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ERP and Functional Fit: How Integrated Systems Fail to Provide Improved Control

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Abstract: Companies have been investing in integrated enterprise applications (such as ERP) for over a decade, without firm evidence of a return from these investments. Much research has centred on the factors which will lead to a successful implementation project (eg: Holland and Light, 1999; Shanks and Seddon, 2000), but to date there appears to be little research on the longer term impact of ERP systems on the organisation (Heili and Vinck, 2008). Although the greater level of system integration brought on by ERP has meant that there is more operational information available to managers than ever before, the information stored in ERP applications requires much off-line manipulation in order to be meaningful to managers. The data held in ERP databases originate in physical processes that evolve over time, and thus inevitably a gap opens between the ERP system, and the reality it is designed to capture (Lee and Lee, 2000). Taking the evaluation of management performance against organisational objectives as research domain, and focusing on a case study in the pharmaceutical sector, this paper looks at the footprint of a global ERP system in the day to day decision making of managers both at a manufacturing site level and at Headquarters level. Although the ERP implementation resulted in major improvements in data integrity at an operational level, resulting in improved visibility of costs and traceability of transactions for head office, many of the benefits associated with exploiting the information thus collected have been compromised by the need to rely on non-integrated tools for certain specific functions. Thus, for decision making purposes, managers must still download data to spreadsheets, where they are manipulated and combined with data from other, non-integrated systems. Thus, this paper examines the role of ERP systems in supporting management activity in a manufacturing environment, highlighting the gap between management performance and the informational and decisional support provided by the ERP.

Keywords: ERP, decision making, data integrity, organisational goals, KPI, skills

1. Introduction

In streamlining the administration of day to day manufacturing activity, ERP systems are implemented with the aim of reducing the potential for error in information handling in the procurement, production and distribution processes. By incorporating efficient data capture technology with powerful networking capacity, the vital transactional information is captured at source by users as an integral part of their work processes, and then made available instantaneously for management (Kalakota and Robinson, 2001). This theoretical ideal makes the concept of ERP an enormously attractive one for large firms faced with on-going struggles to reduce costs and report detailed results to shareholders in a timely fashion (Holsapple and Sena, 2002).

However, the time saved by the organisation in automating administrative processes does not necessarily imply faster decision processes or better decisions (Chang and Gable, 2002). Management decisions are generally based on the ability to compare *actual* data (often provided by the ERP system) with *planned* data (frequently managed in less integrated systems, and subject to much fluctuation). The ERP system is a vital link in this process of management control, being the unique source of the "as-is" situation for procurement, inventory, customer orders and fulfilment (Rowe, 1999). Crucially, as a centralised repository of company data, both site and headquarter level management have equal access to transaction status and history. However, there appear to be several constraints concerning the value of ERP systems to managers in exploiting these systems to their full potential.

Firstly, when selecting and implementing an ERP system, companies are looking at a good fit with operations, not with the more abstract decision processes. Secondly, management is highly concerned with the efficient use of all company resources, including people and manufacturing capacity. The data model of ERP applications is inventory centric, however, and therefore lacks the scope to be able to support managers in decisions that involve trading off the costs related to these resources. Finally, an ERP implementation implies a certain number of assumptions about the company and how it operates at a specific point in time (Davenport, 1998). These assumptions may change over time, due to the organisation changing what it does, without clear means to update the application as these changes occur, as evidenced with the rigidity and daunting complexity of relational data models in market leading ERPs (SAP is based on 8000 distinct data tables).

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In this paper the authors present the background to the use of ERP systems to support management decision making, before presenting the research approach and the main findings of the case study and conclusions.

2. Background to this research

As Ackoff (1967) suggests, it is important in looking at the impact of information systems on decision making to differentiate between the decision process itself and the information required to support that process. It was Ackoff's contention, well before the age of global ERP systems that most managers suffer not from a lack of relevant information, but rather from an over-abundance of irrelevant information.

Gorry & Scott Morton (1971) described the characteristics of the information required by operational, management and strategic levels in the firm as significantly different. Operational control activities require information that is detailed, real-time and based on the actual use of internal resources. Managerial control, on the other hand, requires more summary information, not necessarily real-time and includes external sources of information.

Moreover, the "nimbleness" of large integrated systems has been questioned in the light of the rapidly changing context of managerial decision processes. Dearden (1972) felt that the notion of experts designing for a firm one "completely integrated supersystem" was "absurd". Changes in available technologies have clearly made this overly ambitious target more realistic (less "absurd"?), but Dearden's arguments are still compelling today.

Banker et al. (2006) review the research on the impact of IS on the organisation, coming to the conclusion that much of it has focused on either IT spending globally or on company performance at a general level. Their research premise is that impact may more usefully be studied at an application level (eg. ERP systems) and also within defined functional boundaries (eg. manufacturing plant performance).

Enterprise Resource Planning (ERP) systems are commercial software packages that enable the integration of transaction-oriented data and business processes throughout an organisation (Markus et al. 2003). Implemented as a suite of integrated software modules, ERP systems are used to administer the physical movement of inventory through the supply chain and the allocation of sales orders to finished goods in the demand fulfilment cycle (Russell and Taylor, 1995).

Mason (1969) pointed out that much information system design is based on the activity of the organisation, rather than the decision making processes, and it could be said that more than 30 years later, ERP systems enshrine *the administrative process for transactional activity* as a structuring force in the running of the business, and therefore still failing to address the decision making processes as a design parameter. Furthermore, it embraces the intended formal process, the *canonical process* in the words of Lee and Lee (2000).

The pertinence of the "ancient" writings we have quoted in these few paragraphs, some of them dating to what can only be described as the pre-history of information systems, to the challenges faced by today's managers is striking. Indeed, we argue that the warnings delivered by these early IS researchers, whilst perhaps very often quoted in research papers, have still not been translated into the design of better systems. Thus, we contend that ERP, notwithstanding the way they are marketed, may not lead to improved decision making, for the reasons highlighted in this section. The aim of this paper is to bring definitive empirical validation to this contention. The next section refines the research domain discussed above into 3 research questions.

3. The research objective

In this research, a case study of a large multinational operating in the pharmaceutical sector is used to explore the role of ERP in supporting managerial decision making. This research objective is operationalised in 3 separate research questions which lead to a definitive judgement of the level of support afforded by the ERP application to managers in different areas of the case study firm.

Research Question 1 is concerned with discovering the top down goals to which the different functions work, the way in which these goals are "internalised" and disseminated throughout each functional organisation:

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What are the goals of the organisation? How are these goals operationalised, and therefore what are managers expected to deliver?

Research Question 2 is concerned with a more granular view of the execution of these goals:

What decisions do managers make on a day to day basis, and what are the chief issues in making these decisions?

Research Question 3 draws on the output from Research Question 2 and attempt to analyse the footprint of ERP in the decisional domains thus identified:

How does ERP provide informational support (or hindrance) to managers in the different activity domains identified in Research Question 2? How can the value of an ERP system be represented in the map of managerial decisional activity?

These questions were investigated during an in-depth field study of a large multinational manufacturing organisation. Over an 18 month period, over 50 interviews were carried out with middle managers in all functional areas of the firm, covering a number of locations at local and headquarters level. The next section provides the background to the case studied.

3.1 Profile of the case study

The Key Pharma Company, KPC (real name withheld to allow more detailed reporting), is a leading manufacturer of pharmaceutical products, with a highly successful product portfolio in consumer healthcare, prescriptions drugs and vaccines. With annual sales of nearly €30 billion, and a R&D budget of €5 billion, KPC is in a dominant position in its marketplace.

The manufacturing organisation involves more than 20 autonomous plants worldwide. These plants are involved in different stages in the production process. Active ingredients are produced at bulk manufacturing sites, and this material is subsequently used by multiple formulation sites in the production of finished product. A vast network of commercial organisations, distribution sites and 3rd party licensees is then responsible for worldwide distribution.

Managing the supply chain to efficiently satisfy demand is extremely complex. With over 30,000 Stock Keeping Units (SKU's) or lines of product, any one of the 600 sources of demand could be ordering 300-600 SKU's each.

Demand is aggregated from local markets back up the supply chain to the primary sites via a demand requirements planning (DRP) system. Demand can also be "manual" in that formulation sites can place additional requirements on bulk sites outside the scope of the DRP.

Our case study focuses on the KPC plant in Cork, Ireland, a bulk site which is part of the global Manufacturing and Supply organisation. KPC Cork ships 4,000 batches of goods per year and local managers are proud of their "customer service" record for deliveries, in the context of the complex and sometimes unpredictable scenario described above.

KPC Cork was part of the roll-out programme for a new ERP system (based on SAP version 4.0), which involved all the sites in the Manufacturing and Supply organisation. The ERP project had the overall goal of implementing FDA compliant business processes throughout KPC, using the best practice templates that had been designed by KPC around SAP standard functionality.

The scope of the ERP project at KPC Cork was the integration of processes in all the main business areas (Production, Finance, Sales, Quality), only excluding process control at the manufacturing execution level.

3.2 The research methodology

This pilot case was a longitudinal study running from the first meeting of the local implementation team prior to go-live, in April 2003, through to a post go-live survey in February 2004. This work was then complemented with in-depth interviews 18 months after go-live (in August 2005) with managers from the Cork site, sister manufacturing plants at different locations in the UK, and with "above-site" managers from the head office in London.

In total, this case study is the result of 52 interviews both pre- and post- go-live and 36 questionnaires, summarized in table 1 below:

Table 1: sources of data (interviews and questionnaires)

Interview Table	GSK			
	Cork 03	Cork 05	UK 05	Total
Finance	2	1	1	3
Manufacturing / Distribution	14	9	7	23
Sales	2	1		3
IS	3	3	3	6
Engineering	2	1		3
HR	3			3
Total	26	15	11	52
Questionnaires	36			

An original facet of this research method is that interviewees themselves were asked to define their own areas of organisational focus (goals) and then describe their related decision processes. This ensured a rigorous sampling of the decision processes studied and a tight coupling with organisational objectives. Thus, our study was pertinent to the organisation as a whole.

The next section presents the case study according to the three research questions outlined in the introduction above.

4. Findings of the case study

4.1 Research question 1:

What are the goals of the organisation? How are these goals operationalised, and therefore what are managers expected to deliver?

An intense focus on quality and the critical "compliance" standards that stem from legislative constraints on the pharmaceutical industry as a whole are ever present concerns for managers in the company. More recent legislation regarding financial practices such as Sarbanes Oxeley is also becoming onerous in terms of reporting and documentation.

The primary goal in terms of materials management is to ensure availability of sufficient raw material to satisfy the planned level of demand for finished goods (availability). Doing this while keeping supply costs under control and keeping inventory to a minimum is the key challenge for planning managers.

Production planning takes place over 3 timelines. A bi-annual Product Review Meeting (PRM) takes place at headquarters and brings together the key personnel involved in planning, production, sales and logistics from the supply network. Production numbers are agreed at this meeting over a 3 year time horizon, based on estimated sales figures. This is considered as the global "strategic" plan.

At a site level, a monthly Supply Chain Group (SCG) meets to review forecast orders coming in via the DRP system, and this is considered the "tactical" plan. Also at site level, a weekly Supply Chain Management (SCM) meeting takes place to review the "operational" plans, that is, the process orders that will go into production based on the actual orders (translated at this point to process orders for production). This seemingly robust framework cannot hide, however, that production planners suffer from the extreme variability in the demand picture coming through the DRP:

Some weeks we could have 2 or 3 changes within the one week, you could have it daily, and then you might go 2 weeks with no changes, but it's not the way to work.

Production planning at KPC Cork also needs to incorporate, in addition to the fluctuating forecast demand coming via the DRP, a buffer stock of 2.4 months' supply, and an "operational" cover stock of 1 month's supply, to allow for contingencies in the demand or supply cycle. These contingencies can arise for external reasons, such as changes in customer demand, or internal reasons, such as lower than expected yield, or production shortfall due to maintenance or capacity issues.

At the same time, planners face a challenge ensuring that Days Forward Cover, the amount of days stock for a particular product that is held on-site at any point in time (including all the buffer stocks), is maintained within certain tolerance ranges:

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> *They don't marry, the reality of having it, Days Forward Cover or Targets and whatever, and the reality of what we actually do, and how we have to make the product and keep the customer happy, they don't marry*

At the headquarters level, it was questioned whether the "did I meet my plan?" Key Performance Indicator (KPI) culture alone would drive the right behaviour, as a given node in the supply network could "meet the plan and yet sub-optimise the supply chain". In addition, it was acknowledged that the widespread application of KPI's across all manufacturing sites might overlook some initiatives at a local level to improve process efficiencies.

For instance, managerial effectiveness in the bulk manufacturing site at KPC Cork translates this goal into a customer responsiveness rating. Customer responsiveness corresponds to the % of shipments that are made on time (or within pre-defined tolerance limits). Cork has achieved a 96% rating in customer responsiveness, and, during our study, management were consistently concerned about the potential (negative) impact that the ERP system would have on this rating.

However, this cross company focus on goals introduced a "beauty contest" element to performance reporting:

> *… my personal view would be that sometimes you spend a lot of time collecting – as the customers report on the suppliers, there'll be errors each month, or disagreements on whether they actually hit a target or didn't hit the target – so I think some of the sites spend more time than is justified actually trying to manage those numbers … Which is not a productive use of time.*

Nonetheless, it was evident in our study that KPC was moving on from a historic "silo mentality", where individual sites worked to goals that may not have aligned with other sites goals. The notion of shared responsibility across sites and across functions for more global goals such as customer satisfaction seemed to be evolving. For example, the manufacturing and supply organization as a whole is attempting to move towards a more demand driven model, whereby inventory is pulled through production by customer demand:

> *Demand driven, and customer focused and whatever. So, this is a vision, and this is a strategy, and basically the whole of KPC, the whole of global manufacturing are going to go down this route.*

KPC Cork is quite sophisticated in its use of KPI's to drive performance at the site level. "Visual Workplace" is a traffic light based performance dashboard, emphasising certain operational metrics and making them visible by posting them in high quality hard copy format in highly visible locations such as staff notice boards.

To summarise, question 1, In addition to the maintenance of FDA compliant processes and operations, KPC Cork goals could be synthesised as follows:

- maintain 100% customer responsiveness in terms of on-time deliveries
- procure the right materials, at the right place, at the right time
- use manufacturing resource efficiently (manpower, utilities, materials, …)

The key decisions related to these goals are explored in the next section.

4.2 Research question 2

> *What decisions do managers make on a day to day basis, and what are the chief issues in making these decisions?*

The key management decisions at the KPC Cork manufacturing plant and at the above site organisation at headquarters are concerned with how to orchestrate the supply chain to meet demand effectively, whilst keeping costs at a minimum. This objective can be broken down into 4 principle questions, what to plan, what to buy, what to produce and what to deliver.

4.2.1 What to plan

Planners in the manufacturing plant face conflicting demands in committing their local capacity to production plans, in addition to the variability of that demand as described above in research question 1. The principle issue for the planners at the bulk manufacturing site is the granularity of the individual SKU level orders as they filter back through the supply chain from the markets, as there is no Bill of Materials to relate these quantities back to a requirement for bulk material.

Three further factor complicate greatly the life of the planners. Firstly, the "bays" or physical resources (buildings and equipment) that are used to set-up manufacturing processes are not dedicated to one type of process, they are instead shared by different processes. Thus different products share the same plant capacity. The time it takes to configure and de-configure manufacturing bays for different processes is a matter of days, and therefore must be taken into account in the scheduling of production runs. In general, this would mitigate towards consolidating the demand for a particular active ingredient into one longer campaign, rather than incurring the setup time inherent in frequent de-configuration and re-configuration. The necessity to carry out regular maintenance further adds to the complexity of scheduling production in an optimally efficient manner.

Secondly, the manufacturing process for any particular active ingredient will involve several stages, and each stage must wait for the completion of the preceding stage in order to progress. This implies that planners cannot plan for the production of one batch of active ingredient (finished product) in one go, each stage in that process will be the object of an individual process order and material batch record.

Finally, certain raw materials, solvents in particular, are shared across many different processes and products. Their consumption, as with the yield of active ingredient, will be subject of some variability. This introduces complexity particularly for the buyers, discussed in the next section, but also represents a constraint for production scheduling, as it will only make sense to launch a campaign when all the necessary resources and materials are known to be available.

The above site organisation suffers the consequences of these constraints in that it operates as a remote valve in the supply chain: in situations where demand cannot be met by campaigning manufacturing sites, headquarters must intervene to come up with a solution, and be the arbitrator of priority in the event that production schedules are required to change.

Production planners at the local plant level are required to periodically work towards specific short term goals that will drive a certain type of decision making. An example would be a year-end stock re-evaluation, where the normal rules for buffer stock may be abandoned in favour of finishing the year with the lowest possible levels of inventory.

Other short term decisions might involve scenario planning for specific situations. Planners are asked to evaluate the impact in the event of particular occurrences (eg. shortening cycle times, reducing door to door times, implementing KanBan, stock-out simulation, defect rates, production
bay sharing between 2 competing products, a power outage, increasing effective capacity, …).

The requirement to carry out "what-if" analysis including all the possible parameters for such scenarios means that planners could not work without their spreadsheets, notwithstanding the implementation of the costly and all covering ERP application.

4.2.2 What to buy

Procurement of raw materials using an MRP model is not feasible for 2 reasons. Firstly, KPC's products are characterised by the lack of a Bill of Materials relating the demand for finished goods to their constituent active ingredients, and the active ingredients to their constituent raw materials. Secondly, the variability in demand discussed earlier also militates against an MRP type system:

> *Well I mean you could, if you wanted to, if you used the system to sort of, … you can ring the suppliers today and say I don't need this load till next Wednesday, and tomorrow or the day after your plans change again, you'd be bringing it forward again, you know, you'd be continuously changing.*

Procurement participates in the sequence of events outlined for production planners: customer demand, coming from the Product Review Meeting, will update the requirements for each product. This is then fed into the site's rolling quarterly review of annual volumes. Small demand shifts may not mean any change to the plan. In any case, updates to the plan drive changes to the purchasing schedule. Buyers are therefore subject to the same constraints as production planners with respect to the vagaries of the demand picture:

> *the whole element of planning, and the actual adherence to that plan by production impacts us to an extent, we're continuously re-planning, revising plans on an almost daily basis, certainly weekly basis*

Furthermore, actual consumption of raw materials, and therefore the level of on-hand available, will not be known till the end of any particular campaign, and planners therefore will allow for a year end campaign to use up the outstanding raw material.

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Lead times for products can be anything up to 6 months, and some raw materials are manufactured specifically for KPC.

4.2.3 What to make

Production is organised in shift teams of operators and these teams work around the clock, only stopping for planned maintenance, including an annual plant shutdown during the summer months.

Manufacturing is organised locally in “campaigns”. A campaign is the result of the orchestration of plant capacity (vessels, filters, pumps, …) with labour and materials to a schedule such that a certain quantity of bulk active ingredient will be produced. This quantity is what must be set in advance by the planners. Actual yield may vary from the planned quantity for a variety of reasons, related to any of the resources involved. Chemical reactions may affect yields in unforeseeable ways, breakdowns or maintenance issues may affect the physical plant, and sickness / holidays may affect the labour availability.

At the end of any given week, the production team will prepare its workload for the following week by printing off all the necessary batch records and related documentation, and they will ensure that the dispensary have physically issued the necessary materials related to those batch records. The existence of the batch records in the ERP system is sufficient for the warehouse to be aware of the requirement for material.

Following the go-live of the new ERP system, and despite extensive training for all operators, it was agreed that the “data maintenance” activities described above would be carried out by specific resources within the production teams.

