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Importance of Management Information System in Banking Sector

Znaczenie systemów wspomagających zarządzanie informacjami w sektorze bankowym

Keywords: banks; Management Information System; IT Services; software; automation; innovation

Słowa kluczowe: banki; Informatyczny System Zarządzania; usługi informatyczne; oprogramowanie; automatyzacja; innowacja

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Introduction

Technology is common in our lives. In the beginning, there were only computers with software installed and all data was entered manually. Right now, we have laptops, smartphones and smart watches. The machines are connected to each other and are exchanging enormous volumes of data. More and more technology is smart and provides various data. Not only computers but, for example, buildings, cars, clothes. Many years of development gave rise to industries with businesses based on IT. One example is the financial and banking sector. The amount of sensitive data, customers and market demands and new technologies force the use of sophisticated IT solutions and constant development in this area. The growing infrastructure is becoming more and more complex. This usually invisible infrastructure is the very complex technology system that every function within every bank is built upon, from assessing loan applications to detecting money laundering and to making payments into accounts. Simply put, when this technology does not work, the bank does not work and the

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public wants to know why. Such problems are causing huge costs for the banks. For example, in 2012, millions of Royal Bank of Scotland customers were affected by problems with online banking and payments after a software upgrade went wrong. The problem existed for three hours on Monday, one of the busiest online shopping days of the year. As it was described, "that cost the bank 175 million pounds (286 million dollars) in compensation for customers and extra payments to staff after the bank opened branches for longer in response" [REUTERS, 2013].

To compete, banks need to have more offers that are wider and more sophisticated, which requires IT solutions. The infrastructure is growing and, at the same time, banks need to become more agile so they can better understand market dynamics and anticipate customer needs and design, introduce or modify products and services in a timely manner.

The new technology is also an opportunity for new banks, which need to ensure they avoid IT problems, if they are to win customers from the traditional banks. A recent survey undertaken by "2,000 people by banking software supplier Fiserve showed 80% of people would trust a bank if it had the right technology in place. More than half (56%) said a new bank would have an advantage over rivals if its IT was reliable" [*Sainsbury's Bank IT System…*, 2015].

In an average bank, there are a few hundreds of applications running. This software is connected to a few hundreds of external applications [INGRIFO's Internal Technical and Project Documentations, 2015]. The complexity is a result of a very wide offer, which banks have to provide. In many organizations, there are hundreds of "financial products", such as individual accounts with credit limit, revolving credits, 3-months term deposits, deposit certifications, foreign or domestic letters of credit, annual bonds, etc. The financial products are analyzed in terms of profitability and risk. The same activity is undertaken with customers and currency. Various transactions, the sequence of which starts specific processes, are conducted on these financial products. That is why, a very specific environment, which includes sequences of transactions and financial operations is created around these products.

There are a lot of banking products, and to be able to control and manage them, banks need very good and complex IT services. An IT service is

> […] a set of related functions provided by IT systems in support of one or more business areas, which in turn may be made up of software, hardware and communications facilities, perceived by the customer as a coherent and self-contained entity. An IT service may range from access to a single application, such as a general ledger system, to a complex set of facilities including many applications, as well as office automation, that might be spread across a number of hardware and software platforms [ITIL v1].

When analyzing the components, which are included in banking systems, a few characteristic objects draw attention: customer and his/her bills, accounts, currencies, limits, banking products, transactions. The combination and connections of these

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objects determines the quality of a system's architecture, which consist of many applications. The proper configuration takes into account all information and connections. Maintaining this up-to-date and in high quality determines the business success.

The other challenge is the changing environment and growing requirements. The system's architecture needs to be agile to be able to adapt to the new situation. Without technology, the decision processes take too long – ordering a new software for new offerings, creating new departments which will take care of that, creating new regulations for customers and employees etc. That is why, the role of CIO and IT services becomes crucial for business and competitiveness.

