

Microsystems Case study

Work Package 2

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PROJECT PORTFOLIO MANAGEMENT WITH THE USE OF IT TOOLS

Case Study based on the experiences of MICROSYSTEMS

A- EXECUTIVE SUMMARY

Keywords: PROJECT MANAGEMENT, TECHNOLOGY **MANAGEMENT, PROJECT TEAM MANAGEMENT, PROJECT PORTFOLIO MANAGEMENT**

Project management is one of the major challenges of the modern economy. Dynamically changing their structures, the organizations which are the core of the economy introduce changes both in management processes and governance structures. This results in a different approach to the preparation of modern, fast- changing products, which meet market requirements. As part of these changes, traditional organizational structures are being replaced by dedicated project teams, who use modern information technologies to support manufacturing processes and management.

With the growing importance of projects for the functioning of an organization, management becomes an important issue. In particular, it is visible in the IT industry and High-Tech industries, where complex, difficult to pre-define, unique projects with a high-risk profile are implemented by geographically spread, difficult to manage, project teams. Another factor that has an influence on IT and high-tech companies is strong competitiveness. Companies from these sectors must not only carry out their projects in a timely manner, but also ensure the highest quality of supplied products to meet market requirements. The project nature of the functioning of IT and high-tech companies requires using IT tools supporting the implementation of projects.

This case study is an attempt to answer the question how organizations that implement projects using advanced technology can improve their processes by means of professional tools for managing project portfolios. This case study looks at the possibilities of the development of the organization involved in the design and implementation of customized computer security systems using modern technologies (cameras, unmanned aircraft, sensors, alarms, etc.) combined with dedicated software. It analyses the possibility of improving the management of a portfolio of projects that will serve to better match manufactured products to customers' needs, and help managers to monitor progress through the use of a comprehensive information tool.

This case study is thus a kind of feasibility study combined with a wide-ranging process analysis of an organization/company. This is due to the fact that the biggest challenge for project managers is now the use of such an IT system (computer tool) that will allow a comprehensive look at the progress in a number of projects while ensuring their timely implementation. To meet this challenge, however, such a tool must have the right set of functionalities. The problem of today's IT departments of large organizations is a mismatch of tools for processes performed by these departments. As a result, this leads to a situation in which organizations purchase tools for the amount of 300 000 €, and use only 20% of the capabilities of these tools.

Multimedia: Simple video on Project management and PPT animation on the problem

B – BASIC INFORMATION ABOUT THE COMPANY

- Type of business: IT
- Main area of activity: software development
- Region

The company targets mainly the local market in the Tri-City, but because of available resources it can target any market. On the local market it is known, e.g., for the implementation of the monitoring system of the PGE Arena stadium (the largest stadium in the north of Poland). The applied solutions can be successfully transferred to other stadiums, which, from the point of view of zoning, gives the company a permanent possibility of expansion into other markets.

- Competitors, suppliers, products, promotion, prices

Prices: INDIVIDUAL, ACCORDING TO CUSTOMER'S REQUIREMENTS (In this industry it is impossible to establish fixed prices - the prices are the result of the labour-intensive project, technology and equipment used to build a comprehensive security system.)

Suppliers: SIEMENS (The company does not disclose other suppliers.)

Products:

- Comprehensive safety systems (systems for monitoring and logging)
- Event signalling systems (burglary / robbery)
- Fire protection systems
- Adaptation of software for the needs of the above three

- Financial condition: It has a capital of 150 000 PLN, its financial assets reach 2 000 000 PLN (500 000 €).
- Self-assessment questionnaire (nowadays, last year, next year)

The interviews with company representatives indicate a substantial interest in the development of safety systems (equipment + software) not only among customers from strategic industries but also among smaller customers, actually from any industry (shops, entertainment, etc.).

Multimedia: Company's website <http://www.microsystem.com.pl/>

C – ENVIRONMENTAL ANALYSIS

The main feature of the security systems sector, in which the analyzed company operates, is the need for access to the latest and the most advanced technologies. These technologies (equipment and software) are changing at a very fast pace. Operating systems supporting them are modified regularly every few months, and databases are updated several times a week for safety reasons. High technology companies are required to use current market

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solutions, above all without quality defects (they must be secured according to current standards).