Planners build their production schedules manually, that is, planned orders are converted into process orders (for execution) only on a weekly time horizon. The process orders for any given week must take into account the actual production (and any related contingencies) from the previous week. Process orders (also termed material batch records) are entered into SAP without the associated sales orders, planners use the “daily tables” screen to bypass the link to customers and drive production activity directly through the weekly launching of batch processes.

Another variable in the campaigning of production processes is the ability of the customer to absorb the active ingredient. Although an annual requirement might be set in advance, the customer can only consume it at a certain rate, therefore bulk sites must bring this into the equation when laying out the campaign plan.

4.2.4 What to deliver

The multiple formulations produced in KPC Cork are shipped to multiple commercial organisations (in countries where KPC have a commercial presence), or to multiple distribution sites (who sell product in those local markets on KPC’s behalf). The site might make 10-15 shipments on average per day, and manufactures about the same number of active ingredients.

The KPC plant in Cork, Ireland, is part of the global Manufacturing and Supply organisation. Cork ships 4,000 batches of goods per year (1,000 batches of finished goods). 70% of shipments are by air (giving rapid door to door delivery times eg. UK within 2 days, US within 7 days).

Firm orders from customers are received via the DRP, and this system is interfaced to the ERP system. These orders are used to co-ordinate the shipment of active ingredient, but not to drive invoicing, as the billing is based on an internal transfer pricing.

4.3 RQ3: Footprint of ERP in key decisions

By collating the decisions identified above with the systems used to generate the information supporting these decisions, we can derive an idea of the footprint of the ERP in managerial decision making at KPC Cork, presented in Table 2 below.

Table 2: Footprint of ERP in managerial decision making (Excel and SAP are ™).

Decision	Information	System
D[1] What to plan?	Forecast Orders	PRF, DRP, Excel
D[2] What to make?	PRF, capacity, de-config needs, shared bays, maintenance, …	Excel
D[3] What to buy?	Demand, shared bays, capacity issues, lead times, …	Excel
D[4] What to deliver?	Customer orders, commit dates, ship-to addresses, …	DRP & SAP

For each type of decision, there is a set of information required by the manager in order to decide what level of action is required if any. This information is contained in a number of systems in the organisation, notably the DRP system, the ERP system (SAP) and manual tools such as spreadsheets. In some cases the presentation of the information for managers involves several systems. The more systems required to satisfy an information requirement, the greater the information latency overhead:

> *The fact of life is that what we have at the moment is like a patchwork quilt of all sorts of systems, all sorts of structures and all sorts of plans, and what they are basically doing is that we are going to carry on aligning those and improving them, and improving the flow, streamlining the whole thing.*

In addition, managers have access to the SAP Business Warehouse system (pre-configured reports from SAP) and financial planning tools (Adaytum™).

In KPC Cork, it was recognized early on in the ERP project that cross-site comparison was one of the key driving forces in rolling out a centralized ERP system to all manufacturing sites. Managers at headquarters use KPI's to drive performance in the supply chain, but equally overall performance of the network is important, rather than performance comparisons between 2 nodes:

> *As a supply chain, what's their performance to their customers, rather than talking about an individual site's performance to their customers*

Thus, although the ERP system is used to drive local inventory control and financial reporting, that is, as an integration tool at a local level, it has not been used to integrate between head office and sites. This seems regrettable given the scope for improvement in this area.

Local planners at KPC Cork carry out their planning on their personal spreadsheets. 60% of the workload is scenario planning, responding to contingencies and events, both external and internal. Process orders (called Material Batch Records), corresponding to the launch of a particular production batch, are launched manually (they are created in SAP one by one) based on the spreadsheet-based plans. When a batch has run, and there are redundant process orders, these can hang around in the system until someone specifically deletes them.

In summary, the implementation of ERP for KPC Cork was not an option, it was an imposed corporate solution to address potential compliance risks and there was only limited scope to work on a good fit between local needs and the application configuration. On the other hand, the move to a new integrated system has had its advantages:

> *we have better traceability on our customers, we have less write-offs. We have more control over manufacturing*

In addition, the ERP system has revealed "stress points" in the organization where the process is in need of optimisation:

> *but ERP is only highlighting what is wrong with our current system, there is nothing wrong with ERP, it's just saying, look, the reason this is difficult is because you are not doing it right anyway, it's showing up issues.*

5. Lessons from the case

The enhanced data integrity brought by the ERP has improved management decision making in 2 ways. Firstly it has removed the time wasting arguments about data integrity, and secondly it has given managers more time to focus on more value-adding activities, such as investigating the causes of variances in operational performance.

It is clear that systems cannot automate the managerial decisions relating to variance analysis for a manufacturing plant, but if, on the other hand, they can provide a clear picture of actual vs plan performance, across a number of operational metrics, plus the ability to look at historic actual vs plan performance, plus the usability and sophistication for managers to create their own "what-if" scenarios, then it could be argued

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that the return on systems investment can be quantified in terms of improved decision making (speed and accuracy being the most important decision attributes impacted). This seems to concord with Holsapple and Sena's (2002) survey findings.

However, there appear to be several barriers to site level managers exploiting the richness of information held within the ERP system:

- Lack of skills (both a detailed knowledge of the business processes and ERP)
- Lack of access to data (access to production data is more or less proscribed)
- Incompatibility of transaction data with aggregate management queries

Plant level users are left on their own to master the information held in the ERP system, and yet very few have the requisite level of access to be able to explore the possibilities of using the data to support management questions. Standard reports are more or less ignored, by both users and IT, and there seems to be a commonly held belief that "if it's not in a spreadsheet then it's not acceptable", which is paradoxical in an ERP-enabled business with a strong compliance requirement.

The data itself is jealously guarded, and at best a select group of users will have access to query rights on a copy of the production database. In KPC, the number of people with access to specific (quite powerful) query responsibilities is the strict minimum: 2 people. This is for security and for guaranteeing high availability, but it also has the effect of making it practically impossible for a user to get hold of data in a discovery mode (Adam and Pomerol, 2007).

Finally, ERP transactions are coded in a way that will provide linkages to other elements in the data model, and also in a way that is applicable to the widest range of businesses. For these reasons, the raw data very often does not have the necessary attributes to allow it to be used to answer management questions. These additional attributes (or metadata) are usually added in a data warehouse application, which refreshes from the ERP production database at pre-defined intervals (eg. once a day).

So what would be required is a more flexible investigative approach to data analysis, empowering managers to investigate the root causes of changes to particular patterns or phenomena. This is a pure question of competence, in the same way that if an organisation decided to implement a lean approach to manufacturing, it would to recruit or develop the skills in-house (eg: 6Sigma, etc) to lead the initiative.

It would certainly appear that the complex structure of ERP discourages managers from developing the skills to run queries and establish root cause of symptoms that are experienced. This is particularly true in the area of costs, where ERP systems are capable of providing great detail on current and historic trends, assuming a thorough understanding of the data structure used inn the application's database.

At KPC, KPI's are the means for driving local plant performance, and management are very focused on the quantifiable goals that they are given. Where the data comes from to drive these KPI's is immaterial to managers, they simply require data that they can trust, such that they can be made aware early of any potential variances such that root causes can be investigated and action taken before the issue is picked up at an above-site level.

Here is a key contribution of ERP applications: in the quantitative analysis of work processes which they facilitate and in the cultural change they engender. Thus, ERP could help drive the implementation of KPI's. However, every time there is an interface to another system, and certainly when there is manual manipulation of the data to generate the KPI, the process for calculating and distributing KPI's moves away from a "repeatable / sustainable" model, relying instead on manual intervention. This in turn raises the issues of specialized resources, skills and latency, an important one when processes face time constraints (which are frequent in modern-day supply chains).

This research highlights the gap between the information required to put together these metrics and the information available automatically in the ERP system. The ERP system represents an "actual" picture of the use of corporate resources in terms of inventory, cash and other operational measures. However, "planned" elements and greater representational flexibility are required in order to make these metrics more meaningful for management decision making.

6. Further research

Further research should be oriented towards frameworks for modelling and actively managing the gap between business processes and the enterprise system, such that adequate resources can be deployed to address the gap before the benefits of a centralised IT infrastructure are frittered away in a blossoming of local data warehouse solutions and personal spreadsheets.

This research should address the means the organization needs to put in place to plan for the eventual divergence of ERP systems from reality, and to mitigate against this gap with skills and tools. A non trivial starting point would be to design a framework for the tools, skills and resources capable of reporting on the gap, such that the gradual tendency towards system obsolescence is visible, and can be rectified on the fly. Arguably, if ERP applications are not gear towards such evolutionary patterns, the task of organizational actors will continue to be very arduous.

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A Public Value Evaluation of e-Government Policies

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Abstract: Public Administration aims at producing value for citizens; the use of ICTs to improve government and governance, as implied by e-Government, can be considered as a means to increase the public value produced by Public Administration. As a consequence, the policies for e-Government can be evaluated according to their ability to increase the Public Administration capacity of producing public value, both for citizens as users and citizens as operators of Public Administration. In the first case, the policies for e-Government can be evaluated with respect to the quality of the services delivered to citizens; in the latter case they can be evaluated with respect to their ability to improve the system of Public Administration.

In this paper, we describe a public value evaluation of two different systems of support to e-Government projects implemented in Lombardy Region (Italy). Both systems support Small Local Government Organizations that set up aggregations in order to implement innovation projects. The two systems we will consider concern the funding for e-Government projects according to the Italian National Action Plan for e-Government and the Regional Government funding for the implementation of Inter-organizational Information Systems for Local Government (SISCoTEL).

Considering the stability in time, the attractivity and the level of trust within the funded aggregations as indicators of public value (considered from an internal point of view), in the paper we will use data concerning the Local Government in Lombardy to compare the two supporting models according to their capacity to set up aggregations that are stable, attractive and that could strengthen the level of trust among the partners.

In section 1 we will describe some of the actions currently in use in Italy to support the spread of E-Government at a local level. In section 2 we will describe the models for supporting innovation implemented in the National Action Plan for e-Government and in the Regional Plan for the activation of SISCoTELs. In section 3 we will compare the main characteristics of the two supporting models. Finally, in section 4 we will evaluate the two models, from a public value point of view, with respect to their capacity to strengthen the cooperation among Local Government organizations.

Keywords: e-Government, public value, local government, inter-municipal cooperation

1. Introduction

Starting from the year 2002, the development of e-Government in Italy has been based mostly on projects funded under the National Action Plan for e-Government (DIT, 2002), managed by the Italian National Centre for Information Technology in Public Administration (CNIPA). Yet, also before 2002, some Regional Governments implemented programmes for the innovation of Local Government based on a widespread use of ICTs that, by assuming a broad definition of e-Government (OECD, 2003), can be considered as policies for the spread of e-Government at the local level. As a consequence, many Italian municipalities, that adhered to these initiatives with the only aim of accessing financial resources, have been involved at the same time in different innovation programmes which share the same object, but pursue aims that sometimes could be different. This fact caused considerable problems in the management of the innovation projects, in some cases slowing down considerably their accomplishment (Castelnovo, Simonetta and Lasi, 2006).

However, the activation of different innovation programmes within the same Local Government system also enables to compare them with respect to the outcomes they produce, allowing the evaluation of the effectiveness of alternative policies for supporting innovation.

In this paper, taking Lombardy Region as a case study, we will compare two different models for supporting the spread of e-Government at the local level by considering their outcomes with respect to the system of the Local Government of Lombardy.

Lombardy, with about 9.4 million inhabitants (15,8% of the whole Italian population) is the most densely populated and economically relevant region in Italy: Lombardy contributes to the Italian Gross Internal Product with a percentage which, during the years, has been constantly higher than 20%.

Moreover, Lombardy is a region that with respect to most of the Information Society indicators (for instance those considered in the eGovernment Factsheets published by IDABC (IDABC, 2008)), shows values higher that the Italian mean national values, as shown in table 1:

Table 1: Information Society indicators - comparison between Italy and Lombardy

	ITALY	LOMBARDY
Percentage of households with Personal Computers	46,1%	52,1%
Percentage of households with Internet access	35,6%	42%
Percentage of enterprises with Internet access*	91,7%	94,5%
Percentage of households with a broadband connection	14,4%	16,9%
Percentage of enterprises with a broadband connection*	56,7%	64.3%
Percentage of individuals having purchased/ordered online in the last three months	13,1 %	15,4%
Percentage of individuals using the Internet for interacting with public authorities for obtaining information (in the last three months)	37.4%	38,2%
Percentage of individuals using the Internet for interacting with public authorities for downloading forms (in the last three months)	26,8%	24,4%
Percentage of individuals using the Internet for interacting with public authorities for returning filled forms (in the last three months)	12,6%	12,1%
Percentage of enterprises using the Internet for interacting with public authorities for obtaining information (in the last three months)*	65,5%	70,2%
Percentage of enterprise using the Internet for interacting with public authorities for downloading forms (in the last three months)*	63,7%,	69,7%
Percentage of enterprises using the Internet for interacting with public authorities for returning filled forms (in the last three months)*	33,7%	36,3
Source: ISTAT, period: 2006 *: data referred to the year 2005, since there is not corresponding data for Lombardy in the year 2006		

In 1999 the Regional Government of Lombardy activated the project “Progetto Carta Regionale dei Servizi - Sistema Informativo Socio Sanitario” (CRS-SISS: Regional Citizen Card - Healthcare Information System. The project was focused on the implementation of healthcare services whose secure access can now be granted to both healthcare professionals and Lombardy citizens by means of the Regional Citizen Card (Carta Regionale dei Servizi, CRS hereafter). At the end of 2007, about 9.3 millions of CRSs were issued that can now be used also to access services delivered on line by the Public Administration organizations of Lombardy (Beretta, Bresciani, Ferrari and Zuffada, 2006; Castelnovo, Simonetta and Lasi, 2006).

Finally, the Local Government system of Lombardy is particularly complex: in Lombardy there are 12 of the 109 Italian provinces and 1546 of the 8101 Italian municipalities. Out of the 1546 municipalities of Lombardy, 1153 (75% of the total amount) are Small Local Government Organizations (we consider as SLGOs municipalities with less than 5000 inhabitants; almost 20% of all Italian SLGOs are in Lombardy).

For all these characteristics, Lombardy Region represents a good case study for evaluating the impact of different policies for the spread of e-Government at the local level. In the paper we will consider the impact two different models for the development of e-Government at the local level had on the system of Local Government of Lombardy. The models we will consider are:

- the funding for E-Government projects, according to the first phase of the Italian Action Plan for E-Government (hereafter NAP_e-Government-1);
- the Regional Plan for the activation of Inter-organizational Information Systems for Local Government (hereafter RP_SISCoTEL)

In section 2 we will describe briefly the two programmes and will provide data about the involvement of the municipalities of Lombardy in them. In the case of RP_SISCoTEL the data we will consider is published on the web site of the Regional Government of Lombardy. In the case of NAP_E-Government-1 we will consider data from two sources:

- the Fourth Annual report on Innovation in Italian Regions published by the Italian network of Regional Centers of Competence on e-Government and Information Society (CRC, 2006)
- the fifth report of the monitoring of the e-Government projects funded by the announcement of first phase of the Italian Action Plan for e-Government (CNIPA, 2007c)

In section 3 the two supporting models will be compared as regards some criteria concerning the goals of the funding, the characteristics of the recipients and the time span covered by the supporting actions. Finally, in

section 4 we will suggest an evaluation, based on the concept of public value, of the impact the two different models have determined on the system of Local Government in Lombardy.

2. Local systems of e-Government in Lombardy

2.1 Regional plan for the activation of SISCoTEL: RP_SISCoTEL

In Lombardy Region, technological and organizational innovation processes in SLGOs have been supported mainly by the Regional Government that funded aggregation of municipalities for the implementation of Inter-organizational Information Systems for Local Government (Regione Lombardia, 2002).

An Inter-organizational Information System for Local Government (SISCoTEL) is a technological and organizational infrastructure shared within an aggregation of municipalities (tipically SLGOs) for the activation of inter-municipal cooperation. For this reason, the funding of a SISCoTEL does not simply support the technological innovation in the SLGOs involved in the project. Actually, the announcements for the regional funding explicitly require the municipalities adhering to a SISCoTEL to implement inter-municipal cooperation for the management of at least three services.

Between 2001 and 2005 five announcements for the funding of SISCoTELs were published. In the first two announcements the stress was particularly on the innovation at the back-office level, whereas starting from 2003 the SISCoTEL announcements include explicitly also the requirement of implementing online services to citizens and enterprises that should be accessible through the Regional Citizen Card.

In order to enable the associated management of services within a SISCoTEL, the regional announcements define some technological and organizational conditions which must be satisfied. Such conditions require (Regione Lombardia, 2005):

to set up aggregations covering geographically contiguous areas (aggregations including municipalities belonging to different provinces cannot be financed).

to join the virtual private network Lombardia Integrata, which links on equal terms all the member organizations and which allows a safe exchange of information and services among Local Government Organizations of Lombardy (Regione Lombardia, 2008);

- to adhere to inter-operability and communication standards;
- to structure the application portfolio on the basis of a standard articulation in functional areas and services defined by the Regional Government;
- to realize training projects related to ICTs and organizational innovation in all the SLGOs following the programme;
- to activate a Shared Services Center (SSC) which provides the member municipalities with services concerning the management of the ICT infrastructures and applications, the coordination of training activities for the operators, the management of the contracts and the delivery, on behalf of the municipalities, of services to citizens and enterprises;
- the commitment to maintain the collaboration with the partners and to benefit from the services delivered by the SSC for at least 36 months since its activation.

In the period from 2001 to 2005, 104 SISCoTEL projects have been funded; some of them regarded the implementation of new SISCoTELs, others regarded SISCoTELs already activated. The 104 projects altogether involved 983 out of the 1546 municipalities of Lombardy (63,5% of the municipalities of Lombardy) and led to the activation of 76 SSCs. 133 municipalities adhered to more than one project; more specifically, 8 municipalities joined 3 projects (in 3 different years), while the remaining 125 joined 2 projects (in 2 different years). This gives a total amount of 1124 adhesions of municipalities to the SISCoTEL programme.

2.2 National action plan for e-Government: NAP_E-Government

The Italian National Action Plan for E-Government is based on two phases of intervention that support innovation projects on a territorial level. The first phase started in 2002 (DIT, 2002) with an announcement for the co-financing of E-Government projects with the aim of:

- using ICTs in order to achieve a significant increase in quality and efficiency of the services delivered to citizens and enterprises;
- promoting the creation, or the transformation, of the services delivered by Local Government into online services, or anyway services accessible through multiple channels.

More specifically, the objective of the first announcement was supporting projects for the implementation both of e-Government services for citizens and enterprises and of infrastructural services. The recipients of funding were both single administrations and aggregations of municipalities already existing or specifically set up for accessing the funding. As a matter of fact, most of the funded projects have been submitted by aggregations of administrations which took part in the projects also simply for the possibility to reuse the implemented systems.

As regards the composition of the aggregations, the announcement did not include any requirement of homogeneity among the partners; for this reason, some aggregations were joined both by large municipalities (acting generally as leaders of the aggregations) and by small or even very small ones. Similarly, the composition of the aggregations was not subject to any geographical requirement; for this reason some aggregations include also municipalities belonging to different provinces and regions.

