WINNER: Biggest Improvement in Efficiency and Customer Responsiveness as a Result of Process Automation

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CASE STUDY CONTENTS

Background — A description of the subject workflow environment and conditions prior to implementation
- General Company Profile

Conditions prior to integration

Objectives — A description of the printer, publisher or pre-press service’s goal and motivation, including any quantities criteria upon which the goals were established

Methodology — A description of the process of selecting a solution, including alternatives and deciding factors

Implementation story — A description of the implementation effort including timeline, participants, critical path/milestones, obstacles overcome (if any), training and testing

Resulting workflow/processes — A description of the resulting workflow, including any applicable workflow or process diagrams

Biggest improvement in efficiency and customer responsiveness as a result of process automation — A quantitative analysis of the hard and soft ROI factors expected and realized, to include either breakeven analysis, IRR or NPV determination of hard factors and testimonial evidence from users or customers as to the realization of soft benefits

Quantitative analysis/ROI and qualitative results
ROI calculation and conclusion

Conclusion
BACKGROUND
A description of the subject workflow environment and conditions prior to implementation:

GENERAL COMPANY PROFILE
Köller+Nowak (K+N) is a full-service printer with 12 employees and a total turnover of about 2m EUR (2.5m USD). Prepress features a CTP platesetter that is controlled by Kodak’s Prinergy Workflow since Dec. 2003 and networked since April 2005; FM screening is used by default. In the press department, a five-color Heidelberg SM 52 and a four-color Heidelberg SM 74 produce high quality products. Finishing includes cutting, folding and saddle stitching.

K+N have been using Hiflex MIS for order management (estimating, costing, invoicing), scheduling and shop floor data collection since early 2002. The system was implemented to objectively measure costs and performance.

In fall 2002, the Hiflex e-business solution was installed with the following functions:

- Inquiry: customers have the possibility to place their inquiries by using an according formula.

- Quote archive: customers have the possibility to check quotes and convert them into orders.

- Order archive: customers have the possibility to look up the details of finished jobs (What was the print run? Where was it shipped to? What was the price?)

- Job tracking: customers have the possibility to check on the status of the job (mile stones).

- Warehouse release order: customers have the possibility to order from a stock of finished goods (or place a print order when the stock is too low)

- Personalization: customers have the possibility to personalize print products within a given corporate design (e.g. Business cards, magazine covers)

- Approval: customers have the possibility to approve proofs via the internet (softproof)
In June 2005 K+N were awarded the “Best-Practice” title by the German “Institut für rationale Unternehmensführung in der Druckindustrie (IRD) e.V.”, which is a streamlining institute for the printing industry. For their 2005 automation congress the IRD conducted a survey and found out that 95% of K+N’s customers use one or more functions of the K+N e-business portal.

**CONDITIONS PRIOR TO INTEGRATION**

**FILE DELIVERY WORKFLOW**

**Manual processing of received files**
The file transfer from the customer to K+N was done through ISDN, FTP or E-Mail. Automated processing of received files was not possible since transferred files were not automatically electronically assigned to open orders. Valuable production time was lost if transferred files were not noticed instantly. This shortened the planning horizon and led to ad-hoc decisions on urgent deliveries.

**Unnecessary correction cycles**
If the transferred files were erroneous (e.g. low resolution embedded pictures) the customer was only notified after the file delivery had been noticed (see above) and the files had been checked by the prepress staff (who assigned the files to an order and manually carried out a preflight check). This normally took several hours. After detecting an error that required new files to be submitted, the customer had to be notified (phone call), fix the problem and transfer new files, all of which caused additional waiting times that shortened the production window even further.

**Time consuming clarification of conflicting job content**
The agreed job specification of all orders was (and still is) sent as a written order confirmation to the customer. If the transferred files do not match these specifications (e.g. PDF is not the agreed size or contains spot colors for a CMYK job) the job processing had to be stopped and the customer had to be notified. Was the job modification intentional? Often another file submission with corrected files from the customer was necessary, again causing additional waiting times and a shortened production window.

