Implementing the Serial Number Tracking model in telecommunications: a case study of Croatia

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Abstract

Background: The case study describes the implementation of the SNT (Serial Number Tracking) model in an integrated information system, as a means of business support in a Croatian mobile telecommunications company. **Objectives:** The goal was to show how to make the best practice of the SNT implementation in the telecommunication industry, with referencing to problems which have arisen during the implementation. **Methods/Approach:** the case study approach was used based on the documentation about the SNT model and the business intelligence system in the Croatian mobile telecommunications company. **Results:** Economic aspects of the effectiveness of the SNT model are described and confirmed based on actual tangible and predominantly on intangible benefits. **Conclusions:** Advantages of the SNT model are multiple: operating costs for storage and transit of goods were reduced, accuracy of deliveries and physical inventory was improved; a new source of information for the business intelligence system was obtained; operating processes in the distribution of goods were advanced; transit insurance costs decreased and there were fewer cases of fraudulent behaviour.

Key words: Mobile telecommunications, business processes, bar code, SAP, IT project implementation
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Introduction

This case study deals with the implementation of a Serial Number Tracking (SNT) model in a company that is one of the three mobile network operators in the Croatian market, a few years ago. Serial Number Tracking is a process of monitoring merchant goods movement, based on the reading (scanning) serial numbers. Most of the telecommunication companies income was generated by selling services, but smaller portion came from the sale of merchant goods necessary for the provision and use of services in mobile telephony (mobile devices, top-up vouchers, SIM cards (prepaid and postpaid) and some other equipment).

SNT is important for telecommunication companies because it gives additional information for business intelligence systems and increases safety during transport. The SNT model (which started to be applied in a period 2006-2007, in stages) in question is still in use, constantly developing through upgrades.

The implementation process included some of the company employees, one external supplier and a consulting firm, whose identities may not be unveiled in this study due to reasons of confidentiality. The company employees which were in the project team, was divided into a sub-teams. Figure 1 depicts project organization. Only those sources of information which are publicly available were used in the study, along with information relating to internal business processes which have been cleared. The case study deals with the project in question through its full life cycle. It describes the way in which business processes of a mobile network operator in Croatia can be furthered by the integration of an SNT model in

its information system. Improved business processes and intangible benefits of implementation are given as evidence of the project's cost-effectiveness. The concrete tangible benefits are also listed, but without hard data on actual savings.

The paper consists on the following sections: an overview of company profile and Croatian mobile telecommunications market; specification of business requirements; organization of project; project specification; implementation of SNT project; benefits and economic aspects after implementation; post-implementation activities and finally conclusions.

Company profile and the state of the market

Mobile telecommunications market in Croatia

The Croatian market of mobile telecommunications is determined by the fact that there are three mobile network operators in it, and the largest among them has a market share of 49.1%. When the project, this study deals with, was being implemented (2006), Croatia had a population of approximately 4.5 million. Table 1 shows some of the current economic and telecommunications market indicators in Croatia. The market can roughly be divided in two distinctive segments: the postpaid segment (where service is paid via regular monthly billing) and the prepaid segment (where service is paid in advance, via physical or electronic top-up vouchers). The market growth peaked four years after the project implementation (2010).

Table 1
Some economic and telecommunications market indicators in Croatia

Indicator	Value
GDP per capita (2006)	7.287 €
Telecommunications market (2005)	1.758.000.000 €
Inflation rate (2006)	3,30 %
Mobile penetration rate (as of 1 July 2006)	90,75 %

Source: Cullen International (2007)

Prevailing trends in the Croatian telecommunications market, at the time of project implementation, included technological enhancement of mobile networks (to ensure a higher throughput) and services, accompanied by a trend of decreasing prices of mobile telecommunication services. In order to maintain technological leadership and competitive advantage in the market, operation was going through a process of transformation aimed at the implementation of new services via mobile telecommunications.

Company Profile

At the time, the company operated as a mobile communications division of a local group which is part of an international group. Table 2 presents some of the financial indicators at the Croatian Group level relating to its operation at the time of implementation (year 2006).

Most of the company income was generated by selling services, while a smaller portion came from the sale of merchant goods necessary for the provision and use of services in mobile telephony (mobile devices, top-up vouchers, SIM cards (prepaid and postpaid) and other equipment).

