

# Using process mapping and business process simulation to support a process-based approach to change in a public sector organisation

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## Abstract

A case study demonstrates the use of a process-based approach to change regarding the implementation of an information system for road traffic accident reporting in a UK police force. The supporting tools of process mapping and business process simulation are used in the change process and assist in communicating the current process design and people's roles in the overall performance of that design. The simulation model is also used to predict the performance of new designs incorporating the use of information technology. The approach is seen to have a number of advantages in the context of a public sector organisation. These include the ability for personnel to move from a traditional grouping of staff in occupational groups with relationships defined by reporting requirements to a view of their role in a process, which delivers a performance to a customer. By running the simulation through time it is also possible to gauge how changes at an operational level can lead to the meeting of strategic targets over time. Also the ability of simulation to proof new designs was seen as particularly important in a government agency where past failures of information technology investments had contributed to a more risk averse approach to their implementation.

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## 1. Introduction

Although there is no agreed boundary between public and private sectors in the UK it is estimated that employment in public sector organisations is approximately 6 million, of which 550,000 are employees working for direct government agencies (i.e. civil servants). One of the largest employees in the world is the state-run National Health Service (NHS) with some 1.16 million staff employed in England alone (Walker, 2003). In recent years, business process approaches to change have become increasingly popular in the public sector (MacIntosh, 2003; Gulledge and Sommer, 2002; Thong et al., 2000; McAdam and Donaghy, 1999; McAdam and Mitchell, 1998; Harrington et al., 1997; Halachmi and Bovaird, 1997). The original concept of process change through the use of business process reengineering (BPR) projects was first described by Davenport and Short (1990); Hammer (1990).

These authors defined a 'first generation' re-engineering concept of a new, radical, IT-led, mechanistic and inspirational approach which has been evolving into a 'second generation' process management concept of a hybrid, contingent, IT-enabled, holistic and systematic approach (Cypress, 1994). This evolution results from the recognition of an overemphasis on reductionist and mechanistic aspects, in which crucial issues such as people and strategic issues were simply ignored (Melão and Pidd, 2000). However, a feature of process management remains that of a focus on business processes, with the optimum arrangement of these processes and tasks within the organisation considered to be a critical design variable determining the efficiency of the resulting structure (Orman, 1995). The task of redesigning the process structure is however complex, as changes will be made that may affect different, but interacting and interrelated dimensions of an organisation such as its processes, people, strategy, environment and culture and the reported failure rate of projects is high (CSC Index, 1994).

It has been argued that one of the major issues that contributes to the high failure rate in business change

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projects is a lack of tools for evaluating the effects of design solutions before implementation (Paolucci et al., 1997; Tumay, 1996). Without this ability mistakes brought by change can only be recognised once the redesigned processes have been implemented, when it is usually difficult and costly to correct a wrong decision. The risk of this occurring may be leading to less than radical design changes, or even simply automation of current process designs which is unlikely to maximise the benefit of investments in information technology. In relation to business processes in local government Klood and Martin (2000) state that the lack of information on processes and the effect of process change on costs means that managers are uncertain about how to proceed when the effects of change cannot be estimated. In order to reduce the risk in the implementation of change projects Meel and Sol (1996) advocate the development of computer-based models of business processes to support the process of experimentation with alternative business structures. Bal (1998) also highlights the support process analysis tools can provide in the analysis of the current process design. These include achieving a full understanding of the process to be redesigned and creating a shared vision and understanding of the current process design among the redesign team. Haque et al. (2003) show the use of a process modelling tool for analysis at both a high level process and project management level and at an operational and detailed process level.

A study is presented based on a process-based redesign of a road traffic accident (RTA) reporting system based within a UK police force. The study will examine a process-based approach to change in the context of a public sector organisation using the supporting tools of process mapping and business process simulation. The technique of process mapping involves interviewing personnel and observation of the relevant process that provides information, which is used to draw a process map. The analysis shows the interrelationships between activities and identifies the elements and roles involved in process execution. Harrington (1991) outlines a number of mapping and flowcharting techniques. Business process simulation (Tumay, 1996) is seen as a way of analysing dynamic systems that exhibit variability and has been traditionally used in a manufacturing context, but it is increasingly used in service and public sector organisations. Some examples of use are Levine and Aurand (1994) who describe the use of simulation to analyse an automated workflow system of an administration process, Greasley (2000) who describes the use of simulation to analyse a custody of prisoner process, Verma et al. (2000) who describe its use in redesigning check-processing operations and Hays and Bebbington (2000) who describe its use in a government agency overseeing film and literature classification. However, the use of BPS in general is low, with a UK survey of current or past users who had been trained in the technique giving

a usage rate of 21% across industry and 22% in public sector organisations (Melão and Pidd, 2003).

## 2. Methodology

A case-based research methodology was chosen with the aim to provide an example of practice and test the proposition that the supporting tools of process mapping and business process simulation can improve the success of a process-based approach to change in the context of a public sector organisation. Although, a single-site study has obvious limitations with respect to the generalisability of the findings, the case is not aimed at being representative, but rather exemplary, thus the researcher does not need to assume that what is observed is truly representative of all similar situations (Stuart et al., 2002). In this example a regional police force in the UK shows many of the attributes of many public sector organisations in its structure and reporting relationships, and the involvement of a number of stakeholders in determining strategic targets and operational rules. Collection of data such as process durations, task allocations and process relationships for the study was undertaken by the author and employees of the organisation in order to construct the process maps and simulation used in the analysis of the process designs. These tools thus provided a way of achieving an understanding about the current and future potential design of organisational processes without the risk of disruption to the real system itself.

## 3. The road traffic accident case study

A case study is presented of a proposed process change initiative to a police RTA reporting system. Two aspects of performance of the RTA system require particular attention. The need to speed process execution is seen as essential to provide a faster and more efficient service to vehicle drivers. In particular there is a need to provide UK government agencies, such as the Department for Transport, with accident statistics within a 4-week time period. The second aspect of performance, which requires improvement is the need to reduce the relatively high staffing cost associated with the process. The total cost of traffic police staff is relatively high as their on-costs need to include the purchase and maintenance of a police patrol vehicle. There is also a need for extensive administrative support at locations across the area covered by the police force. The current and proposed process designs for actions leading from a RTA will now be discussed.

### 3.1. The current road traffic accident reporting system

The current process at the selected constabulary for the reporting and recording of accidents involves a police

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