The second factor relevant to the sector in which MICROSYSTEMS operates is innovation, combined with the rapid diffusion of technological innovations. This forces the participants of this sector to invest continuously in current technologies. High technology companies need advanced software development tools for specific security products such as industrial monitoring systems or fire safety systems. A security system that uses an unmanned flying device can be an example. It requires not only the use of the materials the device (motor, blades, wings, etc.) is made of , but also the use of dedicated software for the device to perform specific tasks.

High-tech companies must have their own research and development departments. This, of course, implies high expenditure, which is necessary due to intense competition. Another distinctive factor in this sector, linked to high competitiveness, is a short product life cycle. Products must be delivered quickly (at the customer's request), and replaced or updated when new versions of innovative solutions appear. It is estimated that modifications of existing software or technology are launched every seven months on average. It must also be emphasised that companies should keep up with current trends such as technological advances (mobile devices and the new operating system Android, cloud computing, smart cities, etc.). The factors mentioned above have a great impact on high-tech companies.

Activities in the field of new technologies mean that the capital is frozen for a short period of time and that there are relatively quick profits, which together with a high average annual growth rate in the sector may result in high profits and a high rate of company growth (development). However, it can also cause a rapid decline due to wrong investment decisions.

An important but secondary factor for high-tech companies is the need for skilled workers. Employees must have the ability to track down all new developments and innovations in technology-supported security systems. They must also have technical skills that allow for the integration of various technologies, or the migration from the older to the newer.

There are also significant non-technological factors, which have an impact on companies operating on the technology market. They relate mainly to access to the results of the latest research on technological advancements. Therefore, the analysis of MICROSYSTEMS' activities should take into account such aspects as:

- Neighbouring research centres (universities, scientific and research institutions), which educate staff and conduct R&D.
- Convenient channels of communication and exchange of ideas, which would facilitate contacts with experts
- Access to platforms which ensure the influx of investors, who are ready to invest in research and technology development

The most convenient conditions for the development of a high-tech industry are on the outskirts of large urban centres. Investment costs cause that high-tech industries develop mainly in countries with high economic growth, which have adequate financial resources and research facilities. Research, development and access to innovative technological methods and products play a crucial role. From a technological point of view, the concentration of innovative activity in some areas is of utmost significance (e.g., Silicon Valley in the US).

Multimedia: mini presentation on high tech sectors.

D – DEFINITION OF THE PROBLEM

- Source of problem

Due to its design activity, Microsystems is a very good example of a modern organisation whose mode of operation is based primarily on design activities supported by advanced technology. That is why the value delivered to the customer results from the work not so much of a single department but from the joined efforts of many departments. This approach means that in order to carry out a contract or fulfil an order, a number of people geographically spread co-operate to a lesser or greater extent. The company has also a lot of projects for different clients at the same time. This is a sufficient argument to analyse the possibility of using project management tools by the company. It should also be noted that providing customers with security systems, the company must not only be familiar with the latest technology and secure access to them, but it also has to adjust them accordingly, modify and update to meet their customers' expectations.

- Scope of problem

On the basis of observations, the following types of projects implemented by the company have been distinguished:

- Complex safety systems (systems for monitoring and logging)
- Event signalling systems (burglary / robbery)
- Fire protection systems
- Software adaptations for the three mentioned above

The aim of the projects implemented by MICROSYSTEMS is to adapt the existing software to the management of complex security systems (the software supports recordings from

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security camera systems and integrates security systems with, e.g., police and fire services systems). These IT projects require some modifications and customization of the software depending on the customer's needs. The types enumerated above are typical software adaptation projects. About half of IT projects are only sub-projects, i.e., they are part of projects that aim at the development of comprehensive security systems (using machine vision, sensors, etc.). Hence, one order can involve several projects carried out at the same time. When the company develops solutions for many customers, it may be required to manage the entire portfolio of projects.

The analysis has revealed that the company does not use any complex tools to manage the implemented projects. A company with such a wide portfolio of projects (each order is a separate project), however, is required to monitor the progress of each individual project. In addition, it often has to adjust software, which means running sub-projects (implementation, testing), which are part of a complex project for one client. This results in difficulty with project management.