Table 2
Some financial indicators – Croatian Group level

Indicator	Value
Total income from core business	1.586.894.075 USD
Net income	1.549.371.634 USD
Profit from core business	426.570.916 USD
Net profit	369.479.354 USD
Total assets	3.041.651.706 USD
Long-term debt	138.061.041 USD
Total share equity	2.498.743.268 USD
Operating margin	27,50%
Net profit margin	23,80%
ROA	12,10%

Source:Croatian telecom (2007)

Specification of business requirements

Given a steady Increase in the number of customers for mobile services, it was necessary to reorganize and advance business processes so that services may be provided to a considerably higher number of users. On the other hand, it was necessary at the same time to have optimized and more transparent monitoring of stocked and sold goods, and to make warehousing and processes of booking in, issuing and despatch of goods more economical.

The goals of business nature were to: (1) physically reorganize the warehouse; (2) optimize warehousing procedures; (3) introduce identification numbers; (4) increase the safety of goods and improve transit monitoring; (5) improve the quality of reporting data.

Physically reorganize the warehouse. The goal was to make full use of the warehouse area, ensure safety zones with limited access to certain materials and install specific equipment (conveyor belts, scales, computers, bar code readers, network printers, bar code printers, packing desks and quality control units) in order to optimize warehousing procedures and make the area entirely useable and safe.

Optimize warehousing procedures. Optimization included a reduction of paperwork and the number of steps within each individual warehousing procedure, resulting in scaling down of human error to a minimum. Logistics business processes also required reorganisation with the aim of time-optimization of booking in, storing, producing bundles, packing and issuing of goods, and of increasing the accuracy of data during stock control.

Introduce identification numbers. One task was to introduce serial identification numbers for mobile devices, physical vouchers and SIM cards (prepaid and postpaid), to ensure traceability of goods for each individual product unit, starting at booking in. In the process of production of bundles (mobile device plus prepaid card), it was necessary to enable cross-referencing and monitoring for each (serial) identification number within a package, and to link the issuing of goods with their activation in other connected information systems.

Increase the safety of goods and improve transit monitoring. Apart from increasing the safety of goods and improving transit monitoring, another goal was to achieve economies before and during despatch and relating to costs of insurance of goods during transit.

Improve the quality of reporting data. Another task was to make reporting more transparent by connecting the integrated information system with a system of business intelligence.

Defining organization and project members

As the first step in organizing the project and defining its members, the Project Charter document describes project organization. Figure 1 depicts project organization for SNT project, which is a part of Project Charter document. This document also explains the following: (1) Tasks of each individual project member; (2)

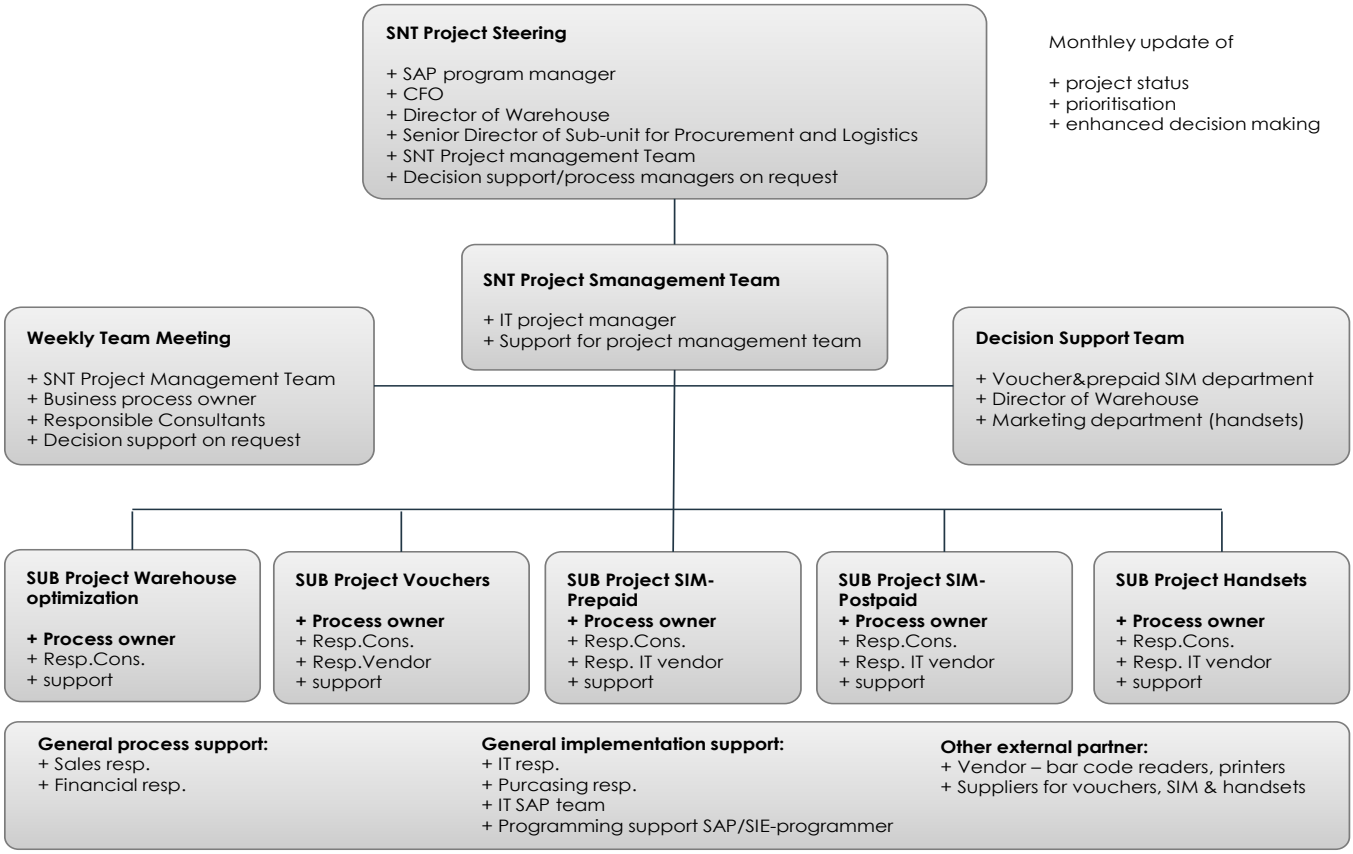
Responsibilities of each individual project member, together with the way to manage and coordinate the project; (3) Goals and planned functionalities of the project (overall and for each individual phase); (4) Project plan and documentation to be delivered with the project (for example: business blueprint, technical blueprint, acceptance tests, end-user manuals); (5) Conditions for project success (availability of consultants, key users, test systems, etc.) and obstacles that might influence implementation or project delivery deadline; (6) Benefits of implementation and analysis of potential risks and challenges after project finalization; and (7) Criteria for assurance of quality and verification of successful implementation of the project. It was on the basis of the Project Charter document that the project was accepted and that members of the project team were included, and they immediately engaged in coordinated activities relating to this project.

