accenture

COST BENEFIT (ROI) STUDY OF ORBIS™

CLINICAL INFORMATION SYSTEM (CIS)
HOSPITAL INFORMATION SYSTEM (HIS)

KRONBERG, TAUNUS, GERMANY | JUNE 2006

AGFA HealthCare

Content

1.0

Motivation

When investment decisions have to be taken in the field of information technology, return-on-investment considerations are of great importance.

Agfa HealthCare has set itself the target to prove the economic efficiency of its hospital information system ORBIS. Secured and evaluated experience shall help potential and existing customers in their decision process for investment. The customers shall obtain the possibility to compare the efficiency of their process organization with other hospitals, taking into consideration the use of ORBIS.

The present study has been drawn up by the management and technology consulting company Accenture for Agfa HealthCare.

Today, information technology is indispensable in many administrative hospital areas. Hospitals increasingly use information systems to achieve integral support of processes in the areas of medicine and care. The target is to optimize quality as well as economic efficiency. However, in comparison with other sectors, hospitals are still way behind concerning the use of IT equipment.[1]

Is it due to a lack of capital appropriations? Or is the reason a lack of conviction that medicine and health care are areas where the use of information technology will help to achieve more? Is the IT support not always as effective as it could be because hospitals save on external services during implementation – with the result that the users are not familiar enough with the software? Is there a lack of coordination between processes and software during implementation? Do increasing case numbers and additional documentation demands annihilate the efficiency benefits achieved with IT investments?

While the advantages of IT support concerning quality enhancement are very often evident, quantitative effects are hard to determine. Therefore it is the aim of the present study to quantitavely evaluate the economic advantages achieved due to the use of ORBIS for process support.

This analysis is focused on selected process areas in medicine and care. The basic approach is a comparison of investment costs and running expenses for IT support on the one hand, and the reduction of process costs on the other hand. The analysis is focused on the question which contribution information technology can make, to the task of supporting administrative activities in medicine and care. Each minute less spent on organization and documentation can be used on the essential services a hospital provides, i.e. care for and support of the patients. ■

1. IDC study: IT expenditure in healthcare is to rise.

Scope of the study

The cost-benefit analysis for ORBIS has been carried out in June 2006 in cooperation with four German hospitals, based on four essential process areas.

2.1 | Process areas included in the study

The process areas analyzed in the study are documented in Figure 1. The ORBIS modules available for supporting the different processes are allocated to the different process areas in the table.

Process costs were compared in the four hospitals, taking as an example the four process areas described above. The costs before and after the introduction of ORBIS were documented. The evaluation of efficiency benefits was carried out in the sense of a before/after-approach.

The comparison of the situation before and after the introduction of ORBIS in the different process areas is focused on the activities covered by ORBIS modules. These activities can be carried out in a software-assisted way after the introduction of ORBIS.

Furthermore, the costs for implementing and running ORBIS were composed for each hospital in a module-oriented way.

To determine the costs, the total of implementation and operating costs were added for the different modules in the four different hospitals. It was not considered if, and to what extent, the ORBIS functionalities available within each module are actually used for support of the process area in question. ■

FIGURE 1– PROCESS AREAS TAKEN INTO CONSIDERATION

PROCESS AREA	ORBIS MODULES	FOCUS OF THE ANALYSIS	NOT IN THE FOCUS
Writing of medical letters	BDAB, DICT	All of the activities from viewing the patient file, dictation / writing of discharge letter, to signing, sending and filing	Drawing up of transfer reports, drawing up of findings in the diagnostic departments
OT planning and OT documentation	OPAP, OPPL	OT registration, OT planning, OT coordination, OT documentation	Anesthesia documentation
Care planning and documentation	PDOK, PPRO	Care anamnesis, derivation of patient resources, problems, targets and measures, documentation of execution and of deviations	Chart documentation of vital parameters, documentation of medication
Order-entry, taking i.e. the areas of laboratory and radiology	LAWP	Request of examinations and acceptance of results on the ward or in the outpatient department. Acceptance of requests and communication of results in the laboratory or radiology departments	Processes within the laboratory department for results determination, processes within the laboratory department for service provision and drawing up of results

Participating hospitals

Four German hospitals of different sizes participated in the analysis. For the present study, they provided their individual process and cost data. The four hospitals involved are listed in Figure 2.

All of the hospitals involved started using ORBIS with the introduction of administrative modules. The use of ORBIS was expanded step by step to the areas of medicine and care, each hospital proceeding according to its own priorities. Today, all of the hospitals involved dispose of a comprehensive ORBIS installation, with the great majority of users being nurses, doctors and diagnostic department staff.

In order to achieve a realistic assessment of the utilization situation of ORBIS, the processes were analyzed in cooperation with the users. All of the hospital staff participating in the study had many years of professional experience and good knowledge of ORBIS in the process areas analyzed. The interviews on location were carried out according to guidelines geared to the main activities of the process areas analyzed.