Due to the fact that project management requires the use of certain formal methods of implementation (these may be methods, IT standards such as SCRUM, PRINCE2, RUP, etc.), and given the necessity to monitor progress by the company managers, the lack of a comprehensive tool causes specific management problems, i.e., creating documentation, versioning, cost accounting and scheduling. The implementation of projects is therefore a challenge for the executives of the organization. The managers are required to continuously monitor the progress of the whole project portfolio (e.g. fire alarm systems projects). Therefore, the use of a comprehensive management tool for the management of the entire project portfolio, a tool that somehow links all the projects carried out by one organization, becomes a priority for the managers. Tools that can support individual subprojects within the whole group of projects not only allow managers to monitor the progress of the projects, but also become a platform for team information exchange, customer information exchange and information exchange for other stakeholders (i.e., for those interested in the results of the project).

In addition, the growing market forces the organization to engage more and more resources - human and equipment, which means that by investing in a project management tool the company expects to improve both team management and equipment evidencing.

All these factors make the company consider introducing order by using a comprehensive solution that will ensure the effective monitoring of the projects. Therefore, in consultation with the staff of Gdansk University of Technology who deal with project management and the implementation of tools to support management processes, the company has decided to carry out a feasibility study which will allow for the choice of appropriate tools to manage a portfolio of projects.

E – SOLUTION

Because the company is interested in a comprehensive tool for project management, one of the most advanced project management tools supplied by IBM was selected for the analysis. The selected tool - Rational Team Concert (RTC) – offers professional project management support on many levels - from requirements analysis and management through the creation of teams and tasks assigned to them to the management of the quality of manufactured products information. MICROSYSTEMS considered it necessary to verify whether IBM RTC could be used to monitor the portfolio of projects they are running. Due to the fact that some projects were not typical IT projects, they involved software customization, the company wanted to find out whether the tool would facilitate the management of such projects. Therefore, it was analysed if its basic parameters/ features would meet the needs of MICROSYSTEMS. Such an analysis is necessary for the subsequent assessment of how the tool can support MICROSYSTEMS in project management and help to resolve the company's current management problems.

METHODICAL SOLUTION

(implementation plan prepared by experts in the application of project management tools)

Based on the analysis of the business processes of MICROSYSTEMS as well as on the examination of the development of the project portfolio, a feasibility study was carried out. Its purpose was to evaluate to what extent the RTC system, which speeded up the implementation of individual projects, could improve the management of a portfolio of projects in the company.

Presentation of solutions:

To solve the business problem of MICROSYSTEMS, a tool was sought which would support the management of not only individual projects, but whole groups of projects, or those that have the ability to group projects and build their hierarchy. RTC, the selected tool, meets this requirement. IBM Rational Team Concert (RTC) is in fact a collaborative environment that helps individual users and all teams achieve high performance design work, assigning them to project areas (areas of projects can integrate several sub-projects). RTC provides integrated project control mechanism, team management as well as support for people who create software working in parallel. RTC also allows connecting distributed teams - both developers and other project team members. Its primary purpose is to support management and production in projects which aim at the production of software. However, due to the customization tools (functionality that allows RTC customization) it is possible to manage any kind of project.

It should also be noted that the purpose of using RTC for design work is to shorten the project life cycle, thereby enabling development teams to faster produce high-quality software. RTC is available in many versions, depending on the needs of the customer. The extended license option, which is expensive, gives more opportunities for performance. It allows managing larger project groups, has the potential to connect professional database systems and archive completed projects. The functionalities of the tool are summarized in the table below.