Current status assessment and financial plan for the project

On the basis of past experience gathered in different IT projects, the project team defined the following steps at this stage: (1) assessment of current business processes and analysis of problems occurring in them (this is one of the most important steps); (2) planning and defining a desired end state after the project implementation, including business and technical processes; (3) goal-setting (on the basis of comparison of desired and current processes). It was necessary to define entirely new or redesign the existing processes. In connection with processes of booking in, issuing and storing of goods, the existing processes were redesigned (quite considerably) and modified in this project. Regarding packing and serial number scanning, some new processes were defined. Specifications were drawn up gradually in such a way that each team was in charge of its part of the project, while the shared parts (coordinated by project leader) were defined jointly.

The specification comprised the shared part and individual project phases. The shared part consisted on Introduction, Project goals complete with Executive Summary, Resource, Cost and time of implementation plan with analysis of cost effectiveness (by individual phases and overall; budget planning CAPEX and OPEX), Reporting, Risks and various supplementary material and open issues. Individual project phases consisted on Description of current and future (desired) business processes and equipment, Tasks for project team and leader, and Cost assessment for each individual phase.

Figure 1
Project organization for SNT project



The project planning phase is the key stage in a project, because without a good plan there is a high likelihood that the project would not reach finalization, or that it would go awry at some point. General conclusion from many resources and researches is that a high percentage of projects never get completed, while others exceed either their time limit or the cost limit. In some cases, this may be a result of unforeseeable circumstances, but in most cases it is a consequence of bad planning and lacking preparations for the project.

After this stage (although some additional activities were taking place simultaneously), work started on the project's technical specifications (also by parts) and ensuring a budget. The following stage was about initiating the procurement of equipment and services by contracting business partners and consultants outside the company, following a selection process.

Implementation of identification number monitoring system

A second key stage after planning is the implementation of project functionality. There are a number of elements which are important for successful implementation, but the most important ones (according to Haft, Umble, 2003) include:

1. Understanding and clearly defining strategic goals, expectations and results.
2. Firm commitment to and involvement in a project by company's top management.
3. A project requires excellent management, which calls for a project leader experienced in managing similar projects. A plan, tasks and goals of implementation need to be clearly defined.
4. Managing organizational changes brought on by the project requires flexibility.
5. A team working together on project implementation need to be professional and experienced in the implementation of similar projects.
6. Data in the system need to be verified and entered correctly.
7. Adequate education and training for end users enables not only correct data entry and processing, but also reduces end users' opposition to new interface application adjustments.
8. Adequate system design to ensure optimal performance in executing transactions.

