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THE PRIMACY OF TECHNOLOGY

Striking a balance between implementing regulation and shaping its impact

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White Paper

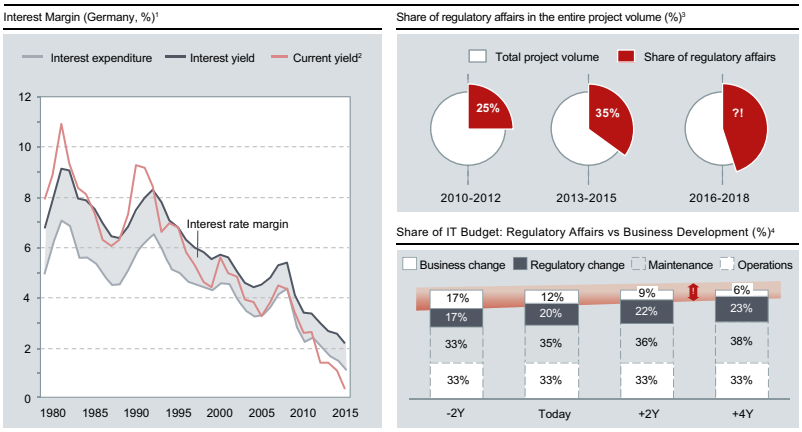
1 Introduction

Ongoing structural changes in the finance industry mean that financial institutions continue to be under considerable pressure to adapt. Sustained low interest rates have undermined one of the finance industry's main sources of profit, while technological progress has forced the adoption of an unprecedented degree of innovation and recurrent adaptation. It is new participants in the market that are taking advantage of the potential of fragmented value creation chains. Changes in customer behavior require implementations to show a very close fit with use contexts. Ultimately, the entire business model of financial institutions is there for the taking.

Increased IT expenditure due to regulations

At the same time, financial institutions face a set of regulations that have clearly expanded in recent years and are now making greater demands. The scope of new or newly implemented regulatory requirements has grown significantly; there were 42 EU regulations and guidelines between 2009 and 2015 alone. For financial institutions, this regularly entails an increase in IT expenditure to ensure compliance with the regulations. Hopes of a reverse in this trend, e.g. by means of a greater degree in automation, have not yet been fulfilled.

Trend in Interest Rate Margin Compared with Cost Distribution to Ensure Regulatory Compliance



¹ Source: Deutsche Bundesbank 2016 I ² As a percentage of total business volume up to and including 1998 I ³ Source: KPMG 2013 I ⁴ Starting point: typical distribution of an IT budget; assumptions: stable operating costs; increase of the share attributable to maintenance costs by 2.5% p.a. due to legacy systems; increase in the share attributable to regulatory change by 5% p.a.; source: COREinstitute 2016

Figure 1: Trend in interest rate margin vs rise in expenditure on regulation

Need for more targeted IT management

Given the overall scarcity of resources, continued profits depend on better targeted technical and IT spending that will guarantee the room for maneuver needed for innovation and further development in the context of adapting to market demands. To this end, in parallel with the previously dominant paradigm in the sector of approaching regulation reactively as a banking matter to be "managed", a second approach addressing five key features needs to be established, on the basis of a new relationship between expertise and technological competence:

- More active use of regulatory requirements in the sphere of technology to rebuild IT infrastructure and organization, in order to gain needed efficiencies from technological developments and attain the degree of flexibility required for business developments.

- Portfolio and requirements management needs to be set up in a risk-differentiated way and to bring together the majority of issues for development in order to allow market potential and risk structure to be assessed and plan for issues with the primary focus on the market, while taking account of risk as required.

- Integrating the analysis of regulatory issues in regular procedures for business and strategic development in order to ensure a common, company-wide view is taken of the financial institution's development and business potential.

Optimization program with five key elements

- Setup and implementation within the organization of agile approaches that allow interdisciplinary teams, using short development cycles, to get to grips with relatively unstructured solution domains.

- Extending regulatory governance with the focus on opportunities rather than on risks in order to implement business models across all areas that will be profitable in the long term as a priority, while still keeping within the regulations.

These reflections present a new approach to dealing with regulatory matters, which we would like to see as a contribution to good practice, against the wider background that is a discussion of how to prepare financial institutions for the future. Chapter 2 outlines current and future regulatory demands, while Chapter 3 offers an assessment of the structural limitations faced by institutions within their current set of approaches. Building on these relevant aspects, Chapter 4 develops an approach to solving these problems.

2 Increased and more onerous regulatory requirements

Regulation is causing an ever-increasing dynamic force within IT

Financial institutions play a key role in the equilibrium of financial markets, meaning they bear indirect responsibility for the proper functioning of economies. At the same time, one of the global societal tasks of institutions is to create the conditions for sustainable economic growth. Society and the political process therefore have an inherent interest in guaranteeing the necessary stability, and they regulate the actors involved. This includes financial institutions which provide for central infrastructure tasks, as well as elements needed to ensure the continued flourishing of the economy itself. Regulation covers four objectives:

- Stability of the financial market: The stability of the financial market is the primary aim of regulation. The transparency of relevant areas is increased in order to allow the identification of risks both internally and across the sector, and to mitigate these if applicable, hand in hand with consistent monitoring. Further elements are present to support the goals of classifying and containing risks (e.g., through ensuring a sufficiently robust and extensive capital base, avoiding a short-term focus for an internal motivation system, and putting structures firmly in place to promote resilience).

- Market liberalization: Opening up markets is driven by politics. On the one hand, this is justified by the notion of free competition and its inherent buoyancy. On the other hand, barriers for entry to new entrants in the market are to be removed in addition to supporting innovation and economic growth.

- Consumer protection: Protective mechanisms aim to preserve or rebuild trust. This can be achieved through increased duties to inform and make obligations transparent, with regards to costs and conflicts of interest.

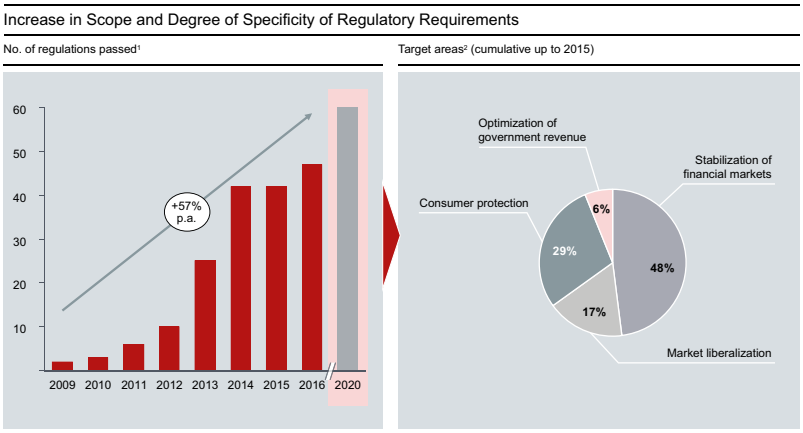
- Optimizing government revenue: By introducing new taxes (e.g. a bank levy), direct and indirect government income is to be increased. Far-reaching reports and transparency requirements for banks (e.g. anti-money laundering law or a law on the automatic exchange of information about financial accounts for tax purposes) have the aim of combating (organized) crime, redirecting cashflows within the black economy to the legal economy, and making tax avoidance and evasion much harder.

Three specific features of regulation since 2008

Regulatory developments over recent years, particularly since the financial crisis of 2008, have been characterized by three specific features. Firstly (Chapter 2.1), an increase in the scope and the degree of specificity of the regulatory requirements together with further market liberalization, secondly, more intensive monitoring (Chapter 2.2), and thirdly, it has taken account of the development of technology (Chapter 2.3). Together, these developments create an immense structural and regulatory challenge for financial institutions. Apart from the familiar topics of BCBS and PSD II (Payment Service Directive), some examples are BAIT (see glossary), IOSCO cyber security and instant payments.

2.1 Extended scope and degree of detail in the regulations

The main characteristic of change in regulatory demands since the financial crisis of 2008 is the extension of requirements. This extension can be seen, firstly, in the increasing number of regulations in all four key areas and secondly, the regulations are more specific in that they are more detailed, or that they take new details into account. Currently, there is no end in sight for this trend (Figure 2).



¹ By the EU Parliament, as of July 2016; 2020 forecast based on an EU Commission green paper | ² Multiple citations possible, CORE expert opinion
Source: COREinstitute 2016

Figure 2: Increase in scope and degree of specificity of regulatory requirements

Financial institutions are forced to react to these developments by acquiring and consolidating relevant expertise, but they also need to react just as intensively in the future, in other areas that used to be less strongly regulated.

Another aspect that continues to characterize the regulatory discussion is a politically colored punitive dimension. This can be seen directly for banks in the increased rigor with which the rules are applied, and also indirectly as the market is opened up to new players, some of them from outside the sector, in the name of liberalization. It remains to be seen whether this punitive rationale is still legitimate, and also whether opening the market to all entrants will be of benefit for national economies within Germany and Europe in the medium and long term.