**PREPRESS JOB PROCESSING WORKFLOW**

**Extended search and response times for repeat orders**
When searching for archived jobs in the prepress system, it was common for searches to return unexpected (or no)
SUMMARY AND CONCLUSION
As K+N’s target has always been to achieve the highest possible customer satisfaction they had to expend a lot of time (and money), coordinate internal communication processes (e.g. several phone calls) and cope with considerable administrative effort. The former workflow was characterized by:
- Costly redundant data entry in isolated systems
- Extended search and response times for repeat orders
- Manual processing of received files
- Unnecessary correction cycles
- Time consuming clarification of conflicting job content
- Interrupted billing due to manual registration of prepress output
- No accurate tracking of authors’ or house corrections
- Inaccurate inventory caused by wrong material bookings
- Limited information on job progress for the CSR

jobs. This was because of inconsistencies between the data in the job ticket and the archived data in Prinergy. As job data had to be manually entered into Prinergy, incorrect entries (typing errors, incomplete fields, use of unique or uncommon abbreviations) inevitably occurred. The result was extended search times, which were disrupting communication and delayed the response to the customer (“sorry, we are still looking for the old files”).

Manual registration of prepress output/interrupted billing
Consumption of plates, page proofs and form proofs, as well as their respective cost center times had to be manually entered into the Shop Floor Data Collection system. The manual input was considerably delayed (usually one day). Sometimes operators forgot to record these items. As a result they were absent from the final costing which could lead to an interruption of the billing process. The bottom-line was a loss of liquidity.

No accurate tracking of authors’ or house corrections
The tracking of authors’ corrections (especially chargeable ones) was dependant on manual reporting. As they were not electronically tracked, they were frequently forgotten. House corrections were not tracked at all.

Inaccurate inventory caused by incorrect booking of material consumption
An inventory check of plates regularly showed discrepancies (about 5%) between purchased plates and those reported as consumed or remaining. These “missing plates” were never accounted for since any investigation would have been too time consuming.

Limited information on job progress for the CSR
The CSR did not have online access to up-to-date information from prepress. He could not see if the customer’s files had been received and he did not have reliable information with respect to page/form proofs (delayed entry in Shop floor data collection). Therefore he could not respond immediately if the customers wanted to check the order status or wanted to communicate new or additional information regarding their jobs.
OBJECTIVES

A description of the printer, publisher or prepress service’s goal and motivation, including any quantities criteria upon which the goals were established:

K+N offer e-business to their customers (95% of K+N’s customers use one or more modules of the e-business portal) and, by that, subscribe to a specific business idea: it is not the pure printing-capacity that is sold but a solution which allows the customer to comfortably purchase printed products, and to profit from a distinct added value.

Ingo Nowak substantiates his business idea with the claim to “create intelligent solutions that support his customers in streamlining and automating the process of procuring print products. This requires a profound knowledge of the customers’ processes as well as the mastery and optimization of the delivery chain with regard to economic factors.”

Here customer communication and customer responsiveness are decisive success factors.

Both "communication channels" (customer to CSR and customer to prepress) should be brought together. Therefore the software systems of both departments (CSR = Hiflex MIS and prepress = Prinergy) have to seamlessly communicate with each other. By this, the CSR (who is chiefly responsible for order processing) should be provided with all important information from the prepress-workflow-system.

Apart from K+N integrating themselves into the procurement processes of their customers, customers themselves should be more closely involved in the company’s production processes. They should be provided with the possibility to check the quality of their PDF-files themselves before data transfer, and to allocate files to certain orders even before their transfer so that they are processed faster (namely by automation). The complete process chain from creative design to plate setting should be streamlined, shortened and simplified.

Furthermore, K+N aimed to improve the possibility of answering their customers’ inquiries about the production status. This was to be managed through organizing operations more efficiently and enhancing transparency and flexibility in the production process.

Finally author’s corrections should be electronically tracked, so that accountable processes are not forgotten.
and the invoicing process becomes more transparent to both K+N and the final customer.

K+N’s ROI target was 2 years.

**METHODOLOGY**

A description of the process of selecting a solution, including alternatives and deciding factors:

“We have been following our business concept that we named ‘ebusiness@print’ since the beginning of August 2002 and have realised a noticeable degree of added value for our customers”, explains Ingo Nowak. “Precedent we invested in the Hiflex software, which I had come across through the search engine ‘Google’ at that time. I was very surprised that ebusiness was already implemented as part of the Hiflex software concept. In 2005, the investment into JDF technology was a consistent step to further promote automation that had been initiated by our ebusiness model and from which we and our customers had already been profiting a great deal.”

Hiflex MIS had been in use since early 2002 and the Prinergy Workflow since the end of 2003. Starting in March 2003, the two vendors Hiflex and Kodak (formerly Creo) had already conducted several JDF-implementations at joint customer sites. And the JDF-link between their systems is clearly considered as proven technology that leads to improved efficiency.