This first announcement was followed by the presentation of 377 projects, whose overall value was 1200 million euros. Out of these 377 projects, 134 have been co-financed with 120 million euros (for an overall value of about 500 million euros). (CNIPA, 2007a)

The projects were started in spring 2003, after the signing of all the agreements for their activation, and should have ended within 24 months. On the 30th of April 2007, 2 financed projects had never been started, 100 projects had been completed, 9 had an advancement between 90% and 99%, and 16 projects had an advancement lower than 90%. This leads to a mean delay of about 23 months with respect to the expected conclusion of the projects. (CNIPA, 2007c)

The announcement funded three types of services: services for citizens, for enterprises and infrastructural services. Out of the 134 funded projects:

- 14 were devoted exclusively to the implementation of services for citizens
- 15 were devoted exclusively to the implementation of services for enterprises
- 17 were devoted exclusively to the implementation of infrastructural services
- 31 concerned services both for citizens and for enterprises
- 24 concerned both services for citizens and infrastructural services
- 5 concerned both services for enterprises and infrastructural services
- 28 concerned all the three types of services

As regards the amount of the services object of the different projects, on the 30th of April 2007only about 79% of the total services had been delivered (CNIPA, 2007c).

Out of all 134 projects which have been funded, 25 involved public administrations of Lombardy. Out of these, 4 were carried out directly by the Regional Government, 6 involved other bodies of public Administration which are not municipalities, whereas 15 concerned municipalities. These are divided into 5 projects involving only one municipality and 10 projects submitted by aggregations of municipalities.

Altogether 628 out of the 1546 municipalities of Lombardy (about 40% of the total of the municipalities of Lombardy) took part in the projects of the NAP_E-Government-1. As in the case of SISCoTELs, some municipalities adhered to more than one project; this gives a total amount of 729 adhesions to the programme. The total amount of the funding for the municipalities of Lombardy adhering to the projects is about € 20,3Mln.

On a national basis, NAP_E-Government-1 involved about 3400 municipalities, with a percentage of participation similar to that of the municipalities of Lombardy (41% of the total of the Italian municipalities). (MIT, 2003)

3. Comparing the funding programmes

Both the RP_SISCoTEL and the first phase of the NAP_E-Government-1 support innovation in Local Government by funding the acquisition of hardware, software and connectivity devices. However, although the two programmes intend to support innovation at the local level by using similar tools, the objectives they pursue are quite different.

In this section the two supporting models will be compared with respect to:

- the goals of the funding programme;
- the characteristics of the recipients of financing;
- the time span covered by the supporting actions.

3.1 Goals of the funding programme

The RP_SISCoTEL was activated in 2001 with the aim of fostering the model of inter-municipal cooperation for service provision through the widespread use of ICTs. To this end, a special attention was given to the need of integrating the information systems of the single municipalities. The goal of the RP_SISCoTEL funding programme was supporting both technological innovation (integration of information systems) and organizational innovation (activation of Shared Service Centers) as a way to promote the cooperation among municipalities and to increase the level of quality of the services delivered to citizens and enterprises.

The projects funded under the RP_SISCoTEL have mainly been devoted to the activation of inter-municipal cooperations for the management of:

- demographic services and anagraphic certifications
- land and buildings registry
- territorial data
- municipal finance and local taxes
- ICT services

The delivery of online services (which is one of the conditions for accessing funding starting from 2003) is supported only indirectly by the RP_SISCoTEL: the sharing of resources within an inter-municipal cooperation allows the partner to implement new services and new channels to access them.

On the contrary, the NAP_E-Government-1 funding programme is specifically devoted to the implementation of technological solutions (systems and infrastructures) for the delivery of online services. The announcement of financing does not refer to any organizational requirement to be satisfied by the partners of an aggregation submitting a project.

The data concerning the content of the projects funded under the NAP_E-Government-1 (shown in table 2) confirms this observation. As a matter of fact, 44,8% of the funded projects devoted to the implementation of services for citizens and enterprises concerned the realization of web portals. This data confirms that national policies for the spread of E-Government in Italy have been especially oriented towards the implementation of technological conditions for delivering online services.

Table 2: Object of the projects funded under the NAP_E-Government-1 (CRC, 2003)

Type of Service	Number of projects	Amount of the financing
Portals	44	€ 52.210.000,00
Services for enterprises	27	€ 13.380.000,00
Job related services	6	€ 5.910.000,00
Health related services	4	€ 1.870.000,00
Money transfer	3	€ 2.260.000,00
School related services	3	€ 1.180.000,00
Security and justice	3	€ 1.160.000,00
Mobility and transportation	3	€ 1.000.000,00
Sport, Environment and Culture	3	€ 580.000,00
Welfare related services	1	€ 340.000,00
Citizens information and participation	1	€ 110.000,00

3.2 Characteristics of the recipients of financing

Both the RP_SISCoTEL and the NAP_E-Government-1 were addressed to aggregations of municipalities. Nevertheless, the conditions provided for by the two programmes concerning the composition of the aggregations differ considerably.

SISCoTEL announcements are addressed to aggregations formed by at least 5 municipalities (or at least 2 municipalities, provided that the total number of inhabitants is higher than 10.000). Out of the 76 aggregations funded, 66,3% includes less than 10 municipalities, 18% between 10 and 20, while 15,3% includes more than 20 municipalities.

Therefore, they are mostly small aggregations, constrained by further requirements: the municipalities adhering to an aggregation must be geographically contiguous; municipalities already belonging to aggregations provided for by law (Unions of Communes and Mountain Communities) cannot submit SISCoTEL projects as members of other aggregations; a municipality cannot be member of two different aggregations. This means that the 133 municipalities which adhered to more than one SISCoTEL project did it in different years, maintaining their membership in the same aggregation.

The funding announcement of the NAP_e-Government-1 does not exclude the possibility that also single municipalities can present their own projects, though they are incentivated to adhere to aggregations. Yet, as we noticed above, the aggregations which were set up do not satisfy any requirement of geographical contiguity. For instance, considering the case of Lombardy, 114 municipalities adhered to projects submitted by aggregations coordinated by municipalities belonging to other Italian regions.

As regards the composition of the aggregations, the two programmes are not too dissimilar. In both cases most municipalities which adhered to the innovation programme are SLGOs, with a higher percentage in the case of RP_SISCoTEL: 77% of municipalities in the case of SISCoTEL, 72% in the case of national projects.

On the contrary, as regards the dimensions of the funded aggregations, the two programmes differ considerably from each other. In the case of the NAP_e-Government-1, considering only aggregations to which adhered municipalities of Lombardy, there is only one aggregation with less than 20 members; 2 aggregations having between 20 and 30 members; 2 between 30 and 50, 1 between 50 and 100 and even 4 aggregations joined by more than 100 municipalities of Lombardy.

Among the municipalities of Lombardy which have been funded under the NAP_E-Government-1, 78 adhered to more than one project, and therefore joined different aggregations. In some cases this results to be critical, since the projects could overlap widely as regards the services to be implemented.

3.3 Time span covered by the supporting actions

The RP_SISCoTEL covered 5 years between 2001 and 2005, whereas the funding announcement of the NAP_E-Government-1 was issued only once in 2002. From this point of view, the Regional programme could support through the years the aggregations which were set up, thus enabling the implementation of innovation projects which could gradually evolve.

Beyond this obvious difference, there is another aspect which differentiates deeply the two programmes as regards the time span covered by the supporting actions. The funding announcement for SISCoTELs binds the funded projects to come to an end within three years from their approval. Besides, the announcement requires that the municipalities which adhered to a SISCoTEL continue benefiting from the services delivered by the SSC for at least three years from its activation. This means that an aggregation which submitted a SISCoTEL project can plan its activity on a six-year span.

On the contrary, the NAP_E-Government-1 only fixes in 2 years the time given to the funded organizations to finish their projects. There are no other constraints as to the continuation of the collaboration after the time limit of two years.

Table 3 below summarizes the main characteristics of the two supporting models we have considered.

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Table 3: Comparison between RP_SISCoTEL and NAP_E-Government-1

	RP_SISCoTEL	NAP_E-Government-1
Supporting model	Co-financing addressed exclusively to aggregations of municipalities	Co-financing addressed to single organizations of Local Government or to their aggregations
Goals of the funding programme	Technological and organizational integration among the partners of an aggregation of municipalities	Implementing technological solutions for the online delivery of services to citizens and enterprises
Characteristics of the recipients of financing	Small to medium size aggregations of small municipalities which are geographically contiguous and share the interest in the activation of a SSC	Large aggregations of municipalities without any constraints as to the modality of adhesion of the partners. The aggregations are not required to continue their collaboration after finishing the implementation of the funded project
Time span covered by the supporting actions	Repeated funding of aggregations for which it is possible to provide a six-year span of activity	Non-recurring funding. The time span of the collaboration corresponds to that of the project (2 years)
Municipalities of Lombardy covered by the programme	63,5% out of the 1546 municipalities of Lombardy	40,9% out of the 1546 municipalities of Lombardy

4. A public value evaluation of the supporting policies for e-Government

4.1 A public value evaluation model

Public Administration aims at producing value for citizens through services, law regulations, and other actions (Kelly, Mulgan and Muers, 2002). Thus, the use of ICTs to improve government and governance, as implied by E-Government, can be considered as a means to increase the public value produced by Public Administration. Hence, the policies for E-Government can be evaluated according to their ability to increase the Public Administration capacity of producing public value (Kearns, 2004).

In general, a public value-based evaluation must be performed by considering the value that citizens perceive in their interactions with Public Administration (Alford, 2002). Discussing the value of ICTs for Public Administration, (Bannister, 2002) underlines that the definition of value reflects the fact that citizens interact with Public Administration, and therefore with public value, playing different roles. Taking as a starting point the set of roles defined by Bannister, in (Castelnovo and Simonetta, 2007) the following classification of roles has been suggested:

- external roles, that is roles in which citizens receive a value from Public Administration as users of services or participants in democratic processes;
- internal roles, that is roles in which citizens, as directly or indirectly involved in the processes of production of value, nevertheless receive a public value from Public Administration, for instance in terms of good functioning of Public Administration;
- mixed roles, that is roles external to Public Administration and yet involved on different levels in the production of public value, as it is the case of Networked Government.

Since the interactions between citizens and Public Administration can concern both citizens as users and citizens as operators of Public Administration, we can measure public value both from an external point of view (citizens as users) and from an internal point of view (citizens as operators). In the first case, the policies for E-Government can be evaluated with respect to the quality of the services delivered to citizens; in the latter case they can be evaluated with respect to their ability to improve the system of Local Government.

Both the NAP_E-Government-1 and the RP_SISCoTEL aim at improving the quality of the services delivered by Local Government; the evaluation of their effectiveness should, thus, be referred directly to their capacity to produce value for the external stakeholders. Nevertheless, for both innovation programmes the improvement of the services quality requires a transformation of the Local Government system; therefore they can be evaluated also with respect to their capacity to produce value for the internal stakeholders.

As we have already observed in section 1, the Italian Local Government system (and the Lombardy Region system in particular) is characterized by high administrative fragmentation and by the preponderance of small municipalities. This makes the system difficult to manage, does not allow to achieve economies of scale and makes it difficult to simplify the relationships between citizens and Public Administration.

Moreover, in Italy the municipalities autonomy is constitutionally granted; therefore the reduction of the fragmentation cannot be easily obtained by means of a forced merger of municipalities.

The implementation of forms of inter-municipal cooperation among SLGOs can be considered as a means to reduce administrative fragmentation, while at the same time safeguarding local autonomies (Hulst and van Montfort, 2007; Council of Europe, 2007). The achievement of this result could be considered as an important element of public value, both directly for the internal stakeholder and indirectly for the external stakeholder.

Considering the fostering of inter-municipal cooperation as an element of public value, we can compare RP_SISCoTEL and NAP_E-Government-1 by evaluating the aggregation of municipalities they funded with respect to attributes such as:

- stability, considered as the capacity of a funded aggregation to maintain itself in time;
- attractiveness, considered as the capacity of a funded aggregation to attract new partners as a result of the projects of innovation;
- level of trust among the partners of an aggregation determined by the sharing of an innovation project.

(Kelly, Mulgan and Muers, 2002) identifies three sources of public value for citizens: services, outcomes and trust. Services, outcomes and trust can be considered as elements generating value also as regards the internal stakeholders involved in the management of innovation processes like those supported by both RP_SISCoTEL and NAP_E-Government-1.

Generating public value for citizens through services depends on the level of quality with which they are delivered in terms of: service availability; satisfaction levels; importance; fairness of provision; cost. In the case of SLGOs adhering to an aggregation involved in an innovation process, the attributes of availability, satisfaction, importance, fairness and cost can be directly referred to the evaluation of the activity of the aggregation by its members. An aggregation evaluated positively by its members can attract new partners; in these terms, the attribute of attractiveness can be related to the service attributes defined by Kelly, Mulgan and Muers.

As observed in (Castelnovo and Simonetta, 2007) the evaluation of the government as regards achieving the desired outcomes concerns first of all the impact of policies on the environment. In a broader meaning of the concept, the environment includes also the concept of constitutive environment, intended as the local and global system of Public Administration. It follows that the evaluation of the outcomes of different policies supporting the creation of aggregations of SLGOs should consider also their capability to increase:

- the degree of policy integration in homogeneous territorial areas;
- the organizational and operational simplification of the single institutions forming the network;
- the capability to maintain cooperative relations with other administrations, suppliers, associations

All these results can be achieved only if the aggregations that are set up maintain a stability in time. In these terms, the stability attribute can be related to the outcomes evaluation as described by Kelly, Mulgan and Muers.

Finally, trust is the third source of public value defined in (Kelly, Mulgan and Muers, 2002). The trust attribute evaluates the capability of government to increase through its activity the citizens' trust towards Public Administration. By assuming the point of view of the internal stakeholders, in our evaluation of RP_SISCoTEL and NAP_E-Government-1 we will consider trust from the point of view of the capability of the aggregations of SLGOs that are set up to make their members willing to make increasing and irreversible commitments towards the cooperation (Doz, 1996). Therefore trust can be evaluated by considering elements such as the reiteration of the members' commitment towards the aggregation (for instance by developing new innovation projects) or the extension of the competencies the members attribute to it.

4.2 An evaluation of the supporting policies for E-Government

The RP_SISCoTEL explicitly indicates among its aims the fostering of interorganizational cooperation for the sharing of resources among SLGOs. The funding announcement of the NAP_E-Government-1 does not explicitly point out such an aim. Nevertheless, discussing the results of the monitoring of the funded projects, in (CNIPA, 2007c) it is explicitely observed that the requirements of the funding programme intended to

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determine, as a side result, the establishment of extended forms of cooperation, both horizontal (among Government organization of the same institutional level) and vertical (among Government organization belonging to different institutional levels). We can thus conclude that both programmes share the same goal of improving the system of Local Government through the fostering of the collaboration among municipalities, although they pursue this goal through quite different strategies.

The establisment of inter-organizational cooperation was the primary objective of RP_SISCoTEL that assumed the funding of technological innovation as a condition to achieve this result. On the contrary, NAP_E-Government-1 defined as its primary objective the implementation of innovative services for citizens and enterprises through technological innovation (DIT, 2002); inter-organizational cooperation was considered simply as a way to share the results of the funded projects.

At the moment only part of the information necessary for a complete evaluation of the outcomes of the two programmes in terms of stability, attractiveness and level of trust is available. Actually, as observed, many projects funded under the RP_SISCoTEL are still in their implementation phase (a SISCoTEL must be activated within 36 months since its funding), whereas concerning the projects funded under the NAP_E-Government-1 the last monitoring data available (April 2007) points out that there are projects that are not concluded yet. Nevertheless, it is already possible to make a first evaluation based on the available data.

In the case of RP_SISCoTEL, we can obtain some indirect information about the stability of an aggregation and the trust among its partners considering its tendency to activate further innovation projects, while keeping the same composition. This tendency is, in fact, indicative of the partners' will to preserve and strengthen the cooperation. As already observed, a considerable number of municipalities submitted three or, in some cases, even four projects during the period 2001-2005 with the same partners. It is even more important to notice that 288 municipalities adhering to aggregations set up for a SISCoTEL project adhered also to innovation projects funded by the NAP_E-Government-1. This fact could be considered as an indicator of a positive experience of cooperation within the RP_SISCoTEL programme.

Due to the requirements of the funding announcement, the same aggregation could submit different SISCoTEL projects only in two cases:

- to extend the aggregation with new members, covering in this way a wider territorial area
- to extend the portfolio of the services delivered by the aggregation's SSC

The adhesion of new municipalities to an existing aggregation can be considered as an indicator of attractiveness of that aggregation which, at the local level, is perceived as the bearer of a positive experience of innovation. Since it depends on the quality of the implemented projects, attractiveness should be referred directly to aggregations and not to funding programmes; however, a funding programme can be evaluated with respect to its capability of supporting and favouring the adhesion of new members to already existing aggregations. From this point of view, RP_SISCoTEL can be evaluated positively with respect to the attractiveness criterion.

Extending the portfolio of the services delivered by the SSC can be regarded as an indirect indicator of the partners' trust towards the cooperation. An aggregation can, in fact, enlarge its domain of activity only in case its members are satisfied with the results of the cooperation, and this determines the strengthening of the level of trust among the partners. From this point of view, RP_SISCoTEL can be evaluated positively with respect to the trust criterion too.

The funding of the NAP_E-Government-1 has not been reiterated in time and, therefore, there are no data that allows to evaluate directly the funded aggregations with respect to stability, attractiveness and level of trust. However, an indirect evaluation of NAP_E-Government-1 can be performed by considering the results of the programme in the light of the actions CNIPA defined to implement the second phase of the Italian Action Plan for E-Government.

The second phase, that started in 2004 (MIT, 2003) and is still going on, includes also the funding of projects specifically devoted to support the inclusion of SLGOs in the spread of E-Government at the local level (CNIPA, 2007b). On the basis of the observation that innovation at the local level is severely limited by the fact that SLGOs often lack resources and competencies to devote to innovation, CNIPA provides special funding for SLGOs that define cooperation agreements for the activation of Local Alliances for Innovation (ALI), based on the model of inter-municipal cooperation. More specifically, the funding is intended to

support the creation of aggregations of SLGOs, preferably defined on a provincial basis, that are directed towards the activation of SSCs.

The funding for the ALI prescribes the requirement of territorial contiguity for the SLGOs adhering to the aggregations. Since they generally do not satisfy this requirement, the aggregations set up under the NAP_E-Government-1 programme cannot access the funding of the second phase. This seems to be an implicit acknowledgment of the fact that the aggregation model assumed in NAP_E-Government-1 cannot support the creation of stable aggregations.

Moreover, in discussing the causes of the delay in the conclusion of the projects funded under the NAP_E-Government-1 programme, in (CNIPA 2007c) it is observed that the dimension of the aggregation proved to be a critical element: actually the data shows that aggregations including more than 30 municipalities are more prone to delays. With respect to the case of Lombardy, out of the 10 projects involving aggregations of municipalities, 3 were presented by aggregation with less than 30 members, whereas 7 have more that 30 members (actually, 4 aggregations have more than 100 members).

From this point of view, it is CNIPA itself that recognizes that there have been problems with the aggregation model assumed in NAP_E-Government-1, not only as regards the lack of a territorial basis for the aggregations, but also as regards their size.

The same critical observation can be made with respect to the attribute concerning trust; since the aggregations were set up with the goal to share the costs for the implementation of technological solutions allowing the online delivery of services for citizens and enteprises, once the systems have been implemented there is no reason for the partners to keep the cooperation. In this case the aggregations have been set up mainly for opportunistic reasons and without the aim of establishing stable trust relations among the partners.