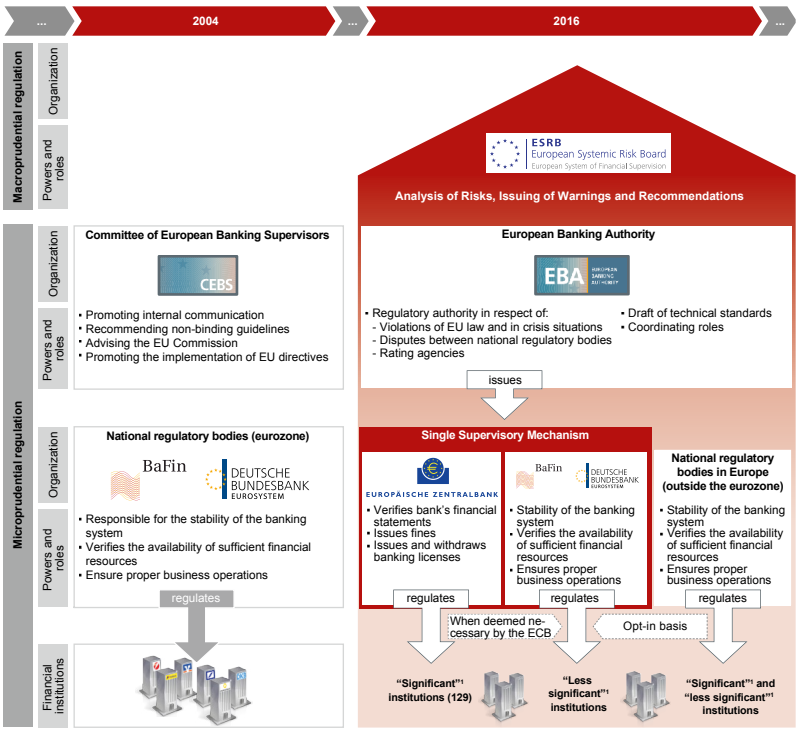
2.2 Increase in intensity of monitoring

Professional makeup of the regulator

Besides the increasing number of regulations to be adhered to, their higher level of detail and the increased frequency of checks by German and European regulatory authorities have led to a significant extra financial burden for players in the financial markets, especially in terms of staffing.

In 2004, banks were still primarily regulated at a national level, with co-ordination at a European level of the implementation and interpretation of guidelines valid throughout Europe. However, as a reaction to the financial crisis, responsibility for interpretation of European regulations was brought together by the EBA (European Banking Authority).

Development of Government Institutions in Terms of Regulating Financial Institutions from 2004 to 2016



[1] Significant as defined by ECB criteria, as of February 2016: 129 significant institutions, approx. 6,000 less significant banks in the eurozone, approx. 2,000 significant and less significant banks in Europe (outside the eurozone); sources: German Federal Ministry of Finance, Deutsche Bundesbank, European Central Bank

Figure 3: Financial supervision and regulation structures in Europe

Nowadays, regulatory supervision of major institutions (with systemic importance) is carried out by the Single Supervisory Mechanism (SSM), a joint regulatory body comprising the European Central Bank (ECB) and supervisory bodies responsible for national regulation. Statutory monitoring is carried out by Joint Supervisory Teams (JST), made up of employees of the ECB and national regulatory bodies.

After taking into account the rise in regulatory requirements, it can be assumed that supervisory bodies will continue to grow in importance. This is confirmed by the fact that the ECB has recruited over 1,000 new employees since 2014.

2.3 Growing focus on technology

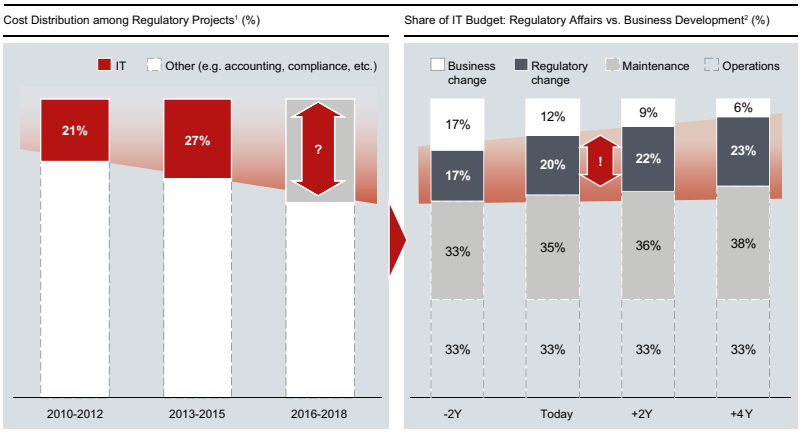
Exponential, not linear technological progress

Technological progress affects all areas of life and activity in society, and it is one of the main drivers of the current structural changes occurring in the finance industry. On the one hand, it is marked by massive progress within short cycles, as captured by Moore's Law, which states that the number of circuits within microprocessors doubles every 18 months at the same cost. On the other hand, technological progress is not limited, even though Moore's law in its strict sense, as applied to the increased density of transistors in chip design, is now reaching physical barriers.

As a result of technological development, it has not been possible to improve the potential for efficiency in the retail segment in recent years. According to our observations, this can be explained by the fact that IT skills have largely been outsourced, and decision-making structures at all levels of the hierarchy possess too little STEM knowledge (Science, Technology, Engineering and Math), as well as the fact that already strained IT resources have mostly been taken up with the implementation of new regulations.

In order to break this trend, regulatory requirements can offer a point of departure for financial institutions if the capacity of an (IT) organization for change is recognized as an essential factor for profitability and is duly supported. Consequently, regulation in conjunction with the deployment of new technology could leverage an increase in the efficiency of financial institutions, or else, should they hesitate, the result will be further inefficiency, and that will either no longer be tolerated by the market, or need to be compensated for by drawing on capital. This can be seen in the figure below.

Trend in Budget Shares as a Consequence of Increasing Regulation



[1] Source: KPMG/Association of German Banks 2013, Bundesbank banking statistics 2013, BaFin, BIS, ECB, EBA, IFRS Foundation |
[2] Starting point: typical distribution of IT budget; assumptions: stable operating costs; increase of the share attributable to maintenance costs by 2.5% p.a. due to legacy systems; increase in the share attributable to regulatory change by 5% p.a.; source: COREinstitute 2016

Figure 4: Trend in budgets as a result of regulation

Greater future relevance of IT in regulatory plans

Increased expenditure for regulation is one of the main reasons for the reduction of the scope for creating new market and business development approaches. This can be seen in the limits increasingly imposed on banks' change budgets (see figure 1 above); expenditure for regulation was up by 25% in the three-year period of 2010-2012, to 35% of 2013-2015. IT is growing in importance too (figure 4), with an increase in the proportion of the budget spent on IT costs in regulatory projects from 21% in 2010-2012, to 27% in the period from 2013-2015, with no sign of a slowdown in this trend. In a similar way, regulatory matters are also absorbing a greater share of the IT budget. According to expert opinion, this will grow from 17% in 2014 to 23% in 2020.

Impacts of Regulation on Organizational Units (Selected)

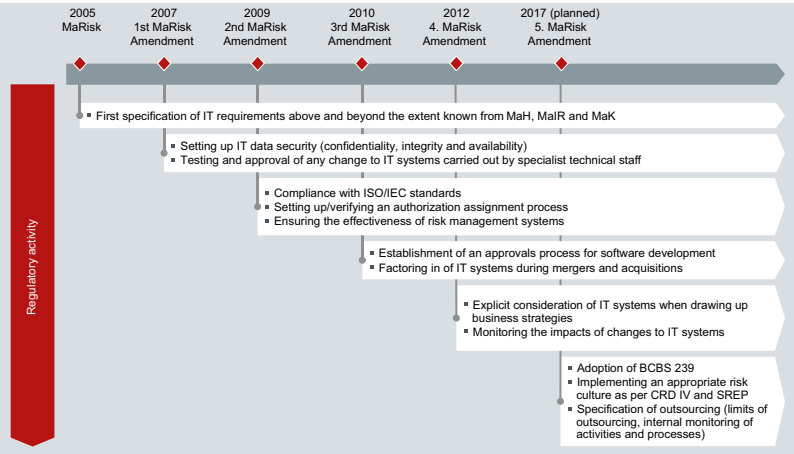
Field of Regulations	Selected Regulations	Business Unit: Front Office	Business Unit: Back Office	Business Unit: Compliance[1]	IT
1 Stabilization of financial markets	5. MaRisk Amendment	✓	✓	✓	✓
	IFRS 9	✗	✓	✗	✓
	EMIR	✓	✓	✗	✓
2 Market liberalization	PSD II	✓	✓	✗	✓
	SEPA	✓	✓	✗	✓
3 Consumer protection	MaSI	✗	✗	✗	✓
	Prospectus Directive	✓	✓	✗	✗
4 Optimization of government revenue	4. Anti-Money Laundering Directive	✓	✓	✓	✓
	FATCA	✓	✗	✓	✓

[1] Roles to be established within compliance/responsibility allocated to compliance
Source: COREinstitute 2016

Figure 5: Impacts of regulation on organizational units

A second indication of the increase in regulatory expenditure is the fact that almost all projects involve IT. Where various departments are affected by regulation to different extents, IT is almost always in the picture. Less surprisingly, traditional IT providers are putting dedicated solutions for regulatory issues on the market, offering bespoke IT solutions, meanwhile auditing firms that were originally brought in to check compliance with regulations have developed consultancy resources, seeing above-average growth in the provision of related advice.

Increasing Focus on IT in the Drafting of Regulation, using MaRisk as an Example (Excerpt)



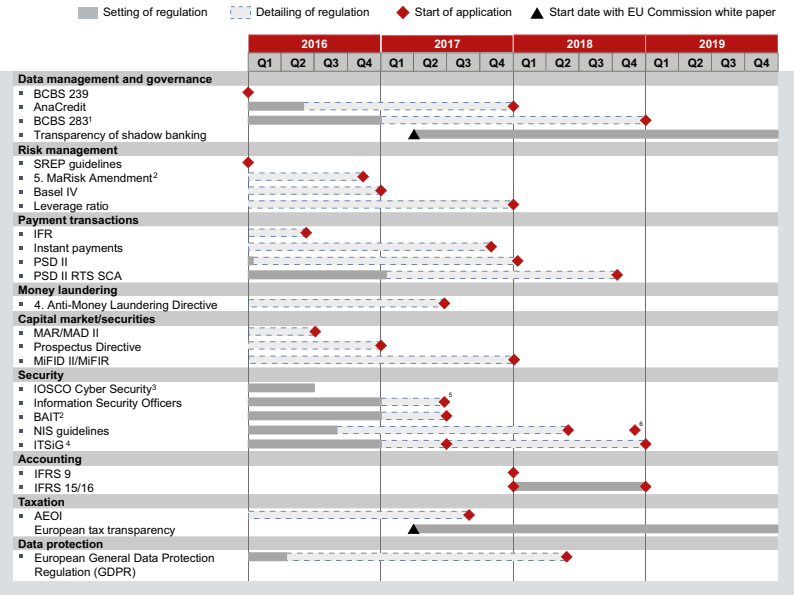
Source: COREinstitute 2016

Figure 6: Direct IT regulation through MaRisk

Technology is increasingly becoming the direct target of regulation

Furthermore, direct regulation of IT is an indication of the altered role of technology (figure 6). From a risk perspective, there is no alternative to regulating the relevant technological aspects directly in regards to their implementation in IT departments, because an indirect approach would not be a sufficient guarantee. Since its introduction in Germany in 2005, the minimum requirements for risk management (MaRisk, see glossary) have been changed and every time new requirements have been added for IT in financial institutions (data, infrastructure/systems, processes and organization).