The release of Acrobat Professional’s version 7 was the first system that provided the basis for including customers in a JDF controlled workflow. This important feature fitted very well into K+N’s concept, which was to integrate the business processes between the final customer and the printer as much as possible.

Additionally, JDF technology allows K+N to meet customer needs through consistent quality management and transparency of internal processes.
IMPLEMENTATION STORY
Adescription of the implementation effort including timeline, participants, critical path/milestones, obstacles overcome (if any), training and testing:

JDF CONNECTIVITY TO ADOBE ACROBAT PROFESSIONAL

JDF connectivity in Acrobat 7 is only supported in the Professional version. Implementation of a JDF workflow is only possible if this specific version is used at a customer site. Additionally the usage of this interface requires a certain affinity to IT technology. Finally, establishing the interface only makes sense for regular customers (not for those who place a few orders per year).

At the moment, there are not many customers who meet these criteria. K+N is currently using the JDF link to Adobe Acrobat with two customers. In order to make it work, the Hiflex software and Acrobat had to be configured as follows:

Hiflex: if the orders for one of the two customers are entered into the order book a message box comes up that asks if a JDF file should be sent to the customer. If “Yes” is clicked, a JDF file is generated and sent via email attachment to the contact person at the customer (the contact responsible for the current order).

Acrobat: When Acrobat Professional 7 is installed, files ending with “.jdf” are automatically assigned to this application. When the customer contact person opens the email containing the JDF from Hiflex, and clicks on the attachment Acrobat will be launched and the JDF file can be processed (see next chapter “resulting workflow”). The PDF content files may be attached to the JDF job parts (e.g. cover and text) and then submitted to K+N. The setup of the submission manager contains hotfolder settings for data transfer to K+N (files are picked up from the hotfolder by the Hiflex Uploader application), a profile for PDF preflight check, as well as the option to use the JDF product intent as additional criteria before transmission. These settings had to be made on the customer system.

The customer had to be trained on how to use the JDF support in Acrobat. This took about 30 minutes but had to be done at customer site via webex.
JDF CONNECTIVITY TO THE KODAK PRINERGY WORKFLOW SYSTEM

As the link to Prinergy had already been installed at various joint Hiflex-Kodak customers, it was considered proven technology prior to implementation. There were no obstacles to be overcome.

The implementation was done in two steps, the first of which was a test period. The test period did not include automatic cost booking in Hiflex MIS. When automatic cost booking was activated (second step), prepress events and approvals are translated to cost center and material data in Hiflex (no manual entry of prepress production data and shop floor data collection is now required).

RESULTING WORKFLOW/PROCESSES

A description of the resulting workflow, including any applicable workflow or process diagrams.

FILE DELIVERY WORKFLOW

When the order is accepted the customer receives the confirmation via email with a JDF file attached. The JDF file contains (a) general job data for each product part / section (e.g. cover and content) and (b) administrative data (customer name, etc.). The data transferred for each product part includes, for instance, product name, JobID, Job PartID, number of copies, format, number of pages, bindery and finishing information, etc. The structure of the product is displayed in the form of a tree:

The production-ready PDF files can be added. Separate PDF files can be directly linked to the job parts and become part of the displayed structure even before upload.

For the customers’ data transfer to K+N they can configure the transfer process in Acrobat’s integrated „Submission Manager“. The specification of the Preflight profile and further submission options have already been configured by K+N, i.e.:

- Internal check to verify if the added PDF files are consistent with JDF job definition (product intent)
- Combining of separate PDF files into a single PDF file
- Internal check to see if the file contains print-ready data (Preflight check).

› Definition of submission options (K+N use a submission tool that monitors a hotfolder)

GENERAL REMARKS

On resulting K+N workflow with respect to customer communication and responsiveness:

Today, K+N has realized improved communication processes through JDF connectivity between their Hiflex MIS and Prinergy Workflow. Via the JDF capability of Acrobat Professional 7, customers are much more and involved in the production process. Erroneous production data is detected through automatic pre-flight at the customers’ systems before sending to K+N and delays caused by inefficient (time consuming) communication are avoided. Errors can be corrected without resulting in processing costs. As a result, K+N and their customers profit from time and cost saving through a tightened communication processes between customer, prepress staff and CSRs.