1. IT service – needs

The IT systems are necessary for Banks to be able to address customer's requirements. Creation of the complete banking system architecture is a huge challenge. From the business perspective, it needs to include all information and objects mentioned earlier and needs to be flexible to be able to adapt to changing requirements. From the technology perspective, there are a few areas, which need to be addressed:

- performance issues: a global banking system moves more than 74 trillion dollars of money each day [IBM Internal Documents, 2014a],
- architecture: a financial supply chain that is massively interconnected and independent,
- availability: system requires 24/7 continuous flow of information,
- volume: rapid increase in types of data entering financial system from "real economy" digitalization,
- security: a criminal element that grows more sophisticated,
- technology: an adaptive system evolving organically.

These complexities increase costs, lengthen delivery time and increase project risks. The main problems are connected with various and old technology, for example, inflexible hard-coded links between applications. In many areas there are duplicate systems and redundant processes. The complexity results in that the relevant information is difficult to access in real-time, it is difficult to track transactions through processes and there is a high degree of manual intervention in processes. More importantly, the technology does not align with business needs.

Since the Banking sector is strictly dependent on IT systems, the CIO has two areas to manage:

- the IT solutions which serves business directly,
- the IT solutions, which helps to manage the IT infrastructure to secure high availability of business applications at optimal costs.

The knowledge about the IT services, elements, connections, relations, and what happens with them is crucial for proper functioning of business in banking sector. That is why the second group of solutions needs to have the ability to auto

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discover services for distributed platforms. This task is very important and, at the same time, very challenging since there are a lot of platforms on the market: for PCs, servers, mainframes, mobile devices. Not only discovering is important, but also maintaining up-to-date data and relations between IT infrastructure elements. The next step is the ability to monitor the quality and performance of IT services. The IT department needs to have information about, for instance, bottlenecks, before the performance issues impacts end users. In a worst case scenario, if downtime takes place, the administrators should quickly get the information where the real problem is (without proper tools, in many cases, only the symptoms can be seen and solving the problem takes a lot of time). For full control over the IT services, the administrators should know where everything is, who the owners are, how everything is connected, what kind of licenses are installed or are still available, etc. Therefore, the organization should have proper tools to manage full asset and software license life cycle. Finally, there should be an information flow between users and IT department. This process can be supported by the Service Desk, where users can place support requests, and administrators can provide information about some activities.

2. It service – challenges

In many organizations, there is no one single IT solution which addresses the abovementioned requirements; there are many solutions, each responsible for concrete tasks. For example, producers of network devices like Cisco deliver equipment solutions that are able to control and manage this environment. Microsoft is delivering software which is able to manage MS environment: infrastructure with Windows as an operation system (servers, PCs, laptops), .Net applications, Sharepoint, mobile devices with Windows, etc. Server's vendors are delivering their own software to control this equipment. In the end, there are a lot of various solutions for IT Service Management, but no "single point of truth". If some problems appear, it is difficult to find the source. Additionally, new technologies and market demands cause growth and development of the infrastructure. Above a certain level, the organizations are not analyzing their resources to decide what they really should add, but they are just getting additional hardware and software slowly losing control over whole infrastructure. In such situation, adding new services or devices without clear information about how this may impact the existing infrastructure can be a challenge. Nowadays, the IT environment is growing, but due to common cost reduction policy, the employment remains on the same level. The full visibility and control of the infrastructure helps to deal with such situations. In such conditions, there is a need of a kind of "umbrella" – a solution, which gathers data from whole infrastructure to provide information for operational and strategic activities.

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3. Analysis of banks

In this part of the paper, I will describe the results of Management Information System implementations in three main banks in Poland.

The main goal of this projects was to achieve full visibility into IT services and to receive proper information required for taking operational and strategic decisions.

