5 Benefits

Process integration based on the Job Definition Format helps to eliminate inefficiencies in the production process. This benefit is achieved at the cost of investments in software, hardware and services. In addition, management and the staff undergoing training are tied up to a significant degree during the introductory phase of networking. The benefits and cost of networking must be weighed against one another depending on the order structure and operating structure.

This chapter focuses on the qualitative benefits of the individual networking routes. Empirical statistics from the IRD are quoted to document the scale of the benefits. Following this, a practical example is used to illustrate the benefits and payback period of a networking project.

IRD

The Institut für rationale Unternehmensführung in der Druckindustrie e.V. (IRD) (*Institute for rational management in the print media industry*) is an advisory institute with 700 member companies in the German speaking countries.

5.1 Benefits of e-business

Print service providers and customers alike expect implementing an e-business solution to simplify processes. The benefits must be compelling to both sides. In practice, however, customers will often require print service providers to use e-business solutions as a prerequisite for working with them. Even in this scenario, the print service provider must perform a cost/benefits analysis and develop business models for the new e-business solution.

Receiving inquiries by fax causes inefficiencies in two ways at the print service provider. For one thing, all the data has to be man-

ually entered and edited in the order management system and, for another, incomplete inquiries lead to time-consuming follow-ups or misinterpretations which can adversely affect customer relations. E-business solutions are particularly efficient for very small jobs where the processing time per job using traditional working methods would throw their profitability into question. Internet portals that provide more than just a description of print service providers' range of services are becoming especially widespread in digital printing. Internet portals significantly reduce the processing time, and therefore the process costs, in these types of application. They also enhance customer loyalty (e.g. warehousing, scheduling overviews, image database) and support communication with customers, agencies and print service providers.

E-business solutions enable print service providers to:

- Reduce *process costs* by integrating customers' ordering processes in the order management system,
- Increase *customer loyalty* by integrating with customer-specific processes,
- Extend their *availability*, overcoming time and geographical constraints, thus expanding sales opportunities.

In essence, the customer has similar job processing problems to the print service provider. Some of the process costs involved in issuing and tracking printing orders are significant. Coordination processes can often be dealt with much more quickly and cost-effectively via an Internet portal. Furthermore, the more people are involved in the process, the more likely it is that collaboration via the Internet will pay dividends. With very small jobs there is often no relation between the benefits and the cost of job processing. If the customer's ERP system is not connected with the print service provider's order management system via the Internet portal, the orders first have to be collected in the ERP system, printed out, and then faxed to the print service provider. The provider's order confirmation, delivery note, invoice, etc., are then also entered manually into the ERP system. Changing media in this way is expensive and can lead to problems if production is time-critical.

E-business solutions bring customers the following benefits:

- All of the customer's project members have a complete overview of the project information they need. This includes the product description, the time and place of delivery for order tracking, access to the stock system for requisitioning preprinted materials.

- Accelerated communication thanks to digitization of ordering processes with agencies and print service providers.
- Implementation of the corporate design with templates that are authorized for use throughout the enterprise and can be edited at predefined points in keeping with corporate design guidelines so that they can be adapted for the purpose in question.
- Internet portals typically deliver management information for customers covering inquiries, print orders issued, etc. This represents a source of quick data for checking budgets.

The IRD has conducted an investigation into the deployment of e-procurement which gives some indication of the potential savings involved.

E-procurement

Electronic procurement (e-procurement) refers to the use of Internet-based information and communication technologies to electronically support and optimize the entire procurement cycle of resources and services.

Jobs are sorted into simple, normal and complex, with each category requiring different amounts of time to process. At an hourly rate of pay of Euro 65 and 2.8 quotations for each order actually received, jobs cost between Euro 35 and Euro 218 depending on their complexity. These job costs can be reduced by implementing an e-procurement solution that is integrated with the order management as long as a large enough number of orders is completed via this system to justify the investment and the training, installation and communication costs incurred when the system is introduced.

The more standardized the workflows, the greater the probability that e-business solutions will pay off quickly. Given the great variety of e-business solutions available in the print media industry and cut-throat conditions on the market, it is advisable to choose partners carefully.