Figure 3 shows which occupational groups were available as contact persons for the different areas analyzed in the four hospitals. ■

FIGURE 2 – PARTICIPATING HOSPITALS

HOSPITAL	LEVEL OF CARE	NO. OF BEDS	START OF ORBIS IMPLEMENTATION
St. Johannis Hospital Troisdorf	Basic over-all care	182	2001
Lubinus Clinic Kiel	Specialized clinic for orthopedic surgery	210	1996
DRK Clinics Berlin	Comprehensive care with various focus areas	1296	2002
Clinic Kirchheim-Nürtingen	Basic over-all care	666	2001

FIGURE 3 – PROCESS AREAS ANALYZED AND CONTACT PERSONS

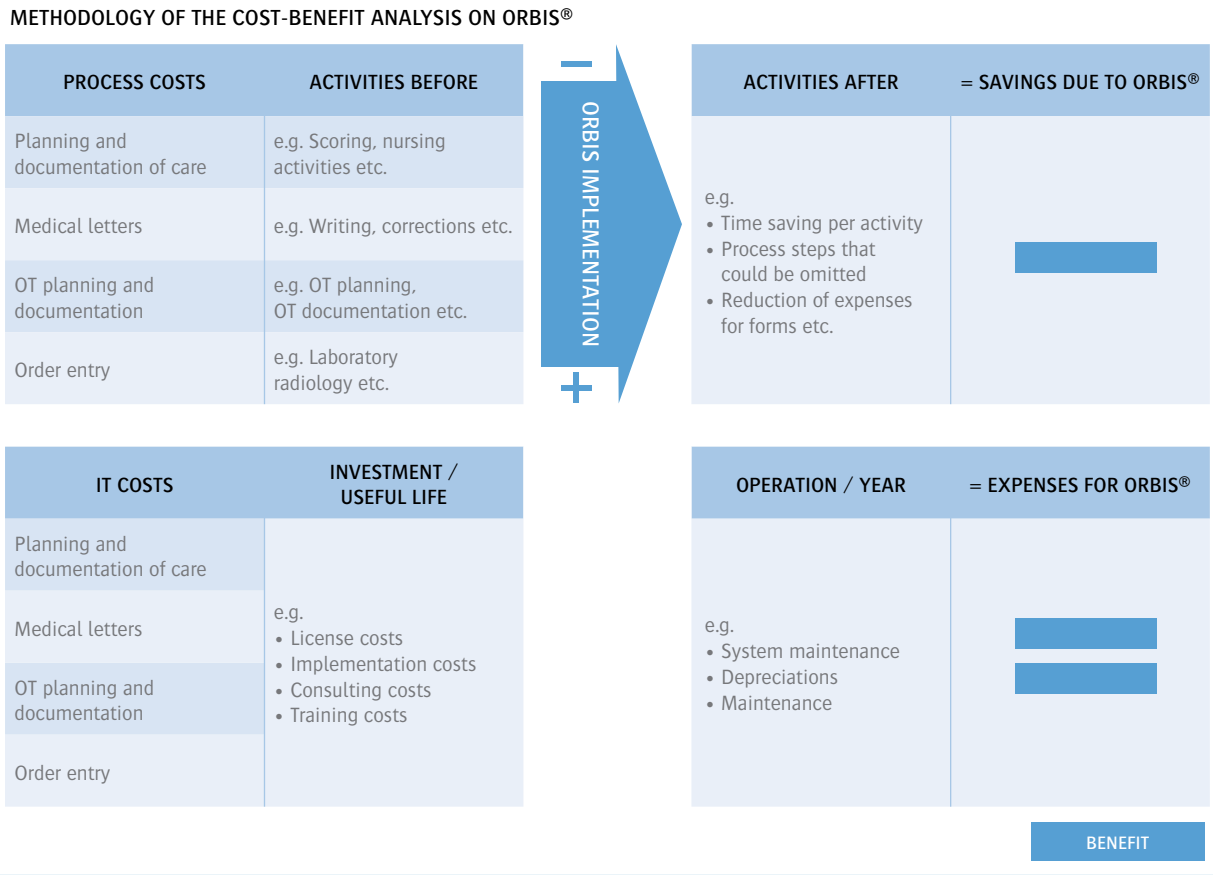
ANALYZED AREA	FUNCTIONS OF THE CONTACT PERSONS
Writing of medical letters	Doctors, secretaries, Head of IT
OT planning and documentation	Admissions staff, Head of OT, OT nurses, Head of IT
Planning and documentation of care	Nursing staff, Head of IT
Order-Entry (taking laboratory and radiology as an example)	Nursing staff, medical laboratory assistants/ medical radiology assistants, Head of IT
ORBIS costs	Controlling, Head of IT

Methodology

In the present cost-benefit study, the assessed improvements achieved with the use of ORBIS are balanced against the investment and operating costs for ORBIS.

The comparison was carried out separately for each of the four process areas considered. This means that cost-benefit statements can be derived separately for the different process areas and the corresponding ORBIS modules. An overview over the methods applied is given in Figure 4. ■

FIGURE 4 – METHODOLOGY OF THE COST-BENEFIT STUDY



Increase in efficiency due to ORBIS

The improvements achieved due to the implementation of ORBIS were determined for each process area separately according to an activity-based segmentation of the processes. For each activity, the personnel costs entailed, as well as relevant material costs, were determined for the time before and after the introduction of ORBIS.