The most important steps during and just after the implementation (stabilization phase) include (according to Umble et al., 2003, adapted):

1. Plan and activity overview prior to implementation.
2. Installation and testing of new equipment. In this particular project, this refers to hardware, bar code readers, conveyor belts, scales, tables, network printers and network connections.
3. Installation of and modification in application (software) in the integrated information system and on interfaces of its connected systems.
4. Implementation of functionality in the integrated information system in one step or through several phases (as was the case with this particular project).
5. Implementation of an authorization concept in the integrated information system.
6. Accuracy of data and transfer of master data into a target integrated information system.
7. Testing new functionalities.
8. Documenting business processes; technical documentation and instruction manual.
9. Education of end users.
10. Go-live with thanks and possibly rewards for members of the project team.
11. Correction of detected errors in application and everyday user mistakes.

Phase 1: Redesign of warehousing processes and reorganization of warehouse

The warehouse was physically divided into seven zones: (1) goods in; (2) storage zone for mobile devices and additional equipment; (3) storage zone for vouchers and SIM cards (prepaid and postpaid); (4) production zone for bundles; (5) packing zone for departing deliveries and checking the quality of transport packages; (6) goods issue; (7) office zone.

The following steps were undertaken to carry out the warehousing processes redesign and reorganize the warehouse: (1) procurement and installation of all the necessary equipment, delivery to the central warehouse; responsibility of Procurement and Logistics sectors and (2) redesign of business processes. Business processes were redesigned in the following sub-phases.

Sub-phase 1: Booking-in of goods

1. An order form for the supplier is created in SAP, containing information about products, volumes, prices,

delivery deadlines and other information.
2. For practical reasons, vouchers and SIM cards are registered by batch.
3. On the basis this order form, identification numbers are entered if items in question are serialized merchandise (mobile devices, vouchers, prepaid or postpaid SIM cards). In the case of devices and SIM cards, the numbers are extracted from a file submitted by a supplier just before delivery. For vouchers, information about identification numbers and batches (4,000 packages) are being sent to SAP via interface, from a system creating and activating vouchers. They are awarded status „PROD" (production).
4. When being admitted into warehouse, products are scanned by the bar code reader before undergoing a quality inspection. After that they are awarded status „QUAL".
5. A sample of vouchers and SIM cards is taken for a test run before being awarded status „TEST".
6. Once the goods have been subject to quality inspection (weighing, visual inspection, checking technical details and functionality, testing of vouchers and SIM cards), they are booked in, which means their identification numbers are scanned with the bar code reader, and then the products are awarded status „STOK". The status means they are ready for despatch, and are going to be transferred to the zone for storing.
7. Returned goods also have a share in goods coming in. They too undergo quality inspection before being awarded status „QUAL". Depending on whether an item is technically sound or malfunctioning (and whether it had been used already or not), it will be forwarded to one of the two different parts of the warehouse. Those mobile devices that had been used and are malfunctioning will be serviced or used as spare items, while those that had not been used and operate normally go through standard procedure, like any other mobile device. Vouchers and SIM cards will be stored again if they are working properly (they are awarded status „STOK"). Otherwise, they will be awarded status „SCRP", which means they will be scrapped. The status of identification numbers is also checked in case of return.
8. Those goods that need to be serviced (mostly devices) are entered in the SAP system at another warehouse location and plant. If successfully serviced, they will be returned to the location for spare mobile devices. If, however, a device cannot be repaired, it will be handed in for scrapping, more precisely it will be disposed of safely. A special report will be made about this, and the item will be booked out.

Sub-phase 2: Production (packing) of bundles
1. There is designated area within the warehouse where bundles are packed. Prepaid cards and mobile devices come here from the storage zone to be packed into single bundles.
2. The production (packing) is done in such a way that EAN is scanned by the bar code reader for every component, so the system can recognize each bundle by its pre-defined combination.
3. Identification numbers are read this way, and a label is generated containing the number of each component. After each bundle is labelled, it is assigned an identification number and its quantity on the inventory list of the warehouse increases by one after booking-in. Consequently, the number of each component on hand is reduced by one item.
4. The bundle is awarded status „STOK", while its components get status „BNDL" (bundled).
5. After this, bundles are returned to the storage zone, prepared for the first step in packing - picking.