Job complexity		Small	Normal	Large
Quotations	Hrs.	0.25	0.37	1.11
	€	16	24	72
Jobs	Hrs.	0.54	0.94	3.35
	€	35	61	218

Table 1
Job costs by order complexity

5.2
The benefits of networked job preparation

The job preparation networking route leads to a standardization of the numbering schemes in order management and production. This enables job, content and production data to be automatically merged at the production control consoles, greatly boosting the reliability of the production process. When job preparation is completely networked, changes are communicated and documented on an ongoing basis.

Networking job preparation should:

- Reduce *job throughput times*,
- Eliminate *inefficiencies* due to duplicated data capture in different software applications,
- Reduce *costs incurred due to errors* by means of standardized designations, up-to-date order information and previews.

A survey by the IRD demonstrates how quickly jobs progress through the individual phases from the inquiry to invoicing (typical values, depending on complexity).

Throughput times for the "Order to confirmation" phase cannot be shortened by networking order management and production. The potential to reduce throughput times can be found primarily in the "Documents to Technology" and "Delivery to invoicing" phases.

The different speeds for processing job tickets can be put down among other things to incorrect, incomplete and frequently changed job tickets. This leads to numerous follow-up questions and high costs incurred due to errors. Investigations by the IRD have discovered that around 90% of all job tickets are modified. Networking job preparation can have a decisive impact here, delivering as it does up-to-date job data quickly to the relevant member of staff's workstation.

Table 2
Typical job throughput times based on IRD data

Job complexity		Small	Normal	Large
Inquiry to quotation	Days	2.2	2.9	4.7
Order to confirmation	Days	1.3	1.6	2
Documents to Technology	Days	0.9	1.2	1.5
Delivery to invoicing	Days	4.2	3.9	5.6
Total	Days	8.6	9.9	13.8

		Not networked	Networked	Difference
Number of follow-ups between Sales and Production	Number/ day	17	7	10
Time per follow-up	Min.	6	6	0
Accumulated time	Hrs./year	382	157	225
Cost per staff member in order management	€/year	24,862	10,237	14,625
Total cost of follow-ups	€/year	124,312	51,188	73,124

Table 3
Benefits of job preparation based on data from the IRD

The sample invoice is based on 5 order management staff with an hourly rate of pay of Euro 65 who work 225 days a year. They have to field between 7 and 17 follow-up questions per staff member per day. Taking an approximate 3 minutes per follow-up and two persons taking part (one asking questions and one answering), the imputed savings can amount to up to Euro 73,000 per year.

While processes do run more smoothly thanks to networked job preparation, the actual benefits are hard to quantify. In the final analysis, the print service provider's staff are relieved of activities that do not add value and can instead take on new tasks that make a greater contribution to the success of the company. The reduction in errors thanks to networking is also difficult to quantify, since usually no definitive values are available that describe the status prior to networking.

5.3 The benefits of networked machine presetting

The presettings produced digitally in order management or prepress are used to set electronically controllable machine components such that operators can initiate the production process as quickly as possible. This networking route has become established with the increasing popularity of CtP, particularly for presetting ink zones on presses. Cutter presetting has also become increasingly popular within specific market segments.

The following benefits are possible by networking machine presetting operations:

- Reduction in *setup times*,
- Reduction in *waste*,

- Improvement in *production reliability and quality*,
- Reassignment of the work to just a few *specialists*.

The decisive benefit of machine presetting, i.e. reducing setup times and waste, is relatively easy to quantify. Thanks to the large installed base, empirical statistics on this are already in place. Up to one proofing operation per job can be saved on a calibrated press. If the ink zone values are not transferred, the printer has to lay every plate on the control console and set the presettings as best he can using the keyboard or stylus. On a fully-automated press a four-color job today can be set up in around 15 to 20 minutes, a process that used to take around 60 to 90 minutes using purely manual methods.[3]

When cutting complex jobs that are not saved on the cutters, staff need considerable time to program all the steps. During this time, no production can take place on the cutter. Using cutting marks from prepress, on the other hand, a sheet can be calculated in minimal time and new jobs prepared during production. The same applies to folders and saddlestitchers, although in this case it is important to consider which presettings can be performed on the machines and whether these justify the networking effort.