The personnel costs generated by a specific activity were determined on the basis of the frequency, the time needed to complete the activity, as well as the qualifications of the employees dealing with the activity. This also results in a price per minute for the personnel involved (cf. example in Figure 5). The evaluation of improvements exclusively focuses on the time the personnel is busy with administrative, organizational activities concerning the process area in question. Activities and times of patient treatment were not taken into consideration, because they existed before and after the introduction of ORBIS in the same way. In order to measure the frequency of activities, the performance figures of the year 2005 were taken as a basis. For the evaluation of the time the personnel is blocked with specific tasks, gross wage costs including all ancillary wage costs were taken as a basis. ▸

FIGURE 5 – SURVEY FORM FOR THE PROCESS COST ANALYSIS "ORDER-ENTRY LABORATORY"

Krankenhaus	Beispiel Krankenhaus	Interviewer	Accenture Berater
Geschäftsprozess	Diagnostik	Interviewee)	Schwester
Hauptprozess	Labor	Datum	13.06.2006
Teilprozess (TP)	Anforderung - Befundinformation		

	Vorher						Nachher						Differenz
Aktivität	Häufigkeit / Anzahl / Frequenz	Bezugsgröße (pro Anforderung, Tag, Fall ...)	Bearbeitungszeit (in Minuten)	Qualifikation ASS Assistenzarzt PFL Pflegekraft	Preis / min	Summe Prozesskosten vorher	Häufigkeit / Anzahl / Frequenz	Bezugsgröße (pro Anforderung, Tag, Fall ...)	Bearbeitungszeit (in Minuten)	Qualifikation ASS Assistenzarzt PFL Pflegekraft	Preis / min	Summe Prozesskosten nachher	Differenz Prozesskosten
Dokumentation der Anordnung	46.260	ANF	1	ASS	0,61	28.219	46.260	ANF	1	ASS	0,61	28.219	0
Erfassung Anforderung	46.260	ANF	3	PFL	0,38	46.136	46.260	ANF	1,5	PFL	0,38	26.368	29.768
Erzeugen/Beschaffung Etiketten	46.260	ANF	1	PFL	0,38	17.579	46.260	ANF		PFL	0,38	0	17.579
Freigabe der Anforderung	46.260	ANF	0	ASS	0,61	0	46.260	ANF	0	ASS	0,61	0	0
Bekleben der Monovetten	46.260	ANF	0,5	PFL	0,38	8.789	46.260	ANF	0,5	PFL	0,38	8.789	0
Transport Karter	365	TAG	120	PFL	0,38	16.644	365	TAG	0	PFL	0,38	0	16.644
Entgegennahme der Anforderung im Labor	46.260	ANF	2	MTA	0,35	32.382	46.260	ANF	0	MTA	0,35	0	32.382
Drucken von Laborbefunden		TAG	0	MTA	0,35	0	365	TAG	0	MTA	0,35	0	0
Transport von Laborbefunden	365	TAG	45	PFL	0,38	6.749	365	TAG	0	PFL	0,38	0	6.749
Archivierung / Ablage in Akte	365	TAG	200	PFL	0,38	27.740	365	TAG	200	PFL	0,38	27.740	0
Aktive Befundnachfragen Station an Labor Pflege	365	TAG	100	PFL	0,38	13.870	365	TAG	50	PFL	0,38	6.935	6.935
Aktive Befundnachfragen Station an Labor MTA	365	TAG	100	MTA	0,35	12.775	365	TAG	50	MTA	0,35	6.388	6.388
Aktive Befundbenachrichtigung Labor an Station MAT	365	TAG	50	MTA	0,35	6.388	365	TAG	5	MTA	0,35	639	5.749
Aktive Befundbenachrichtigung Labor an Station Pflege	365	TAG	50	PFL	0,38	6.935	365	TAG	5	PFL	0,38	694	6.242
Kenntnisnahme Befundwerte	46.260	ANF	1	ASS	0,61	28.219	46.260	ANF	0,9	ASS	0,61	25.397	2.822
Summe						359.127						228.871	130.256

Increase in efficiency due to ORBIS

Material costs were only considered if there were changes in the organizational means due to the introduction of ORBIS (e.g. cancellation of paper-based laboratory forms when electronic laboratory requests are introduced). Reductions in material costs due to enhanced patient treatment as a result of the introduction of ORBIS were not incorporated in the evaluation.

The input data for the process areas were collected using interviews on location with an activity level approach, individually for each hospital. For activities with high personnel input or large differences between the situation before and after the introduction of ORBIS, at least two employees were interviewed separately. The results are based on the empirical values of the hospitals involved and thus have been determined in a practice-oriented way.

Furthermore, the statements were checked for plausibility by comparing the statements of the four hospitals among each other and by cross-checking them with the experience Accenture has in the area. Variations in efficiency benefits at the different hospitals can be explained by different forms of organization before ORBIS was introduced, as well as by differences in the efficiency of ORBIS utilization. There were no time measurements in the form of process monitoring.

The process cost changes generated by the introduction and use of ORBIS are mainly a result of:

- **Changes in the duration of an activity** (e.g. entering a laboratory request on a paper form vs. choosing the request on the monitor)
- **Addition or abolition of an activity** (e.g. printing and filing)
- **Changes in the frequency of an activity** (e.g. an activity has to be carried out only in 50% of the cases due to IT-based plausibility checks)
- **Shifting of activities to other roles / qualifications** (e.g. the doctor writes medical letters himself, using text macros)
- **Shifting of the material costs for organizational means** (e.g. abolition of costs for forms)

The analysis on the activity level mainly shows for which activities the implementation of ORBIS has an effect on process costs. Furthermore, it becomes evident how gains in efficiency are distributed among different qualifications and roles within one process area.