Sub-phase 3: Packing of products in storage
1. After sales departments create delivery orders for external buyers (vendors) or proprietary distribution, the process of packing begins in the warehouse. The first step is picking items, in such a way that overlapping items from a certain number of orders are picked at the same time, to optimize movement within the warehouse.
2. The second step is separation, which comes after the items which had been picked are brought to the zone for packing. They are sorted into separate orders according to despatch notes, so that the system automatically selects a despatch plastic box after reading the bar code. This information serves to the warehouse operator to place an item into its box.
3. After sorting, products are packed into shipping cartons. During packing, each product is scanned with the bar code reader, so that the content of each carton is clearly displayed at the end.
4. After the last scan, when all items on a despatch note are checked off, the operator will know that all products had been scanned and packed. Upon completion of this process, a despatch note is printed out to be enclosed with the products. A label displaying the bar code and other important information (buyer's address, order number, despatch note number) is created for each shipping carton and attached to it.
5. Shipping cartons are then sent for final inspection and weighing at the check desk, where a label with

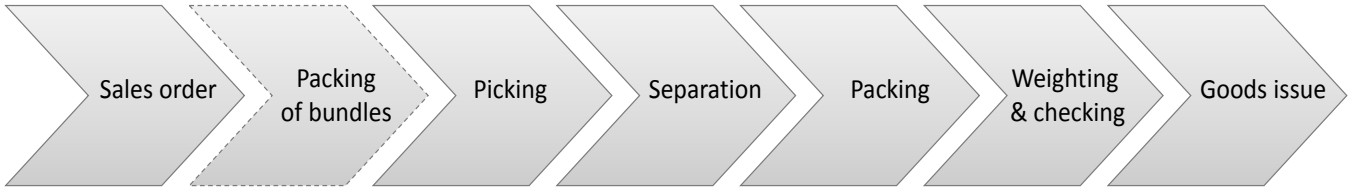
their weight and a carton number per shipment (carton 1/3, for example) is attached. At the check desk, information about the weight is automatically entered into the system, for (optional) control to see whether it matches the assumed weight of the shipping carton's content. A deviation signals shortage/ surplus. This is the third inspection, so the likelihood of a mistake by this stage is extremely small.

Sub-phase 4: Products leaving warehouse

1. Shipping cartons that have been checked this way are placed on pallets and grouped by buyers and shipping partners, in the goods issue area.
2. At the end of the day, shipments are despatched via shipping partners to vendors and end buyers, and their respective quantities are booked out. At this point, the products are awarded status „ISSU", and an invoice is created and printed out for the buyer.
3. Upon delivery confirmation by SAP, the products' (if they are vouchers and SIM cards) identification numbers are sent via interface, according to certain rules, to activation systems for vouchers and SIM cards (implemented in phase 5).
4. Information about the order, despatch, shipping carton, identification (serial) numbers are forwarded to business intelligence systems, where they are further combined and supplemented by information from other systems.
5. At the end of the month, invoices are generated to be sent to a mobile operator/buyer of transport services, on the basis of list of deliveries.

Figure 2 depicts processes which were described through sub-phases 3 and 4. The Packing of bundles process which occurs in some cases is described in sub-phase 2.

Figure 2
From order to goods issue process for (serialized goods) in storage



Source: Croatian telecom (2006)

Phase 2: Implementation of software solutions in the integrated information system for vouchers

The second phase was about the implementation of functionality for physical vouchers (of different denominations), which included the following: (1) implementation of the identification number tracking functionality for the goods in, storage, packing and goods issue processes referring to vouchers, complete with redesign of processes; (2) redesign of existing and creation of new reports in SAP and business intelligence systems.

Phase 3: Implementation of software solutions in the integrated information system for mobile devices and bundles

The third phase was about the implementation of the identification (serial) number tracking functionality for mobile devices and bundles, which included the following: (1) implementation of the identification number tracking functionality for the goods in, storage, packing and goods issue processes referring to mobile devices and bundles in storage, complete with redesign of processes; (2) implementation of quality inspection functionality when mobile devices are booked-in; (3) implementation of identification number tracking functionality for the production (packing) of bundles which contain mobile devices, among other items; (4) implementation of identification number tracking functionality in the process of unbundling and, finally (5) redesign of existing and creation of new reports in SAP and business intelligence systems.

Phase 4: Implementation of software solutions in the integrated information system for prepaid and postpaid SIM cards

The fourth phase was about the implementation of the identification (serial) number tracking functionality for prepaid and postpaid SIM cards, which included the following: (1) implementation of the identification number tracking functionality for the goods in, storage, packing and goods issue processes referring to prepaid and postpaid SIM cards and (2) redesign of existing and creation of new reports in SAP and business intelligence systems. Same as with the implementation phases referring to vouchers, mobile devices and bundles, changes were first made on the development system and then switched to the test

system. Technical documentation was compiled simultaneously.

