Supporting Strategic Conversations: The Significance of the Model Building *Process*

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Abstract

This paper reports on the use of both qualitative modelling (i.e. Journey Making) and quantitative system dynamics simulation modelling for a strategy making process in a UK police force. The main focus of the work is on the tension between the supply of resources (i.e. police officers) and the demands placed on those officers. The strategic conversation that took place was facilitated by 2 modellers - one focussing on managing the strategic enquiry, while the other considered the implications of the conversation for the system dynamics model. Three key strategic conversations emerged: the management of quality with respect to staff, measuring productivity, and the role of public expectations. The work raises issues for both model building processes and the strategic management of any public organization.

Introduction

Although the role of operational research modelling within the context of the operations of the organization is well established, operational researchers have had less of an impact at the strategic level of organizations. What is generally referred to as a 'soft OR' has had some impact through the use of causal mapping (Journey Making Eden and Ackermann, 1998) and the Strategic Choice Approach (Friend and Hickling, 2005). In particular, Journey Making reflects the commitment within operational research to explicit qualitative modelling that is amenable to analysis and also reflects a developing set of strategic management concepts (Bryson *et al*, 2007). Additionally, in recent years, there has become a growing interest in multi-method operational research (for example Jackson, 1999, Mingers, 2000, Mingers and Brocklesby, 1997, Mingers and Gill, 1997, Munro and Mingers, 2002). The research reported here addresses the use of 'soft-OR' – Journey Making as the basis for strategy making in a large public organization, with the addition of system dynamics modelling as a basis for exploring the veracity of the key strategies agreed by the top

management team. Throughout all of the work discussed the process involved group model building with little 'back-room' modelling.

The research results in some lessons and implications for modelling: the use of simulation modelling to inform strategic *conversations,* modelling as a dialectic device, the facilitation and modelling roles that are required when balancing quantitative modelling needs with a good strategic enquiry, the complementarity of 'soft' and 'hard' modellinh and the contribution this could provide to a strategy process. In addition the research has clear implications for the strategic management of public organizations.

Background to work

This paper reports on the experience of using system dynamics simulation modelling as a significant contribution to strategy making in a large public organisation. The experiences are set within one of the largest UK police forces. The police force manages a large area, which includes both an urban and a rural area. The force employs over 10,000 officers and support staff.

The strategy development was undertaken with the executive team of the constabulary, that is, the Chief Constable, Deputy Chief Constable, Assistant Chief Constables, and the senior managers responsible for human resources, legal services, and information technology. The strategy developed was the result of three full one-day workshops involving all of the executive team and five evening mini workshops involving subgroups of the executive team. The substantive output was: an agreed goals system that became the basis for writing the mission statement and vision statement, prioritised strategies that were judged to have the highest leverage with respect to the goals system, action programmes with respect to each of these key strategies, and agreement about the executive team members responsibilities for implementation. However, the strategy making process was also expected to contribute to the development of the executive team as a team. The majority of the members of the executive team were new to it and so the Chief Constable was keen to ensure that executive team members had an opportunity to express their views about the future of the force and so learn from one another and develop trust and confidence in each other.

The strategy making process was derived from the Journey Making process: strategic issue surfacing and analysis leading to the prioritisation of key strategic issues; an understanding of the emergent goals derived from the key priorities; drafting a future goals system; understanding and analysing patterns of distinctive competences; developing and exploring the business model which links distinctiveness to goals; revision of goals; an exploration of alternative futures-scenarios; stakeholder analysis and management (Eden and Ackermann, 2000; Ackermann and Eden, 2003); revision and agreement of strategic priorities; development of action plans. All of these workshop activities involve two facilitators and the use of a group decision support system ('*Group Explorer*') using a network of computer consoles. The theory and practice of the approach has been developed over the last 20 years and is derived from cognitive psychology, social negotiation, group processes, and strategic management with a particular emphasis on organisational differentiation and competitive

advantage. The explicit modelling is derived from cognitive mapping and causal mapping with particular attention to mapping formalities and formal conceptual categories (Bryson *et al*, 2004). The conceptual categories relate to a structural strategy that seeks to understand and agree the relationship between actions, environmental context, strategies, competences, distinctive competences, core competences, goals, and negative goals (Eden and Ackermann, 2001).