With the methodology applied, qualitative improvements were not included in the quantitative evaluation. For example, it became evident that the number of fields documented per OT session increased noticeably after documentation was no longer carried out on paper but with the aid of ORBIS.

At the same time, the time needed for each OT documentation task has decreased perceptibly due to the fact that standards have been lodged in ORBIS, and because data can be taken over from OT planning.

For process cost calculation of ORBIS OT documentation, no reduction was made for the time needed for increased documentation volumes. Neither was there a quantitative evaluation of the advantage that now, in contrast to the situation before, additional activities such as, time needed for cutting and sewing, time needed for preparing between surgeries, as well as OT utilization can now be regularly evaluated at the push of a button. The results can then themselves be converted into gains in efficiency. Only the documentation expenditure for paper-based documentation as compared to documentation in ORBIS was evaluated. The basis was the current number of OT sessions.

Usually, the efficiency of newly introduced modules continues to increase over a period of 6-12 months after the start of live operations. In order to simplify the cost-benefit analysis, we assumed that the added value of the ORBIS implementation stays on the same level throughout the utilization of ORBIS as compared to working without ORBIS. ■

Expenditure for ORBIS

For the expenditure regarding ORBIS, we distinguished between initial costs and operating costs. Initial costs were distributed on a planned operating life of 10 years. This period of time corresponds to the economic useful life assumed usually when hospital information software is introduced.[2] Financing of the initial cost was determined to be based on an interest rate of 5% p.a. over the complete time period of 10 years. This basis for expenditure calculation was independent of the point in time and the extent of reductions in expenditure due to increased efficiency.

Initial costs are mainly:

- **ORBIS license fees** (including license fees for databases, for interfaces relevant to ORBIS modules etc.)
- **External services in connection with the introduction of ORBIS** (e.g. for process consulting, user training, taking over of legacy data, customizing etc.)
- **Internal implementation expenditure** (Expenditure of the IT department, of key users within the different departments, for initial user trainings and intensive support activities during the implementation phase)

Operating costs are mainly:

- **Personnel costs of the IT division** (for system administration, workstation maintenance, user helpdesk etc.)
- **Depreciations on workstation and server hardware as well as infrastructure**
- Costs for maintenance and care of software and hardware (e.g. ORBIS maintenance fees, running IT expenditure for toners etc.)

Expenditure for ORBIS was allocated to the ORBIS modules included in the analysis according to the principle of causality. If IT expenditure could not be directly linked to the different modules (e.g. for server hardware, helpdesk expenditure of the IT division), other reference figures were taken as a basis for distribution of expenditure to the ORBIS modules in question, like e.g. proportionate license fees or number of workstations.

The useful life of server hardware was determined to be 5 years, for PC workstations it was set to be 3 years. From these figures, the amortization amount for each of the 10 years of useful life determined for ORBIS can be deduced. For the annual operation costs, this means that a replacement of server hardware is assumed to take place every 5 years, a replacement of PC workstations every 3 years.

Current market prices for the ORBIS modules were taken as a basis for license fees, and the budget sums recommended by Agfa HealthCare as a basis for service expenditure. These recommended service budgets are usually not fully used. For hardware, current prices were taken as a basis.

Very often, ORBIS modules are not only serviced by the IT division, but also by key users of the different departments. The times needed by the key users in the different departments (besides the IT department) for servicing ORBIS modules were taken into consideration when process costs were compared. For example, working time saved due to more efficient writing of medical letters was balanced against time needed within the specialized department for the maintenance of forms and text macros.

The increased use of information technology for medicine and care processes leads to higher demands on the availability of systems. For the calculation of operating costs, an availability of 98.5% was assumed. Higher process costs for the remaining 1.5% of non-availability were calculated as being three times as high as the precedent process times, which were usually significantly higher. This mirrors the fact that a manual failure concept does not only mean a step backwards to the times before ORBIS was used, but that it usually goes along with a significant increase in expenditure in comparison to the former routine work without ORBIS.

The model of ORBIS operating costs thus includes an appropriate evaluation of failure times. For the parameters “availability in percent” and “additional manual expenditure for replacement processes” concerning the failure concept, we took into consideration that planned maintenance works on the system are usually being carried out at times when the work intensity is low. ■

2. Concerning expenditure for the introduction of a new software system please compare http://www.solidaris.de/publikationen/informationen/2005_05_seite02.php.

Results

For all of the four process areas, the result was a significant reduction of **process costs per activity** due to the implementation of ORBIS.