IBM Rational Team Concert	
Rational Team Concert	Repository files - versioning and configuration
	Process Patterns and information flow within the team
	Server build version (Build Engine)
Jazz Team Server	Team cooperation
	Measures of state
	Safety
	Information about events
	Searching and querying
	Context work
Open integration	Customer integration
	Server integration

Since the RTC tool is built on the Jazz platform, which supports both manufacturers and software developers, it is possible to simultaneously organize the work of many teams who work in parallel on their projects. Jazz Team Server, which is an integral part of RTC, also facilitates the accumulation of knowledge about both manufacturing and project-management. When individual users involved in a project are defined, groups to which they belong are defined as well. There may be one team dedicated to the user interface, and another one to a requirements analysis. The essence of this system is the power of team communication, which can be established by selecting the Jabber instant messaging or IBM Lotus Sametime. Employees using this environment should not have any problems with the integration of Rational Team Concert client and server with older integrated development environments (IDE). This is possible due to the fact that RTC is an extension of Eclipse which allows teamwork and project documentation. For user convenience, access to the Jazz platform is also possible with a web browser via the web UI (based on Ajax). This allows employees to access it from any location where there is access to the World Wide Web.

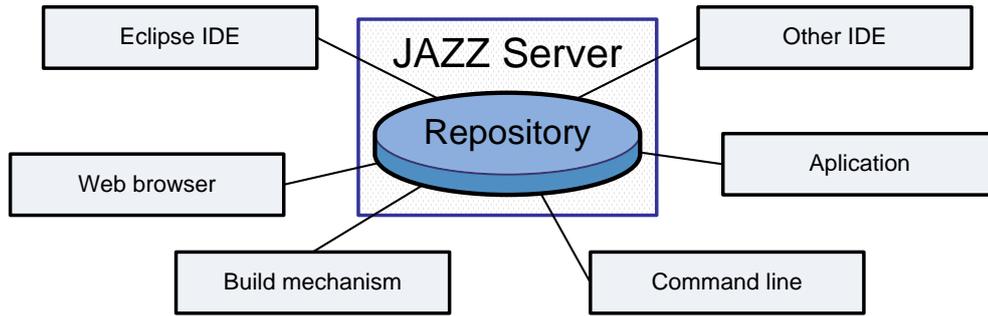


Figure 1 Structure of JAZZ

An important advantage of using the RTC tool is that the tool functionalities support methodological approaches in project management processes through built-in templates. This means that the project manager who is familiar with that method of project management can define tasks. The templates can be used for both development methodologies such as Agile and Scrum and classic methodologies. The platform provides the following templates Eclipse Way, OpenUP, Scrum, Agile Process and Simple Team Process. What is important is that these templates can be edited. Thus, the template does not impose the way it should be used, it rather offers a set of methodological principles. The way of using the templates processed by the Jazz platform, which is an integral part of RTC, is presented in the scheme below. The layout can be different, and it can be adapted, depending on needs, i.e., new components can be added.

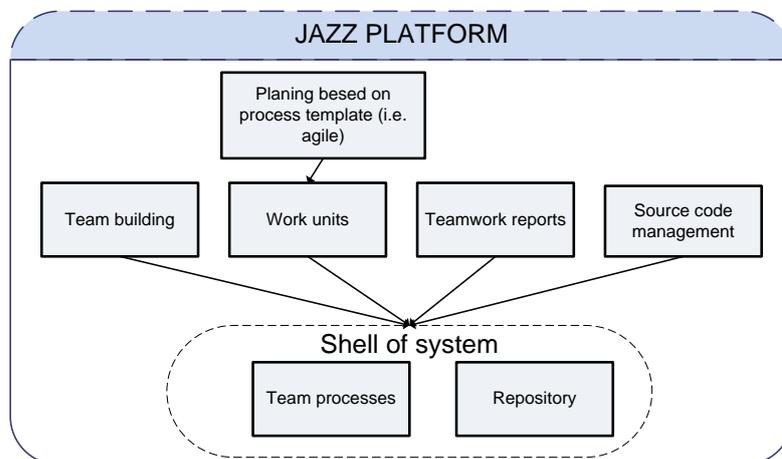


Figure 1 Use of the Jazz platform

Areas of business that can be supported by the selected tool

The research conducted in MICROSYSTEMS allowed identifying several key areas of business activity (business processes). The aim of the pre-implementation analysis was to determine to what extent the company’s main business areas can and/or should be supported by IT management technologies such as RTC .

Therefore, at first the main task categories of the basic projects were determined. It made it possible to create the structure/categorization of the tasks and the functionalities of RTC, to which measures of adjustment were added.