Current and Future Regulatory Issues in the Financial Sector (Selection)



[1] Complete implementation by 2019 I [2] Anticipated implementation I [3] Reference paper for banking regulators as the basis for new laws/directives I [4] Staggered roll-out according to size of bank I [5] Incorporated within BAIT I [6] Identification of critical drivers within six months
Source: COREinstitute 2016

Figure 7: Overview of current and future regulatory topics (selection)

Greater IT skills are now a prerequisite

In terms of current and future regulatory issues, this view of the increased relevance of technology (figure 7) is confirmed. Risk and data management (5th MaRisk Amendment/BCBS 239), Market Abuse Regulations (MAR), the EU Payment Service Directive (PSD II), instant payments, as well as security regulations (ITSiG, German IT Security Act) and BAIT (see glossary) are all regulations with their roots in new technological possibilities which either presume they have been implemented in financial institutions or require the latter to use them. Technological issues in general are being addressed by regulation in a variety of ways. As a result, current and future technologies are being dealt with directly in order to formulate rules for their use or for their inherent opportunities and risks. This affects, among other things, APIs (interfaces) and app technology, the use of app containers and the possibility of usefully accessing cloud services, increased employment of big data and the use of cognitive computing (a current example is natural language processing).

3 Alignment Structure of Regulation

To sum up, financial institutions are faced with growing demands from the regulator in three ways:

- Regulatory requirements are becoming more copious and specific,
- Auditing is more intensive and is carried out more frequently, and
- Requirements are focusing more and more on the underlying technology.

Regulatory requirements are increasingly focusing on technology

Financial institutions are regularly spending more in order to ensure compliance with the regulations. This increased expenditure primarily involves project budgets and resources, which as a result, comes at the expense of the further development needed in business and market areas. Given that overall funds are not increased or at least only very slightly, there is no prospect of this scenario changing.

Consequently, financial institutions are facing the challenge of keeping up with this tendency for increased regulation against the background of a reduced market budget. Given that the overall budget remains more or less static, synergies should be sought between these areas. With regards specifically to regulation, IT efficiencies should be sought, while putting the focus on options for meeting the requirements.

Examples are shown below detailing which approaches need to be changed in order to allow institutions to make the IT efficiency gains outlined in the previous chapter, as well as strategic advantages in their market positioning, according to the following four aspects:

- Project portfolio planning,
- Requirements management,
- IT procedural models, and
- Information technology skills.

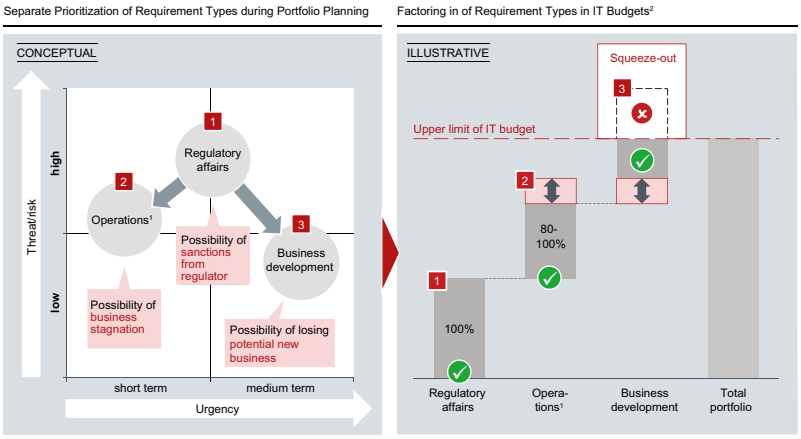
3.1 Project portfolio planning

The portfolio planning process of financial institutions takes a separate view of regulatory, lifecycle issues and business development, prioritizing them in different ways. This regularly leads to the development of market and operational areas being forced out (figure 8).

Regulation is prioritized at the expense of market opportunities

This approach is based on the different risks within each of the areas. Non-compliance of regulatory requirements are met with sanctions, and for reasons of legal liability, issues of this type fall under the remit of executive boards. IT operations keep the business up and running, and a distinction is usually made between optional and essential areas, e.g. infrastructure updates are not prioritized. Essential aspects are a given, whereas the optional ones are a matter for the management team to negotiate.

Portfolio Planning Process, Including Prioritization for Financial Institutions



¹ Includes initiatives taken to ensure ongoing operations, as well as explicit change issues at the company | ² Assumptions made for the illustration: equal budget requirements for each requirement type
Source: COREinstitute 2016

Figure 8: Prioritization and portfolio planning

For those who make the decisions in a financial institution, the lowest risk associated with not putting a proposal into effect is when it comes to business development, because this means losing potential and future business. The medium and long-term effects for a given bank's business model are rarely discussed proactively by the executive board or the supervisory board, and thus it seems likely that regulators – European bodies, the relevant German Federal Ministry and subsidiary bodies – have not given systematic consideration to the consequences so far.

As a result, budgets tend to prioritize conformity with regulations and operational safety. Business development and developing operational IT systems beyond the required minimum are seen as a lower priority for structural reasons. The consequences over the medium and long term, such as investment bottlenecks for IT projects or potential lost business, are ignored.

3.2 Requirements management

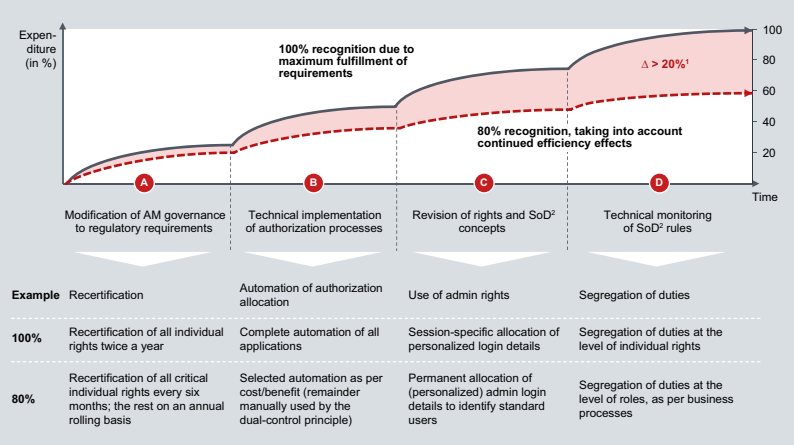
Focus on prevention and maximum fulfillment

The established process of requirements management involves the analysis of regulatory requirements by the departments affected; they are then formulated in terms of banking procedures and issued to those responsible for implementing them within the organization. Though this approach can be efficiently organized, our observations have shown that it tends to lead to increased expenditure in regards to both time and budget.

Several examples show that due to the lack of risk differentiation, the analysis of the regulations fails to focus on alternative and minimum requirements. Instead, a brute force approach is used to draw up comprehensive solutions that will satisfy any possible internal and external checks, a tendency often augmented by the desire of the executive board and supervisory board members to mitigate their personal risk exposure. This continues in the individual process steps, as can be seen in the example of identity and access

management (IAM, figure 9). Regulations are not analyzed for exceptions or minimum requirements, while the suggested technical implementation employs the full capacity of the technology in question; solutions for specific aspects employ persistent features, and instead of systematic higher-level solutions, they are implemented gradually. As a result, there is the potential for greater expenditure to be made for implementation than the minimum required, and there is no sign of any attempt to counter this trend.

Expenditure Progression Using the Example of Authorization Management



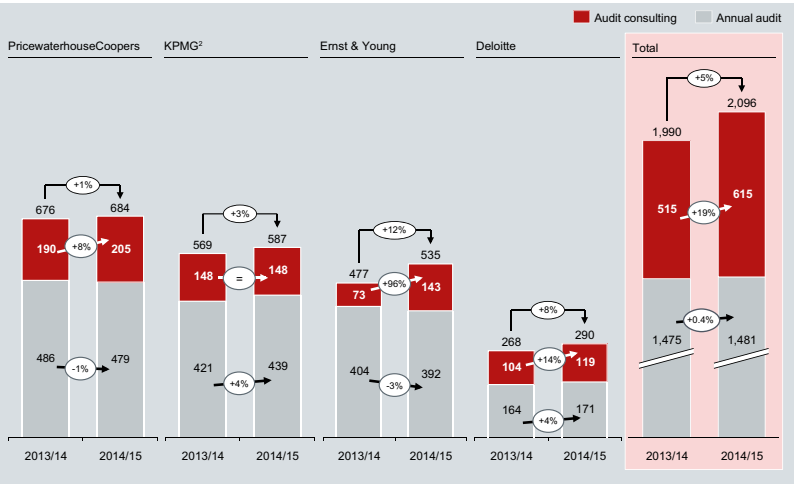
¹ 80:20 model cumulates the effects of small implementation expenditure at each stage | ² Segregation of duties
Source: COREinstitute 2016

Figure 9: An example of Identity and Access Management (IAM)

Auditing and service mechanism accentuates the effect

These effects are intensified by the mechanics of the external support and service structures, when an alternative approach could have been developed. The need for improvement noted in regular audits can be met by consultancy services coming from an auditing background. Financial institutions hope to use best practice approaches to benefit from the know-how of auditing companies and by putting this into effect they can acquire solutions that are ready for implementation.