The intermediate goals:

- increase of the IT services availability. In many situations, the performance of the IT services in banking sector determines the competitiveness, especially that the services are provided to end users as in, for example, on-line banking. If the customer is waiting too long to log in or is not able to make a money transfer, he/she will most probably resign from the service and change the bank,
- IT infrastructure visibility. In many situations, the infrastructure is so complex that every time there are some performance issues or there is a new implementation, nobody analyzes the current infrastructure and just buys new equipment. In the end, there are a lot of resources and nobody has control over them,
- information about how the IT service performance impacts the business. It is crucial to know, what the priority is. If a problem appears, the IT department should know what should be done first,
- receiving information regarding IT service performance issues before the customer is affected. The administrators should know about any bottlenecks earlier to be able to react. An example would be the overload of discs or CPUs,
- improvement of communication within IT. In many cases, there are problems, such as when people who are responsible for network don't communicate with people who are responsible for applications,
- providing support 24/7 due to online banking and the need to support customers all the time,
- better utilization of people. There is always a time pressure and lack of resources. Especially that there are times when there is a need for specialists and some when there is none. Taking into consideration that a good IT specialists is paid well, the CIO needs to find an optimal solution to have enough people for more sophisticated and for easier tasks,
- clear situations and communication with business: why is this not working?, what has happened in IT?, why are the costs of IT so high?, why is it impossible to provide some services?, how to communicate with IT when there are some problems?

The initial analysis, before the implementation, identified many areas for improvement. The IT departments were providing support for the internal and external customers 8 hours per day, 5 days per week. Banks were using many monitoring software programs and subject-specific solutions for managing the infrastructure,

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but there was no "single point of truth". Such a situation is typical, in the current situation. When there are a lot of connections, platforms, technologies, it is very difficult to provide one solution which will be able to manage the servers, networks, applications and business processes. Therefore, banks are choosing what is the best within a class and optimal for them, but in the end they have various solutions not cooperating with each other. The software generates a lot of events coming from infrastructure, but nobody is able to properly gather, analyze or understand them. Another problem is with Service Level Agreements (SLA), which are "a part of a service contract, where a service is formally defined. Particular aspects of the service – scope, quality, responsibilities – are agreed between the service provider and the service user. A common feature of an SLA is a contracted delivery time (of the service or performance)" [Wikipedia, 2016b]. The metrics were defined, but the IT department didn't have proper tools to measure if SLA is fulfilled.

The solution for this situation and challenges was the implementation of Management Information System (MIS) for IT department. The implementation was not so trivial. Banks are huge organizations employing a lot of people who have their habits. The first step for the management was to convince employees about rightness of this project. The next step was to prepare a proper action plan and timeframes and to analyze what kind of technology can be used and who should be involved.

First stage of the implementation was software installation for continuous data collection. In real time, the discovery tools are gathering data regarding the type of equipment, software installed, configuration and relations between those elements. After getting information on what kind of resources are available, there was a need to know how they are working. Current or implemented new monitoring tools and software which is gathering and analyzing events from the infrastructure were used for this purpose. These solutions are providing data about the "health" of the IT infrastructure and services. It associates events with views of business services, applications and infrastructure to help achieve shorter time to resolve system and performance issues. On the market, there is no ideal solution for all areas: network, servers, endpoints etc. That is why, usually there are a lot of domain-specific solutions, which are generating data in various formats. To gather and translate these formats, there was a need to implement event correlators or solutions which provide event management and integration functionality, which in turn makes the flow of huge number of events more user-friendly and ready to use. This data is transferred to Change and Configuration Management Data Base (CMDB).

CMDB is a repository that acts as a data warehouse for information technology (IT) organizations. Its contents are intended to hold a collection of IT assets that are commonly referred to as configuration items (CI), as well as descriptive relationships between such assets. When populated, the repository becomes a means of understanding how critical assets such as information systems are composed, what their upstream sources or dependencies are, and what their downstream targets are [Wikipedia, 2016a].

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This database integrates data from various places – not only the infrastructure, but also financial systems, identity management systems, asset management systems – to provide more detailed information for business decisions. A key goal of a CMDB is to help an organization understand the relationships between the main components of the IT environment and track their configuration. The ideal CMDB, according to ITIL, should support all the other service management processes of incident, problem and change management. To be able to handle this processes, Service Desk was implemented. This solution supports maintaining requests from business users, IT employees and incidents created by the monitoring software. It consists of a few main elements:

- help desk, which is a single point of contact for users. It works for both sides, IT and users. Users can place their requests regarding problems, but also orders for new hardware or services. IT can communicate about some activities or downtimes,
- knowledge base, which helps to solve problems faster. It is a repository of solutions with instant access and easy answers. It was created specifically for users and technicians. It provides end users with self-help system that helps reduce call volume,