Team management

Many employees perform tasks within one project. Typically, the task/worker ratio is 1:1 (no shared tasks). However, there are relations between tasks (sequences of tasks, parallel tasks), which means that the tool should allow for the creation of workflow and unrelated tasks. In addition, project tasks should be assigned to specific individuals or roles.

Version management

The company's projects by definition are varied, but they have certain common features. Versioning allows reusing components in subsequent projects.

IT Project Management

Some projects require using information technology (implementation, testing), hence the need for the management of projects that aim to produce software or pieces of software (integration with other systems etc.).

Managing customer requirements

Before the creation of a security system, customers specify their requirements. The company's employees have to translate them into specifications for future systems contractors.

Such modelling is an introduction to evaluation, which can be used for recommendation. Before purchasing and implementing the tool which supports projects, it must be determined if it meets the customer's expectations.

Taking into account the flexibility of RTC, and the fact that the authors had an opportunity to implement this solution in an organisation which needed only certain functionalities, the possibility of using RTC by Microsystems should be assessed.

Recommendations (implementation analysis - feasibility study)

Support Area	Possible tasks supported by RTC	Measure of adjustment (from 1 to 5)	Explanation
Team	1. Defining roles (responsibilities) 2. Assigning tasks 3. Monitoring tasks performed by employees	4	RTC allows assigning tasks to individual participants in the project so that each employee can control their activities. RTC enables the scheduling of work and the graphical representation of the work progress of team members.
Projects	4. Versioning 5. Sharing documents	3	First and foremost a repository of files, gathering all information about the project, creating components, creating a database of the implemented projects.
Software	6. Version and Configuration Management 7. Producing code	5	RTC is a comprehensive tool for IT projects, so any IT project can be supported by this tool
Client	8. Defining requirements 9. Scheduling meetings	4	If there are a number of analytical tasks related to customer requirements, it is possible to use RTC for collecting such requirements, or it is possible to extend RTC by adding dedicated tools (Requirements Composer).
Testing	10. Testing customized software	4	RTC enables functional testing (using Quality Manager - an integral part of the Jazz platform).

1- low adjustment 5-best adjustment (expert marks)

Technical parameters – Is there sufficient computational power?

The company's server resources allow for the full installation of RTC. It is also acceptable to use cloud computing (assuming that the owner of the data centre, where it will be installed, will maintain it).



Decision:

The expert evaluation shows that MICROSYSTEMS is technologically ready to implement RTC, and that the tool can be used to manage the portfolio of the company's projects.

Further steps – discussion about the solution

Based on the analysis, it can be concluded that RTC can improve and support the majority of the company's project tasks. However, by deploying this solution, the company will face significant costs induced by:

1. Pilot implementation by an IBM partner company (employee training and adaptation of the new tool to meet the company's needs)
2. Purchase and adjustment of RTC to the company's needs (purchase of license and full implementation).
3. RTC testing through mobile units (RTC has a mobile application for Android)

The variants presented above will result in making strategic decisions. Depending on the license, RTC can cost tens of thousands of dollars. It can introduce structure and order to the system of project management. The preliminary analyses show that most of the tool functionalities meet the company's expectations, which means that deciding to buy the tool, the company will meet its current needs.

It is worth considering if pilot implementation is necessary. Such a solution would help employees prepare for full implementation in the future. However, is it necessary to pay for pilot implementation if it is obvious that the tool meets the company's current needs? It should be emphasised that not all the company's projects are IT projects. It must be added that many of the company's IT projects are only sub-projects. Therefore, the question arises if the tool is good at managing other projects (IBM uses RTC to manage its IT projects, so do research and development centres).

The study also raises the question whether the complexity of the tool, which allows supporting existing project tasks such as defining tasks for employees, monitoring work status, version scheduling and controlling, will be sufficient in the years to come, and what the company should do when it turns out that it needs a new functionality such as integration with the financial and accounting module of another system.

The repository may provide important support, as it can be used as an assembly of components and reference models for future projects. Does the repository have sufficient space for storing organizational knowledge?

Should the company suspend the decision to purchase the tool as it will cause quite a significant change in the employees' habits, and decide on pilot implementation or should the company use it through cloud computing or through mobile tools for tablets and smartphones instead?

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