Revenue Growth of Auditing Companies, using the Example of the Big Four (EUR millions)¹



¹ German industries, selected business units | ² Adjusted for extraordinary items
Source: COREinstitute 2016

Figure 10: Growth of auditing companies in selected fields

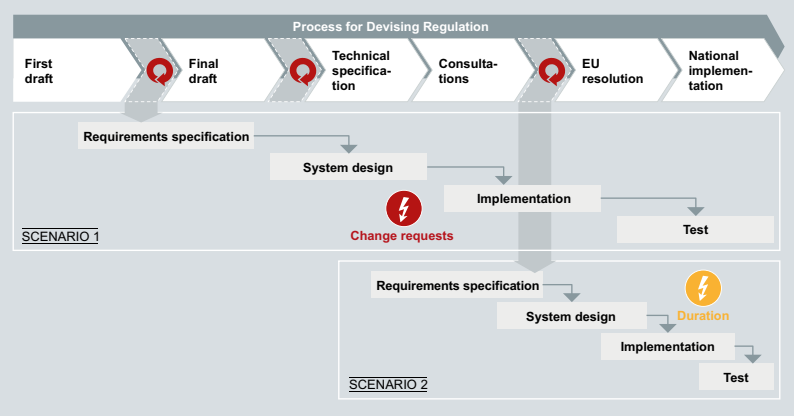
∅ 19.4% growth from auditing-based services

The mechanism is clear, but nonetheless, consultancy structures can be optimized, as is shown by the above-average growth of business auditing enterprises through a specialist consultancy. While revenue from auditing annual accounts was nearly stagnant for the “big four”, with just a 0.4% increase from 2014 to 2015, there was significant growth of 19.4% for specialist consultancies (figure 10). This trend can be seen clearly in the case of financial structures with close ties to the regulator, when a market arbitrage can be gained from time-savings or superior knowledge.

3.3 (IT) procedural models

When it comes to implementing regulatory requirements for IT, financial institutions generally use waterfall-type or sequential models. Such an approach entails proceeding to implementation and subsequent testing after the requirement specification and solution design, with deployment for production following successful testing. In view of the way regulatory requirements take shape, this model is not altogether suitable (figure 11).

Scenarios for the Implementation of Regulatory Requirements as per the Waterfall Model



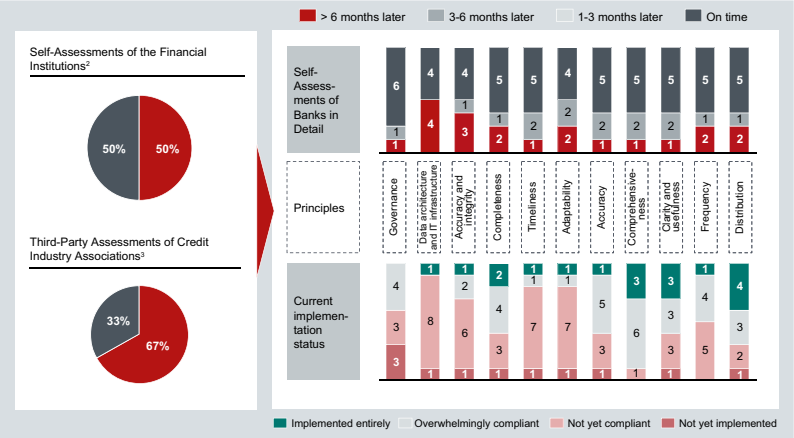
Source: COREinstitute 2016

Figure 11: Scenarios for implementation of regulatory issues

Waterfall approach is structurally unsuitable

The point of application for this model is the overriding process whereby regulatory requirements are formulated in detail. A sequential approach would involve making an early start on the requirements specification (Scenario 1). As the higher-level process only produces the stable requirements framework that would be needed for this later on, starting early would entail numerous adjustments further down the line, and these could only be implemented by means of cost-intensive change requests. Consequently, implementation of regulatory requirements is generally only begun later on in the higher-level regulatory process, once further delay is no longer possible (Scenario 2). By this point, the deadline imposed for implementation is generally very tight, meaning there is little time available for the other implementation steps, as can be seen in the case of the actual degree of implementation of the BCBS 239 requirements in relation to the deadline (figure 12).

Conformity of BCBS 239 Implementation in the German Finance Industry[1]



[1] Survey of the relevant financial institutions and credit industry associations, as of November 2015 | [2] Self-assessment on the basis of eight institutions | [3] Third-party assessments courtesy of three credit industry associations
Source: COREinstitute 2016

Figure 12: Adherence to regulation implementation time frame – BCBS 239 example

The reason for these delays is not so much in the inadequacy of the political and legislative process through which regulatory requirements are specified, but rather in the limited capacity of the procedural models used till now by financial institutions to enable participation in a solution domain for relatively unstructured requirements. This had a significant impact on shaping the outcome as well as bringing in outside expertise (see below, figure 23).

3.4 Information technology (skills)

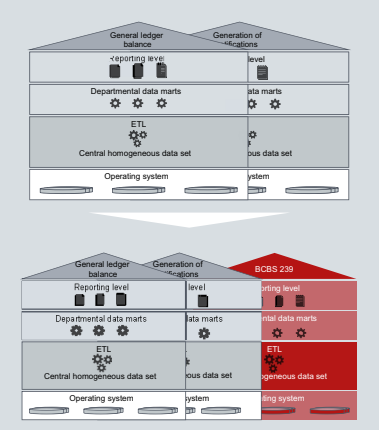
Limitations imposed by existing technological infrastructure

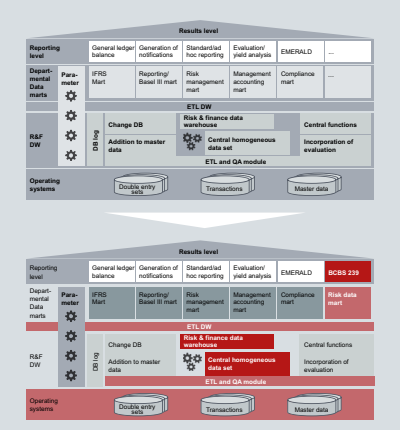
The implementation of regulatory requirements does not take place separately from the IT systems in place, established processes and organizational forms; it occurs within a pre-existing business and IT environment. Possible solutions are constrained by this reality. An aging technological infrastructure and processes that have yet to become fully digitized and consistent, means the solution domain is very restricted because a less flexible IT infrastructure makes it harder to guarantee conformity with the regulations in a flexible way.

Established Solution Scenarios for Implementing BCBS 239

Setting up of a New Data Warehouse

Expansion of the Data Model





Source: COREinstitute 2016

Figure 13: Structural solution scenarios for implementing BCBS 239

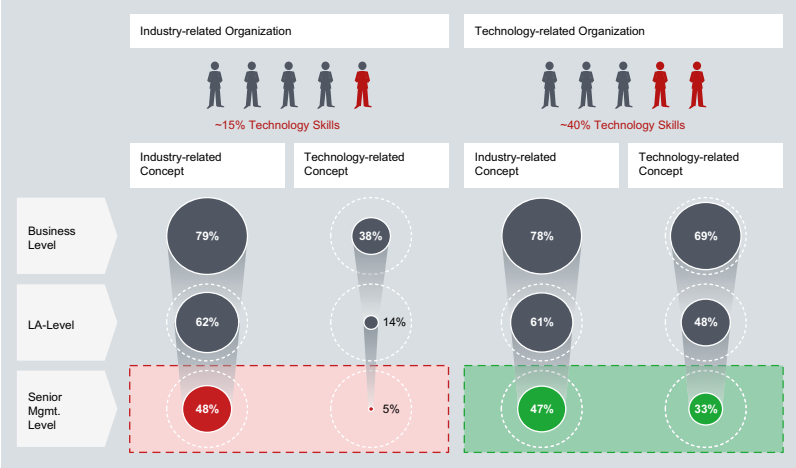
Limitations due to technology skills

Financial institutions face a second profound challenge. Solution domains are limited by the technical skills inside and outside institutions. Data models are extended, source systems adapted, and the frequency of changes often exceeds the speed of implementation. There is a tendency to prefer seemingly tried and tested strategies rather than pursuing with real energy, the innovative solution approaches that are needed (figure 13). Established solution concepts are copied without thinking them through which, in turn, heightens the complexity of the systems environment even more.

Structural loss of IT expertise

Meanwhile, it should be recognized that a career in the finance industry is not that attractive an option for university graduates, school leavers or experienced employees. The knowledge shortfall in banks is all the more greater because of the root-and-branch IT outsourcing that has characterized the management of IT over the past 10 years, meaning that the knowledge bearers much sought after today are now thin on the ground. Furthermore, provider structures based on freelance agencies, locally oriented development partnerships and outsourcing partners focused on operating IT infrastructure are not well suited to enabling that banks make up the current shortfall promptly and efficiently. Given the prospect of future regulatory demands, this trend needs to be reversed by focusing on building up critical IT expertise in-house and applying it at all levels of the hierarchy.

Probability of Implementation Decision for Solution Concepts[1] (in Germany)



[1] Model calculation based on game theory assumptions, taking into account various degrees of understanding (and risk aversion) for industry-related and technology-related concepts
Source: COREinstitute 2016

Figure 14: Decision on solution concepts related to organizational weighting

Technological skills are poorly represented at management level

The level of technology skills at management level in banks, gained through training or previous responsibility for technology, is currently low. This is reflected in a systemic preference for traditional banking solutions as the main approach to regulatory requirements (figure 14). A modelling calculation shows, that in organizations with a typical distribution of technological skills, only 5% of technology concepts are likely to receive a favorable vote from the executive board, whereas traditional projects stand a fifty-fifty chance. The reason for this discrepancy is the poor representation of technology skills in the boardroom (15% on average in Germany). In a beacon organization with 40% affinity for technology, technological concepts stand a one-in-three chance of approval from the board.