Job preparation stations allow trained staff to centrally prepare machines for the production process. The machines and software applications can thus be operated by less highly trained staff without compromising quality.

5.4 The benefits of networked production planning and control

The production planning system schedules the machines and times on a job-specific basis. Simulations can be used to arrive at the best production sequences. Machine scheduling can be changed at short notice. The level of planning detail differs from one company to the next.

The following benefits are possible by networking production planning and control:

- Eliminating *duplicated inputs*,
- Eliminating *follow-up questions* on the production status,
- Reducing the effort required for *planning meetings*,

[3] Prof. Kipphahn (editor): Handbuch der Printmedien, Springer Verlag, 2000, p. 333.

- Increasing the *reliability of production* by ensuring that paper, ink and plates are available when needed at the correct press,
- Increasing the possibilities for the company to control itself through the evaluation of technical information.

In non-networked processes, the planner must re-input the job data (job number, customer, etc.) in his planning tool (e.g. planning chart, Excel). This step is eliminated by networking production planning and control with the order management system. In addition, status messages can be provided to order management, field staff, company management and, if required, customers.

Non-networked production planning and control requires a large number of planning meetings to be held with the departments concerned. These usually takes place in the morning and the plans are then updated several times throughout the day. Usually only the planner, who collects the necessary information from the production staff, has an overview of the current production status. This requires considerable communication input. The IRD has ascertained that planners typically devote less than 30% of their working time to pure planning and controlling activities. Reducing the number of participants in, and the duration of, main meetings and coordination meetings can produce a significant saving which, according to surveys by the IRD, can easily exceed Euro 100,000 per year in midsize operations.

The availability of non-job-specific technical information which is used to document the progress of shifts and machine downtimes is another important benefit. This data delivers valuable information for analyzing non-productive times and disruptions.

5.5 The benefits of networked operating data logging and actual costing

If the company management doesn't want to simply rely on "gut feeling", it needs business management information drawn from the day-to-day operations. As things stand, this information is primarily acquired using daily dockets, but is also increasingly obtained via terminals for logging operating data. Recording, checking and inputting this information from daily dockets is a relatively work-intensive process. The usefulness of this method is limited since the data is frequently not recorded in real time, inputs are missing and entries are posted incorrectly, thereby falsifying the actual re-

sult. It is better to evaluate machine data and supplement this with operating data that is not supplied by the machines.

The following benefits are possible by networking operating data logging and actual costing:

- Recording the *actual costs*,
- Eliminating *duplicated inputs* and checks,
- Providing prompt *status messages* and high-quality management information.

While networking the operating data logging process eliminates the need to fill in daily dockets, entries have to be made on machine terminals or operating data logging (ODL) terminals. The real saving therefore lies in the Accounts department, since daily dockets no longer need to be input into the order management system. By evaluating machine data in conjunction with operating data entered by production staff, it is possible to gain a reliable picture of how production resources, times, and consumables are utilized. Random checks can for the most part be dispensed with. The data is automatically transferred to the order management system, where it is available for actual costing and statistical evaluation.

The sample invoice is based on 30 staff in production filling out their daily dockets, with an average hourly rate in order management and production of Euro 65. On average 7 jobs a day are processed, 225 days a year. Staff take 0.4 minutes to fill in each item in the daily docket, and Accounts takes just as long to transfer this information to the order management system. Due to the higher proportion of discrepancies, checking the daily docket takes one minute, twice as long as checking the inputs at the operating data logging terminal. There is no need in the networked system for Accounts to review the inputs at the operating data logging terminals. When using daily dockets around 10 follow-ups are needed per week, which have each been apportioned an estimated duration of 3 minutes. In the sample invoice, the work progress checks could also be reduced from 140 hrs. to 35 hrs. as a result of networking the operating data. This yields potential imputed savings for the sample operation of around Euro 34,000.