Unified communication

As mentioned earlier, K+N was troubled by the two communication channels to their customers (CSR and prepress operator) and by the internal communication problems that lay herein. Now, the two software systems that are used by the two responsible customer contacts (Hiflex MIS for the CSR and Prinergy for the prepress operator) are communicating closely with each other, so the internal communication problems are resolved. Internal telephone calls are no longer necessary in order to gather relevant information. In a way, the two communication channels have been unified. Response times have improved dramatically.
Finally, the customer submits the JDF file back to K+N. The embedded PDF-files are already pre-flighted and through the “JDF wrapper” they are clearly assigned to an open order. As soon as the files arrives at K+N the employees responsible are notified by e-mail and the files are forwarded to the Prinergy folder for further processing.

**Automatic processing of received files**

As the transmitted files are already pre-flighted (with PDF pre-flight profile and with JDF Job definition) the received files are ready for imposition and time consuming correction cycles are not required.
PREPRESS JOB PROCESSING WORKFLOW

Automatic Job Create
Upon order entry in the Hiflex MIS, administrative and production data is automatically transferred to Prinergy via JDF for automatic job creation. Re-keying of the job specifications is no longer necessary. After the order has been created via JDF in Prinergy, the two systems maintain a constant link between the customer order and the prepress job(s). (Multiple pre-press jobs can be linked to the same Hiflex order.)

Better access to archived jobs / very fast search and response times
If a historic order has to be accessed, it can be easily found, since the administrative data in Prinergy was supplied by Hiflex (thus, guaranteeing data consistency between the two systems). Hiflex can also send a message to Prinergy to restore a previous job from its archive if it is a reprint.

Automatic booking of material consumption
During actual production, Prinergy supplies Hiflex MIS with information about processing and output tasks via the JDF/JMF interface. These messages contain information such as:
- Operator
- Event time and date
- Operation and elapsed time
- Work type (e.g. printer’s error, author’s correction, chargeable, non-chargeable, etc.)
- Materials consumed (page proofs, form proofs, plates)
- Page status
- Proof and plate approval status
- Page thumbnails (see screenshot 4 below)
- Operator comments

Material consumption and cost centre times are automatically booked against the job which leads to accurate, reliable costing report.

Uninterrupted billing process
Because all prepress material consumptions are always automatically booked (no output without booking), the historic costing is more accurate and the billing process is usually seamless. This increased liquidity.
Tracking of authors’ and house corrections
Due to automatic tracking of house corrections (chargeable or non-chargeable ones) in the Prinergy Workflow System and the automatic transfer of this information into Hiflex, all error costs are captured, so that the tracking of costs for internal quality management and for invoicing is easier and more reliable. Sales can be automatically notified as soon as a chargeable correction occurs and can then contact the customer immediately in order to avoid billing disputes later (see screenshot 5 below).

Inventory checks of plates no longer show discrepancies.
The inventory of available plates on hand is also now accurate (again: no “unbooked output”).

Prepress progress visual for the CSR
Today the CSR profits from a precise insight into the job’s progress. From the order book (a CSR’s everyday tool), anyone can see which Prinergy jobs are connected to this order (one Hiflex order can be linked to an unlimited number of Prinergy jobs), the files that have been added to a Prinergy job, the status of any page, proof or plate, material consumption, booked costs and chargeable corrections, which are displayed in red. Even thumbnails generated within the Prinergy system are passed to Hiflex. If the customer calls to check on the order status or to give new or additional information related to their jobs, the CSR can respond immediately. He even has – in his administrative
tool which is the Hiflex MIS – direct access to the PDF files on the Prinergy server (the ones used in production).

Up-to-the-minute plate status for the scheduler
Moreover, the exposed plates are automatically displayed on the scheduler’s digital planning board. Now it’s more transparent if the plates for an urgent job are already available. This reduced the number of ad-hoc changes to the production plan.

BIGGEST IMPROVEMENT IN EFFICIENCY AND CUSTOMER RESPONSIVENESS AS A RESULT OF PROCESS AUTOMATION
A quantitative analysis of the hard and soft ROI factors expected and realized, to include breakeven analysis, IRR or NPV determination of hard factors and testimonial evidence from users or customers as to the realization of soft benefits.
THE BENEFITS
The effects of the JDF project for K+N as presented in the previous chapter “Resulting Workflow” are:
- Automatic Job Create
- Better access to archived jobs / very fast search and response times
- Automatic booking of material consumption
- Prepress progress visual for the CSR
- Up-to-the-minute plate status for the scheduler
- Tracking of authors’ and house corrections
- Seamless and accurate billing process
- Inventory checks of plates no longer show any discrepancies.
- Unified communication
- Tight integration of the customer into the prepress workflow
- Automatic processing of received files
- No unnecessary correction cycles / clear job content

Reduced labor / Wage bill reduction (D)
Automation of prepress led to less manual labor and a wage bill reduction of one prepress operator. Cost savings of EUR 50,000 (= gross salary + national insurance contributions) were achieved.