5. Conclusions

In the paper we considered two different programmes that support innovation at the local level and compared them with respect to their impact on the system of Local Government of the Lombardy Region, Italy. The programmes we considered are: the funding for E-Government projects, according to the first phase of the Italian Action Plan for E-Government (NAP_E-Government-1) and the Regional Plan for the activation of Inter-organizational Information Systems for Local Government (RP_SISCoTEL). Both programmes have been based on the collaboration among municipalities as a means to foster innovation at the local level; for this reason we suggested an evaluation of the two programmes based on the properties of the aggregations that are set up to access the funding.

Considering E-Government as the use of ICTs to enable innovative forms of government and governance we suggested that cooperation among Small Local Government Organizations could represent a possible solution for the problem of administrative fragmentation that affects many countries of the European Union. However, to achieve this result the aggregations that are set up should be stable in time, strengthen the trust relations among the partners and attract new members. Thus, considering stability, attractiveness and trust as sources of public value, we compared the two E-Government programmes with respect to the stability, the attractiveness and the level of trust characterizing the aggregations of SLGOs they funded.

Both programmes funded the acquisition of hardware and software systems as well as the development of local telecommunications infrastructures. Hence, the different outcomes of the two innovation programmes do not depend on the object of the funding. Rather, what makes the two programmes different are the requirements they stated for accessing the funding. RP_SISCoTEL defined requirements concerning the integration among the partners of the cooperation (through the activation of SSCs), whereas NAP_E-Government-1 did not state any organizational requirement, simply assuming that inter-organizational cooperation can be fostered by supporting the development of interoperable systems.

The evaluation performed with respect to the data concerning Lombardy pointed out that, to achieve the result of fostering inter-municipal cooperation, it is not enough to implement a policy oriented towards supporting technological innovation. If the goal is the transformation of the Local Government system, and not simply the automation of the administrative procedures or the definition of new channels to access services, what is needed is a model that supports combined processes of technological and organizational innovation, as it should be in all the innovation processes typical of E-Government.

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Outsourced Information Systems Failures in SMEs: a Multiple Case Study

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Abstract: Since the 1980s, a number of frameworks have been proposed for understanding the concept of information system (IS) failure. Two approaches to IS failures seem particularly important: the concept of Expectation Failure and the concept of Termination Failure. We argue that there is an extra dimension to the problem that is not covered by those descriptive models, which we call the Outsourced IS Failure (OISF). To explain the OISF we draw on agency theory, which views the problems that occur in outsourced environments as the results of three factors: goal differences, risk behaviour differences and information asymmetry. Although the (positivistic) agency theory has already been used to describe phenomena of failure in IT relations there is still a lack of empirical evidence.

This paper brings the results of the attempts of falsification of the agency theory in situations of OISF. A positivistic case study research was conducted based on multiple cases in SMEs. The choice for qualitative research is based on the accessibility of well documented secondary data in litigation files of failed IS projects. Eight cases of IS project failures subject to litigation were selected.

We conclude that the agency theory has strong prediction and explanation power for OISF. However some adjustments are needed to the agency theory. The theory seems to work in two ways, opportunistic behaviour is also observed on the side of the principal. The findings indicate that lack of trust is a prominent determinant for failure.

Keywords: IS outsourcing, SMEs, IS failures, Principal Agent theory, Organisational and Personal Trust

1. Introduction

Despite the numerous success stories illustrating the advantages of bringing information technology into organisations, it is broadly accepted that the processes of designing, developing and implementing are cumbersome and not straightforward. Recent and older reports show that IS projects frequently fail. The broad and elaborate research on IS failures has been conducted for more than four decennia (Ackoff, 1967, Lucas, 1975; Lyytinen & Hirschheim, 1987; Sauer, 1993; Keil, 1995; Beynon-Davies, 1999; Schmidt et al, 2001; Ewushi-Mensah, 2003; Iacovou & Dexter, 2005; Avison et al, 2006).

IS failures can be divided in *expectation* (Lyytinen, 1987) and *termination* (Sauer, 1993) failures. Expectation failures can be categorised in *correspondence*, *process* and *interaction* failures. *Correspondence failures* occur when IS are evaluated towards previous defined design objectives. A lack of correspondence between design objectives and evaluation is seen as a failure. *Process failures* occur when there is unsatisfactory development performance, i.e., one fails to produce a workable system or to deliver within the budget constraints of time and costs. Process failures are sometimes called 'runaways' or escalating projects (Iacovou, 2004; Keil, 1995). *Interaction failures* are situated within the mismatch between requirements and user acceptance. An interaction failure appears when an IS is not used. In summary, an IS expectation failure is the inability of an IS to meet the expectations of the stakeholders.

Sauer brought up the more pragmatic concept of the termination failure (Sauer, 1993). According to Sauer an IS failure can only occur when the development process or operation of an IS causes dissatisfied stakeholders to abandon the project.

One of the most intriguing questions is: why do IS still fail if we known what causes a failure? The answer is that we still do not really understand the nature of IS failures. Various small, apparently insignificant factors interact with each other leading to a complex amalgam that is hard to identify. If additional problems occur or if the root causes of the original problems are not effectively addressed, the problems grow worse. Software engineering has only evolved during the last half of the twentieth century and its culture is still immature. In times of rapidly advancing technology and fierce competition good engineering practices are reluctantly adopted. Being able to provide complex software solutions of good quality has become critical in differentiating success from failure.

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Not all causes of failure have an objective nature or seem to be connected with technology but tend to lean on fashion, perception, expectancy, pressure, internal or external politics and cognitive processes. Smith and Keil believe that some failures involve psychological, social and organisational issues that cannot be addressed with techniques such as the critical path method or joint application development (Smith & Keil, 2003:70).

We argue that there is an extra dimension to IS failures that is not covered by those descriptive models, which we call the Outsourced IS Failure (OISF). An OISF is a failure that occurs during an IS project in an outsourced environment. We use the taxonomy of Lacity and Hirschheim (in Dibbern et al., 2004:10) of outsourcing options and focus on Project Management. Some academics have already pointed out that outsourcing increases risks leading to IS failures (Natovich, 2003; Aubert et al, 2003).

We conducted a case study research based on multiple cases in SMEs. The choice for qualitative research was based on the accessibility of well documented secondary data in litigation files of failed IS projects. Eight cases of IS project failures were selected. SMEs are our domain of interest since those enterprises tend to outsource their IS projects very intensively due to their dependency on external IT knowledge.

To understand OISF we draw on agency theory, which views problems that occur in outsourced environments as the results of three factors: goal differences, risk behaviour differences and information asymmetry. We crafted the agency theory to induce propositions that were testable in our experiments. Together with agency theory we searched for rivalry and competing theories that could help explain phenomenons at a more detailed level. We formulated propositions from organisational trust theory (Zaheer et al., 1998) and prospect theory (Kahneman & Tversky, 1979). Both theories were already used in IS research (Lander et al., 2004; Rose & Rose, 2004).

The remainder of the paper describes the relation of IT and SMEs, followed by the relevant literature on agency theory and outsourcing, and a description of the research method. The final section includes discussion and conclusions, as well as limitations.

2. IT and SMEs

Research and literature have highlighted the definitional problems of SMEs. Companies differ in size, location, business, financial performance, maturity and management style. Europe defines SMEs as independent businesses that employ less than 250 people and with either a turnover of less than 50 million euro or a balance sheet total of less than 43 million euro. SMEs can be split up in micro, small and medium-sized enterprises (European Commission, 2003). Even with this definition SMEs are diverse. Some are dynamic and flexible with a great power to innovate and a vast range of diversity. Some are based on family involvement and embedded in local business environments. Some others are start-ups: fragile organisations striving for survival. Our research focus on genuine SMEs or in the European definition: medium-sized and small enterprises.

In the years of the dotcom hype many believed that IT would enable SMEs to compete with large companies. However a lack of readiness for networking with other enterprises and reluctance to use advanced IT proved otherwise. SMEs perceive little incentive to change business models when returns are unclear (OECD, 2004). Research also showed that SMEs do not excel in knowledge retention and obtaining a sustainable competitive advantage. There is a slower adoption of IT in SMEs than in large enterprises. The methodologies that lead to successful IS implementations in large organisations can therefore not be extrapolated to SMEs, since we are dealing with a completely different economical, cultural and managerial environment. Existing mechanisms of IT governance do not work as such in SMEs where the decision making is mostly centred on one person (Southern & Tilley, 2000). Despite the efforts to develop specific derivative methods of governing IT in SMEs, like the Cobit QuickStart method for practitioners, the implementation is rather disappointing. (IT Governance Institute, 2003).

Due to their small scale and hence a lack of in house IT-skills, SMEs depend more on vendors than large companies (Thong et al., 1994: 210). This does not mean that outsourcing is without risks or problems. From a managerial point of view we associate risk in IT outsourcing with negative outcomes. Two risk scenarios that are of special interest for this research are lock-ins and disputes. A lock-in is a situation where a client cannot get out of a relationship without extra costs (Bahli and Rivard, 2003: 213). Disputes can be separated in litigation and non-litigation. Not all disputes lead to litigation.

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3. Principal agent theory and outsourcing

The (positivistic) agency theory (Jensen & Meckling, 1976; Eisenhardt, 1989) has already been used to describe phenomena in IS relations, however there is still a lack of empirical evidence especially in situations that lead to actual failures. Many IS in SMEs are implemented via an outsourced project. Those projects are conducted in an environment in which there is *information asymmetry*. This is typically the situation of a SME (principal) and an Independent Software Vendor or ISV (agent). It is assumed that the agent often has private information about the quality of the IS that is not available to the principal. According to agent theory agents can therefore act in their own best interest.(Tuttle, 1997).

Agency theory addresses relationships in which one party (the principal) delegates work to another (the agent) who performs the work according to a mutually agreed contract. Both parties are self-interested with incongruent goals. This leads to two problems: 1) ex-ante, before signing the contract: the problem of adverse selection and 2) ex-post, after signing the contract: the problem of moral hazard.

Adverse selection arises pre-contractually because the agent possesses private or hidden information about the real quality of his service and the principal is unable to find out that information. This leads to information asymmetry and puts the principal in a disadvantaged position since the principal is faced with a pool of bidders with often insufficient qualifications. The principal cannot easily distinguish the 'bad cars or lemons' from the good ones (Akerlof, 1970: 489).

Moral hazard arises post-contractually when the principal is unable to observe and verify the actions of the agent and may be faced with an agent engaged in hidden actions and not acting in the principal's interest because of goal differences between both parties.

Hidden information and hidden action (sometimes named opportunistic behaviour) are coming into play because the SME-principle cannot monitor the agent's behaviour and performance without agency costs (Jensen & Meckling, 1976:6).

Besides asymmetric information and goal differences, there is an important third factor: risk behaviour differences. The implementation of an IS is highly risky since the outcome is not always stated in measurable outputs and only partly verifiable by organisation members. The likelihood of failure looms large because of this outcome uncertainty. This gives rise to an entrepreneurial risk situated initially with the principal. The transfer of that risk to the agent is not straightforward since both parties' express risk behaviour differences. The principal is assumed risk neutral and the agent risk averse. This assumption is based on the argument '[…] that agents are unable to diversify their employment […] and principals, who are capable of diversifying their investments, should be risk neutral.' (Eisenhardt 1989: 60). However it is assumed that the principal is risk averse when choosing for a "buy" option (Eisenhardt 1989: 65). It is our belief that on the issue of risk behaviour differences the prospect theory is of special interest. When principals are faced with adverse possibilities there is an overweighting of certainty (Kahneman & Tversky, 1979:269)

Agency theory is a well-known and used IS-theory, especially in the research of IS and outsourcing (Dibbern et al., 2004; Aubert, 2005; Bahli and Rivard, 2003). While researchers acknowledge the importance of agency problems, most treat it unidirectional. Opportunistic behaviour is considered to be found with the agent. Very few offer a deeper understanding of how and why agency problems occur. Using case study research we reveal and explain the surfacing and culminating of agency problems in a bidirectional way.

When principal and agent are contracting the negotiated transaction can never be described perfectly. Anderlini and Felli state that: '[...]the contracting parties may lack the necessary degree of rationality necessary to describe exactly the various states of nature in the ex-ante contract they draw up.' (Anderline & Felli, 2004:5). The role of trust in an outsourced IS environment can therefore not be overestimated. Recently a lot of research has been carried out on the relation of trust and IS (Sabherwal, 1999; Lander et al., 2004).

In our research we combine agency theory with prospect theory and with organisational and personal trust theory (Zaheer et al., 1998) to induce testable propositions and to craft patterns in the experimental findings. So far we formulated the following propositions:

- P1 - When asymmetries in information are combined with opportunism, hidden actions may arise from both the agent and the principal.

- P2 – The risk behaviour of agents can evolve from 'risk averse' to 'risk taken' if the possibility of a lock-in scenario becomes possible.
- P3 – Structured controls are not sufficient to eliminate opportunistic behaviour in an outsourced IS project
- P4 – Agents postulate their prospects (proposals) as certainties
- P5 - Trust limits the need for structured controls by reducing the perceived need to guard against opportunistic behaviour

4. Research method

We have chosen for a qualitative and positivistic IS case study research strategy based on multiple cases. The choice for qualitative research is based on the accessibility of well documented secondary data in litigation files of failed IS projects. Eight cases of IS project failures were selected. The positivistic stance of the research is our personal conviction that there is an objective reality of failed outsourced IS projects in SMEs. However those phenomena are embedded in an organisational context which is not separable from the unit of analysis. There are also definitely more variables to be studied than there is data available. This is a situation where the case study is an ideal research strategy (Yin, 2003; Lee, 1989:35). According to Yin a case study research is useful when a phenomenon cannot be studied outside the context in which it occurs or where the boundaries between phenomenon and context are not clearly evident (Yin, 2003:13). Sauer shares the opinion that research to IS failures is best done by case study (Sauer, 1993). The development of the research design and methodology is inspired by the work of researchers experienced in case study research (Eisenhardt, 1989, Lee, 1989; Dubé & Paré, 2003).

A case study protocol was developed to minimize the errors and biases in the study. The protocol contains all procedures, observation protocols and general rules that are followed during the research. The case study protocol offers a guideline for investigators and reviewers who will help in the evaluation of the cases.

We used a longitudinal approach in all cases. Three sources of evidence were used to ensure construct validity: 1) documents, 2) focus and open-ended interviews and 3) direct and participant observations. Project documentation, minutes from steering committee meetings, memorandums and letters were analyzed. Documents were delivered by three sources: plaintiff, defendant and expert witness. The plaintiff and defendant documents were often the same but were brought into litigation for opposed opinions. All expert witness reports were exposed by cross examination of all parties and were corrected if material errors did occur. This resulted in an extra triangulation of the available data. The interviews were recorded on audiotapes and written down in reports and sent to all parties for cross examination. All interviews took place in the present of all parties and the expert witness. The case study sites were visited at least four times for the purpose of doing interviews and direct observations. Additional data was collected during those site visits. In two cases (Stones and Boxcars) evidence was obtained as participant observer. The data coming from all sources was coded by means of a coding scheme, which is part of the case study protocol. The coding scheme separates the basic data from the metadata (the documents, reports, sheets …). The coding scheme was designed to avoid data contamination. All data is stored in a computerised case study database and links are made between basic data and metadata. The data is retrievable by computer but is also available in original and raw format for reviewers. The data analysis is based on alternate template strategy which is a pattern-matching technique (Langley, 1999). Data was analyzed in two steps. First step was a within-case analysis to review the unique patterns of each case. Second a cross-case analysis was conducted in search for common patterns. The cases were selected to allow comparison and to maximise variation as shown in Table 1.

Table 1: Selected cases

	Type of Project	**Result**	**Dispute Resolution**
Case Foam	ERP implementation	Process Failure	Litigation
Case Woody	Software development and implementation	Process Failure	Litigation
Case Mach	ERP implementation	Expectation Failure	Litigation
Case Bupo	Software development	Process Failure	Litigation
Case Dybo	Software development and implementation	Process Failure	Litigation
Case Stones	ERP implementation	Expectation Failure	No litigation
Case Boxcars	DIS implementation	Expectation Failure	No litigation
Case Hero	Software development and implementation	Escalation Failure	Litigation

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Similarities pertain to the size of the enterprises; all principal sites are SMEs and the failed result of the project. In terms of variation four projects are ERP implementations, three projects are software development and implementation projects and one project is a software development without implementation.

Case Boxcars is a consortium of 60 car dealers who contracted together for a Dealer Information System (DIS). Customizing took place for all ERP implementations in the observed case. Two cases (Stones and Boxcars) were subject to litigation however an alternative dispute resolution was applied.

Table 2 gives an overview of the observations in our research. For each case we look at:

- *Type of contract*: according to agency theory two types of contracts are possible: outcome-based and behaviour-based. In some cases a mixed form was discovered in which some parts of the contact were outcome-based (in particular software licences) and others (in particular consultancy fees) were behaviour-based.
- *Structural controls:* appropriate mechanisms including deliverables, reporting arrangements, meeting schedules, penalty clauses for governing the project. We searched for two aspects of structural controls: stipulated in contract and performed during the course of the project.
- *External consultancy*: engagement of external expertise.
- *Information asymmetry (private information of agent and of principal):* traces of private information at both parties.
- *Hidden actions (of principal and of agent):* traces of hidden actions.
- *Adverse selection*: adverse selection takes place before signing the contract (ex-ante). The traces could only be observed ex-post, once the project was started.
- *Prospect framing:* the way (positive or negative) the agent is making his proposal to the principal
- *Vendor lock*: a vendor lock is seen as a lock-in situation in which the principal cannot get out of his relationship with the agent.
- *Lack of commitment:* includes lack of oversight and engagement by executives
- *Trust level:* three levels of trust: deterrence-based or calculus-based, knowledge-based and identification-based trust (Lander et al., 2004)
- *Trust deterioration:* decline of trust
- *Trust building mechanisms:* Lander et al. presented a list of trust building mechanisms in outsourced IS development projects (integrity, predictability, communications, commitment, sharing control)

Table 2: Overview and summary of the case observations

	Case Foam	**Case Woody**	**Case Mach**	**Case Bupo**
Principal	Manufacturer (plastic foam)	Trader (lumber)	Trader and manufacturer (veneered boards, ceiling coverings, wall planks)	ISV
Turnover	€50 million	n.a.	€12.75 million	€475000
Staff	100 White collars 450 Blue collars		146 (total)	8 white collars
IT Maturity	CMM level 1	CMM level 1	CMM level 1	CMM level 1
Application	ERP + customizing	ERP development	ERP + customizing	Office application
Cost	Original: €644000 Final: €1.290000	€372000	€90000	€50000
Litigation	Yes	Yes	Yes	Yes
Type of contract	Outcome-based	Outcome-based	Mixed	Outcome-based
Structural controls in contract and in project	Yes/Yes	Yes/Yes	Yes/No	Yes/No
External consultancy	No	No	Yes	No
Private information (agent)	Yes	Yes	Yes	Yes
Private information (principal)	Yes	No	Yes	No
Hidden actions agent	Yes	Yes	Yes	Yes
Hidden actions principal	Yes	No	Yes	No
Adverse selection	No	No	No	Yes
Prospect framing	Positive	Positive	Positive	-
Vendor lock	Yes	No	No	No
Lack of commitment (agent)	No	Yes	Yes	Yes
Lack of commitment (principal)	No	No	No	No
Level of trust	Deterrence	Deterrence	Deterrence	Deterrence
Trust deterioration	Yes	Yes	Yes	Yes
Trust-building mechanism	No	No	No	No

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Table 2: Overview and summary of the case observations (cont.)