Some of the savings that can be made by networking operating data logging and actual costing are quite transparent. This is especially true for the process of transferring information from the daily dockets – an activity that can now be dispensed with. In what measure the elimination of clarification and checking activities actually has an economic impact varies from case to case, since in the phase when networked operating data logging and actual costing is be-

		Daily dockets	ODL/MDL
Writing one daily docket item	Min.	0.4	0.4
Daily docket check by section manager	Min.	1.0	0.5
Input of daily docket item in Order management system by Accounts	Min.	0.4	0
Clarification by Accounts per week	Qty.	10	0
Time per clarification by Accounts	Min.	3.0	3.0
Writing/capturing (staff)	Hrs.	315	315
Check by section manager	Hrs.	112.5	56
Input by Accounts	Hrs.	315	0
Clarifications by Accounts	Hrs.	52	0
Work progress checks	Hrs.	140	35
Total annual cost	€/year	60,743	26,390
Annual saving through operating data logging	€/year		34,353

Table 4
Benefits of operating data logging and actual costing according to figures from the IRD

ing introduced, the values obtained must be checked particularly intensively. Although not factored into the equation here, it will become increasingly important in future to record the additional work occasioned by the customer. In this area, new, networking-enabled software applications can help to document the reasons and the additional work required in these cases.

5.6 The benefits of the networked color workflow

In prepress, color data is edited on the screen and scanner and is then output on the proofer and, finally, printed. If the color workflow from the agency to prepress and all the way up to the press is not standardized, the result has to be coordinated between the customer and printer. The coordination processes on the press cost time and, therefore, money. If the print product is not coordinated, the decision about the coloring of the print job lies in the hands of the printer. Where color fluctuations are significant, jobs either cannot be sold or must be reprinted.

The following benefits are possible by networking the color workflow:

- More *productivity* from the first step to the finished print,
- Increased *reliability* and consistency in the print quality,
- *Shorter setup time* and less waste,

- *True-color proofs*,
- Increased *reliability* vis-à-vis the customer.

The networked color workflow is based on products used for machine presetting, but also includes services and, usually, the use of spectrophotometric instrumentation and control equipment. The networked color workflow enables greater consistency, so that different printers with different levels of experience and skill can achieve consistently high-quality results.

The sample invoice assumes ink zone presetting has already been implemented. The focus is on the improvements that can be achieved by standardizing processes. With 7 jobs per day and 225 working days per year, a paper price of Euro 70 per 1,000 sheets and workcenter costs for the press of Euro 200, a three-minute reduction in setup time and 100 fewer waste sheets per job already yield annual savings in the order of Euro 26,000 per press.

Table 5 The benefits of the standardized color workflow

		Without PCM	With PCM	Difference
Setup time per job	Min.	26	23	3
Setup time per working day	Min.	182	161	21
Waste during setup	Sheet	500	400	100
Waste per working day	Sheet	3,500	2,800	700
Cost of setup time/press	€/year	136,500	120,750	15,750
Cost of material/press	€/year	55,125	44,100	11,025
Total costs	€/year	191,625	164,850	26,775

This information must of course be qualified by the fact that printed paper is often used to setup the press, so that the actual saving is more likely to be around half of the costs presented here. The saving in setup time, too, is in the first instance an imputed value, though this can become relevant in the event of capacity bottlenecks and the expansion of shift operations.

5.7 Payback period of a networking project

Since print service providers often only have limited capital resources, expensive investments must not only provide qualitative benefits, they must also boost the company's financial situation. Companies should therefore always carry out investment analyses. While many are rightly skeptical when it comes to speculating on future events, an investment analysis nevertheless provides a good

basis for assessing whether or not investments make economic sense.

In the practical example, the reflow of funds is determined and compared with the costs for investment and ongoing maintenance. The result is used to determine the payback period, which is drawn on as a criterion for the investment decision. A payback period of two to three years is considered a worthwhile investment. If the payback period is longer than this, investments can only be justified by strategic goals such as technological leadership, improved marketing opportunities or ensuring the continued custom of specific customers.