Phase 5: Implementation of authorisation concept and interface in relation to connected information systems

The fifth phase was about the implementation of an authorization concept in SAP and creating interface connected to other systems which included the following: (1) implementation of an authorization concept based on roles, where each user is assigned a specific role; (2) each authorization group was assigned several roles, and one user may belong to more than one authorization group (to the quality inspection group and the report display group, for example); (3) implementation of interface between SAP, the system for generation and activation of vouchers and the system for activation of prepaid and postpaid SIM cards; (4) implementation of SAP interface which sends data to business intelligence systems on the basis of identification number tracking functionality.

According to Sammon and Adam (2005), the idea about linking integrated information systems and business intelligence systems first appeared in mid 1990s. The need for this emerged because integrated information systems were appropriate for transactional operations, reading, data storing and uploading/ downloading, but unfit for more detailed reports and analyses. The contemporary integrated information systems have reporting ability and are capable of producing certain kind of business analysis, but at a level which is not too sophisticated. The performance of integrated information systems in this case is unimpressive and inappropriate in comparison with the performance offered by decision support systems, which has been tailored for this purpose specifically. Of course, a majority of companies never expected that they would have to invest in new business intelligence systems after the implementation of integrated information systems. The general expectation was that they would get it all with integrated information systems. Nowadays, we are very much aware of all the benefits of introducing a business intelligence system and liking it to a company's integrated information system. The resulting synergy creates preconditions for gaining competitive advantage and ensuring business momentum.

As one normally expects, certain problems emerged in the implementation of every phase, along with some entirely unexpected occurrences. Deliveries were late for some equipment, or subsequent adjustments were made in packing by some suppliers. In certain phases of the project, some internal members of the team and external consultants were not available at all times. Furthermore, during the interface test run certain problems emerged in connection with network and database performance, and there was decreased availability of connected IT systems. Members of the staff included in the redesign of processes showed some initial opposition to changes in fear of future processes, but this is normal for any large-scale project.

Kerr, (2008) lists some of the problems that might appear in similar projects (and be the cause of extended implementation deadline or even cause the project to fail entirely), but this particular project was spared from them: (1) lack of top management involvement, (2) difficult or inadequate definition of requirements, (3) poor ERP package selection, (4) poor understanding of the time and effort required to finish the project, (5) poor understanding of how well the software fits with the business processes, (6) management's unrealistic expectations of the capabilities of the ERP, (7) problems associated with managing the project, (8) poor communication between management and staff, (9) inappropriate cost savings, additionally (10) incompetence of internal and external project members, (11) exceeding the planned project budget, etc.

These problems were avoided primarily owing to the expertise and experience of the project leader and members of his team (internal and external alike), and necessary level of understanding of project requirements by the top management. Some of the external project members had multinational experience of involvement in projects and the implementation of SAP functionalities, while internal members (leader included), on the other hand, had experience of steering and partaking in several SAP projects within the company. Motivation was one of the key success factors, together with commitment and expertise of everyone else involved in the project (from key users to top management). Through a synergy of this multinational team, the project was finalized with minimum delay (caused by unforeseen technical obstacles in connection with network and database performance, limited availability and problems with connected IT systems that appeared during interface test run independently of the SNT project, as it was mentioned earlier).

Testing of functionalities and authorization concept, training for end users

There are many situations in which it is necessary to test the integrated information system (for example, adding new patches, switching to newer versions). In this part, testing relating to the analyzed project is described. Planning and executing a test run is a time-consuming process that requires quite a number of project members and key users who are going to use the new functionalities developed in a project. The most important thing is to prepare quality cases for testing, to ensure adequate testing environment and make sure that key users are available at the required time. A testing plan for SAP and the most of other

integrated information systems includes the following (according to Fajardo and Dustin (2007), adapted):
1. Test case description.
2. Roles and responsibilities for testing individual functionalities.
3. Testing interface in relation to other systems.
4. Data verification test by using false data (negative testing).
5. Authorization concept testing (authorization for execution of individual transactions).
6. Integrated testing (simultaneous testing of SAP and other integrated systems).
7. System performance testing.
8. Final testing - acceptance tests.

According to Fajardo and Dustin (2007), User Acceptance Tests (UAT) allow end users to test the application (or functionality) from the point of view of how they will interact with it in the production environment. End users also plan, design, and execute UAT test cases. In this particular case, we selected key users as representatives of end users for specific areas. The UAT development and planning stage included, apart from key users, some project members and the manager, as well. Acceptance tests in our case were official documents from the testing book, approving the implementation of functionalities, that is, the implementation of the project on production system. They were signed by persons responsible for testing of individual functionalities within the project – the key users.