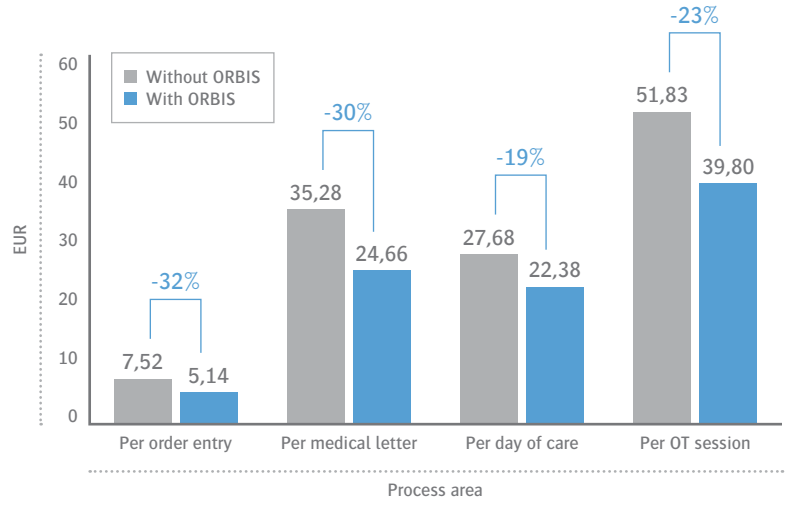
4.1 | Reduction of process costs

Figure 6 shows the averaged process costs for all of the four hospitals before and after the introduction of ORBIS for the administrative completion of one activity, i.e.

- For entering an order and reporting a result
- For drawing up, sending and filing a medical letter
- For planning and documentation of care per day of care
- For planning and documentation of one OT session
- As well as the reduction in costs per activity in percent after the introduction of ORBIS.

Due to the change from paper-based to electronic **order entry and results reporting** between wards and outpatient departments on the one hand, and with the laboratory or radiology department on the other hand, the four hospitals achieved an average reduction of process costs of 32%. The use of order entry modules mainly led to staff spending less time on phone calls and the transport of order documents and results. ▸

FIGURE 6 – REDUCTION OF PROCESS COSTS PER ACTIVITY



Reduction of process costs

Laboratory results are available on the ward as soon as they have been released by the laboratory – not only after printing and distribution of laboratory finding lists. Phone calls by the ward nurses asking whether results are already available are not necessary any more, just like phone calls of the laboratory to the wards, informing them about pathologic results. Before, each phone call blocked two employees and kept them from their work process.

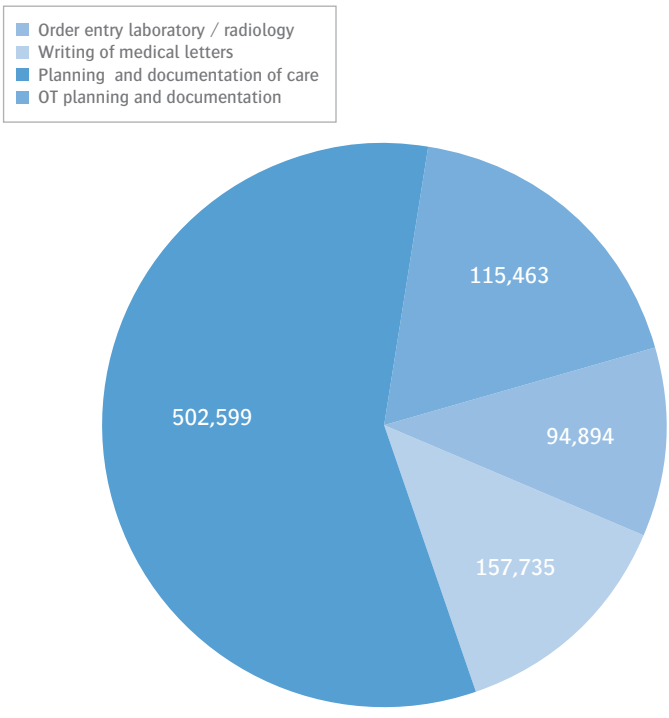
For the writing of **medical letters**, the increase in efficiency as an average for all the four hospitals was 30%.

The average costs for one medical letter in the control sample were reduced from € 35.40 ($ 47.58 USD)* to € 24.86 ($ 33.41 USD)* due to the introduction of ORBIS. The reduction resulted mainly from the fact that results that are already electronically available in ORBIS can be taken over into the medical letter.

Furthermore, if the functionality for writing medical letters is used to its full extent, the number of and expenditure for correction cycles between doctors and secretaries is reduced significantly. ▸

FIGURE 7 – ABSOLUTE REDUCTION OF PROCESS COSTS

RETURN-ON-INVESTMENT OF ORBIS® FOR PROCESS AREAS



* Euro to USD conversion based on exchange rate as of June 1, 2007 at noon EST.

Reduction of process costs

The higher the proportion of information electronically available, the more pronounced the advantage if medical letters are composed with the help of the information within the electronic patient file in ORBIS. No matter whether the doctor dictates the letter or writes it himself, the proportion of additional paragraphs written by the doctor (or dicated by the doctor and written by secretaries), like e.g. anamnesis or epicrisis, is reduced.

At the time of the study, ORBIS **planning and documentation of care** was completely implemented in two of the hospitals taking part. The interviews in both of the hospitals showed that even 6-12 months after the introduction of ORBIS, the efficiency was still increasing due to improved utilization of ORBIS by the users. Increases in efficiency became evident above all with the software-supported.

The introduction of ORBIS **OT planning and documentation** lead to average efficiency benefits of more than 20%. The organizational expenditure for planning and documentation with ORBIS is about € 41 ($ 55.11 USD)* per OT session in the hospitals involved.

The increase in efficiency due to software-supported OT planning pays off especially in the areas of integration with admission planning, and the coordination of pre-operative diagnostics. For OT preparation and OT documentation, it is above all working with stored OT standards that simplifies the process.