Payback period

The payback period is the length of time it takes for the reflow of funds to cover the total cost of ownership. It is also known as the payoff period.

5.7.1 Basis for calculating the payback period

Companies normally use two key figures in their investment analyses, the Return on Investment and the payback period.

ROI

The Return on Investment (ROI) is a key figure for determining the profitability of investments. The ROI is the product of percentage return on sales (ratio of profits to sales) and capital turnover (ratio of sales to capital invested).

Both key figures are used to make a quantitative statement on the success of an investment. While Return on Investment determines the profits from the investments over a defined period of time, the payback period aims to calculate when the investment costs will be recouped, i.e. paid back. The method of calculating the payback period that is most usual in practice will be used here.

The payback period t is the period of time taken for the discounted, accumulated reflows of funds to recoup the investment costs. Discounted means that the value of money at a defined point in time is taken into account (in periods of inflation, money will be worth more today than it will be in the future). As an alternative to the inflation rate, financing costs can also be used for discounting purposes.

Equation 1: Calculation of payback period

$$0 \leq -C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \ldots + \frac{C_t}{(1+r)^t}$$

C_0 = Investment
C_1 = Reflow of funds, first payment period
C_2 = Reflow of funds, second payment period
C_t = Reflow of funds, final payment period
r = Interest rate for financing costs

The payback depends on the monthly reflow of funds, i.e. the assumed earnings per month less expenditure – or, alternatively, the savings that can be attributed to the investment. The payback period does not provide information about the period in which a reflow of funds will occur, nor about the value the investment will add (since the period after the investment has been paid back is not considered). The investment analysis carried out before the decision was made to invest should be compared with actual values for the purposes of project auditing.

In this context, a distinction must be made between payment-related and imputed savings. Payment-related savings have a financial impact in the form of reflows of funds, while imputed savings are not directly connected with a reflow of funds. Imputed savings only have a payment-related impact if staff or production capacities are cut back.

Payment-related costs

Payment-related costs are costs that have a financial impact. They are contrasted with imputed costs such as owner's salary, cost of capital, etc.

5.7.2 Practical example

The print service provider in this example works with 38 staff in a two-shift operation on four mid- and small-format presses. These presses are utilized 15.5 hours per day. The company serves around 300 customers, processes approx. 2,500 jobs a year and writes 5,500 quotations. The range of products breaks down into 30% standard products such as business stationery and advertising printing, 50% complex products such as brochures and calendars, and 20% periodicals such as journals and magazines.

The company, which is run by the owner, has already gained some early experience of networking concepts. Initial attempts

were undertaken in 1998, but failed due to the lack of integration readiness and weak functionality of the order management system. This led to the company changing suppliers in 2000. Equipped with a completely revamped machine park, the three-stage operation then successively introduced the presetting, job preparation, production planning and control, color management, and operating data logging and actual costing networking routes. The print service provider opted for Prinect, the networking offering of Heidelberger Druckmaschinen AG.

The scope and content of the networking project were defined in a two-day workshop. A decision was made not to network finishing operations to begin with. All attention was focussed instead on the printroom, the sector that yields a considerable portion of the added value. The project was launched with the introduction of ink zone presetting and the order management system. Once the order management staff had become familiar with the order management system, initial efforts concentrated on standardizing the color workflow using spectrophotometric measuring equipment and setting up the job preparation and production planning and control networking routes. After six months, the processes were sufficiently well established for networked actual costing to be introduced.

The introduction of operating data logging and actual costing was prepared in detailed discussions in order to achieve greatest possible acceptance among the workforce. Although workers were initially skeptical about complete time recording, many staff were surprised to learn how much time is spent on which activities, particularly ancillary activities.

The benefits of networking were estimated with the help of an ROI tool. This was done by comparing the status after the networking project had been completed with the unsatisfactory, non-functioning partial networking that had existed prior to this. Adequate information on the non-networked status was no longer available. But this does not detract from the usefulness of the practical example, since the poor networking at the investigated plant led to the adoption of working practices that came very close to those of a non-networked status.

