportunities. The mapping of the entire management cycle of analysis, planning and control of data and processes is supported. As a result, BI develops into a recognised corporate asset.

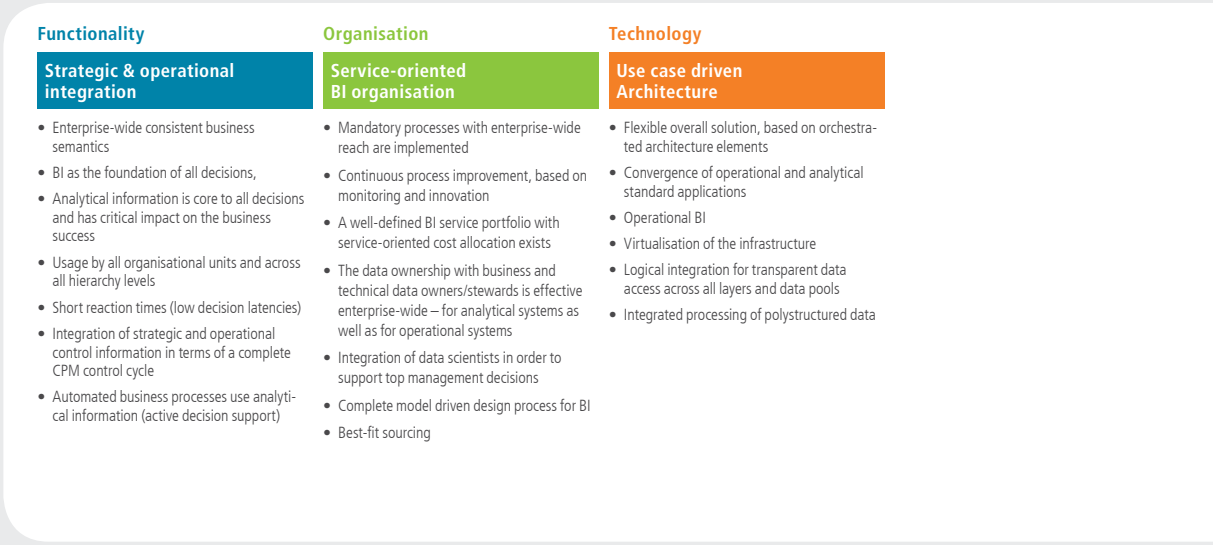
The cross-departmental view on business processes imposes specific requirements in terms of more consistent functional semantics. Although the company-wide harmonisation of all key performance indicators and common dimensions is a noble objective, it is perhaps a Utopian aim. Nonetheless rules need to be established. This will ensure optimum functional consistency and user-orientated flexibility. Define a targeted approach for individual information systems whereby they focus on comprehensive, central, local and decentralised processes. From an organisational perspective, this means that data ownership must be established with both IT and functional involvement.

Whilst at level 4, operational business processes clearly benefit from BI offerings, the BI organisation must also be aligned much more with specific requirements. A dedicated BI strategy provides aims and guidelines that are made operational by specific BI governance. Established BI programme management is an important instrument here. This comprehensively coordinates the initiatives of the teams set up at level 3 and aligns them with the strategy. The aim is to develop BI products with defined service level and cost allocation models. Implementation and operation take place in the context of specific processes.

There is a technical challenge in terms of how to provide information to the correct addressees. This provision needs to take account of the relevance, quality and adequate presentation format of the data, as well as the required topicality (relevance) of that data. The large number of information sources to be included in the decision-making processes, as well as the increased relevance of large-volume polystructured databases (big data), now requires flexible, potentially distributed solutions. This demands a move from the physical integration ("single point of truth") towards a logical integration where the central component of such architecture is a comprehensive metadata repository. This supports BI users with continuous documentation in the form of integrated functional, technical and operational metadata. The access routes, functional definition, technical data transformation, quality level and currentness of data can be tracked for each piece of specialist information.

The success in terms of data provision and the evaluation of information for focused processes is the basis for a broad rollout of BI. User demand for extreme flexibility is now being addressed. While there is less user demand for self-contained BI applications, there is more for a defined portfolio of easily combined BI service offerings that offer optimum support for their respective use cases in the short-term.

From an organisational perspective, there is a necessity to transform into a full service organisation. A further development of BI governance must ensure that a balanced relationship is established in the process between flexibility and stability along defined lines. Account must also be taken of the required flexibility from a technical perspective. Appropriate technologies must be made available in order to provide the various services in the short term. Ultimately, the familiar separation between an operational and an analytical world will become more and more blurred.



biMM® Level 5: Information-driven Enterprise

Level 5 – Information-driven Enterprise

The complete integration of BI into strategic, tactical and operational business processes in the sense of a closed loop is achieved at level 5. BI takes on a character that is critical to success as a result of the organisation-wide use of analytical information in all decision-making processes. BI thus develops from providing a supportive role to becoming part of the business model that sets it apart in the market.

Analytical information does not necessarily need to be provided in real time for this purpose, but in accordance with the dynamics of the business process at the required time. This includes the capacity to prepare and implement the required analyses flexibly and promptly in the existing infrastructure. This high level of adaptivity is a result of the provision of functionally orientated BI services that are orchestrated according to the respective use case.

The organisational challenge in level 5 consists of the seamless integration of BI-specific aspects into governance that is applicable throughout the company. This must allow extreme flexibility, but at the same time ensure stability, comprehensive consistency and cost-effectiveness.

A corresponding service-orientated BI organisation ensures the sustainability of corporate information asset usage by creating data specialists. These act as pilots through the existing glut of information and offer proactive support as internal advisers at management level by preparing and functionally interpreting data in business-critical decision-making processes.

The increasing merger of the operational and business analytics world in the field of technology corresponds to the service-orientated consolidation of responsibilities and tasks from an organisational perspective. At this maturity level, the BI organisation provides services to the business departments that include components from the analytical and operational IT environment encapsulated behind a service layer.

A crucial prerequisite for the required level of flexibility is full data content transparency, as well as the option for logical integration of distributed, polystructured databases where applicable. The real-time provision of infrastructural resources is enabled through virtualisation, for example in the form of private clouds.

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