Figure 7 shows the distribution of **absolute reductions in process costs** on the basis of the different process areas.

Due to a large number of activities, planning and documentation of care has the largest absolute effect, even though in Figure 7 we assume that the effect is only 10%. The absolute amounts in Euro are shown for the average number of activities of the hospitals involved. These hospitals have an average number of beds of about 600.

The change to electronic order entry and results reporting lead to average, absolute savings of about € 100,000 ($ 134.408 USD)* for one diagnostic department in the hospitals involved.

The introduction of medical letters writing with ORBIS lead to an average, absolute reduction of process costs of more than € 150,000 ($ 201.612 USD)* per year in the hospitals involved.

The introduction of OT planning and documentation adds up to average actual savings of just over € 125,000 ($ 168.010 USD)* per year. The basis for calculation is an average number of about 13,000 in and outpatient surgeries per year in the hospitals involved.

The potential gain in efficiency in the area of care cannot yet be predicted with adequate confidence due to the data basis not being large enough. Due to the large number of daily documentation activities in the area of care, on the basis of a conservative estimation of 10%, the result would be potential absolute savings of about € 500,000 ($ 672.043 USD)* per year. Looking at the absolute amounts, the highest potential for reduction of administrative process costs exists in the area of planning and documentation of care. ■

* Euro to USD conversion based on exchange rate as of June 1, 2007 at noon EST.

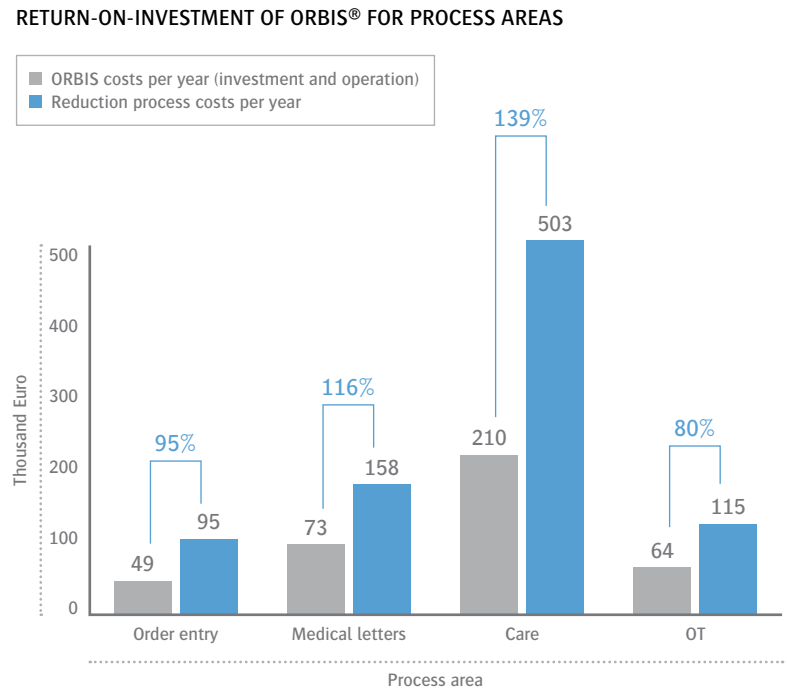
Costs and benefits

Usually, hospital information systems like ORBIS are implemented in stages, so that very often, the existing network infrastructure, server hardware and PC workstations can still be used when more software modules are introduced. With the introduction of more modules, the costs for existing central infrastructure and hardware components can be distributed to the new modules as well.

In the study, this correlation was taken into account by proportionately distributing first investment costs to the operating costs of modules that had been added later. This means that a clear differentiation between investment and operating costs is difficult for modules that are introduced later. Furthermore, there is a tendency towards leasing of hardware as well as software components, which means that the dividing line between investment and operating costs becomes even more blurred.

That is why a cost-benefit analysis was carried out as described in chapter 3.2. The introduction costs of ORBIS were distributed to the operating life determined by fiscal authorities (taking into consideration interest rate effects) and added to the annual operating costs. ▸

FIGURE 8 – COST-BENEFIT OF ORBIS FOR THE DIFFERENT PROCESS AREAS



Costs and benefits

The annual costs for ORBIS determined in this manner were balanced against the improvements established in the process cost analysis. Furthermore, in chapter 4.3, a classical ROI and break-even analysis is presented.

The observations made are based on the following model settings:

- Operating life of 10 years
- Interest on introduction costs 5%
- Availability of ORBIS modules 98.5%
- In the case of system failure, expenditure is three times as high as process times before the introduction of ORBIS

Figure 8 opposes annual costs and benefits of ORBIS in absolute figures and percentages, subject to the above assumptions.

In the diagnostic departments of the four hospitals examined (laboratory or radiology), order-entry modules lead to actual annual savings of just under € 100,000 ($ 134.408 USD)* with annual costs of about € 50,000 ($ 67.2004 USD)*. This means that the actual annual savings surpass the annual costs by more than 100%. This effect recurs during the whole of the expected useful life of 10 years and is similarly true for other modules.

The actual annual savings due to the use of ORBIS in the field of writing of medical letters surpasses the total sum for distributed investment costs and annual operating costs for this module by about € 85,000 ($ 114.247 USD)* per year (as an average for the four hospitals involved in the study). The calculation shows that actual annual savings for ORBIS medical letter writing therefore surpass the costs by 115% each year.