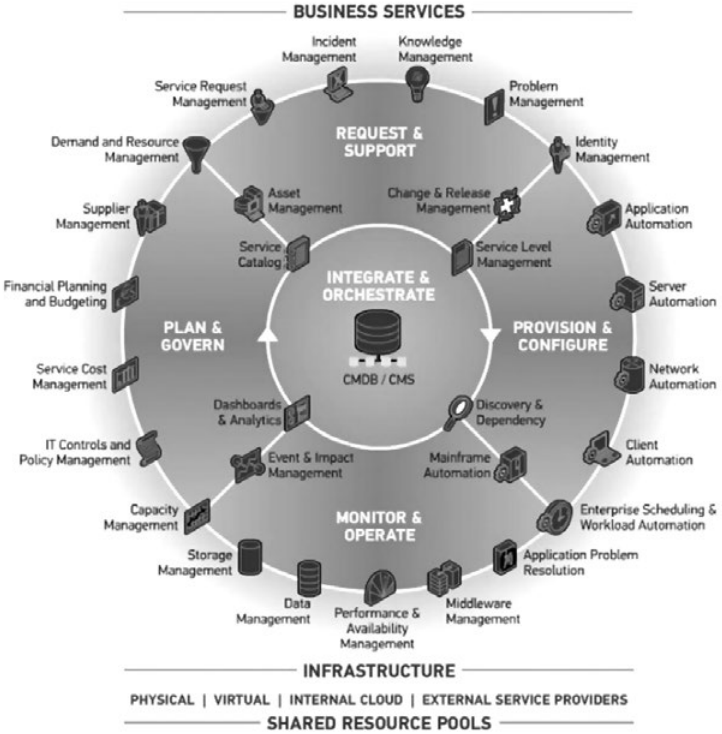

Fig. 1. BSM overview

Source: [Business Service Management].

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– IT asset management functionality, which collects data regarding IT assets, purchases, costs, contracts and subcontractors. Based on this data, the organizations not only know what they have, but they are also able to make strategic analyses, for example, an analysis of vendors. The cheapest purchase doesn't mean that the Total Cost of Ownership (TCO) is also the best one. It might be worth to pay more, but to have reliable resources.

The final step was the implementation of Management Dashboards – a console which is gathering and presenting all data from the infrastructure in one place. Managers or administrators are able to seethe IT service performance very fast. The colors show the status of the service and importance of the alerts. If the user wants to see more detailed data, it is possible with one click. The solution shows the IT service tree and all elements that are part of this service. All events related to these elements can be seen on one screen. The administrator can easily filter critical alerts and see details. The solution helps to control what is happening in the infrastructure, check the trends and service behavior. It allows to generate sophisticated reports and graphs.

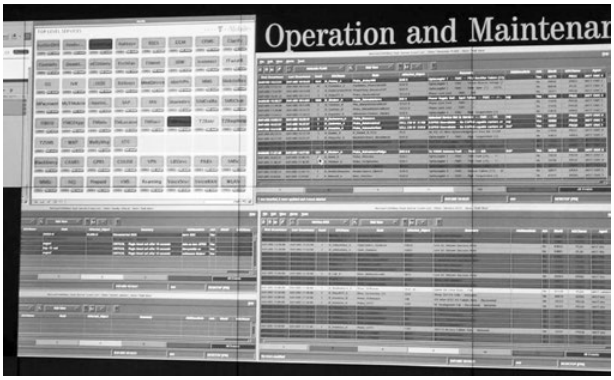

Fig. 2. Presenting Business & IT Dashboards

Source: [IBM, Presenting Business & IT Dashboards.ppt; Richard Wilkins].

On the market, all the biggest players have monitoring tools, CMDB and Service Desks in their portfolio. After the initial analysis, the technology has been selected to meet the needs of each bank. That is why, in all these projects, technology provided by HP, IBM, Microsoft, BMC, Cisco and open source was used.