Testing is aimed not only at functionalities and the authorization concept, but also at educating key users. They have experience in operation and are responsible for acceptance tests, along with project members. It is with their help that manuals for end users are drawn up, and in most cases they are the ones who further pass on this knowledge to their colleagues – the end users.

Initial data input and operational launch of functionalities

Before the so-called go-live for every phase of the project, initial data needed to be input to the database. Furthermore, the key users needed to train the end users. After that, manuals were created for the education of end users, on the basis of testing scenario (their education was also developed in the test system). It was necessary to ensure that all users were locked at that moment, which means no transactions could be carried out by the system at the same time, so there were no entries in the database.

This work was done over the weekend to minimize impact on everyday procedures, and to ensure sufficient amount of time for assigning authorization roles to end users. Of course, time was planned to enable correction of potential mistakes in the process of transferring functionalities from development to production system. These were the steps in releasing functionalities into the integrated information system (depending on the phase):

1. Locking all business customers, allowing only key IT users that were supposed to work on the system during go-live.
2. Transferring functionalities from development to production system.
3. Checking that all functionality transports have been successfully transferred to production system.
4. Assigning authorization roles to end (business) users.
5. Initial data input (data transfer).
6. Interface activation in relation to connected information systems.
7. Automatic data output/input to/from connected information systems via activated interface.
8. Checking interface operation, new functionalities and authorization concept.
9. Unlocking all users in the system.

Economic aspects and cost-effectiveness of implementation of identification number tracking system

The cost-effectiveness of implementation of a system or functionality is calculated by different methods. Except financial, projects usually have some immeasurable positive effects.

There are several methodologies for measuring technological investments (economic valuation of IT projects), but one of the most frequently used ones is the cost-benefit analysis.

The advantages of this type of analysis are that results can be easily interpreted, but the challenge is in carrying out adequate measuring. It is generally accepted that results need to cover expenditures and profits in the following period. This type of analysis most frequently measures the net present value (NPV), the internal rate of return (IRR) and the time of return. Intangible benefits, on the other hand, can potentially even exceed the financial tangible benefit. This case also proves that the intangible benefit

considerably exceeds the purely tangible benefit.

Additional benefits come not only from the implementation of integrated information systems, but from the integration with other systems, as well. A lot of new data for new reports have become available to business intelligence systems, and we are all aware how valuable certain information can be nowadays.

Due to confidentiality treatment, the exact data about tangible benefits resulting from this project cannot be unveiled. However, it is indicative that, looking at the material aspect alone, the investment paid after only two years. Economies were made on the cost of transit insurance, the cost of distribution for returned deliveries which were not packed properly and the cost of paper documentation and office supplies.

Apart from these direct savings on costs, improvements were reported in the following processes: (1) accuracy rate for deliveries increased by 3% - 5%; (2) after the process redesign, the average despatch time decreased by 5% - 7%; (3) the accuracy of physical inventory increased to 99% and, finally (4) control of potential abuses reduced them by 20% - 30%.

This project produced some intangible benefits for the future period, too. Internal enhancements in processes and control and the quality of service reflect indirectly on the increased level of customer satisfaction. The intangible benefits include information about identification (serial) numbers and the entire history (movement), which have been enabled for business intelligence systems.

They are important for the quality of information, the possibility of creating new reports and for connection to information from other relevant systems. The company also saved, and continues to save, on decreased material expenditures after the project implementation. Economies made this way are an opportunity to invest further in other areas, and consequently improve the company's competitiveness.

Post-implementation activities

Monitoring implemented processes and correcting mistakes – stabilization phase

This phase is often an integral part of projects, but some cost-related reasons in this case made it a post-implementation activity. A few mistakes always appear while functionalities are being tested (integration and acceptance tests). How big a mistake is depends on the testing quality and scope, as well as the time available for testing.

For this reason, a stabilization phase is always counted in after project implementation, and its duration is usually in proportion to the extent of project. Very often, these bugs and the history of correcting them are managed by systems designed specifically for this purpose. These systems can be accessed by end users, consultants and other members involved in the project.

If a large number of mistakes are detected, the stabilization phase may be prolonged. In the case of this particular project, the stabilization phase lasted as long as it was predicted to take, and the number of mistakes detected was even smaller than expected. This was proof that testing and implementation were done well.