This model calculation also draws attention to a further aspect (on the assumption that technologists have a greater understanding for traditional concepts than those with a banking background do for technological concepts). Extending an organization's technological expertise does not in any way reduce its ability to support traditional concepts, which would continue to be selected with a probability of almost 50 %. Building up technological skills is the right thing for financial institutions to do. It is erroneous not to make sure that technological skills permeate all levels of the hierarchy.

4 Possible solutions for shaping and implementing regulation

Regulation as an implementation issue

Financial institutions have based their toolkit for implementing regulatory requirements on the previously dominant approach of dealing with regulatory issues as an administrative problem:

- Regulatory issues receive preferential treatment, particularly compared to market issues, so that they do not compete with them and are not seen in the same context.
- Regulatory projects are based on the assumption that regulatory requirements are already fully assembled and have attained their definitive form, with enough time for implementation.
- The requirements are commonly interpreted as a banking matter, whereas the technical realization is carried out following what is generally a traditional analysis and deduction of requirements.
- In regards to IT infrastructure, the working premise is that the technological base used is currently adequate and will remain stable enough in the future to absorb the changes that are a result of regulation.

Regulation as an opportunity for transformation

This scenario is becoming less and less valid, as is shown by the increase in expenditure required for implementation and the extremely clear delays in launch, as those responsible in the institutions know, or are beginning to realize. Instead, a new primary scenario is gaining a foothold where change is effected through regulatory requirements:

- Regulatory issues should be taken up for discussion by management early on, in regards to all divisions and the overall context of the financial institution's growth.
- Change processes call for the penetration of a poorly structured solution domain with short (agile) implementation cycles.
- Conception and implementation partners should be jointly involved in the change process at an early stage.
- The ability to find solutions and to innovate are critical for profitability, and they require a high level of infrastructure and technological skills, which should receive a higher priority in relation to traditional banking requirements.

In order to meet the challenge for the implementation of regulatory requirements, the administrative approach needs to be accompanied by a transformational one, with its focus on shaping regulatory issues. It is characterized by a proactive approach to issues, early monitoring and collaboration with those involved in its development (from the initial formulation of the issues to the consultation stage).

Gaining room for maneuver is critical for profitability

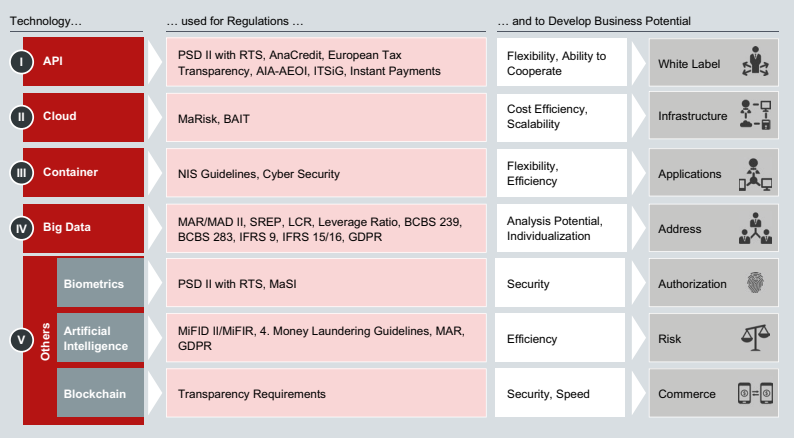
The objective for financial institutions is to ready themselves in dealing with regulatory issues in a different way. The result will be to allow them to take a more flexible approach to regulation, whilst also enabling them to gain a new and wider view of the further development of regulatory, operational and market issues, and thus gain room for maneuver. Solutions to achieve this need to be developed in three areas, which are technology, processes and organization.

4.1 The primacy of technology

The increasing significance of technology for regulatory issues is reflected in a number of ways. First, the use of modern technologies in IT infrastructures is a prerequisite for meeting regulatory requirements. Secondly, the associated technological expertise is indispensable, because it too shapes the solution domains – identifying and discussing options depends on this technological set of skills.

Thirdly, technology's importance for profitability is founded in the primacy of the technological dimension – regulatory issues and requirements need to be understood more and more as primarily technical tasks, with traditional banking aspects seen as secondary. In this way, a paradigm shift is occurring whereby, rather than the leading role being given to a traditional analysis and definition of what needs to be done, regulatory challenges will be seen as fundamentally technological.

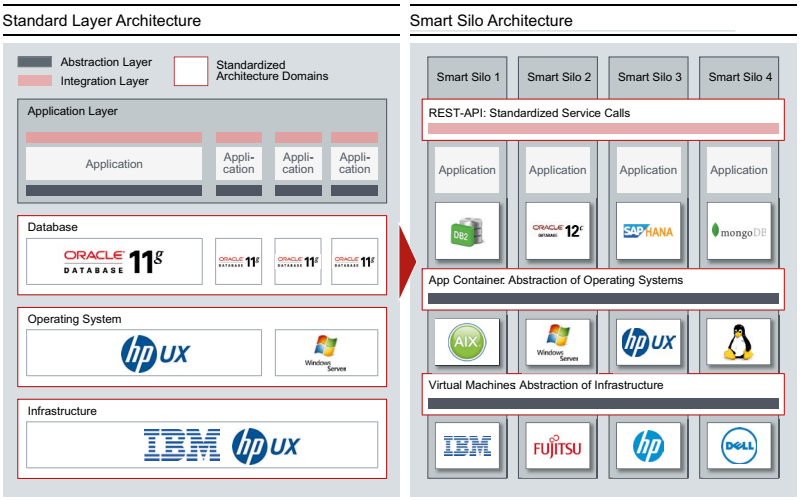
Technology Application as a Lever to Implement Regulation and for Business Development



Source: COREinstitute 2016

Figure 15: Technologies as a basis for regulatory issues

A look at key technology clusters shows the extent to which they can provide the basis for targeted development of solutions for regulatory questions (figure 15). For example, the targeted creation of new, technologically and semantically standardized APIs would permit faster reactions to regulatory requirements such as PSD II, AnaCredit and instant payments, therefore indirectly making it possible to meet the requirements fully with optimized expenditure. This technologically motivated comprehensive view also allows synergies to be sought early on so that their potential can form part of the basis of the calculations.



Source: COREinstitute 2016

Figure 16: Smart silo architecture

Smart silos as an approach to IT architecture

The basis for this amended focus on technologies is a move from a layer-based standardization of architecture with distinct abstraction and integration layers, to a smart silo architecture (figure 16) structured according to domains. The aim of this is to guarantee the technical flexibility needed for future adjustments. Smart silo architecture is characterized by

- Concepts for standardized virtual machines as an abstraction from specific infrastructure features,
- App container technology as the de facto standard for the abstraction of operating systems, and
- Standardized service calls based on REST APIs in order to integrate business processes which will become more fragmented in future.

Application Programming Interface – API

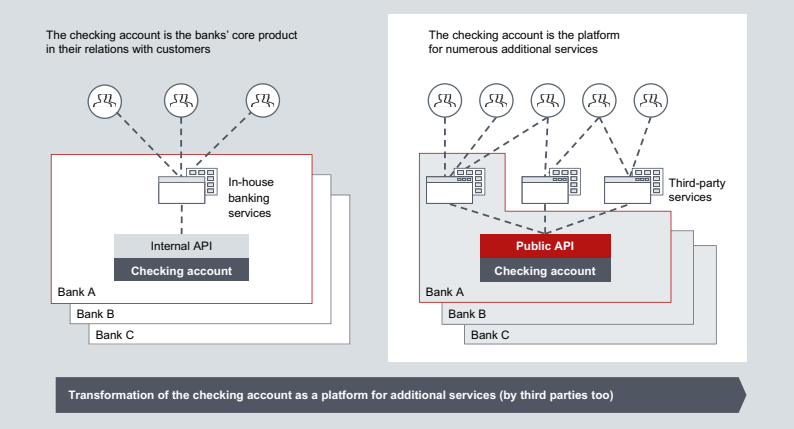
Full separation of applications

Modern software and application environments are based on the concept of micro service architecture. Rather than adopting a monolithic application system, this approach uses a set of loosely coupled services that can be set up so that they are tailored to a particular task, freely combinable, and yet largely independent of one another. The capacity to exchange and extend services can only be achieved by means of a correspondingly flexible interface technology. The use of representational state transfer interfaces (REST) has become the de facto standard for this, because they allow services to be loosely bundled via a unified interface. The narrow requirements of REST support the development of unified and well-structured services that can be flexibly scaled.

Through a number of initiatives, the regulator is putting pressure on financial institutions to create access to data and information, thereby undermining their compartmentalization. One striking example of this is that banks are being forced by PSD II to open up their online-capable payment accounts to third parties (compare the recently published Regulatory Technical Standards (RTS). For an example of the depth and precision of regulatory requirements see: www.coretechmonitor.com/impact-of-the-new-rts-regulatory-technical-standards-of-psd-ii/). The bank's own services until now, accessed via internal APIs in the bilateral relationship with the customer, will have to be opened up to third parties via public APIs by January 2018 (figure 17).

APIs manage internal and external access

Opening of Banks to Accounts via Modern Interfaces



Source: COREinstitute 2016

Figure 17: API interfaces for a checking account

Banks can use interface architectures to meet this specific requirement, while at the same time creating a point of departure for further forms of cooperation. By means of an in-house banking API, banks are able to offer the three mandatory PSD II functions which are Payment Initiation Service (PIS), Account Information Service (AIS) and Payment Instrument Issuing Service (PIIS). A general platform API covering several banks or banking areas is also conceivable. This type of platform API could be used to offer additional services for current accounts as well as for the products offered by individual banks.