An inevitable focus of the strategy making was on demand management. The significance of future changes in demand as it related to the quality and quantity of the staff to tackle that demand was central to strategic discussions. Four priority strategies were agreed that were seen to significantly impact on the ability of the organisation to meet demand. Firstly, a well articulated strategy of developing partnerships with other significant organisations in order to manage the development of new crime (called "incubating demand") and the change in traditional crime became one primary strategic focus for the organisation. The second strategic focus was on the management of national performance indicators – the team were keen to ensure that inappropriate performance indicators were not used. The third strategic focus was on seeking to ensure that the reputation of the police force continued to grow. This strategic focus was designed to ensure the retention and recruitment of high quality staff. Finally, the fourth strategic focus was on the development of a more effective human resources strategy.

The final, overall strategy was developed following analysis and negotiated agreements in relation to a series of complex causal maps. However some of the key aspects of the strategy were also summarised through an emergent feedback structure. Although the feedback structure has generic public sector properties, it nevertheless was seen to be very specific to this police force as they saw themselves at that particular time in their development. It is worth noting that it is often the case that a summary strategic focus looks like a generic strategy and yet it represents an emphasis on a *specific portfolio* of generic strategies that are particularly relevant to the organisation at that stage in their life. Thus, apparently similar strategies are different because of their different emphases.

Figure 1: Summary map of the feedback structure ABOUT HERE

The overall summary map of the feedback structure is represented in figure 1. Some of the feedback loops in the structure appeared to be producing desirable behaviour in the real system at this point in time - for example, the role of reputation in developing high quality staff and so the ability to meet demand, which in turn affects reputation. Needless to say, the executive team were concerned that there might be conditions where the positive, currently virtuous, feedback loops might switch to produce undesirable outcomes by driving vicious cycles. In particular, they were concerned that the impact of a significant budget decrease on their ability to meet demand might trigger vicious cycles. Similarly they were concerned that their influence over the agreed national performance indicators might result in unrealistic public expectations, which in turn could trigger vicious cycles. In order to explore some of these concerns, the client group requested that further work be carried out.

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The Modelling Process

The need to explore the behaviour of feedback loops over time led to the decision to adopt a system dynamics simulation approach (Forrester, 1961, Sterman, 2000). Although our own inclination would be to start constructing a rough and ready system dynamics simulation model that represented the real system, as has been our experience with most client organisations, an understanding of what a simulation model could do for them was missing. In addition, it has long been recognised that the process of building the model can be more valuable than the model itself (Mitchell, 1993, Morecroft and Sterman, 1994). Our experiences with other organisations have suggested that some of the greatest benefits from *attempting* to build a simulation model derive from the questions that arise from seeking to develop the formal structure of a system dynamics simulation model - determining the stocks and flows, and how they relate to one another. Thus, our initial task was to introduce the possibility of building a simulation model and the benefits that might derive from it. Our approach was to construct a very crude part of the simulation model with some very rough quantification and hope that by demonstrating the model it would prompt a conversation that was seen to have been useful (the simulation model is akin to Richardson & Andersen's 'concept model' (1995)). We hoped that the nature of the conversation would be seen to be valuable and so encourage continued incremental development of the model that would gradually lead to answers to the question of what the risks were from implementing the key four strategies, with particular emphasis on the probability that the force would be required to revert to traditional policing.

There was a lukewarm reception to our 'demonstrator model'. It was presented to the deputy chief constable and three other members of the executive team during a 1 1/2 hour session at the end of a working day. One of the assistant chief constables "could not see the point of quantifying judgement" and "our judgement that we would be able to manage a budget decrease without it affecting our strategies is good, and we don't need the help of spurious computer models to tell us". Nevertheless, the deputy chief constable, with some support from two members of the executive team, was keen to "give it a go". Needless to say, the head of the corporate planning team, sitting in on the meeting, was very keen, and thought that the model could help him answer some other important questions about the resourcing of the organisation. His interest was not in the strategic conversation that would take place during the construction of the simulation model but rather in a final model.