In the two hospitals examined concerning planning and documentation of care with ORBIS, these modules lead to the highest annual costs for investment and operation compared to the other ORBIS modules included in the study. This is mainly due to the large number of workstations and users involved. However, as described in section 4.1, these costs are opposed to savings of several hundred thousand Euros.

For the area of OT planning and documentation, we found annual gains in efficiency rated at € 125,000 ($ 168.010 USD)* opposed to annual costs of € 69,000 ($ 92.741 USD)*. This calculation means that each year, a savings surplus of just over 80% in comparison to investment and operating costs is achieved.

Summing up, the actual savings, averaged for the four hospitals, clearly surpass the costs for the implementation of ORBIS in all of the process areas examined. ■

* Euro to USD conversion based on exchange rate as of June 1, 2007 at noon EST.

Break-Even Time and Return-On-Investment

The raw data of the cost/benefit analysis are also suitable for a calculation of the break-even time and return-on-investment (ROI) for ORBIS modules.

In order to calculate the total sum of investments required for an ORBIS module, based on the indications by the hospitals, part of the data of the cost-benefit analysis have to be allocated differently:

1 For all of of the fixed assets, the investment character is taken into consideration. This means that all of the module-oriented depreciations of the cost-benefit analyses are capitalized and added to the investments. The straight-line depreciations for server hardware (useful life 5 years) and PC workstations (3 years) were added to the total investment sum required, taking into consideration the useful life of 10 years determined for ORBIS, even if the replacement purchases occur later.

2 In conformity with classic ROI considerations, the interest is not set off rigidly against the total investment sum, but is added each year to the remaining balance of investment sum and efficiency gains. The implicit assumption is that efficiency benefits lead to corresponding expenditure shortfalls, for example due to a reduction of paid overtime, non-filling of new vacancies, or due to free capacities being used for expanding the performance. ▸

THE ROI IS CALCULATED ACCORDING TO THE FORMULA

$$ROI = \frac{\text{SURPLUS REVENUE}}{\text{INVESTMENT}} \times 100$$

Break-Even Time and Return-On-Investment

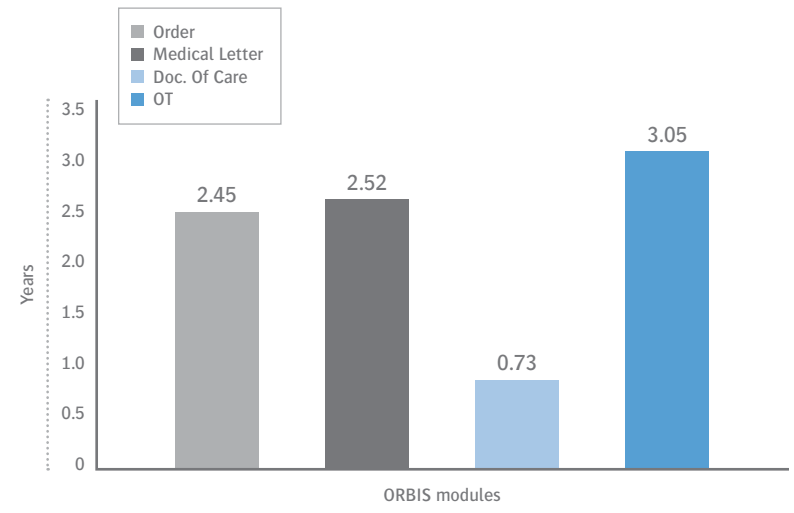
The surplus revenue results from the difference of gains in efficiency minus the operating costs (assumed as remaining level each year), minus calculatory costs during system failure, and minus the dynamic interest on cumulated excess spending (up to the break-even year). Furthermore, the total amount of (artificially determined) investment (including necessary replacement investment during the useful life of ORBIS) has to be deducted.

The break-even is reached in the year in which the cumulated return flows of funds, balanced against the annual ORBIS expenses, completely cover the investment. When calculating the ROI, no interest was calculated on the revenue surplus after reaching the break-even. A calculaten per module is shown in Figure 9.

For the modules for order entry laboratory and radiology, medical letters writing as well as OT planning and documentation, the break-even is reached after two or three years, with hardware, software and implementation investment being calculated on the basis of 10 years useful life, including replacement purchases during useful life.

The exceptionally short break-even period for planning and documentation of care – together with a very high ROI – is currently based on the analysis of only two hospitals, and should be examined further by expanding the data basis to other hospitals. The ROI for all of the modules examined is shown in Figure 10. ▸