Good Practice: Open Banking Standard

The reaction of the British government to PSD II is a good example where account was taken of regulatory requirements in good time. The UK Treasury set up an "Open Bank Working Group" which is producing strategic gains for the country's banking sector. With the participation of major British banks, the "Open Banking Standard" was published; it sets out the framework and basic principles for an open banking interface, governance model, standards for data, the API, and security, as well as the development process needed to set it up. The implementation envisages a "minimum viable product" for the final quarter of 2016, with the final interface planned for the beginning of 2019. This initiative ensured that PSD II was fulfilled early on, while giving the best possible support to disseminating the (British) solution in the form of an open, up-to-date standard aimed at a European audience and, at the same time, open up the potential for making use of data in the banking sector. This makes new business models possible for British players, which can expand across the region.

Cloud Computing

Cloud computing offers services without the need to provide central data storage; decentralized structures are becoming cost-effective and easy to deploy. Financial institutions have been able to make use of cloud resources for some time, whether individually or jointly, they can offer a range of services:

- Application services (Software as a Service, SaaS),
- Platforms for applications (Platform as a Service, PaaS), and
- Server and data center infrastructure (Infrastructure as a Service, IaaS).

Cloud providers replace infrastructure providers

Cloud service providers such as Amazon, Microsoft and Google are providing complex IT infrastructures in order to capture business demands quickly and scalably; companies such as Atos and T-Systems are offering cloud services for the Single Euro Payments Area (SEPA); examples of successful local providers are noris network AG and e-shelter. Cloud provision is opening up new possibilities for the consolidated data centers of the Sparkasse-Finanzgruppe (Finanz Informatik) and the Genossenschaftliche FinanzGruppe (Fiducia & GAD IT) to continue building on the synergies gained for their owners and customers through mergers over the past decades, at a new level of efficiency.

In order to ensure competitiveness, the regulator is urging financial institutions to optimize their cost structures and to focus on their core skills. IT operations (especially infrastructure) is not necessarily one of those core skills, while, at the same time, IT costs represent a large and growing item in their budgets, especially as IT will play a greater role in the future in the successful launch of new products.

Cloud computing is an outsourcing opportunity for financial institutions. The advantages lie in obtaining IT services from highly specialized cloud providers, meaning they are free of the technical burden of running them themselves at a low cost, allowing them to focus on their core business.

The old argument that cloud services cannot meet essential data protection requirements is now left unfounded by a number of established service providers in Germany and Europe (SEPA). The regulator has already approved similar services for individual banks, where cloud computing represents a regular application of IT outsourcing (regulated by German Banking System Act [KWG] §25b and by MaRisk General Section (AT) 9; see glossary).

Industry example: cloud-based core banking

The use of cloud technology is recognized even in the finance industry. Cloud-based core banking systems such as Nymbus and Corezoid (or at a local level, Fidor) develop their full potential in combination with API interfaces that allow for a high degree of flexibility through the ability to combine services and processes. Traditional software solution vendors have also announced they will be transferring their services to the cloud. To address these potentials, whilst still ensuring risks are hedged against, individual banks such as Commerzbank or La Caixa in Spain are taking part in industry-wide initiatives such as the Cloud Security Alliance (CSA).

Container technology

Container technology reduces operational complexity

Container technology aims to deal with complexities in the preparation and maintenance of IT services and application environments. In technical terms, containers are characterized by the presence of all libraries and system interfaces needed to run the application within an independently executable container. This goes a long way towards making it easier to prepare and operate the application, because the latter is provided with all components needed to run it and can be used immediately without making any adjustments. At the same time, application containers reduce resource requirements, because applications can be isolated from one another without the need to use dedicated individual virtual machines for each application. Consequently, the application can be used in its original state in various environments, e.g. in different operating systems. Containers can be executed flexibly through virtualization, locally, or in the cloud, and thereby offer the ideal basis for refactoring IT architectures in the complex IT systems present in banks, together with their growth history.

Many European regulatory initiatives reveal an implicit challenge to innovate, whether for financial institutions, fintech companies or service providers. Innovation is being forced ahead specifically in order to promote the sector's competitiveness and economic growth in general.

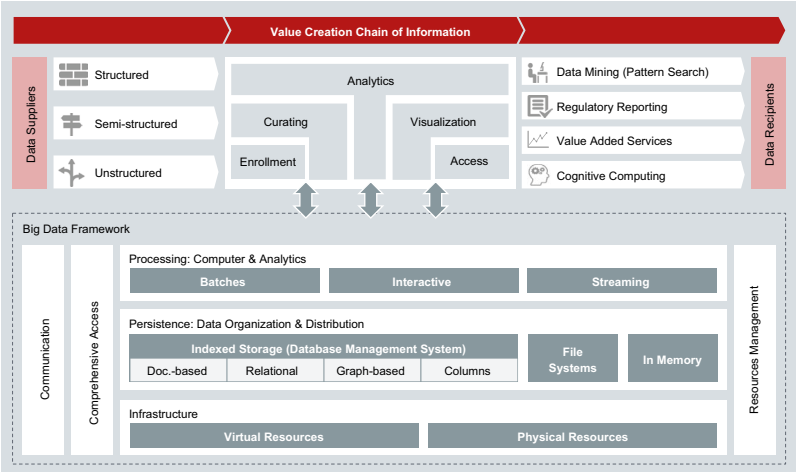
Container technology, generally embedded in cloud structures, enables a high degree of modularization of services which can be adapted flexibly and quickly to meet the needs of both market and regulation. This ability to implement new and ever more quickly changing requirements is on the cusp of becoming a decisive competitive advantage. Although data and security issues currently remain critical obstacles to their use in the finance industry, application containers will very probably succeed in becoming the norm.

Big Data

Data: yes!
Analytics: yes, please!

Data as a raw material and the capacity resulting from the analysis of large quantities of data are coming to be an important factor in competitiveness for financial institutions. The number of datasets that can be exploited today is constantly increasing, while different types of data require a high degree of flexibility when it comes to being able to analyze it; what's more, rapid change in databases is putting pressure on processes and infrastructure. The ability to build an integrated informational value creation chain in which structured, semi-structured and unstructured data can be made available, as needed for both internal and external consumers within a high-performance analytics machine, is also emerging as a competitive advantage (figure 18).

Cross-Linking of Internal and External Data using Big Data Architecture



Source: COREinstitute 2016

Figure 18: Big data architecture for creating information value

The regulator is vociferously demanding greater transparency in the areas of risk, the market and prevention by introducing various initiatives. The bank must be able to report on its risk structure within seconds, showing the market full transparency over its business conditions and practices, and to protect itself and its customers promptly from affliction.

The use of a broad range of big data technology offers solution domains for these areas of regulatory transparency, which can meet the relevant requirements in a timely manner with lower expenditure, with the added advantage of gaining valuable knowledge about customers and markets. With Apache Hadoop and other big data components such as Cassandra, open source solutions are available for distributed systems, which have established themselves in the context of big data and cloud computing and developed into the existing standard.

Context of use: use case driven application

Big data is used in a variety of contexts within the finance industry. As in other sectors, its employment in specific applications comes with clear utility expectations. Especially when it comes to payment processing, the use of big data tools for fraud detection has become standard in the industry. Fintech companies consistently base the decision as to whether or not to grant credit in the consumer area on an evaluation of all available data and information on the applicant; established banks are cooperating with robo advisory specialists, who use big data infrastructures for this. Additionally, financial institutions are gaining access to new possibilities for strategic risk management, such as in-depth consideration of various scenarios or campaign management based on ad hoc analysis, while refined data can be used to initiate highly personalized customer dialogues in a context-sensitive way.

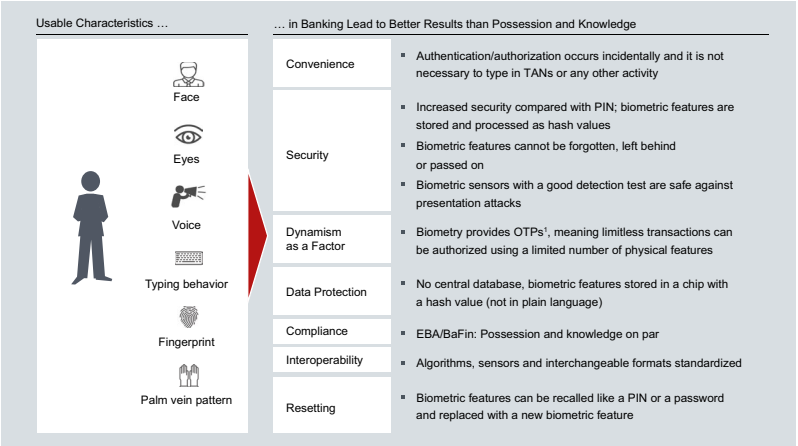
Other technologies

Biometrics

Modern biometric procedures allow physical characteristics and typical behavior patterns to be used as a security factor when authenticating a person's transactions. Biometry also meets all data protection requirements, as modern biometric procedures do not require central storage of the physical characteristics used. Features based on biometric data can now even be revoked and updated in the same way as a PIN or password.

Maximum convenience and greater security

Application of Biometry in Banking



[1] One Time Password
Source: COREinstitute 2016

Figure 19: Benefits and application dimensions of biometrics

The regulator demands strong two-factor authentication for transactions, allocating the same degree of security to biometry (inherence) as to ownership (e.g. a card with chip) and knowledge (e.g. PIN). The advantage of a biometric approach is its combination of greater security with increased convenience (figure 19).

Industry examples: technology providers/financial institutions
Biometrics is ready for the market – with fingerprinting, Apple and Samsung helped biometry make its breakthrough in banking. Samsung has set up its latest phablet with an integrated iris scanner to unblock the display with the eye. Voice, is used by various European banks in telephone banking for fraud prevention. Scandinavian banks, in particular, are using behavioral biometry such as typing behavior and mouse movement to identify customers. Biometry has been widely deployed on cashpoints in Brazil and Japan for about 10 years, and more recently in Poland and Turkey.

Artificial intelligence

Artificial intelligence is on the horizon

Artificial intelligence (AI) offers a broad range of possibilities for further developing products and services, especially in cases where interdependent factors make analysis difficult. When the solution space or data volume is too large to gain an overview of, or if fast reactions are needed, these cannot easily be implemented using traditional technical solutions because of the complexity of the decisions required. For this reason, neural net concepts are increasingly attracting the attention of solution providers for banking products.