	Case Dybo	**Case Stones**	**Case Boxcars**	**Case Hero**
Principal	Trader and manufacturer (lumber)	Manufacturer (stones, street furniture)	Dealer in cars	Contractor (waste removal)
Turnover	€15.65 million	€31.25 million	n.a.	n.a.
Staff	16 (total)	80 white collars 120 blue collars	-	5
IT Maturity	CMM level 0	CMM Level 2	CMM level 1	CMM level 0
Application	ERP development	ERP + customizing	DIS + customizing	Office and DB application development
Cost	€50000	€750000	60x€75000	€75000
Litigation	Yes	No (dispute)	No (disputes)	Yes
Type of contract	Mixed	Behaviour-based	Mixed	Outcome-based
Structural controls in contract and in project	No/No	Yes/Yes	Yes/Yes	Yes/No
External consultancy	No	No	Yes	No
Private information (agent)	Yes	Yes	Yes	Yes
Private information (principal)	No	No	No	Yes
Hidden actions agent	No	Yes	Yes	No
Hidden actions principal	No	No	No	No
Adverse selection	No	Yes	Yes	No
Prospect framing	-	Positive	Positive	Positive
Vendor lock	Yes	Yes	Yes	No
Lack of commitment (agent)	No	No	No	No
Lack of commitment (principal)	Yes	No	Yes	Yes
Level of trust	Deterrence	Knowledge	Deterrence	Deterrence
Trust deterioration	Yes	No	No	Yes
Trust-building mechanism	No	No	No	No

5. Discussion and conclusions

The research has not come to an end but some preliminary conclusions can already be drawn.

First of all it is apparent that avoiding OISFs can be very cumbersome. We learned that the establishment of structured controls during the implementation of an IS project is not sufficient to avoid OISFs. In the observed cases we could noticed that a loss of trust was often a very strong determinant for failure, despite structured controls. Trust is often connected to agency problems, although agency theory does not take trust into account. In the literature on IS failures trust is often ignored. In six cases we could observe trust deterioration, although the level of trust was already initially of deterrence-based.

In all cases we observed asymmetric information and found out that principal agent theory has a strong validity but that works in a bidirectional way. All agents had private information concerning the project, which is in line with agency theory assumptions. However we could observe moreover that in at least three cases there were also principals with private information relevant to the project. In two cases (Foam and Mach) one could detect even hidden actions on behalf of the principal. This was already suggested by Moynihan and Aubert.

> *'Agency theory views the exchange primarily from the perspective of the principal. But what of the agent's perspective? What strategies can agents use to protect themselves from potentially opportunistic or other unfavourable forms of behaviour on the part of the principal?' (Moynihan, 2002: 378)*
>
> *'Both clients and vendors tend to behave opportunistically when entering into a contract and this can lead to mutual disadvantage.' (Aubert, 2003: 183)*

The principal in case Mach made a contract for implementing two systems in two separate business units. During the project the principal sold one of the business units without informing the agent.

An outcome-based contract is seen as a solution of controlling opportunistic behaviour of the agent as suggested by agency theory (Eisenhardt, 1989:60). However the outcomes of the contracts in terms of measurable goal indicators were in all cases very poorly specified. Hardware and software licences are mostly mentioned in a detailed way in all contracts, but the real outcome is often defined in very obscure and vague terms. This is a phenomenon not typically for SMEs, but points out to the problem of value perception and measurement in IT investments (Bannister & Remenyi, 2003). We could observe that SME-principals often naively interpret their contract solely as a fixed-price contract, although this is not always formally true. On the other hand the uncertainty of the outcome of an IS implementation gives rise to a difference in risk behaviour which is well described by agency theory.

The overall IT maturity of the principal was assessed during the research and was scored to the CMM maturity levels also used in Cobit. Since not al IT processes occur in SMEs (IT Governance, 2003) it is fairly easy to assess the IT maturity. The overall maturity was in all cases very low, which is very typical for SMEs.

An explanation for the problem of adverse selection is given by Akerlof (Akerlof, 1970). ISVs that are active on a SME marketplace tend to comply with the Akerlofs Lemon-theory. However there are other mechanisms involved that can be explained by prospect theory. Further research however is needed here.

In appendix A we provide more information on the observations of the project characteristics private information and hidden actions.

This paper represents a first step in an on-going research. The approach adopted here is comparable with forensic investigation where a chain-of-evidence in a post-mortem is carefully built up. The process of revealing the information patterns in the experimental data is tedious and far from straight forward. Much remains to be done to improve the matching of the theoretical and empirical patterns.

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Appendix A

Observations of the project characteristics private information and hidden actions	
Case Foam	
Private information of agent:	Agent knew that a higher budget was needed for customisation Agent sold a computer with a lower internal memory capacity than correctly calculated by the dimensioning program
Private information of principal:	Principal did not inform the agent that an internal BPR program in the manufacturing division failed
Hidden actions agent:	Agent starts working on customizations without informing the principal Agent did not give detailed information on work performed Agent assigned an inexperienced project leader to the project Agent assigned inexperienced programmers to the project
Hidden actions principal:	Principal assigned an inexperienced project leader to the project
Case Woody	
Private information of agent:	Agent knew that the budget needed was much higher than the proposed one
Private information of principal:	Not observed
Hidden actions agent:	Agent assigned an inexperienced project leader to the project Agent assigned inexperienced programmers to the project
Hidden actions principal:	Not observed
Case Mach	
Private information of agent:	Agent sold obsolete software
Private information of principal:	Principal had a plan to sell a business unit
Hidden actions agent:	Agent assigned inexperienced project leader to the project
Hidden actions principal:	Principal sold a business unit during the course of the project
Case Bupo	
Private information of agent:	Agent's project leader dismissed just after finishing the design of the software
Private information of principal:	Not observed
Hidden actions agent:	Agent assigned inexperienced programmers to the project
Hidden actions principal:	Not observed
Case Dybo	
Private information of agent:	Agent sold software which was not yet fully finished and debugged Agent built in old parts of software into the new software
Private information of principal:	Not observed
Hidden actions agent:	Not observed
Hidden actions principal:	Not observed
Case Stones	
Private information of agent:	Agent did not tell the principal that the owner of the ERP package sold his software to another vendor Software contained licensed programs from third parties Agent did not tell the principal that new vendor was involved in a Chapter 11 procedure
Private information of principal:	Not observed
Hidden actions agent:	Agent modified software without informing the principal Agent assigned inexperienced programmers to the project
Hidden actions principal:	Not observed
Case Boxcars	
Private information of agent:	Agent sold software with modifications which were not yet fully finished and debugged Agent sold software based on old technology Agent worked on new software based on new technology
Private information of principal:	Not observed
Hidden actions agent:	Agent modified software without informing the principal (customer) Agent installed software without informing the principal (steering committee)
Hidden actions principal:	Not observed
Case Hero	
Private information of agent:	Agent sold a software package as an empty box
Private information of principal:	Principal did not inform the agent of the staff changes Principal did not assign a skilled project leader
Hidden actions agent:	Not observed
Hidden actions principal:	Not observed

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Towards an Integrated Approach to Benefits Realisation Management – Reflections from the Development of a Clinical Trials Support System

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"We know what we do, and often we know why we do what we do; but what we don't know is what we do does." -Michel Foucault

Abstract: The aim of our research project, described in this paper, was to develop a purpose-built clinical trials support system [CTSS], which would be sufficiently comprehensive, integrated and flexible, so as to support the vast majority of research studies that were to be managed and conducted by one UK-based health authority. Whilst at the start of this project, it was reasonably clear what major clinical activities the system would need to be able to support, it was less clear what benefits the system should be expected to deliver, nor how these benefits were related to specific aspects of the system's functionality. Moreover, whilst it was recognised that the introduction of the CTSS would engender fairly significant organisational changes, it was less easy to articulate the nature of the changes, nor how they might ultimately relate to the realisation of benefits. Consequently, it was agreed at the project's outset that an explicit benefits' realisation approach should be integrated into the system's development activity. The aims of this paper are threefold: 1] to describe the CTSS project, paying particular attention to why it justified the inclusion of a benefits realisation approach; 2] to provide a description of, and justification for, the benefits management approach adopted; 3] to provide a provisional assessment of the effectiveness of this approach. In addressing these objectives, it was envisaged that our paper would make an important contribution to the literature by providing one of the few first-hand accounts of the conduct of benefits' management practices, and certainly the first in the context of clinical trials support systems. Moreover, the paper provides new insights into the integration of benefits realisation and structured development tools and practices: we describe how the benefits dependency network has been successfully related to use case diagrams.

Keywords: Benefits realisation, Software development, Clinical trials, NHS.

1. Introduction

A considerable amount of time, money, effort and opportunity has been wasted upon IT investments that have ultimately failed to deliver any appreciable benefit. Whilst estimates of the level of failure vary, over the past thirty years they have tended to stay uncomfortably high. For example, it has been suggested that in the late 1970s only 20% of projects '*achieved something like their intended benefits*' [Eason, 1988], whilst by the late 1980s, it was estimated that up to 70% of IS project fail [Hochstrasser & Griffiths, 1991]. By the late 1990s, Clegg *et al* [1997] estimated that: '*up to 90% of all IT projects fail to meet their goals'*, whilst more recently still the British Computer Society [BCS, 2004] concluded that *'only around 16 per cent of IT projects can be considered truly successful*'. There is also an established stream of research to suggest that the root cause of this problem is the failure of project teams to explicitly consider the organisational impacts and implications of a new piece of software and to proactively manage the associated organisational change [Clegg et al, 1997; Doherty and King, 2001]. The typical IT project team will focus upon delivering a technical solution, and only worry about its organisational impacts, once it is operational [Ahn & Skudlark, 1997; Eason, 2001; Doherty et al, 2003; Markus, 2004; Peppard & Ward, 2005].

One potentially important mechanism for proactively managing the social and organisational impacts of an IT project, to ensure that it ultimately delivers value, is through the initiation of an explicit benefits realisation programme. Such approaches have been defined as '*the process of organising and managing, such that the potential benefits arising from the use of IT are actually realised*' [Ward & Elvin, 1999]. A clear link between the high incidence of IT failures and the absence of formal and explicit '*benefits realisation*' approaches may

well have already been established [e.g. Farbey et al, 1993; Ward et al, 1996; Remenyi et al, 1997], but there is little evidence that organisations have been able to translate the academic research prescriptions with respect to the realisation of benefits, into effective working practices [NAO, 2006]. Indeed, Farbey et al [1999a] have explicitly highlighted the urgent need for benefits management approaches and practices to be developed for, and adopted within, the NHS, but to date there is little evidence that this advice has been heeded. Benefits realisation appears to be a good example of the often substantial gap between management theory and practice [Pfeffer and Sutton, 2002]. Consequently, there is a pressing need for new contributions that present insights into how benefits-oriented practices might best be operationalised and incorporated into systems development projects.

To help fill this notable gap in the literature, a KTP-funded, research project was initiated to help develop new benefits management approaches, and to explore how these could best be integrated and applied in support of the development, implementation and operation of a clinical trials support system [CTSS]. The remainder of the paper is organised into four parts. First, we provide a brief review and critique of the relatively small, but growing, body of literature related to the realisation of benefits from the investments in information technologies. Moving on, we then outline the research method adopted for the empirical part of this study and summarise the key findings. Finally, we explore the theoretical and practical implications of this work, paying particular attention to the lessons that might be learned to improve the realisation of business benefits in future IT projects.

2. Literature review

The aim of this section is to critically examine the link between organisational change and benefits realisation before reviewing the literature with respect to the application of explicit benefits realisation approaches.

2.1 Benefits realisation and organisational change

A major problem with the vast majority of information technology evaluation exercises is that they tend to be oriented towards the '*what*', rather than the '*how*': they focus on identifying the benefits that the project team anticipate [hope?] the resultant system will deliver, rather than attempting to understand how these desired outcomes will be realised. Moreover, such 'wish-lists' of benefits are typically framed in financial or economic terms. Indeed, the emphasis on the financial and economic contribution of information systems is very evident in the literature. For example, Ballantine et al, [1996] note that '*studies have tended to concentrate on the financial techniques used to evaluate investments*', and that '*financial reviews of cost / savings*' are the most common aspect of evaluation procedures. Similarly, Farbey et al, [1999b] note that the debate about systems evaluation has been primarily concerned with '*Value for IT money*'. Consequently, systems evaluation is often defined in these terms. For example, Willcocks [1992] defines systems evaluation as the '*process of establishing by quantitative and / or qualitative techniques the worth of IS / IT projects to the organisation*'.

Unfortunately, there is very significant gap between simply specifying the desired outcomes of a prospective software development project, in financial terms, and ultimately establishing the veracity of such cost savings or improvements to revenue, once the system is operational. This is partially because it is far less easy to effectively measure the outcomes of a system's project, in financial terms, than it is to make pre-investment predictions. However, probably, the more significant reason that anticipated benefits, whether financial or otherwise, rarely translate into actual benefits is that project teams typically fail to recognise the critical role of organisational change. For the past twenty years researchers have been flagging up the importance of organisational change. As Strassman [1990; p 519] reflected: *'computers add value only if surrounded by appropriate policy, strategy, methods for monitoring results, talented and committed people, sound relationships and well designed information systems'.* More recently, Melville et al [2004] commented that '*improvements in process and organisational performance [from IT] are conditional upon appropriate complementary investments in workplace practices and structures*'. Consequently, a fundamental purpose of any investment appraisal must be to explicitly establish the scope and implications of such organisational change [Lubbe & Remenyi, 1999]. Whilst there is a strong recognition amongst researchers, and perhaps practitioners also, that effective benefits delivery is predicated on well focused organisational change, there is little evidence that this understanding has been translated into a suite of well focused and commonly used tools and techniques, as discussed below. Indeed, there is a very significant gap in the literature, with respect to empirical accounts of the application of benefits-oriented approaches.

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2.2 Benefits realisation approaches

It is unlikely that benefits will simply emerge, as if by magic, from the introduction of a new technology. Their realisation needs to be carefully planned and managed [Lin & Pervan, 2003; Markus, 2004]. Unfortunately, to date, there have been fairly few attempts to create specific tools, methods and approaches that are specifically suited to this task. One of the few exceptions to this rule has been the work conducted by researchers at the UK's Cranfield University [e.g. Ward & Elvin, 1999; Ward and Daniel, 2006], who have created a number of prospective methods, of which their benefits dependency network is probably the most widely recognised. However, even where such tools have been developed, there is very little suggestion that they are being actively used in systems development projects [Lin & Pervan, 2003]. Consequently, it is essential that the effectiveness of such tools is critically evaluated in systems development projects, and the results reported in the literature, to promote wider interest in their use.

3. Research context, objectives & approach

The aim of this section is to briefly describe the research context, in terms of the organisation and IT application, before articulating the study's objectives, and describing the research methods and approaches utilised.

3.1 Research context

No new medicinal drugs can be prescribed to patients without them being thoroughly tested beforehand, through the conduct of a formal clinical trial. Moreover, it is also good practice – and in most cases mandatory - for clinical procedures and practices to also be formally trialled before being enacted upon patients. Whilst the safety arguments for clinical trials make them an essential element in the evolution of clinical knowledge and practice, they are by no means straightforward undertakings, as they are time consuming, resource-intensive and they generate very significant amounts of data that need to be captured, stored, analysed and retrieved in an efficient and effective manner. Consequently, there is a very strong rationale for providing clinical trials with dedicated and comprehensive computer-based support to facilitate effective data management practices, and to ensure that the investigating team can gain access to the information that they require in a timely and accurate fashion. Unfortunately, relatively few clinical projects have access to such dedicated and comprehensive systems, and they typically have to make do with a combination of end-user generated, database or spreadsheet-based systems, that are tailored to the needs of a particular trial, but are then effectively redundant. However, such systems do not typically cover all of the clinical investigators' data processing requirements, and it is not unusual for them to have to out-source some specialist tasks, such as patient randomisation, and resort to paper-based record keeping, for others. Against this backdrop, the rationale for Health Authorities to either develop, or buy, a fully integrated and comprehensive clinical trial support system [CTSS] is strong.

The clinical trials support system in question is being developed by University Hospitals of Leicester, on behalf of the NHS research community of Leicestershire, Northampton & Rutland. It has been designed to standardise, integrate and, where possible, automate the conduct of clinical trials, within an NHS environment, by providing web-enabled, real-time support to all clinical research staff, as and when required. Given the fairly broad scope of the system, in the first instance it was envisaged that the systems' development effort would focus upon the following important areas of functionality:

- **Trial registration:** Once a new research contract has been secured, the first task to be performed, from a system's perspective, is to create a detailed description of it on the CTSS. More specifically, the Principal Investigator or the Trial Manager is required to record the following details: the research centres involved, the research staff and their roles, the trial treatment arms [e.g. active drug or placebo], the recruitment parameters [which define the sample], the patient trial data [e.g. blood pressure, white cell count, patient weight, ECG or MRI results etc] and the randomisation approach that is to be applied.
- **Patient randomisation:** To ensure that there is no bias in the allocation of patients to the treatment arms of a specific trial – for example, allocating the active drug to the least healthy patients and the placebo to the healthiest – it is important that the allocation process is randomised. The patient randomisation module has been designed to ensure that this service is delivered in a secure and accurate fashion.
- **Electronic data capture [EDC]:** Once a trial goes live, it will be necessary to collect, on an on-going basis, the patient-related data that will be needed to ultimately interpret the effectiveness, or otherwise, of the drug or procedure, under investigation. The EDC module has been designed to facilitate the collection and validation of such data, at the point at which it is generated: this is

an important development, as the web-enabled nature of the CTSS will enable patient data to be captured at a number of different clinics or surgeries, at the same time.

- **Adverse events reporting [AER]:** When a patient, on a trial, appears to suffer a harmful reaction to their drug regime or treatment, it is important that the research team and the regulatory authorities are informed immediately, so that they can determine an appropriate response; for example, the trial could either be suspended or even abandoned. The AER module has been designed to collect a detailed picture of such adverse events, and ensure that they are reported to the appropriate authorities, and acted upon, in a timely fashion.

In terms of progress, the project has been underway for just over a year, and thus far, all the information requirements have been gathered and the design has been specified – through the production of use case models - for each of these four modules. Moreover, the software has been developed and tested for the '*trial registration*' and the '*patient randomisation*' modules, and the coding is now also under way for the '*electronic data capture*' module.

The specification and compilation of the functional software was relatively straight forward, as most of the stakeholders, who are experienced clinical researchers, had a clear idea of how they wanted the system to perform. However, it has been less easy to establish the measurable benefits that should ultimately be delivered [from this IT investment] and the exact nature of the organisational changes, upon which benefits realisation would ultimately be predicated. Consequently, there was a clear rationale for the adoption of a benefits realisation approach, which has become the focus for the research project, explored in this paper. More specifically, the following two research objectives, for this project, were established:

- to explore how benefits management approaches can best be adapted and applied in the context of a live systems development project;
- to provide a provisional assessment of the effectiveness of this approach.

In addressing these objectives, it was envisaged that our paper makes an important contribution to the literature by providing one of the few first-hand accounts of the conduct of benefits' management practices, and certainly the first in the context of clinical trials support systems.

3.2 Research approach

The research method adopted on this project can best be described as a single case study approach [Yin, 1994]. The detailed design of the research strategy was very strongly influenced by the fact that one member of the research team was actively employed on the project, in the role of the '*Management Information Analyst*' [MIA]. More specifically, he was heavily involved in the development and implementation of the CTSS, playing a key role in the: capture of users' requirements, the systems design and the writing of XML code. In this position he had unrestricted access to a wide variety of relevant information and key personnel, through which he was able to gain unique insights into this increasingly important phenomenon. The research approach adopted was, however, more akin to '*action research*' than '*participant observation*', as he was given a very specific brief to research and apply benefits realisation methods on this project.