Implementation of the Management Information System (MIS) for IT departments brought a lot of quantifiable and unquantifiable results. Full visibility of the IT services performance improves the quality of these services. Real time monitoring showing what is happening in the IT infrastructure changes from reactive to proactive monitoring. Right now, the IT team does not react to failures, but it will know much earlier if something wrong can happen in the future. If the system does not detect potential issues and fails, the software helps find the problem, not symptom,

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which shortens MTTR (Mean Time To Recovery). The analysis of the MTTR after finishing projects in these 3 banks, shows that with proper management, the factor can be reduced by 75%. Unification procedures and directions how to address events reduced the time of services restoration:

- critical failure duration from 2 days to 5 hours,
- critical failure number from 13 to 5,
- average time for closing events: 115 second.

The real time discovery of the infrastructure elements, gives up-to-date knowledge regarding current resources and allows for a better and more effective usage of these elements. More effective usage of the devices (for example servers, laptops, network devices) on average, gave annually 1.5% of savings (almost PLN 500,000) in investments into hardware and on average 2% annually in investments into licenses (ca. PLN 400,000). Additionally, the organizations saved annually around 2% (ca. PLN 600,000) on better management of hardware maintenance and software subscription. The software lifecycle management processes, which automatically compares physically installed software with data from purchase department, helped to save on average PLN 1,000,000 in case of an audit provided by a big solution provider. Another advantage of MIS implementation is improved IT team effectiveness and costs. The specialist can take care of difficult and strategic tasks and easier problems can be solved by less educated people. The team was able to change the support from 8/5 to 24/7 with the same crew. The banks also got tools for better SLA management; automation mechanisms were implemented during the project, which inform if the service meets required levels. The big picture with current data helps with faster decision making but is also crucial for strategic decisions. Thanks to sophisticated reports, management can analyze various historical and current data. They can observe how the IT departments or each group are performing and what needs to be improved. They can also easier analyze data regarding the service: to see its costs and performance, to see its influence on other services, to see if it is better to invest in new technology or, maybe, it is better to buy a service.

The most important result is the improvement of customer satisfaction and loyalty.

4. Results of management information systems in IT departments

The customer is the key element in doing business. The organizations have to, not only gain customers, but also put a lot of effort to keep them. This means, they need to provide better offerings and services. According to Accenture research [Samcik, 2014], the biggest disloyalty is among customers of shops and banks.

Good competitive pricing, high quality customer service and good value for money are the top three dominant factors that convince customers to switch to another bank. It's not a coincidence that banking also has been among the most highly distributed industries by digital technologies in recent years. Of the consumers, who

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switched to another provider due to poor service, more than 80% said they could have been retained, mainly if their issue had been resolved on their first contact with the bank [Accenture Strategy, 2014].

Accenture question: "How much did each of the following reasons contribute to your decision to switch/stop doing business?".

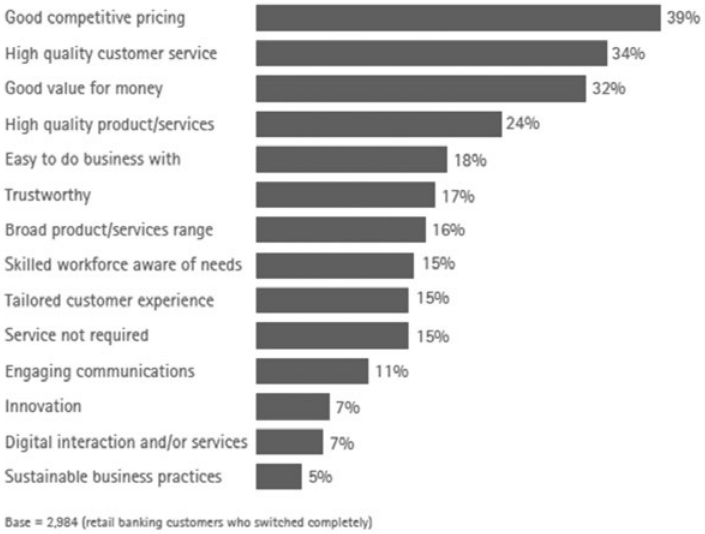

Fig. 3. Reasons for complete switch

Source: [Accenture Strategy, 2014].