Increase in sold productivity (C)
The increase of transparency and flexibility within the prepress department had a direct, positive impact on the production schedule. This led to an increase in productive hours (print run hours) on the presses of +5% in the first period (2005 compared to 2004). The extra productive hours multiplied with the hourly cost rate of the respective machines lead to an increase in added value. The direct costs are subtracted and the calculated increase in sold productivity is EUR 13,838. This figure is also cross-checked with the increase of the net profit before taxes (which was taken from the company’s profit and loss statement), which results in the same value. For 2005 this is empirical and proven data.
For the periods 2006, 2007, 2008 and 2009 the assumption was made that the number of productive hours and the direct costs will stay unchanged (increase compared to 2005 of + 0%).
THE COSTS

One time costs (I)
Hiflex software always includes a company license with all modules for an unlimited number of workstations. Because of this model, K+N already owned the license for Hiflex JDF. Nevertheless, the license costs for the necessary modules were proportionally calculated as if an investment would have been necessary. The one time costs listing also includes the Synapse Link licenses required for JDF/JMF connectivity. Additionally training, installation, terminal licenses, hardware, necessary machine updates, internal startup costs and ancillary IT infrastructure costs have been taken into account.

Recurring costs (J)
The recurring costs comprise the proportional Hiflex recurring fee (license and maintenance) for the Hiflex JDF, as well as external services and internal IT maintenance.

THE ROI
The Return On Investment (ROI) of the JDF implementation at K+N was 798.1% within five years (which means that the investment is paid back 8.98 times). The Net Present Value (NPV) is EUR 226,505 or US$ 289,181 which equals an Internal Rate of Return (IRR) of 262%. Since the implementation was carried out in April 2005 the calculation is not based on ideal assumptions but on empirical data taken from 2005. Although one period (2005) has already passed, all periods are discounted with a rate of return of 8%. The rate of return is the expected reward investors demand for investing in the project rather than carrying out alternative investments. The rate of return is often referred to as the discount, interest, hurdle rate, or company cost of capital. Without this consideration the ROI would be even higher. The figures calculated for this project (ROI, NPV and IRR) are list prices.
THE CALCULATION (ROI, NPV, IRR)

Periods | Investment | 2005 | 2006 | 2007 | 2008 | 2009
--- | --- | --- | --- | --- | --- | ---
1 - DISCOUNT RATE
A Discount rate (expected Rate of Return) | 8% |
B Discount factor: | 1,000 | 0,926 | 0,8570,794 | 0,735 | 0,681 |
2 - BENEFITS
C Avoided costs
Wage bill reduction | € 50.000 | € 50.000 | € 50.000 | € 50.000 | € 50.000 |
(1,0 persons)
D Increased added value
Increase in sold production
E Annual benefits (C+D) | € 63.838 | € 63.838 | € 63.838 | € 63.838 | € 63.838 |
F Cumulative benefits | € 63.838 | € 127.676 | € 191.514 | € 255.352 | € 319.190 |
G Discounted annual benefits = PV(E) | € 59.109 | € 54.731 | € 50.677 | € 46.923 | € 43.447 |
3 - COSTS
H One time costs
License Hiflex JDF | € 1.530 |
Installation Hiflex 1 day € 1.024 |
License Synapse Link | € 15.000 |
Training on Interface | € 1.280 |
Internal Startup-costs (1 wk) | € 2.000 |
IT ancillary infrastructure costs | € 500 |
I Recurring costs
Hiflex recurring fee on license and maint. | € 765 | € 765 | € 765 | € 765 | € 765 |
External Services | € 500 | € 500 | € 500 | € 500 | € 500 |
Internal IT maintenance (10h) | € 500 | € 500 | € 500 | € 500 | € 500 |
J Annual costs = (H+I) | € 21.334 | € 1.765 | € 1.765 | € 1.765 | € 1.765 |
L Discounted annual costs = PV(J) | € 21.334 | € 1.634 | € 1.513 | € 1.401 | € 1.297 | € 1.201 |
NET VALUE
N Cumulative total | -€ 21.334 | € 40.739 | € 102.812 | € 164.885 | € 226.958 | € 289.031 |
O Discounted annual value = PV(M) | -€ 21.334 | € 57.475 | € 53.218 | € 49.276 | € 45.626 | € 42.246 |
ROI per Year = M/J | -100,0% | 3516,9% | 3516,9% | 3516,9% | 3516,9% | 3516,9% |
ROI Present Value = SUM(O)/SUM(L) | 798,1% |
NET PRESENT VALUE
P Net Present Value (SUM(O)) | € 226.505 |
INTERNAL RATE OF RETURN
Q IRR (Internal Rate of Return) | 262% |
ABOUT PROJECT FINANCIAL ANALYSIS