When conducting a case study, Darke et al [1998] suggests that data should be collected in a variety of ways, including '*formal interviews, questionnaires, observation, and document analysis*', so that the findings can be triangulated. More specifically, when working on each case study site, the following data collection techniques were employed:

- **Document reviews:** The MIA had access to a wide variety of documents, including IT, marketing and corporate strategy reports, staff communication documents and detailed design documents.
- **Interviews:** Formal interviews or informal discussions were conducted with a wide variety of stakeholders, associated with the project, ranging from clinical and clerical users through to very senior managers. The main objectives of the interviews were twofold: 1] to understand how the users' requirements so that these could be translate into benefits-oriented design documents; and 2] to gain critical feedback on the application and impacts of our benefits-oriented approaches.
- **Observation:** Being an active participant in the project, the principal researcher was able to observe their day to day execution at very close quarters, including participation in the vast majority of important project meetings.

A series of note-books were compiled to ensure that a complete, coherent and contemporaneous set of evidence was captured. Furthermore, the advice of Nandhakumar & Jones [1997: 118] was followed and

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time was set aside to periodically '*step back from the research context*', to write-up key findings and objectively review them with the other researchers.

4. Research findings

The presentation of the research findings is structured around the two specific research objectives, as previously highlighted.

4.1 The benefits realisation approach

There were three major aspects to the benefits realisation approach adopted on the CTSS project, to date, namely the benefits dependency network, the benefits-oriented use case diagram and the benefits-oriented prototyping. Each of these three innovative new approaches is described below:

- **The benefits dependency network:** The benefits dependency network [BDN] [Ward & Elvin, 1999] was chosen as our main tool, as it is probably the best established of the benefits realisation tools, and it is particularly useful for critically evaluating the targeted benefits, and the means by which these will be achieved, at a project's outset. More specifically, it has been designed as a means of enabling *'the investment objectives [of a specific IT project] and their resulting benefits to be linked in a structured way to the business, organisational and IS / IT changes, required to realise those benefits*' [Ward & Daniel, 2006]. It has proved to be a very useful tool on the CTSS project, as it has helped to focus the thoughts of the project stakeholders, as well as all the team members, on the system's overall purpose, as well attainment of specific benefits and value from the system, once operational. At the time of the project's conception and initiation most of the discussion focused upon the high level drivers for the system, in particular: cost reductions, greater regulatory compliance, and improved competitive positioning, by being in a better position to win research funding. However, through developing the BDN, the project team were encouraged to explicitly consider how such high levels investment objectives might best be achieved.

  The BDN was not a document that was created at a certain point in time, and then remained constant from thereon. Rather it was a document that evolved, over time, through an on-going process of review and refinement, in line with the stakeholders' growing understanding of the scope and potential of the system.

  A copy of the BDN, as it currently stands has been provided [see figure 1]. Perhaps the most interesting issue to emerge from this document is the strong focus on improving the Trust's competitive positioning. The UK's National Health Service hospital trusts, being public sector institutions, are not normally considered to be engaged in the cut and thrust of market competition. However, as hospital trusts will be in competition with each other, and other research organisations, when seeking to secure research funding, it is important that they take steps to ensure that they are in the best position to compete effectively. One particularly effective tool in the competitive armoury of any organisation engaged in clinical research is a CTSS, as this sends important signals to the funding bodies about the organisation's ability to effectively undertake and manage clinical trials.

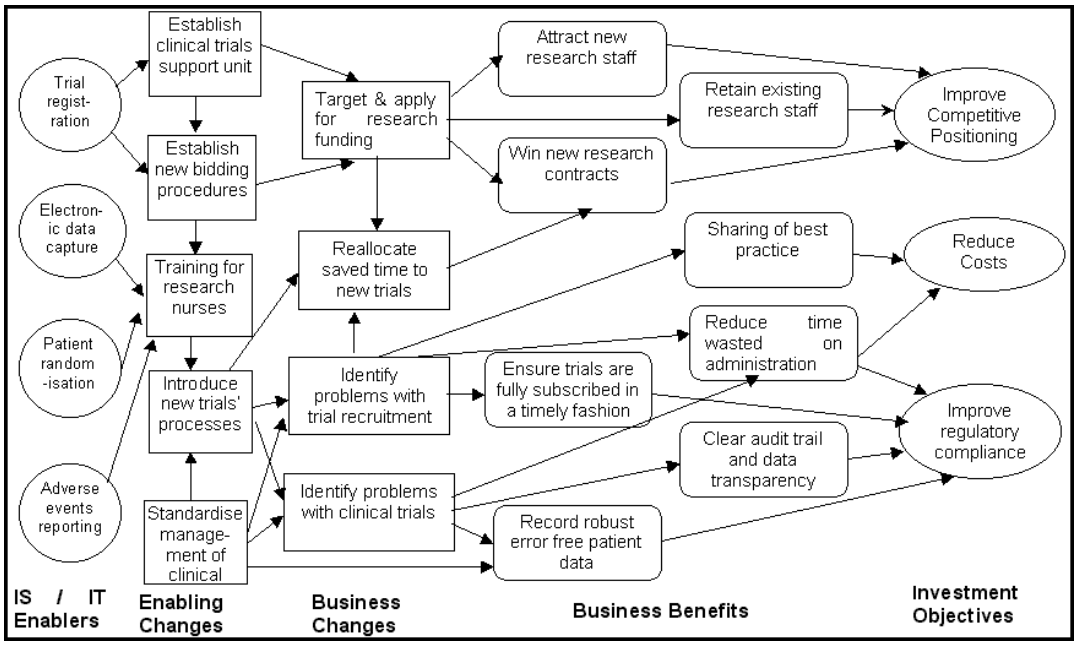


Figure 1: Benefits dependency network for the CTSS

- **Benefits-oriented 'use cases':** The creation of a benefits dependency network was recognised as being an important first step towards ensuring that the CTSS project maintained a clear focus on the delivery of value. However, at an early stage in the project, the team realised that it would be very easy for that benefits' focus to be lost once the focus of the project switched from the specification of information requirements, to the more technically-oriented aspects of systems development – in particular the software coding. Consequently, an important aspect of the research agenda was to explore the potential of linking the benefits identified in the BDN to the design documentation, from which the coding was to be conducted. As the primary design tool, we had elected to adopt '*use cases*' [Schneider & Winters, 1998], which can be defined as a means of establishing the sequence of transactions between an actor and a system that support the activities of the actor. The standard 'use case' description [see table 1] doesn't have any explicit links with benefits, so we have modified it, so that the software developers can see how their programmes relate to the attainment of benefits [see table 2]. This link between systems design and benefits is an important one, as it helps to keep the focus on benefits realisation, throughout the systems development. However, it does not help in terms of detailing the requisite organisational change, upon which the attainment of benefits is dependent. To this end, the research team are currently exploring ways of integrating the organisational change into their '*use case diagrams*' [Schneider & Winters, 1998].

Table 1: The standard use case specification

Facet	Description
Name	Case Name
Goal	An overview of the case's primary objective
Primary actor	Uses the main functionality of the system
Pre-conditions	List of conditions that have to be met before the case can be invoked
Post-conditions	List of conditions, if any, that will be true once the case has been successfully concluded
Main course of action	A step by step account of how the use case scenario should unfold, assuming that everything runs according to plan
Alternative courses of action [extensions]	An account of how the use case will respond to unusual situations or problems.

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Table 2: The modified use case specification, as applied in the context of a specific CTSS function

	Description
Name	Adverse events reporting
Goal	To record adverse events on trial.
Primary actor	Principal investigator or Chief investigator
Pre-conditions	Patient for whom adverse event is reported should be registered on the trial
Post-conditions	CTSS records the adverse events and alerts the trial sponsors
Main course of action	The primary actor will try to log on to the CTSS. On successful authorisation, the primary actor will try to access the adverse event reporting functionality. The CTSS will then validate if the primary actor is eligible to access the adverse events reporting functionality. On successful verification, the primary actor would be asked to enter the patient id for whom the adverse event is reported, the adverse event description, what action will be taking on the patient and whether the trial needs to be stopped. On submitting this information, the CTSS will create an automated alert to inform the trial sponsors.
Alternative courses of action	3a. The primary actor would be asked to review their staff ID entered and try again. 4.a The primary actor would be asked to review the patient ID entered and try again.
Benefits linkages	Prompt information sharing and action– a full description of the adverse event must be captured and validated and then sent to all relevant parties immediately. The recipients' of the information must acknowledge that they have read and understood the report and will then be prompted to enter their response. Reduce time wasted on administration: It is essential that details of the adverse event be recorded in real time, at the point at which it was recognised, and then automatically relayed to all the relevant parties, to reduce the need for any administrative intervention. Clear audit trail and data transparency: In order to comply with regulatory requirements, it will be essential that a full and accurate record of the adverse event, and any resultant courses of action, are captured and securely stored, as an audit trail.

- **Benefits' oriented prototyping:** The final tool to be deployed by the project team, to help ensure that the CTSS ultimately met its investment objectives, was through the use of benefits' oriented prototyping. Whilst 'use case' specifications and diagrams had been drawn up to provide guidance to the programmers, the resultant software was regularly reviewed with project stakeholders, so that their requirements could be tested and refined on a regular basis. An important element of these review sessions was to invite the stakeholders to consider how likely it was that the software, in its current state, would support the attainment of the specified benefits, and then suggest enhancements to the software that would improve the likelihood of benefits realisation. Moreover, the prototyping sessions were also used as a forum for exploring the stakeholders' views as to the nature of the organisational change that would be necessary to leverage these benefits, and this feedback was used to modify the BDN, and to develop the organisational change strategy.

4.2 Critique of the benefits realisation approach

From a research perspective, one of the most interesting aspects of adopting a benefits realisation approach is that it allows the capabilities and limitations of our approach to be critically assessed in the context of a '*live*' IT development project. Whilst the project is still on-going, it is not possible to make any definitive assessments. However, it has been possible to develop the following, highly '*provisional*' list of findings, with respect to our approach:

- It proactively encourages stakeholders to explore the multitude of relationships that exist between technology, organisational change and benefits;
- It keeps benefits very firmly on the agenda, and it facilitates benefits-oriented communications between a range of system's stakeholders;
- It helps bridge the gaps in understanding and expectations that often arise between the system's designers, the software developers and the end-users;
- Each of the three developed tools has been found to be useful in its own right, but they deliver maximum value when applied in unison.

- Whilst the tools, developed and trialled thus far, have been found to be very useful, others will be needed to model the specified organisational changes, at a more detailed level.

Because of the highly provisional nature of this list, we will seek to develop and validate it in the coming months.

5. Concluding remarks

Ciborra [2004] argues that the prescribed use of systems development methods is very often subverted by the developers themselves who are apt to intervene, tinker and drift. In this project the team's tinkering has come in the form of experimenting with a number of benefits management practices, Thus far we have found these interventions and practices to have been very helpful, as they have helped to maintain the team's focus on benefits and organisational change, and they have also proved to be very helpful in terms of stimulating focused communication amongst all the stakeholders. Unfortunately what we don't know at this stage is - to paraphrase Michel Foucault - the ultimate effects of what we have done. However, we do believe that we have made an important academic contribution, by adapting and proactively applying benefits realisation practices, in a live project. Moreover, our experiences may be of interest to other IT practitioners who are also looking to make benefits the focal point of their software development efforts.

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ICT Adoption and Use in UK SMEs: a Failure of Initiatives?

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Abstract: In this paper, we explore some of the results from a survey of 378 small and medium sized enterprises (SMEs) based in the southeast of England. The objective of this survey was to build a snapshot of the state of play of the information and communications technology (ICT) use by SMEs in economically significant sectors in this region. The sectors chosen were as follows: food processing, transport and logistics, media and internet services. More specifically, the survey was intended to answer the following questions: what types of ICT are in use by SMEs in this region, what prevents and facilitates the adoption and use of ICT amongst these firms, and where do SMEs acquire information on ICT related issues. Our survey suggests that most SMEs in the southeast of England are in general positively inclined towards adoption and use of ICT. However, this adoption and use of ICT is mainly focused on operational matters with few extensions into potential strategic use of such technologies in their business environments. SME owner/managers perceive ICT to be often costly and complex and are wary of consultants and vendor organisations. We also discovered, somewhat surprisingly, that SMEs are largely unaware of existing policy instruments at the regional, national and European levels, designed to help them in their adoption and use of ICT.

Keywords: Information and communications technology (ICT), small and medium sized enterprises (SMEs), ICT adoption, ICT use, government policy

1. Introduction

According to the Observatory of European SMEs (2003), 92% of all European enterprises employ less than 10 people. Both EU policy and UK regional development agencies have sought to actively promote small and medium sized enterprises in the country with the aim of bolstering competitiveness and encouraging collaboration with like-minded businesses, providing the basis for innovation and accelerated growth. For instance, the Southeast England Development Agency (SEEDA) has called for a 'southeast commitment to mirror the EU's ambition of becoming the most competitive knowledge-based economy by 2010' (SEEDA 2003). An important part of this ambition is to facilitate the competitive ability of SMEs increasingly operating in the global market. SMEs can be viewed as the poor sibling of the business community compared to their larger brethren. Much of the focus on ICT is predicated and driven by the needs of large businesses often ignoring the more diverse needs of SMEs.

This paper aims to addresses some of these issues using a survey of SMEs in the southeast of England. The paper is structured as follows: the next section provides a brief overview of the key characteristics of the SME community and the literature on their adoption and use of ICT. This is followed by a discussion of our research methodology. We then present some of our main findings. The paper concludes with a discussion of the implications of these findings for both the SME community and policy providers.

2. ICT and SMEs

The most widely used definition of an SME is that of a firm with 0-250 employees (DTI 2007). SMEs have started using ICT relatively recently and they are generally characterised by inferior technology and management capabilities (Caldeira and Ward 2002). Also, as Pool *et al*. (2006) note, whilst e-commerce (i.e. the use of Internet related ICT for business) has spread rapidly throughout large firms, its growth amongst SMEs has been much less pervasive. Indeed the need to build ICT-related capabilities and competencies within European SMEs was specifically identified by a recent report from the Observatory of European SMEs (2003).

Research into SME use of ICT within the UK context has been limited to a few studies that are now dated (for instance, Thwaites and Wynarckzyk 1993; Naylor and William 1994; Levy, Powell and Yetton 2001; Martin and Matlay 2001; Simpson and Docherty 2004). Whilst, the SME sector is very heterogeneous, at least some of these studies found strong correlation between IT use and firm size, innovation, product development and R&D in traditional sectors such as textiles in the UK, implying that SMEs are at a disadvantage in terms of IT use. Strong regional differences were also found within the UK between SMEs clusters in innovation rates, profitability, size and structure of ownership. It appears that significant differences remain between SMEs. For example, a recent survey of their region by Yorkshire Forward, the

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Regional Development Agency, found that whilst 63% of SMEs were connected to the Internet, 46% had a website and 36% traded on-line, 30 % (mostly microbusinesses of less than 10 employees) did not use computers at all (Pritchard 2006). Whilst opting out of the digital economy may be possible for some, Brown *et al.* (2005) point to the problems that some SMEs face whilst engaging in on-line trading or collaboration with supply chain partners. They argue that the complexity of business operations as well as company size matter in respect of ICT adoption and use in SMEs.

Synthesising the wide-ranging literature on e-commerce adoption and adoption models, Wymer and Regan (2005), identify 26 factors affecting ICT adoption and use in SMEs. It is possible to classify these as either technology related or business related (including external factors, internal knowledge and expertise, and finance). Their findings (from a study of US SMEs) show that, perhaps unsurprisingly, cost was the one consistent factor across all organisational types.

According to Levy, Powell and Yetton (2001), the vast majority of literature on ICT adoption by SMEs point to the operational nature of investments, driven as they often are by cost and efficiency considerations. However, the same research team has also found evidence that SMEs can also behave strategically; their empirical study of SMEs in the UK West Midlands finding that strategic intent influences decisions to invest in e-business (Levy, Powell and Worrall 2005)

Thus, there is something of a confused picture with regard to current practices within UK SMEs in relation to ICT use. Given that both markets and technologies have undergone rapid change over the last few years, the time seems ripe to revisit this issue.

3. Research methodology

The population for the survey was SMEs drawn from four economically significant sectors in one of most productive regions in the UK, the southwest London and Thames Valley region of England. The sectors chosen were: food, transport and logistics, media, and the Internet. See table 1 for a sector breakdown. The survey targeted 2800 companies chosen from the Dunn and Bradstreet list. We received a total of 378 responses.

Table 1: Breakdown of firms

Sector	Proportion of firms (%)
Food processing	24.46
Transport and logistics	26.46
Media	23.81
Internet	23.28

We used a telephone survey method with a standardised questionnaire of 66 questions organised into 6 major sections: business specific questions, current ICT use, use of Internet and e-commerce, ICT investments, staff skills and training for ICT use, and ICT advice. Most of the questions were of a “tick box” format although each question also gave the respondent the option of providing additional comments. A number of follow-up interviews were also conducted to explore issues arising from the survey findings.

The business specific questions asked for company and respondent details as well as questions on firm size, firm history, firm’s main products and services, key customers and markets. We also asked respondents questions concerning what they perceived to be their key business strengths (e.g., low cost, product quality, innovation, other specialised expertise etc), main business plans (in terms of increase in sales or market share etc), and whether the firm had any formal strategy documentation.

Questions on current ICT use focused on types of ICT used (such as email, Internet, wireless etc) and kinds of ICT applications (stock control, sales, marketing, human resources management, enterprise resource planning etc). This section also included questions on business benefits from ICT, key ICT problems faced by the company and a question on whether the firm’s ICT investment represented value for money.

The section on Internet and e-commerce usage asked a series of questions on the type of Internet connection used, whether the firm used the Internet for online sales/purchase or for information gathering and sharing, and whether the Internet had any impact on sales (for example through increased sales). We also asked a question on e-commerce challenges faced by the firm.

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The section on ICT investment included questions on the firm's IT strategy, how they funded and justified their ICT investments, choice of ICT supplier, and a series of questions on ICT implementation and post-implementation evaluation. We also asked about any implementation challenges faced by the organisation.

The section on staff skills focused on existing IT skills, skills shortages, how training was provided and any barriers to the provision of such training. The final section on ICT advice sought replies on where the firm obtained ICT advice, and if they had sought help or advice from government agencies.

In this paper, we will mainly focus on the key findings from the four sectors covered in the survey.

4. Results from the survey

In this section, we present some of our main findings from the survey of the food, logistics and transport, media, and Internet sectors. We found some interesting differences between what we could characterise as 'traditional' sectors (food, transport and logistics) and 'new' sectors (media, and Internet).

4.1 Commonly used ICT applications and reasons for investing in ICT

Table 2 provides details of the commonly used ICT applications in our survey, split according to sector. As can be seen most firms in our survey concentrated primarily on operational and functional applications such as sales and marketing and document management systems. Interestingly, 'older' sectors of logistics and food processing recorded higher levels of computerisation in their human resources management function. This may be related to the higher levels of government regulation of these sectors. Compliance requirements in these sectors seemed to be driving much of the more recent investment in new ICT applications in both these sectors.

As we would expect, there was near universal adoption of email and Internet facilities. However, there was a very low take up of allied adoptions of a more strategic nature such as enterprise resource planning (ERP) systems. As table 2 highlights, the sectors displaying the highest levels of ERP adoption were the 'new' sectors of media and Internet services. By contrast, there was a very low level of adoption of such technologies in the 'older' logistics and transport and food processing sectors.