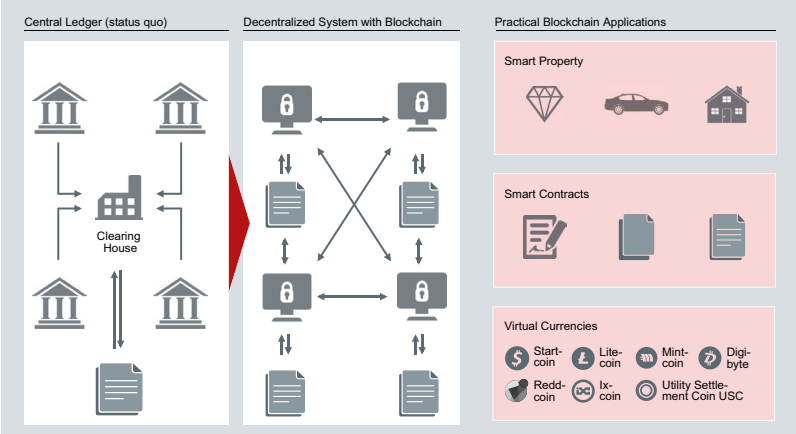
These AI applications are at different levels of maturity depending on their type. For assistance and automation, language-based systems are in use at the level of simultaneous translation. One example of this in financial institutions is the use of robo advisory elements with predictive functions. In this way, a high degree of independence is guaranteed for the advice, and what's more, these methods can offer support in the prevention and discovery of fraud. Asset management applications have made considerable progress, and beyond the banking sector, artificial intelligence is used in medicine for diagnosis and decision-making in the service sector.

Blockchain

Blockchain is beyond the horizon

Blockchain technology, also known as distributed ledger technology, enables a distributed account book to be run and used within a network. The concept of blockchain originated in order to validate transactions among participants who do not trust one another and to retain these reproducibly without the need for a trustworthy third party. The central intermediary for transaction processing becomes superfluous and the relevant data sets are stored in a distributed manner that can be checked and is not subject to tampering.

Decentralized Paradigm of the Blockchain Opens up Application Possibilities



Source: COREinstitute 2016

Figure 20: Blockchain principle and possible applications

From the regulator's point of view, blockchain technology has considerable potential for assuring its goals of increased transparency and security together with lower costs. The potential can be seen in relation to smart property, smart contracts, and currencies (figure 20). According to the clear opinion of security bodies, the cases of fraud involving virtual currencies depend on exploiting security gaps elsewhere and not in the underlying blockchain technology.

The R3 Consortium, an industry-wide initiative

Financial institutions continue to take a cautious approach to blockchain. The biggest initiative, as measured in the number of participating banks, is the R3 Consortium, which brings together over 55 companies from the finance sector. The R3 Consortium is active in research and development for technology stacks in the finance industry based on cryptography and distributed ledger protocols (blockchain). Examples of current R3 projects include a platform for contracts between financial institutions (Corda), the crypto-currency Ethereum (Project Zero), and the allocation and return of company loans (Genesis Project). Alongside this, smaller consortia, fintech companies, central banks and technology firms are experimenting with blockchain-based transactions. The Utility Settlement Coin initiative (USC) was recently made public, involving some prominent participants including BNY Mellon, Deutsche Bank, Banco Santander, UBS, Icap (broker) and Clearmatics (technology) who are working together using blockchain technology.

4.2 Integrating regulation in regular processes (in a new way)

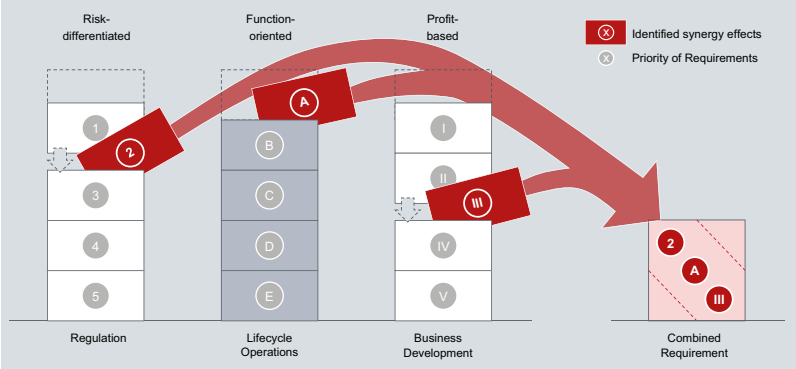
Integrating regulatory issues within business development

Integrating regulatory issues directly and more deeply into the regular processes of business and IT strategy results in gradually eroding distinctions between areas. Issues should be networked across the company, and the discussion this promotes between decision-makers and those responsible for implementation is in itself an important contribution to the development of corporate culture.

Portfolio planning process

The portfolio planning process should be based on the overall consideration of the issues followed by setting priorities among them. This allows cross connections to be made between regulation, operations and business issues and to take account of them when deciding how implementation should unfold, or to take advantage of synergies and weigh risks and opportunities to make a decision about the appropriate level of risk coverage.

Rough Sketch Illustrating Synergy Formation for Various Requirements



Source: COREinstitute 2016

Figure 21: Comprehensive portfolio planning process

Strategy process, in general and for IT

Give more weight to strategic opportunities than regulatory risks

The integration of regulatory issues in regular processes, especially when it comes to business and IT strategy, seeks to superimpose development perspectives on regulatory issues. This means it will be possible, alongside the previously dominant focus on risk coverage, to initiate a substantive consideration of the issues, generating new ideas.

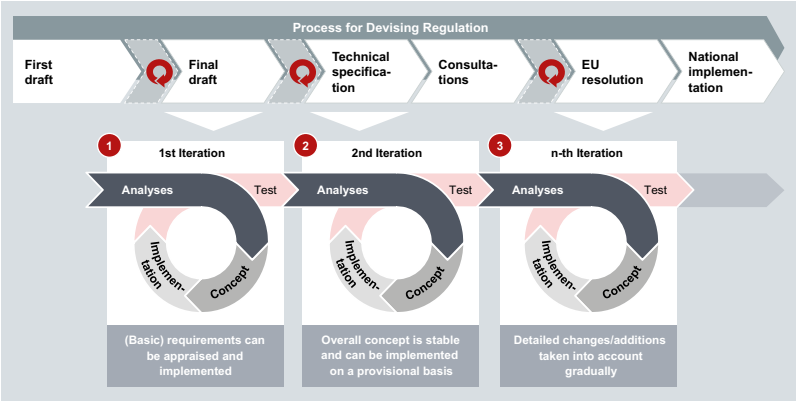
Firstly, these stimuli relate to the prioritization of regulatory requirements, i.e. to the portfolio planning process outlined and the priorities that underlie it. Secondly, the strategic advantages that may arise should be specified in order to address whatever potential there is. Thirdly, including regulation in strategic processes, at the very beginning of strategic planning, ensures that issues will be raised early on, meaning that there is greater room for maneuver in planning terms, for example when it comes to resources,

but most especially for forward-looking IT concepts. Hence, the issue of increasing data requirements can be approached using modern data architectures, in order to develop integrated conceptions for effective and efficient approaches, both for future regulatory requirements and for business opportunities too (cf. figure 21 above).

Project management methods

In its early stages, regulatory plans do not provide a stable basis for planning for proposed integration within financial institutions, because they will be changed in various ways as they are elaborated upon, and a clearly defined, definitive version is only achieved much later on. To ensure timely implementation, financial institutions are compelled to begin the process while regulations are still being formulated. This approach to regulation, which is less structured at the outset, is better served by agile methods rather than a waterfall procedure.

Gradual Implementation of Regulatory Requirements with the Help of Agile Processes



Source: COREinstitute 2016

Figure 22: Agile project management procedure

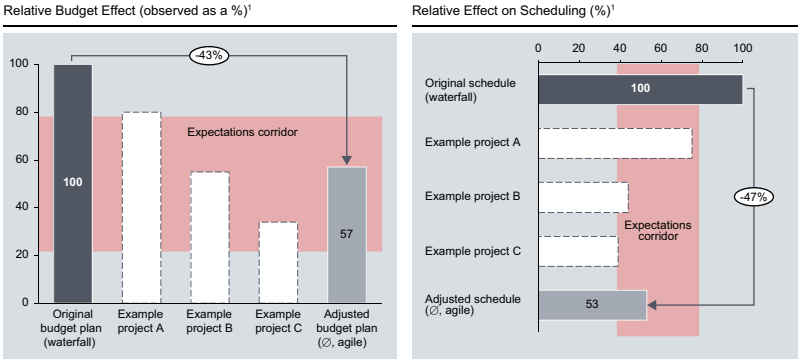
Prioritize agile project and organization management

Iterative uses of agile procedures (figure 22), together with a focus on key functions and features in short development cycles with highly decentralized responsibility, will lead to highly dynamic and flexible project implementation. Handling projects in a more agile way increases the robustness of implementation while also having a significantly positive impact on time and budget aspects (figure 23). Establishing agile components within corporate culture will lead to structural competitive advantages, as a reactive, wait-and-see approach to tasks gives way to a proactive culture of innovation and continued development.

Importance of taking control of the speed of change

The range of methods should be expanded to include the new skill of agile approaches, while, at the same time, agility and system independence must be established as non-negotiable institutional values within the organization. Given that regulatory demands and technological progress both seem likely to continue unabated in the medium and long term, decision-makers within the institutions – and not forgetting politicians – should do everything they can to create conditions within which the positive effects of these changes can emerge, instead of giving too much weight to the inevitable risks they entail. This also means introducing agile techniques such as DSDM and SCRUM (see glossary), and becoming proficient in them.