One of the factors to improve the service and to be able to provide a better offer, is the Management Information Systems implementation in IT departments. It helps to improve visibility, control and management. Consolidated tools used for infrastructure and service monitoring, improves operator efficiency and service quality. Monitoring the customer experience (both front-end and back-end) and giving proactive alerts when problems occur, also improves service quality and customer retention. The efficiency is also better with consolidated events and performance management. According to the IBM's research done on worldwide organizations, the projects resulted in [IBM Internal Documents, 2014b]:

- increased people utilization: 10–20%,
- increased asset utilization: 3–5%,
- decreased number of purchase: 3–5%,
- increased effective enforcement of warranty: 10–50%,
- decreased inventory: 20–30%,
- decreased logistic costs: 5–20%,

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- decreased material costs: 5–10%,
- reduction of the number of external orders: 10–50%.

Other benefits identified by IBM after analyzing successful implementations:

- increased resources and services productivity,
- increased OEE factor (operational equipment efficiency),
- increased ROA factor (return on assets),
- better equipment utilization,
- decrease of expenses and maintaining costs,
- standardization and unification of processes,
- improved supply chain: equipment and people always on time,
- reduced inventory.

Banks do not have any other choice – they have to use IT. To gain and keep the customer, the technology needs to be reliable and agile. This is possible to deliver with Management Information Systems implemented in IT departments.

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Znaczenie systemów wspomagających zarządzanie informacjami w sektorze bankowym

Artykuł opisuje zalety korzystania z systemów wspomagających zarządzanie informacjami (*Management Information Systems*) w działach IT sektora bankowego. Takie rozwiązania zbierają pełne informacje o usługach i aktywach IT. Pełne informacje oznaczają dane dotyczące zasobów, typu, konfiguracji, powiązań z innymi aktywami, priorytetów biznesowych, właścicieli, kosztów, zmian, podwykonawców, wyników

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itp. Rozwiązanie ukazuje szeroki obraz infrastruktury i usług IT. To podejście daje zarządowi pełen obraz sytuacji, w jakiej znajduje się usługa IT, co pomaga w podejmowaniu dobrych operacyjnych i strategicznych decyzji. Rozwiązania tego typu są niezbędne w organizacjach, których interesy są zależne od branży IT, przykładowo w bankach. Bez dostępu do rozwiązań IT w dzisiejszych czasach banki nie mają racji bytu. Na przestrzeni lat systemy powstawały na podstawie innych systemów, aby umożliwić zmiany dyktowane przez regulacyjne, konsumenckie i rynkowe zapotrzebowania. W rezultacie posiadanie narzędzi do kontroli tej złożonej infrastruktury stało się bardzo ważne z punktu widzenia biznesu.

W artykule zostały omówione wyzwania stojące przed bankami, ich potrzeby, zastosowane rozwiązania i wyniki projektów. Opisano trzy polskie banki, w których wprowadzono rozwiązania dla zarządzania usługami IT (*IT Service Management*). Dane pochodzą z wywiadu przeprowadzonego z dyrektorem do spraw IT i menedżerami projektów.

Importance of Management Information System in Banking Sector

This paper describes advantages of using Management Information Systems in IT departments in the banking sector. Such solutions are gathering full information about IT services and assets. Full information means data regarding resources, type, configuration, relations with other assets, business priority, owners, costs, changes, subcontractors, performance etc. The solution is showing the "big picture" – the full view on the infrastructure and IT services. This approach is giving the management a complete view of the IT service's situation, which helps in taking the right operational and strategic decisions. This type of solution is crucial in organizations, the business of which strongly depends on IT. A good example of such organizations are banks. Nowadays, their existence is impossible without IT solutions. Over the years, systems have been built on top of other systems to implement a constant stream of necessary changes, driven by regulatory, customer and market demands. As a result, the infrastructure is very complex and having the right tools to control it, became very important.

Challenges of banks operating in current environment, their needs, solutions implemented and results of such projects are examined in this paper. Three Polish banks are mentioned, where sophisticated solutions for IT Service Management were implemented. The data is gathered from interviews made with CIO and project managers.