Table 2: Commonly used ICT applications

	Computerised Systems Used (*number of replies*)							
	stock control	sales or marketing	design	market research	document management	production planning & control systems	HRM	ERP
Media	35	61	69	36	70	56	39	28
Logistics	29	67	17	28	91	44	54	21
Internet services	17	80	77	56	79	47	48	35
Food processing	77	74	41	40	94	57	56	19

The lack of strategic intent in the adoption of ICT is shown more clearly in table 3. Here, we detail the SMEs' responses and motivations for investing in ICT. Once again, we can highlight the mostly operational nature of these ICT investments, driven as they are by the need to increase operational efficiency. This is not surprising given the often highly competitive, low margin, business environment in which many SMEs operate and the consequent need to continually bear down on costs.

Having said this, it is again worth emphasising that some of the more sophisticated use of technology was found in the 'older' sectors of food processing and logistics and transport. In subsequent follow-up interviews, a motivation for this more sophisticated use was attributed to the need for compliance with government and European legislation in both sectors. More specifically, in food processing sector, new regulations require SMEs to be able to demonstrate the traceability of their food products in terms of the supply of ingredients used in their products. In the case of the logistics and transport sector, new European directives required firms to be able to log transportation drivers' total driving time on a daily basis so as not to exceed legislated maximum driving time.

Table 3: Reasons for investing in ICT

Main Reasons For ICT Investments Made Recently *(%)*						
increase operational efficiency	improve communications with suppliers	improve enhance customer service	keep up with competitors	enhance joint working in collaborative ventures	increase staff satisfaction	because customers demanded it
83	25	45	34	23	33	19

4.2 Barriers to ICT adoption

The majority of the SMEs surveyed identified costs as the single biggest factor threatening future investment in ICT. This perception can be explained with reference to the funding sources open to the SMEs in our survey. We found that most SMEs sourced their ICT capital expenditure through retained profits. In very few cases were alternative sources of funding such as venture capital and commercial loans used by SMEs. This can be explained by the very cautious approach that SME owner/managers often adopt with respect to ICT investments, particularly when they have difficulty quantifying or envisaging the business benefits that might arise from such investments.

We found that owner/managers by and large were not ICT trained or skilled and were often reliant on the advice of external consultants or vendor organisations. This tended to affect the confidence with which they approach investment decisions concerning ICT. Part of this cautious attitude to ICT can also be explained by the lack of internal ICT expertise in these firms. We also found that while staff in many SMEs were often keen to train in ICT, the lack of resources and uncertainty over business benefits from the perspective of the owner/manager hampered the development of internal capabilities in this area.

Interestingly, we found that barriers to ICT adoption were mostly related to costs and skills rather than to do with problems with the technology per se. Only a minority (about 25%) of firms reported technical problems sufficient to act as a barrier to future investments.

4.3 Perceived benefits from ICT

Most of the SMEs surveyed were generally satisfied with their ICT investments. In fact over 90% of the firms in all four sectors surveyed perceived their ICT investments as offering good value for money. In the case of the Internet services firms, this figure rose to almost 98%. How then does ICT affect these SMEs?

Table 4 highlights some of the key perceived benefits from ICT adoption. As can be seen, most of the benefits relate to operational matters. In particular, all four sectors see ICT as helpful in improving the response time to customers. In three out of four sectors, ICT was also helpful in improving productivity. The exception to this was the logistics and transport sector, which reported lower levels of perceived benefit in this respect. All four sectors also perceived ICT as important and helpful in keeping up with their competitors. In this sense ICT could be deemed to be having a strategic impact. However, when seen in the context of the overall survey results, we were unable to find clear evidence of strategic impacts. For example, in the development of electronic commerce, firms in our survey restricted themselves to providing information portals rather than using ICT to extend their business environment into the electronic domain.

Table 4: Perceived benefits from ICT

	Perceived ICT Benefits *(number of replies)*					
	improved productivity	improved product/ service quality	faster response to customers	improved customer satisfaction	improved working on joint projects with other firms	keep up with competitors
Media	77	75	79	71	54	81
Logistics	56	77	75	62	34	72
Internet services	78	79	79	76	66	77
Food processing	71	60	78	67	45	83

Having said this, the impact of online sales, where evident, differed between the old and new sectors. In the media and Internet services sectors, we found comparatively greater use of online sales than in the 'older' logistics and food processing sectors. In the 'older' sectors, the vast majority of SMEs made very little or no

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use of online sales than in the 'newer' sectors. Unsurprisingly, the highest impact of online sales was felt in the Internet services sector with just under 50% of the firms reporting that half or more of their sales stem from online sources.

4.4 Information sources on ICT use

The single most important information source for SME owner/managers in our survey was ICT consultants. Almost 50% of firms irrespective of the sector used external consultants in ICT matters. The second most important source of ICT advice and support was friends and family (37% of firms surveyed), followed by ICT vendors (35% of firms). Professional independent sources such as trade associations (8% of firms) or government agencies (4% of firms) seemed to have very little influence on our SMEs. Indeed the media had more of an impact as a source of advice (10% of firms) for our SMEs than these other independent sources.

This finding surprised us given the range of policy mechanisms aimed at SMEs as shown in table 5. Most of the SMEs surveyed had very little or no knowledge of these mechanisms designed to help them. Indeed, those that had used some of these mechanisms did not report a happy experience. In follow-up interviews, respondents pointed to the often bureaucratic and cumbersome processes that they had to engage in order to receive advice that was often not tailored to their business environment.

Table 5: Awareness of government policy mechanisms

Government Agencies Used (*number of replies*)						
business link	e skills into Business (sector development agency ESIB)	central government DTI trade partners UK	regional development agencies (SEEDA)	local government agencies borough or county council	learn direct IT courses	None used
73	1	11	7	5	4	268

5. Discussion and conclusions

From the survey, we identified a number of other key problems faced by SMEs with regard to ICT adoption and use. These can be grouped into two categories: technology related and business related.

In terms of technology, the most important concern was a fear of technology obsolescence requiring frequent updates. In the cash-poor, highly competitive context in which SMEs operate, the need to find funding for updates was a real concern. Firms also frequently encountered operational problems with their ICT exacerbating their dependence on external consultants or vendors. This dependency on consultants and vendors was often cited as a major problem by SME owner/managers who are more focused on making the best use of limited resources in terms of time and money. ICT often competes with more pressing business concerns. Owner/managers typically do not view ICT as offering them long term solutions to business sustainability.

Turning to business issues, our survey suggests that SMEs are often driven by the pressures of cost and efficiency. There is a need to retain competitiveness by driving down costs rather than increasing value-added. The SMEs in our survey had very little strategic flexibility and their ICT investments reflected this narrow perspective. Where sophisticated ICT applications were found, these were often driven by the need to comply with government regulations rather than through any considered attempt at using ICT strategically. We found this effect was most prevalent in the 'older' sectors of transport and logistics and food processing as opposed to the 'newer' media and Internet services sectors.

As often highlighted in the literature on SMEs, owner/managers often determined the nature and extent of ICT investments. Indeed in most cases owner/managers did not have a strong ICT background or the skills necessary to judge the potential of ICT investments. Many of them are also uninformed about the variety of support mechanisms available through regional and national agencies targeting SMEs. This information and capability gap is further entrenched by the lack of internal ICT champions in SMEs themselves.

In summary, our survey findings suggest that SMEs need to think more strategically in relation to the use of ICT. In this respect, SMEs are falling behind best practices adopted by their larger counterparts in the global economy. Agencies charged with the development of SME capabilities also need to reorient their delivery mechanisms to address the ICT capability and information gaps identified in this survey.

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Interpretative IS Evaluation: Results and Uses

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Abstract: One major reason for doing evaluations of information systems is to take actions based on the results of the evaluation. In order to make better use of interpretive evaluation processes in practice we need to understand what kinds of results such evaluations produce and the way that the results are used to be transformed into change and betterment in the organisation. We have developed, applied and studied a methodology in support for doing interpretive evaluation. In the paper we report the case of a performed action research study that has comprised an IS evaluation. Through this action research we have transformed the theoretical principles of the interpretive approach into a useful evaluation methodology in practice. The main emphasis in this study is on the results and the uses of the evaluation process. We make a brief theoretical overview of interpretive principles for IS evaluation and of the research on evaluation use, from the field of evaluation theory, and represent a framework for analysing influences from evaluation efforts. We use this framework to analyse and identify the results and uses of the performed evaluation in order to shed light on what kinds of results that interpretive evaluation may offer. We experienced the influence framework useful for locating and understanding the variety of results from interpretive evaluation processes. We conclude with a model depicting results and uses from interpretive IS evaluation processes. The main point we elaborate on in this paper is how evaluations influence the actions taken in the organisation in order to establish betterment. How people in the organisation use evaluation in order to establish betterment and change. Further we bounce back the insights on evaluation results and uses into the discussion on how to design interpretive evaluation processes and how to design evaluation methodology in support for those processes.

Keywords: IS evaluation, evaluation process, evaluation results, evaluation use, interpretative evaluation methodology

1. Introduction

One major reason for doing evaluations of information systems is to take actions based on the results of the evaluation. Results from evaluations form a base of knowledge that is supposed to be used to plan and perform knowledgeable actions by individuals in the organisation.

Evaluations of information systems can be performed through different approaches and methodologies and consequently evaluations aims to fulfil different kinds of purposes and produces different kinds of results (Lagsten and Karlsson 2006). The interpretive evaluation approach has been reported as a capable evaluation approach with important implications for practice (Symons and Walsham 1988; Symons 1991; Avgerou 1995; Farbey *et al.* 1999a; Hirschheim and Smithson 1999; Walsham 1999). There is a growing body of work on interpretive IS evaluation, but as Introna and Whittaker (2002) put it "most of the interpretive work on IS evaluation is interpretive in its evaluation of empirical studies, but more limited when it comes to describing IS evaluation *as* interpretation". This paper concerns the use of interpretive evaluation methodology in support for doing evaluation as interpretation.

Walsham (1999) and Hirschheim and Smithson (1999) address the problem that there does not seem to be much evidence of extensive use of interpretive evaluation approaches in practice although the approach seems well founded academically and theoretically to offer potential advantages (such as stakeholder commitment, learning opportunities). Walsham suggests that the non-use might be explained by a lack of knowledge in the IS field of the interpretive approach or that such evaluations brings into light problems that is normally hidden leading to anxiety and fear. The non-use might also be due to organisational-political motives. Hirschheim and Smithson suggests that the wide use of formal-rational evaluation methods could be explained by the ritualistic value the organisation achieve by adopting scientific (positivistic) methods and that those methods offers a rhetoric that reconciles the lack of rationality in decision making and the responsibility of the decision maker.

We suggest that one reason for the low-use is due to poor understanding of the results and uses of interpretive evaluations. The interpretive evaluation *process* is of course important to study and conceptualise, but we want to move beyond a limited process focus and direct attention to its results and uses. In a pragmatic vein, we want to study the interpretive evaluation process in the light of its uses and results. In order to do this we will provide an illustrative analysis of results and uses of a performed evaluation. In this analysis we apply a framework, from the area of evaluation research, which categorise

different mechanisms through which evaluations may achieve influence. We approach the studied evaluation from its use and consequences in the organisation, from the perspective of usefulness, which is an intentionally pragmatic stance towards knowledge and understanding. “In a nutshell, the overriding issue for pragmatists is whether or not something, be it philosophical assumptions, methodology, or information, is useful in the sense that the something in question is instrumental in producing desired or anticipated results” (Goles and Hirschheim 2000). We think the analysis will help practioners and researchers to better understand the interpretive evaluation process and contribute to better use and usefulness of interpretive evaluations in practice.

In this paper we do several things. First we make a brief overview of principles of interpretive IS evaluation in section 2 and then of the research on evaluation use where we represent a framework for analysing influences from evaluations (section 3). We shortly report the case of an action research study that has comprised an evaluation based on interpretive methodology (section 4). We use the influence framework to locate and elaborate on the results and uses of the performed evaluation in section 5. In section 6 we present a model of interpretive evaluation results and uses. We close the paper with making conclusions on how we can use conceptions of evaluation consequences in order to establish better interpretive IS evaluations in practice.

2. Interpretive IS evaluation

In the litterateur on IS evaluation there has been several calls for interpretive methodology and researchers has suggested principles to guide interpretive evaluation processes.

Avgerou (1995) suggests a dialectic approach to undertake evaluation processes that are recognised as interpretive and political and put forward following guiding principles:

- The task of the “evaluator” is to organise and support a dialectic evaluation process, to asses methodically aspects of the system under evaluation as seen appropriate by stakeholders, and to inform about issues which, although significant according to the IS literature, might have been ignored by the participants.
- The evaluation process is participative, allowing all stakeholders to express their views and supporting them to defend their position.
- The criteria of evaluation are determined by the context and include all the concerns of the stakeholders.
- The objective is to reach consensus decisions about future systems developments, either by accepting and possibly modifying plans and proposals for new systems, or by learning the lessons of past experience.

According to Avgerou the proposed approach takes into account actions of different agents and establishes a collective responsibility for information systems changes and questions the validity of the projects initial objectives.

Jones and Hughes (2001) propose an interpretive approach that emphasises the situatedness of social action and knowledge. They argue that the social interaction and actor perception plays an important interpretive role that should be obtained and valued in the evaluation process. They characterise the interpretive evaluation process to be concerned with the context in which IS evaluation takes place, that it engages with stakeholders in process to understand assumptions and views. Furthermore the interpretive evaluation seeks multiple-stakeholder subjective views and that the process is recognised as social and political.

Additionally Jones and Hughes propose guidelines for practitioner action that maps onto the characteristics of the process:

- Articulate the importance of the stakeholder view by appointing a facilitator to elicit the views and concerns of stakeholders so that these can be disseminated. Use methods in practice similar to the GT method which provides a set of procedures for the articulation analysis and dissemination of a grounded view of stakeholders.
- Expose and document these grounded processes.
- Through seminars and group discussion expose the underlying assumptions and values.

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The framework of Content, Context and Process (CC&P) (figure 1), introduced by Symons 1991, has been proposed as an analytical tool for interpretive IS evaluation. The CC&P framework elucidates the elements of IS evaluation and support the researcher with a theoretical framework for analysing evaluation in a specific context (Serafeimidis and Smithson 1996, Symons 1991, Walsham 1999). The framework can act as a foundation for discussion of the various aspects of IS evaluation in its organisational and business context (Serafeimidis and Smithson 1996). It has, for example, been used to analyse case studies in order to explain why an implementation of a new evaluation approach failed (Serafeimidis and Smithson 2000).

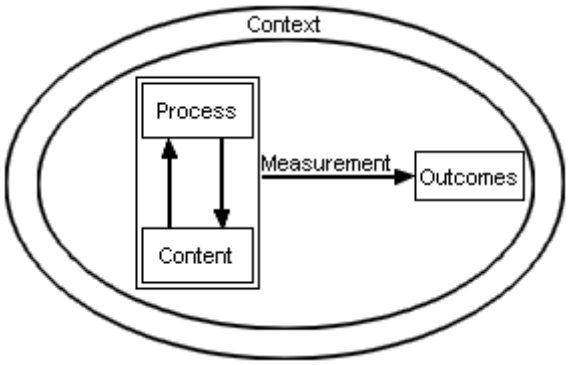


Figure 1: The elements of evaluation (the CC&P framework) (Serafeimidis and Smithson 1996).

It has been argued that the CC&P framework has implications for practice but, from our point of view, the framework is suited for analysing and understanding practical situations but is of less use when it comes to guiding evaluators and practioners in the practical art of doing evaluation. Further, the framework gives no guidance on the important matter of how the evaluation process works in order to realise betterment (the outcome box in the framework is not connected to the context in some way). As we see it, the betterment realisation process that is supposed to follow from the evaluation comprises (at least) two stages; results and effects. Firstly, there are the immediate results that are produced within the different evaluation activities; these are the direct outputs from the evaluation, the results. Secondly, there are the effects that these results have on peoples thinking and doing and further onto the wider organisation environment; these effects could be recognised as the outcomes of the evaluation. It is the effects, or the outcomes, that are the reasons for why people engage in evaluation efforts.

3. Learnings from evaluation research

In order to better understand the way evaluations are used, and how evaluations influence on people and organisations, we have turned to the literature in the field of evaluation research. Evaluation research has developed as a field from the need of evaluating public programs of social change (within schools, health-care, and welfare enterprises) in order to show if services and improvement efforts were succeeding (Stufflebeam 2001). According to Henry and Mark (2003) is social betterment the ultimate purpose of evaluations and refer to improvement of social conditions. We agree that the concern for social betterment lies behind the widespread purposes of evaluation: to inform decision making and to improve the subject or program under study. Farbey et.al. (1999b) points out that IS evaluation has a lot to learn from the field of evaluation research and state ”If IS are complex and pervasive socio-technical systems whose life extends over several months or years then IS investments can be seen as social action, based on complex technology and taking place in substantial period in time. They are thus like programmes of social action which are the subjects of evaluation research”.

Alkin and Christie (2004) organize the field of evaluation research within three main branches; use, methods, and valuing. Evaluation use has traditionally been regarded as the use of evaluation findings (in the evaluation report) for 1) *instrumental use* – findings lead to immediate actions for example program change or termination 2) *conceptual use* - or enlightenment, refers to the general learning that takes place by taking part of the evaluation findings 3) *symbolic use* – the justification of the purported rationality of an agency (Mark and Henry 2004). More recently *process use* has been added to the uses of evaluation (Patton 1997; Russ-Eft *et al.* 2002). Process use differs from the use of findings in that it refers to uses that arise from the participation in the process of evaluation (Mark and Henry 2004). Process use also indicates the perception of evaluation as an intervention with its own set of processes, outputs, and outcomes.

The instrumental use of evaluations, or the implementation of evaluation results, may not follow a straight path forward to change and betterment. “Most studies that examine the consequences of evaluation find the same thing: that decision makers seldom use evaluation evidence as the basis of immediate decisions”

(Weiss 2004). Weiss continues with saying that the times when evaluations tend to influence is often due to that the evaluation evidence strengthens already hold beliefs of decision makers or legitimises prior opinions. Sometimes evaluations can give directions in situations when the organisation is facing a crisis and no one is sure how to proceed. Occasionally new administers comes in from outside and is receptive to negative findings and new ideas.

We think that the perception of evaluation as an intervention with its own procedures, results and effects will help us to better locate and understand the way evaluations can produce change. When we perceive evaluation as intervention we take into account the influences that the evaluation activities has on people in the organisation. In section 4 we present our process model of evaluation, in line with the interventionist view, with four interrelated phases: initiate, arrange, evaluate, change & develop. These phases are processed by people participating in evaluation activities and conversation around the object of evaluation. While the evaluation precedes different kinds of results steam out from the conversation involving actors in the organisation; insights are given, understanding is raised, concepts are defined, situations are identified, misconceptions are articulated, agreements are held, purposes and objectives are negotiated, conclusions are drawn, actions are planned and taken, language and grammar for the conversation is developed. The evaluative conversation influence peoples thinking and actions and produce change on different levels in the organisational practice. Henry and Mark (2004) have developed a framework (Table 1), based on empirical investigations, of the mechanisms through which evaluation may achieve influence and changes. It includes three levels of analysis, individual, interpersonal and collective; the levels indicate the locus of the change mechanisms.

Table 1. The mechanisms and outcomes of evaluation influence (Mark and Henry 2004).