5.7.3 Quantitative benefits of networking

The print service provider in the example was able to reduce its order management staff from 4 to 2 in the course of the networking project. Half a post was not refilled, and one further person has been

assigned to alternative duties internally. These staff cuts in order management were made possible by more efficient job preparation and operating data logging workflows.

Networking order management provides the print service provider with an overall saving of 16.7%. This breaks down into a 21.0% saving with standard products, 13.2% with complex products and 11.0% with periodicals. This saving corresponds to around 1,200 working hours, and is based on far better coordination than was the case previously. This is mirrored both in a reduction in the number of meetings and a dramatic decline in follow-up queries. The improved flow of information cut the number of follow-up queries between order management staff and production from a total of 40 per day to 10 per day.

The automatic transfer of machine and operating data into the order management system eliminates around 330 hours of work inputting information. In addition, daily docket checks by the production manager and the associated follow-up queries by order management were halved. The reduction in checking work was quantified at approx. 50 hours.

The complete recording of all activities identified Euro 95,000 worth of additional services that had been rendered, though only Euro 45,000 of this could be passed on to customers. The rest was classified as goodwill.

The company invested around Euro 180,000 in Image Control to network its color workflow. This investment resulted in significant savings.

Press setup times were cut from 20 – 25 minutes to 10 – 15 minutes. With around 12 setup procedures per day and press, 100 less waste sheets per setup procedure, workcenter costs of Euro 150 per press, 225 working days per year and an average paper price of Euro 35 per 1,000 sheets, this resulted in a total saving of Euro 76,950 per press. Reduced setup times saved Euro 67,500 of this and reduced paper consumption Euro 9,450.

5.7.4 Evaluation of the investment decision

The payback period is determined by considering two areas separately. These are, on the one hand, networking of job preparation (JP), production planning and control (PPC) and operating data logging (ODL) and actual costing – grouped under the term operational data networking – and, on the other, networking of machine presetting and color workflow.

Year		2001	2002	2003	2004
Investment: JP, PPC, ODL	€	−120,000			
Software maintenance	€	−8,000	−8,000	−8,000	−8,000
Reflow of funds Staff costs (1 post)	€		+60,000	+60,000	+60,000
Net monetary value after reflow of funds (r = 10%)	€	−128,000	−88,800	−29,680	+19,352

Table 6
Payback period for operating data networking

The initial investments and ongoing expenditure on software maintenance contracts are set off against a reflow of funds deriving from savings in staff costs. Imputed interest of 10% is assumed. A new order management system is needed and has a major impact on the level of investment required. The networking implemented thus far does not support the recording of additional services, which therefore have no influence on the payback period.

If the costs for the order management system are included in the payback period analysis, the operating data networking solution achieves a positive net monetary value in the fourth year. Without the order management system, the investment would have paid for itself as early as the second year.

When it comes to the networking of machine presetting and the color workflow, the initial investments in Prinect Image Control, services and ongoing expenditure for maintenance contracts are set against reflows of funds from savings in setup times and reduced paper consumption.

In theory these networking routes will yield a positive net monetary value after two years. In practice, however, this payback will only have a payment-related effect if the company is operating at its capacity limits. In the example, the savings in setup time eliminates the need for a third shift at peak times.

Year		2001	2002	2003	2004
Investment in color workflow	€	−180,000			
Reflow of funds, setup time per press	€		+67,500		
Reflow of funds, waste per press	€		+9. 450		
Net monetary value after reflow of funds for four presses(r = 10%)	€	−180. 000	+109. 800		

Table 7
Payback period for networking the color workflow

In summary, while they can be directly attributed to the networking, the savings described here are not sufficient to provide clear justification for the entire networking. When making purchasing decisions, however, qualitative gains resulting in improved workflows, reduced proneness to error, increased customer satisfaction and more efficient operational management must also be considered. It is difficult to record qualitative criteria in reliable, black and white figures, but these important arguments should be carefully considered when deciding on investments.