Return on Investment

The term Return on Investment (ROI) is frequently used in different ways. In financial circles, the strict meaning of Return on Investment (ROI) is Return on Invested Capital, a measure of company performance: the company’s total capital is divided into the company’s income (before interest, taxes, or dividends are subtracted).

Most business people use “ROI” simply to mean the “Return” (incremental gain) from an action, divided by the cost of that action. In this sense, an investment that costs $100 and pays back $150 after a short period of time has a 50% ROI. This is exactly how it is used in the financial analysis of K+N JDF project.

Net Cash Flow (can be found in the line ‘Annual Net Value’ (N))

Cash flow, like income, focuses on the difference between money coming in and money going out over a time period. (Net Cash Flow = Cash Inflows - Cash Outflows). Cash flow results do not include some items found in the income statement, such as depreciation expense. Depreciation expense, for example, does not represent an actual cash payment during the reporting period, but rather an accounting charge against earnings. As a result, depreciation expense is not a “cash outflow” in the above financial analysis.

Discounted Cash Flow (DCF) (can be found in the line ‘Discounted annual value’ (P))

The DCF is a cash flow summary that has been adjusted to reflect the time value of money. It is an important criterion in evaluating or comparing investments or purchases. All things being equal, the purchase or investment associated with the larger DCF is the better decision. DCF makes use of the Present Value concept, the idea that money you have now should be valued more than an identical amount you would receive in the future. Why? The money you have now could (in principle) be invested now and gain return or interest, between now and the future time (interest rate used in the above financial analysis is 8%, (A)). Money you will not have until some future time cannot be used now. Therefore, the future money’s value is Discounted in financial evaluation, to reflect its lesser value. What that future money is worth today is called its “Present Value”.

Net Present Value (can be found in the line ‘Net Present Value’ (Q))
The net present value is a form of calculating discounted cash flow. It encompasses the process of calculating the discount of a series of amounts of cash at future dates, and summing them. Therefore the height of the net present value is depending on the length of the period for the project financial analysis. The period which we have chosen for the financial analysis of K+N’s JDF project is five years.

Internal Rate of Return (IRR)
The IRR for an investment is the discount rate for which the total present value of future cash flows equals the cost of the investment. It is the interest rate that produces a 0 NPV. Another way to think of IRR is this: IRR tells you just how high interest rates would have to go in order to “wipe out” the value of this investment. Like DCF, the IRR is a cash flow summary that has been adjusted to reflect the time value of money. The IRR view of the cash flow stream is essentially an investment view: money will be paid out in order to bring in gains. The higher an investment’s IRR, the better the investment’s return relative to its cost and the lower the risk.

Note:
1. IRR says nothing about the magnitude of the return. A tiny investment or expenditure may lead to a magnificent IRR. An alternative action with a smaller IRR might still be preferred if it brings in a much larger net cash flow, or DCF.

2. IRR has the most meaning when there is an initial net cash outflow, followed at least one period with a net positive cash inflow. IRR cannot be calculated with outflows only, or inflows only; IRR is thus not applicable to “cost only” analyses (such as the typical cost of ownership analysis).

3. IRR can be quite misleading if there is no large initial cash outflow. For instance, when comparing a “Lease” scenario with a “Buy” scenario for new computing equipment, the “Buy” alternative may show an IRR of, say 30%-70%, whereas the “Lease” approach may have an IRR in the thousands. This is because leasing may not involve much of an initial cash outlay. IRR is more appropriate for comparing alternatives that have roughly similar patterns of inflows and outflows.