	Level of analysis		
Type of process/outcome	Individual	Interpersonal	Collective
General influence	Elaboration Heuristics Priming Skill acquisition	Justification Persuasion Change agent Minority-opinion influence	Ritualism Legislative hearings Coalition formation Drafting legislation Standard setting
Cognitive and affective	Salience Opinion/attitude valence	Local descriptive norms	Agenda setting Policy-oriented learning
Motivational	Personal goals and aspirations	Injunctive norms Social reward Exchange	Structural incentives Market forces
Behavioural	New skill performance Individual change in practice	Collaborative change in practice	Program continuation, cessation, or change Policy change Diffusion

The mechanisms are classified into four processes. General influence processes are fundamental architecture of change, likely to set into motion some change into the cognitive/affective, motivational or behavioural processes. Such processes can occur at all three levels, they are not likely to be important as change mechanisms in isolation but are of interest because the may stimulate outcomes of greater practical interest such as changes in beliefs and feelings, motivations and actions. Mark and Henry mean that the processes lead to one another and could trigger a cascade of changes in the organisation. Evaluators can, for example, benefit from the framework to better capture and plan for the consequences of an evaluation by identifying pathways of socially mediated changes that the evaluation process and findings set into motion.

The individual level refers to change in the thoughts or actions of one or more individuals, when a difference in question takes place in one individual. The source of a change in attitude could be the elaboration that is done by reading an evaluation report carefully or by participating in dialogue about criteria for the evaluation object. This change in attitude could emphasize individual aspirations and trigger behavioural changes in practice.

The interpersonal level refers to change brought about in interactions between individuals. Evaluation findings could work as authoritative arguments in persuasion processes when trying to change attitudes and behaviours of others or justifying held positions. Evaluation findings or processes can stimulate individuals to rise to action as change agents.

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The collective level refers to the direct or indirect influence on the decisions and practices of organisations. This level is involved when a change process or outcome operates in the aggregate social organisational body as a formal policy change.

4. The evaluation study

Our study concerns the design of methodology for interpretive evaluation of information systems. The emerging methodology is called VISU (Swedish acronym for IS evaluation for workpractice development).

4.1 Study procedure

In our action research study (Susman and Evered 1978) a methodology for interpretive IS evaluation has been designed and tested during several cycles of use. VISU has been refined in several stages (Lagsten 2005) and built originally on constructivist evaluation (Guba and Lincoln 1989), Change Analysis (Goldkuhl and Röstlinger 2005) and an explicit pragmatic knowledge perspective. Constructivist evaluation contributes with principles on stakeholder perspective, dialectic process and stakeholder generated criteria. Change analysis contributes with methods and modelling techniques for capturing, modelling and analysing problems, strengths, goals and change requirements as well as guiding principles on participation. The pragmatic perspective emphasises that the evaluation knowledge created during the process is intended to be used for transformation of the studied problematic situation. Confer the notion of inquiry in Dewey (1938).

VISU is designed for taking into account, and make use of, process results of an evaluation. The principal approach is to ensemble concerns of all stakeholders of the information system in systematic dialogues. This is done by the use of dialogue-seminars. A dialogue-seminar can be compared to a focus group were a special set of questions are addressed and examined by a stakeholder group. The principles of interpretive IS evaluation (section 2) are incorporated in VISU through various components. Figure 2 presents the process model of VISU.

INITIATE	ARRANGE	EVALUATE	CHANGE & DEVELOP
Identify preconditions	Make entrance Understand the practice Create a model of the evaluation object Identify stakeholder groups Identify possible uses	Carry out dialogue-seminars with different stakeholder groups Analyse activities, problems, strengths and goals Identify change needs Shape change measures Joint valuation Make completions	Use evaluation results Report and inform

Figure 2: Process model of VISU (Swedish acronym for IS evaluation for workpractice development).

The VISU approach originally emerged in a study of project evaluation at the Swedish employment agency (Lagsten, 2005). Later it was transformed into an explicit IS evaluation approach (ibid). VISU has been tested through the use of the methodology in performing evaluation of the information system Procapita (supporting social welfare services) in a municipality in Sweden. Procapita is an off-the-shelf system from a large Swedish ERP vendor and is in use by approximately 150 municipalities in Sweden. In this studied municipality the system is used by 350 social workers (case handlers) in their daily workpractice with case handling. The clients of the service are adults or children who have difficulties in organising a normal life (due to drug-abuse, violent behaviour, insufficient provision etc.). Case handling includes writing field notes, document investigations, take decisions on measures, assess measures and take decisions on placements in institutions and residential care. The social workers carry out 40%-60% of their working hours throughout Procapita. The system has been in use in this authority since 1999.

One of the authors has had the role of the evaluator in the study. Techniques used to capture results and uses are questionnaires to participants in the evaluation, interviews and participative observations.

4.2 The evaluation

In the initiation phase the evaluator, the IS manager (assigner) and the IS operations manager together identified and defined the situation. A preconditions document were formulated and worked as a mutual commitment for the evaluation. The precondition document defined the evaluation object, the aim of the evaluation, the questions that the municipality wanted to resolve through the evaluation and the evaluation

method. The main question for the IS manager was if it was about time to terminate Procapita or if the current system satisfied the organisational needs.

In the arrangement phase an inventory of stakeholders were done. The evaluator put an effort in understanding the practice supported by the system by participating in regular meetings with the maintenance personnel and the social welfare committee, participating in Procapita education, and reading central documents. A theory based model of the case handling practice was created in interaction social workers. The evaluator contacted administrative personnel and managers in order to inform about evaluation activities and organise stakeholder participation in the forthcoming dialogue-seminars. An evaluation board was set up consisting of the IS manager, the IS operations manager and maintenance people. Stakeholders were chosen to participate in the seminars; the choice was based on their crucial interests in Procapita and on the possibility to get answers to the evaluation questions.

In the evaluation phase 16 dialogue-seminars were held. The stakeholders represented were users (five different user groups), unit managers, maintenance, and IS management. Each group (3-7 individuals) had two seminars taking two hours in general. Central organisers of stakeholder concerns are four specific VISU-questions elaborated in the seminars: What do you do while using Procapita? What problems do you perceive? What good does the system do for you? What are the goals you try to achieve? The VISU-questions are other than the evaluation questions and worked as tools for gathering information to answer those.

Every seminar was documented in a working report articulating stakeholder concerns and issues arranged by activities, problems, strengths and goals. In between the first and second seminar every participator got the report by e-mail, in the second seminar the group made refinements and validated the report. All reports were successively published on the intranet. Altogether there were about 70 individuals participating in the evaluation process. Paralleled with the ongoing dialogue-seminars the evaluation board interpreted the reports and transformed them into change requirements.

After the dialogue-seminars were carried out the evaluator analysed the working reports according to statements on activities, problems (400), strengths (50) and goals (70). The analysis was done, to a large degree, with the use of analytical tools from Grounded Theory (GT) (Strauss and Corbin 1998). For each stakeholder group an account was written. After having identified change needs for the different stakeholder groups, the thorny task of identifying and formulating change measures weighted together and aggregated for all stakeholder groups were conducted. A range of change measures were identified and described under following labels: 1) Wash away usability problems from the interface 2) Develop adjusted education 3) Develop conceptual models for cases and registration 4) Demand bug-free versions and fixes from the vendor 5) Establish an arena for communication between practice and maintenance 6) Explicate the interface between practice and maintenance 7) Assess and evaluate continuously. An evaluation report were written, the report contained a comprehensive model of the system from a multiple-stakeholder perspective, descriptions and analyses of problems, strengths and goals for the different stakeholder groups. The report concluded with the identified measures and a discussion on the initial evaluation questions. Seminars were held to discuss the findings. The IS manager has got the assignment from the social welfare committee to write a detailed plan on how to act upon the findings and the knowledge produced in the evaluation.

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5. Analysis

In this section we employ the influence framework to analyse the results and uses that were identified during and a short time after the evaluation. The purpose here is to illustrate different influences from the performed evaluation on an individual, interpersonal and organisational level. The analysis is based on statements from participants (via a questionnaire), and on interviews and observations during the process.

5.1 Individual

General influence	"It has contributed to reflective thinking about Procapita." (User) "You get to learn new ways and shortcuts on how to handle Procapita." (User) "I think we shall benefit from this way of working in our practice" (Manager) *Commentary:* The dialogue-seminar joins stakeholders in reflective thinking and elaboration on Procapita. Due to the evaluative dialogues users get more aware of the system and their perception of system features in the workpractices as well. Participants develop new knowledge and skills through sharing experiences on handling Procapita. The way of working in the seminar becomes as well new skills for evaluative inquiry.
Cognitive and affective	"It becomes an opportunity to stop and reflect about strengths and betterment issues." (User) "It's more obvious now which problems that are general in Procapita." (User) "It has been a long journey and I have struggled back and fourth with my opinion but now I feel satisfied with the system. It's a good system." (Maintenance) *Commentary:* Participation develops personal standpoints and attitudes on what is god or bad about the system and related routines relative to what stakeholders do and try to achieve in their workpractice. The conversation explicates tacit heuristics when participants explain their standpoints to each other.
Motivational	"It makes clear what issues that is important to go on with. "(User) "A forum for discussion on measures to make it work." (User) "Necessary with more education." (User) "Gives the side effect that we discuss case handling in the group." (User) "It's also fun and educating." (Unit manager) *Commentary*: The evaluative conversation shapes personal goals and aspirations and motivates individuals to go on with specific issues revealed in the process.
Behavioural	*Commentary*: In the second of the two seminars some users reported that they have started to use the system differently due to what they learnt in the first seminar.

Figure 3: Results and uses, individual level.

5.2 Interpersonal

General influence	"Shortcomings and strengths become more evident in discussions with others." (User) "Someone in the group says something that leads to that someone else thinks of a second/third issue and so on." (User) "Everybody has the right to put forth their opinion." (User) *Commentary*: Stakeholders shape more precise accounts of the system in interaction. Minority-opinions are included.
Cognitive and affective	"Gets a joint and overall picture of the system." (User) "The maintenance personnel has adopted a new approach – they have taken on a user perspective." (IS manager) *Commentary*: Stakeholder groups develop local descriptive norms based on a larger picture and mutual understanding. Understanding of other stakeholder perspectives start to influence.
Motivational	
Behavioural	*Commentary*: The evaluation process, and the reading of working reports from the dialogue-seminars, had strong influence on the maintenance personnel who made changes during the process. The maintenance people took on a new role in working groups and started to hand over responsibility (for registry maintenance, corrections, user knowledge) to the case handling practice. Maintenance also made an assessment of a system from another vendor but that system was judged to not have enough support for "heavy operations". Several projects were formulated, some were started during evaluation process: New user roles with routine support Templates New organisation of education Log project Investigation of new module for text editing The maintenance people put forward more precise demands on the vendor and did more careful investigations in ongoing projects. Some fixes were also made in Procapita. It seems like they, through participating in the evaluation process, understood the importance of those needs and changes and got the final motives that made up their minds on which changes to go on and work with.

Figure 4: Results and uses, interpersonal level.

5.3 Collective

General influence	*Commentary*: The social welfare committee has decided that a detailed plan shall be drawn up on how to take care of the findings from the evaluation. The development committee is analysing the evaluation report in order to tighter anchor the evaluation findings to other change measures in the organisation. The IS manager has introduced the evaluation to the vendor; the evaluator is invited to give a seminar on the evaluation with vendor.
Cognitive and affective	*Commentary*: The evaluation has been presented to 10-15 of the largest municipalities that uses the same system. Evaluation of Procapita has become an issue in other organisations.
Motivational	*Commentary*: A month after the evaluation report were delivered the IS manager stated that "we are already in action, the benefits are concrete and the thoughts are used". The evaluation has activated different organisational structures and motivates to go on and make betterments.
Behavioural	Commentary: The IS manager has decided not to terminate the system but to renegotiate the contract with the vendor. The renegotiation has started. The evaluation process gives rise to diffusion in other areas than the focal matters of the evaluation. An information security education for 250 managers within the municipality has been held; conceptualisations produced in the evaluation are used in the education. The IS-manager explained that "the insights from the evaluation gave me the extra strength to negotiate the funding for the education that was not planned for in this budget". Another example is that a new element, evaluation, is now incorporated in the business plan.

Figure 5: Results and uses, collective level.

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6. A model of interpretive evaluation results and uses

We found the influence framework to be a useful instrument in order to locate and elaborate on the results and uses of the evaluation. The framework helped us recognise influences from the evaluation on different levels and via different mechanisms. The analysis also brings an understanding on how socially mediated changes set into motion a cascade of changes in the organisation. The framework represents influences from evaluation by starting within the individual body of knowledge and feelings – we recognise this as an important acknowledgement both from this study and from other similar studies that we have performed.

It was sometimes thorny to categorise observations into entrances in the framework, especially to differentiate between cognitive/affective and motivational processes. Maybe the framework is too fine-grained for our purpose. That is why we used the dashed lines to separate between the processes.

As a contribution from our study we have created a model depicting results and uses from an interpretive IS evaluation (figure 6). The evaluation process is a temporary practice related to ordinary continual workpractices. In this case we distinguish several related workpractices as case handling (involves IS use), unit managing practice (includes governance of case handling), IS managing practice and IS maintenance practice. The evaluation practice is concerned with these continual practices and is furnished with knowledge from them through the participating stakeholders. Stakeholders/participants go back and forth between the temporary evaluation practice and their respective ordinary workpractice. They bring experiences from their practices to the evaluation and they gain insights from the evaluation dialogue-seminars which they bring back to their workpractices. The evaluation produces gradually written documentation which the participants also can bring back.

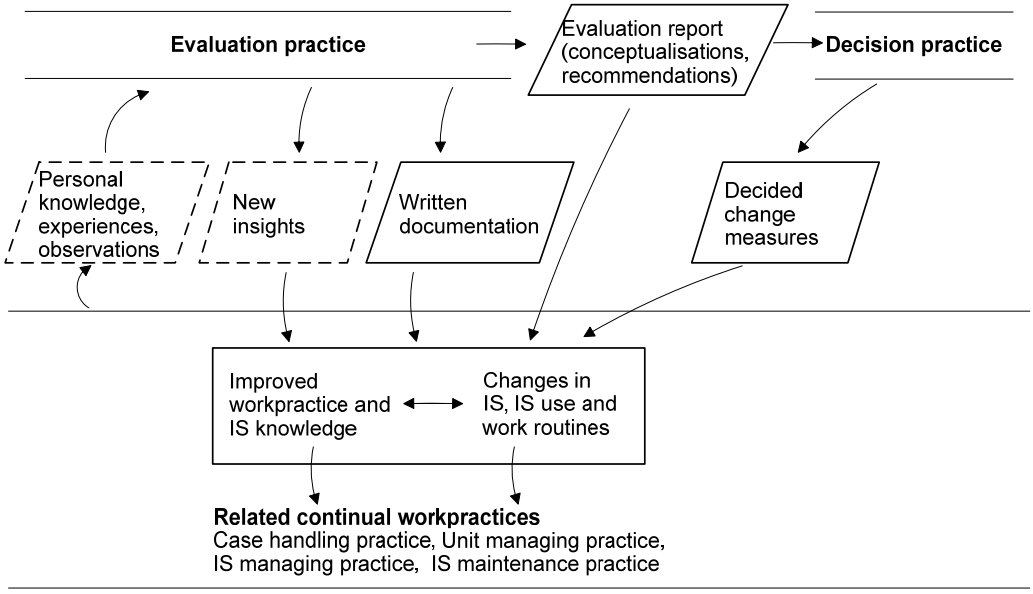


Figure 6: Evaluation results and uses.

Participation in the evaluation yields learning about their workpractice. These new insights may be turned into changed behaviour in workpractices and even in immediate changes in routines, IS uses and sometimes in IS changes. There is a flow of knowledge from the evaluation process to the ordinary workpractices during the conduct of evaluation. People may do not wait until the evaluation process has come to an end and a formal report is written, and formal decisions are taken, to start changing their workpractices. New insights are often imperative to action. People may also bring back parts of the emerging written documentation from the evaluation arena. They may show them to their colleagues and together reflect on possible interventions. What is described here are process uses in the continual workpractices during the evaluation process.

One essential result from the evaluation practice is of course the written evaluation report which comprises documented learnings about the evaluation object and recommendations for future actions. Such report is often handled in some official decision context; we call it a decision practice. Decision makers make deliberations based on the report and produce some formal decisions, which often will be change measures to be implemented in the ordinary workpractices. The decision practice and the continual workpractices are different workpractices, which may explain why not always the decided changes correspond to the

implemented ones. Implementers (from outside and inside the continual workpractices) usually make adaptations of the stated decisions during the implementation process.

In our model we recognise the different types of uses (process, instrumental, conceptual and symbolic) that are represented in the evaluation research literature. Process use is characterised in the flow of knowledge between the temporary evaluation practice and the related continual workpractices and in the transformation of thinking and doing in these practices due to the knowledge that is produced in the process. Conceptual use, that usually refers to that general learning that takes place from reading the evaluation report, is represented both in the learnings due to participation in the evaluative dialogues and due to the reading of documents produced in the process. Instrumental use is represented in the model by the decision practice and the flow of decided change measures into the continual work practices. The symbolic use that refers to the "evaluation ritual behaviour" of decision makers in order to justify the rationality of an agency could be more of an aspect of using the model itself and is not an aspect within the model.

In our model there is a distinction between result and effect. This is an important pragmatic insight made by for example von Wright (1971); confer also Goldkuhl (2005). The result is what is produced through an action and this is what is within the range of the actor. Effects are what arise as consequences through the use and influence of the action results. This distinction can be used to make a "macroscopic" clarification. The evaluation process will create an evaluation report as a primary result for instrumental use. It is important to conceive that uses and effects of this report may be different from what is stated within it. Suggested change measures may be rejected by the decision makers or they may be transformed in the implementation process. However, "microscopic" effects arise already in the evaluation process. Evaluation statements are interpreted by the participants and they bring this knowledge back to their continual workpractices, as described above, and process uses occur.

This distinction between results and effects must also be complemented by the pragmatic insight of action reflexivity (e.g. Mead, 1938; Giddens, 1984; Goldkuhl, 2005). The actions conducted always act back on the actors themselves. There is a natural learning inherited in all action. The actor perceives the result of her action and possible effects of it. Knowledge evolves through action (Kolb, 1984). People learn through participating in evaluation. There are not only external results as produced evaluation statements. Insights among participants arise through the process; both as consequences from listening to the evaluation dialogues and as reflections from their own active participation. As said above, these insights produce process uses.

7. Conclusions

In order to understand the consequences of interpretative evaluation processes we need conceptions on how such processes produces results and how these results are used to be transformed into effects. Conceptions, in the shape of models, frameworks and illustrations help us to recognise how evaluation outputs proceeds into evaluation outcomes. We also need vocabulary and grammar for the consequences of evaluation so that we can talk about those in a comprehensive manner.

We have suggested a model of interpretive evaluation results and uses. The model uncovers the process where evaluation outputs transforms into outcomes. The results and use model is anchored in empirical findings from interpretive evaluation processes and in literature on evaluation, knowledge and change. In our case there is gradual use of insights and documentation during the evaluation process. This may not be the result of any formal decision process. Stakeholders, participating in the evaluation, just start adjusting their behaviour according to their improved knowledge. This new behaviour may imply changes in work routines, in IS use and in the actual information system. There is also a more formal chain of actions; from evaluation to evaluation report and further to a decision practice resulting in formal decisions which can lead to implementation of planned changes in workpractices and information systems.

We think it is important to include awareness and logic about the different type of results and the different type of uses into the design of evaluations, as well as into the design of evaluation methodology. We need evaluation methodology that guides and supports an interpretive evaluation process, that recognises the process as an intervention within its own procedures and results, and that especially acknowledges the process use that take place during the ongoing evaluation. This will help us to better understand and appreciate such evaluation processes for its capability to generate change and betterment. Then, we think, we have improved the opportunities for better use and usefulness of interpretive IS evaluations in practice.

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