FIGURE 9 – BREAK-EVEN ACCORDING TO ORBIS MODULES



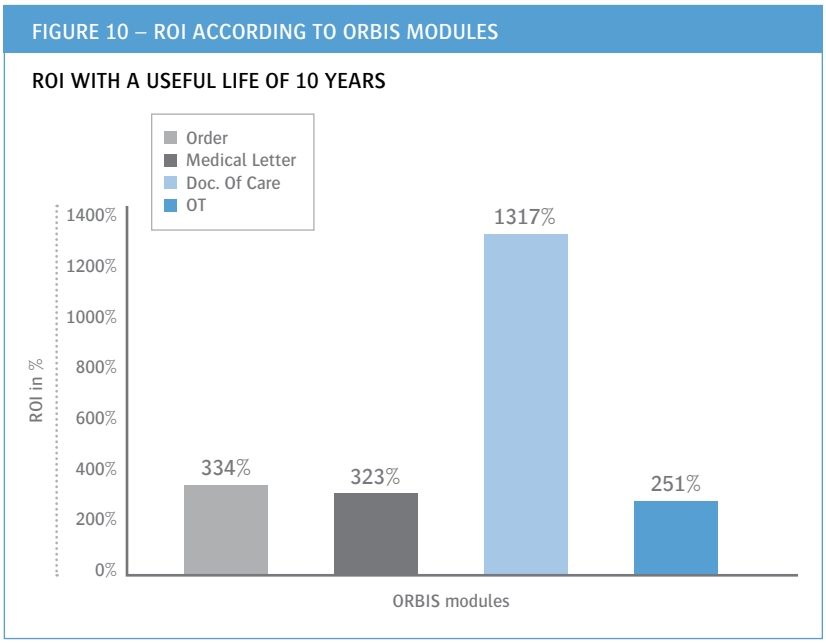
Break-Even Time and Return-On-Investment

Calculated on the basis of a useful life of 10 years, the results are ROI percentages between 250% and 350% for the areas of order entry laboratory/ radiology, medical letter writing, and OT management. According to the data collected in the four hospitals involved, for the useful life the return is 2.5 to 3.5 times as high as the investment (excess revenue for process costs saved balanced against total investment plus operating costs). Interest and calculatory costs for system failure have been taken into consideration.

Altogether, the values in percent are higher for the classic ROI view than for the cost-benefit view. This results from the fact that the total excess revenue for the period of useful life of the system is only seen in relationship to the investment. For the cost-benefit view, however, the annual excess revenue is balanced against the annual total for investment and operating costs.

The data of the classic ROI analysis have to be considered with care, because the investment part of the spendings can vary considerably between the hospitals. For example, system leasing or utilization of application service providers (ASPs) can reduce the investment total and increase operating costs, with a strong effect on the individual ROI. ■

FIGURE 10 – ROI ACCORDING TO ORBIS MODULES



Summary | Perspective

The study was welcomed by all of the hospitals involved, and supported in a very positive way. In some cases, the participants gained interesting insights in their process organization and enhanced application options of ORBIS in their hospital even in the course of the interview.

The data collected and evaluated show that for the ORBIS modules considered, the benefits clearly exceed the costs. The examples clearly show that the utilization of ORBIS for process support significantly contributes to an increase in productivity in hospitals. The time needed for administrative, non-value-creating activities could be reduced in the hospitals examined, so that employees now have more time for patient care and other medical activities.

Another important conclusion when comparing the four hospitals is that the way the processes are organized, as well as the degree of utilization, is clearly varying. Strengths and weaknesses became evident due to a comparison of process costs. Due to the fact that not only the differences between process costs for the period before and after the introduction of ORBIS were determined, but also the process costs for complete organizational processes bottom-up (like e.g. costs for drawing up a medical letter), the results are also suitable for process cost benchmarks.

The methodology chosen allows retracing differences in process costs for different clinics down to the level of the activities involved, in order to find the cause. This way, superior ways of organizing a process and superior concepts concerning the utilization of ORBIS can be identified to become best-practice solutions. Many of the participants requested a more ample study. The envisaged expansion of the sample survey will further increase the significance of a process cost benchmark. A transfer of the methodology to other process areas and ORBIS modules is envisaged.

A prognosis concerning actual savings is hardly possible without knowledge of the basic situation of the hospital before the introduction of ORBIS. The gains in efficiency that may be achieved additionally depend on:

- How efficient or inefficient the processes were organized before, without software support
- How consistently processes are optimizied in connection with the introduction of ORBIS
- How much importance is attached to good customizing geared towards the individual demands of the hospital
- How comprehensive implementation and operating support for users is in the first 6-12 months.

A preceding in-depth study of existing process flows can be very valuable in order to assess the potential gains in efficiency. Equally important is to check whether there is a readiness to change to best-practice processes. ■

About Agfa HealthCare

Agfa HealthCare is a leader in the rapidly growing market for integrated IT and imaging systems, offering healthcare facilities a seamless flow of information and a 360° view of patient treatment. The company has a unique, comprehensive approach, offering completely integrated solutions for all areas within a hospital. These specialized solutions combine IT with imaging systems for the areas of radiology, cardiology, mammography and orthopedy. ORBIS, the hospital information system offered by Agfa HealthCare, integrates all of the administrative and clinical data generated in healthcare facilities, catering to the specific needs of medical and nursing staff.

ORBIS is the top-selling healthcare system in German-speaking countries. It is used by over 400,000 hospital employees every day. The ORBIS platform offers unique workflow and management capacities with more than 70 modules/units/subsystems. These modules can be used for expansion and customer-specific parameterization of the system, according to the changing needs on the healthcare market.

About Accenture

Accenture is a global management consulting, technology services and outsourcing company. Committed to delivering innovation, Accenture collaborates with its clients to help them become high-performance businesses and governments. With deep industry and business process expertise, broad global resources and a proven track record, Accenture can mobilize the right people, skills and technologies to help clients improve their performance. With more than 129,000 employees in 48 countries, the company generated net sales of 15.55 billion US Dollars in the past fiscal year (31st of August 2005).

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