Regular supervision and interface maintenance in relation to other information systems

Since the project itself enabled (via interface) sending data to other connected information systems, and receiving data from them, the interfaces require continued monitoring. Prompt reaction is needed in case of an error or connection interruption between the systems. Some data are sent online, but the most are sent offline and outside regular working hours, so that they would not take up resources needed for the system to operate normally. When such transactions are carried out during normal working hours, they put quite a stress on the system. It is for this reason that scheduled jobs are introduced in the integrated information system which are carried out at pre-determined times, and then initiate programmes which output and input data via interface. Of course, planning is always wise, to allow for the possibility of managing (turning on/off) interfaces from an application (within the integrated information system). This makes interface maintenance easier in case of regular maintenance of the overall system, new version upgrades and transport of new projects.

Implementation of additional requirements on the basis of functionalities already introduced

Changes and constantly new challenges in operation cause the need to constantly implement additional requirements. Requirement evaluation by people with necessary expertise is a precondition for its acceptance or rejection. Furthermore, the requirement needs to be well described and accounted for in business specification. Only after that will a request in this sense be forwarded to the IT for technical realization.

Discussions and conclusions

A company should choose a system and the way to implement it which best suit its requirements, and are expected to be the most beneficial. The implementation of an integrated information system is not the final but the initial stage in system development and upgrade, as illustrated by the example of identification number tracking model. Same as any other technology, identification number tracking systems develop and improve. For example, the auto-ID technology (RFID with XML) already enables simple programming and exchange of files with a large amount of information, apart from enabling two-way communication between marks on products and the system. This allows for even shorter distribution times, with more data about a product issued from the warehouse. Reports relating to market research and consumer behaviour (specific segments of service users) are particularly important. They could serve as foundation for future strategy and operation of a company, and identify areas for developing new technologies and services. This is very important for the operation of mobile network operators, since they exist in a highly competitive environment. Of course, as always, there is the issue of privacy and ethics. Legislators and regulators will need to define precisely how far it is allowed to go in collecting information from customers, and what kind of information. Customer needs and behaviours will need to be analyzed on the basis of this.

Advantages of the identification number tracking model are multiple: operating costs for storage and transit of goods were reduced, while the accuracy of deliveries and physical inventory improved; it became possible to monitor individual material units; a new source of information for the business intelligence system was obtained; operating processes in the distribution of goods in storage were advanced; transit insurance costs decreased and there were fewer cases of fraudulent behaviour. With the accuracy of deliveries improving, the satisfaction of users increased, as well as the satisfaction of warehouse staff. Furthermore, competitive advantage was gained since rivals were not using the same functionalities at the time. The team that was in charge of this project learned a lot, and gained experience which will be useful in future projects.

Drawbacks were insignificant, in comparison with these advantages. The biggest drawback was that costs of maintenance increased considerably for the integrated information system, and the system overall became more complex. Also, there was some opposition to changes coming from employees initially, but that eventually grew into users' satisfaction (after the new procedures became matter of routine). Furthermore, there was an increase in the number of demands for new functionalities, and it caused additional costs of work on the system. This increased dependency on external suppliers who maintain the system. These drawbacks notwithstanding, the advantages are much more important (in both quantitative and qualitative terms), proving the case for implementation of a project of this kind.

References

1. Croatian telecom (2006), „SNT Project Charter (in-house document)", Zagreb, Croatian telecom.
2. Croatian telecom (2007), „Annual report for 2006", Zagreb, Croatian telecom.
3. Cullen International (2007), "Report III – Country comparative report: Supply of services in monitoring of south east Europe – Telecommunications services sector and related aspects", available at: http://www.hakom.hr/UserDocsImages/dokumenti/Usporedni%20izvjestaj%20TK%20sektora%20CEE,Cullen%20International%202006.pdf (1 April, 2012).
4. Fajardo, J., Dustin, E. (2007), "Testing SAP R/3: A manager's Step-by-Step Guide", Hoboken, John Wiley & Sons, Inc.
5. Kerr, D. (2008) "Feral Systems and Other Factors Influencing the Success of Global ERP Implementations", in Ferran, C and Salim, R. (Ed.), Enterprise Resource Planning for Global Economies: Managerial Issues and Challenges, Hershey, Information science reference, pp. 147 165.
6. Sammon, D., Adam, F. (2005), "Towards a model of organisational prerequisites for enterprise-wide systems integration: Examining ERP and data warehousing", Journal of Enterprise Information Management [online], Vol. 18 No. 4. pp. 458-470.
7. Umble, E.J., Haft, R.R., Umble, M.M. (2003), "Enterprise resource planning: Implementation procedures and critical success factors", European journal of operation research, Vol. 2 No. 146, pp. 241-257.

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