Possible Benefits from Switching to Agile Procedural Models in Practice



[1] Anonymized evaluation of transformations in the financial industry in Germany, Austria and Switzerland with significant agile shares
Source: COREinstitute 2016

Figure 23: Possible corridor of expectations using agile methods

Increase the use of agile project methods

A simple assessment can be used within an institution to establish every manager's experience level in project methodology. Little effort is required to conduct a survey for a) linear, waterfall processes (e.g. the V-model or Rational Unified Programming [RUP]), b) iterative models like DSDM or SCRUM, and c) no project methodology. If a level lower than 50 % is found for b), the consequence should be an energetic reaction by the management of the institution in question. If a level greater than 10 % is found for c), the sophistication of IT project management needs to be improved. In either case, the level of skill within the organization should be raised through a combination of training in methodology, bringing in specialists, and implementing a targeted root-and-branch introduction of process models. Otherwise, it will not be possible to achieve the efficiency gains that ought to result from the implementation of agile methods.

An increase in the use of agile implementation methods will lead to the challenge of reconciling this speed of change with the stable operation of the company. This challenge arises from the apparent conflict between permanent improvement or "continuous delivery", and the current tendency to separate projects and innovation from normal operations when it comes to development and operations models. This can be met through DevOps concepts – financial institutions that are doing well in the market are now more frequently implementing models of this type.

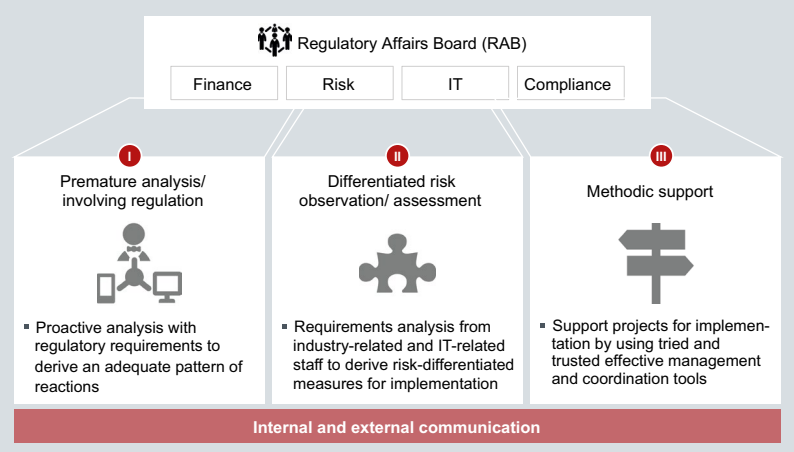
4.3 Adding two elements to governance

Governance, in the sense of company management, includes specific institutions (e.g. committees) and tools (frameworks, policies etc.) which allow the management, leadership and control processes within the company to be represented, and which are reflected in corporate culture. It is in keeping with this broad view of governance to make use of it as a key element for building on the transformational approach, by creating a central responsible body and continuing to develop the company's risk culture.

Setting up a Regulatory Affairs Board

If a central body is set up, the required management functions can be brought together, at the same time bringing the institute a range of performance benefits. This might take the form of a Regulatory Affairs Board (RAB, figure 24); factors specific to the institution such as its business model and the implementation of the three lines of defense model should be considered when determining how it addresses external and internal tasks.

Regulatory Affairs Board (RAB) Scope of Services



Source: COREinstitute 2016

Figure 24: Regulatory affairs board functions

Top-level bundling of regulatory responsibility

The external task of the RAB is to analyze pending regulatory changes and to assume interaction with regulatory bodies as part of a consultation. This means the institution can be involved in the shaping of the regulatory specifications while establishing a cooperative relation of trust with the regulator.

Internally, the RAB is obligated to evaluate the requirements in the form of an analysis of their IT and general banking implications, thus enabling initial indicators of the implications for the organization as a whole to be established early on; the RAB will then lay out the various steps needed for implementation in consultation with the banking divisions. Coordination of support for the methods used (in the form of expertise and employee training) can also be provided by the RAB, in addition to the definition of roles needed

for compliance such as CISO, CRO, or BISO. The RAB will also take on the role of an interface within the organization to ensure the banking divisions are proactively engaged and to coordinate the implementation of the project requirements. The consolidation of requirements affecting different areas means efficient portfolio planning processes can be combined with the use of agile project management methods. The role of the RAB should also include a market-oriented structure that takes on independent responsibility for the continued development of the institution's business policy.

Targeted risk management

More active opportunity and risk management

Giving more weight to the transformational element goes hand in hand with a different risk culture, the establishment of which should be promoted within financial institutions. Aversion to risk tends towards an outcome where maximum requirements are geared towards the ideas of internal and external auditors, while in all probability the institution's market profitability is not the first priority. Instead of this, proactive balancing of opportunities and risks needs to become established in the risk culture and set out in a Risk Appetite Framework (RAF).

All in all, the establishment of a risk culture makes it possible to define the right risk appetite for the institution and to create an organizational framework for dealing with risk in an active and balanced manner. In this way, various factors such as importance or implementation cost can be included in the calculation to motivate high-level, strategic decisions taken independently of regulatory structures and with greater self-confidence, for example on the basis of "self-identified issues". This permits choices to be made on a spectrum between maximum implementation and covering the minimum requirements (cf. figure 9, above), as determined by the institution and the specific case in hand.

5 Conclusion

Financial institutions are faced with sustained pressure from the market to adapt to increasing demands from regulation. The previous chapters have explored the challenges on the regulatory side. It has been demonstrated that the approach taken to regulatory issues in the past has tended to favor traditional banking methods, but in the future, technology will need to be the main way of dealing with regulation. The transformational approach that goes along with this is characterized by five elements:

- More active use of regulatory requirements in the sphere of technology to rebuild IT infrastructure and organization, in order to gain needed efficiencies from technological developments and attain the degree of flexibility required for business developments.

- Portfolio and requirements management needs to be set up in a risk-differentiated way and to bring together the majority of issues for development in order to allow market potential and risk structure to be assessed and plan for issues with the primary focus on the market, while taking account of risk as required.

- Integrating the analysis of regulatory issues in regular procedures for business and strategic development in order to ensure a common, company-wide view is taken of the financial institution's development and business potential.

- Setup and implementation within the organization of agile approaches that allow interdisciplinary teams, using short development cycles, to get to grips with relatively unstructured solution domains.

- Extending regulatory governance with the focus on opportunities rather than on risks in order to implement business models across all areas that will be profitable in the long term as a priority, while still keeping within the regulations.

The technology components are especially important. Instead of treating regulation largely as a traditional banking matter in the manner of the past, there is more and more evidence to favor the necessary primacy of technology in order to draw up more efficient solutions for regulatory requirements.

Mastering technology is the basis for efficiency gains

In order to structure typical regulatory projects in this way, decision-makers within financial institutions must make it possible for technology specialists to be involved in the decision-making and implementation process for such issues in a new manner. The composition of the bodies that make the decisions within today's structures is in itself enough to make it unlikely that proposed solutions from a technological angle will be approved for implementation. It comes as no surprise to specialists that the regulator is initiating necessary changes in the way that supervisory entities are set up within the dualistic system. With that, they are also bringing pressure to carry them out, as is proven by recent adjustments demanded by the Single Supervisory Mechanism (SSM) to governance structures in supervisory boards and other areas, as well as the technology requirements of European and German bank regulators.

Glossary

AEOI	Automatic Exchange of Information
AIS	Account Information Service
AnaCredit	Analytical Credit Datasets
API	Application Programming Interface
BAIT	Bankaufsichtliche Anforderungen an die IT (Supervisory requirements for banks in relation to IT)*
BISO	Business Information Security Officer
CEBS	Committee of European Banking Supervisors
CISO	Chief Information Security Officer
CRD IV	Capital Requirements Directive IV
CRO	Chief Risk Officer
DSDM	Dynamic System Development Method
EMIR	European Market Infrastructure Regulation
FATCA	Foreign Account Tax Compliance Act
GDPR	General Data Protection Regulation (EU)
IaaS	Infrastructure as a Service
IFRS	International Financial Reporting Standards
IOSCO	International Organization of Securities Commissions
ITSiG	German IT Security Act
JST	Joint Supervisory Team
KWG	Kreditwesengesetz (German Banking System Act, implementing the Basel Accords)
LCR	Liquidity Coverage Ratio
MAD II	Market Abuse Directive II
MaH	Mindestanforderungen an das Betreiben von Handelsgeschäften (Minimum requirements for operating trading companies)**
MaIR	Mindestanforderungen an die Ausgestaltung der internen Revision (Minimum requirements for internal auditing) **
MaK	Mindestanforderungen an das Kreditgeschäft der Kreditinstitute (Minimum credit requirements)*
MAR	Market Abuse Regulation
MaRisk	Mindestanforderungen an das Risikomanagement (Minimum requirements for risk management)*
MaSI	Mindestanforderungen an die Sicherheit von Internetzahlungen (Minimum requirements for internet payments security)*
MiFID II	Markets in Financial Instruments Directive II
MiFIR	Markets in Financial Instruments Regulation
MiF-VO	EU regulation on interchange fees for card-based payment transactions
NIS Guidelines	Network and Information Security Guidelines
PaaS	Platform as a Service
PIS	Payment Initiation Service
PIIS	Payment Instrument Issuing Service
PSD II	Payment Service Directive II
RAB	Regulatory Affairs Board
RAF	Risk Appetite Framework
RAS	Risk Appetite Statement
REST	Representational State Transfer
RTS	Regulatory Technical Standard
RUP	Rational Unified Process
SaaS	Software as a Service
SSM	Single Supervisory Mechanism
SREP	Supervisory Review and Evaluation Process
STEM	Science, Technology, Engineering and Math

* Drawn up by BaFin, Germany's Federal Financial Supervisory Authority

** Drawn up by BaKred, the predecessor body to BaFin

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About COREinstitute

COREinstitute researches the dynamics and systems of complex transformations in various industries and sectors in order to develop new solution approaches in IT transformation management together with industry experts, academia and engineers. COREinstitute makes the results of its interdisciplinary research available to a wider audience in lecture series and publications.

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