The agreed outcome of the evening meeting was that we would plan a series of short, two-hour, meetings that would involve the deputy chief constable, one other member of the executive team (alternating), and someone from the corporate planning team. The initial focus of these meetings would be to work on the supply side of the model - in particular, what was meant by quality of staff and its impact upon managing demand. A longer-term objective would be to focus on the demand side of the model by seeking to articulate how demand might be quantified and how it related to public expectations. During the original strategy making episodes, half a day had been spent constructing a range of scenarios about potential future demands, and so it was hoped that the modelling process might describe these scenarios more completely.

The Nature of the Strategic Conversation

At each of the sessions held with the client there were 2 modellers, each fulfilling a different role (Richardson and Andersen, 1995). One focussed on managing the strategic conversation with the client group, whilst the other considered the implications of the conversation for the system dynamics model. The client group had become accustomed to causal maps during the strategy making sessions, and so the conversation aimed at constructing the simulation model using real-time causal modelling to capture the arguments presented. In addition the team members present for these conversations were gradually introduced to system dynamics iconography of stocks, flows, and auxiliaries.

As previously mentioned, it was agreed with the client group that the initial focus of the strategic conversation would be to work on what was meant by quality of staff and its impact upon managing demand. From the discussions that took place with the client group, 3 key strategic conversations emerged; a conversation regarding the management of quality with respect to staff, a conversation relating to measuring productivity and a conversation regarding the role of public expectations. Each of these 3 strategic conversations will be discussed in turn. The strategic conversation that took place will be initially described, illustrating how the conversation unfolded based on the needs from constructing the model. Then, general issues will be discussed from the perspective of both the development and delivery of effective strategy making as well as for the management of not only a police force, but any public sector organisation. It should be noted that the discussion of the first strategic conversation is considerably longer than the second and third. This reflects the longer time spent on this conversation with the client group since it was the main conversation that contributed to creating the structure of the simulation model.

(i) Strategic Conversation 1: Managing Quality

The impact of 'high quality of staff' on the organisation's performance can be seen in figure 2, which is an extract from figure 1. The feedback loop shown in this figure demonstrates a strategic focus on continuously increasing the overall quality of staff through retention and recruitment of high quality staff. This was to be achieved via the strategy put in place to manage reputation. This had been seen to be key to ensuring the feedback loop was a virtuous rather than vicious cycle.

Figure 2: Extract from figure 1 showing impact of 'high quality staff' ABOUT HERE

Sustaining and growing high quality staff delivers demand management and is key to enabling the organisation to benefit from the success of the virtuous cycle believed to be so crucial to their strategic future. Senior managers believed they had a clear sense of what quality meant and, in particular, were of the view that their reputation had enabled them to recruit high quality people. The significance of their reputation as a successful police force had led to the articulation of a "reputation management"

strategy. However, while the qualitative arguments captured through causal maps had been persuasive, the executive team had not made serious attempts to make explicit what quality meant and so how it might vary over time. In order to manage, strategically, the quality of their staff they recognized a need to ensure that the organisation retained and promoted high quality staff.

The qualitative variable 'high quality staff' was a key variable for the management team, and yet it encompasses two variables: quality and staff numbers. Early discussion suggested that the team conceived of 'high quality staff' and 'not high quality staff' across a relatively fixed number of total staff. They viewed the proportion of staff that was currently high quality being higher than for other forces, and believed this to be the case because of their ability to recruit good staff as constables or cadets. This assertion suggested a very simple stock and flow: a stock of 'high quality staff' with an inflow of 'high quality recruits' and an outflow of retirements; and a stock of 'not high quality staff' with an inflow of 'not high quality recruits' and an outflow of retirement. The stock and flow diagram displayed no connections between the 'high quality staff' stock and 'not high quality staff' stock – as none had, so far, been suggested.

The implications of the stock and flow diagram showing a lack of any connection was quickly denied and it became clear that the quality of staff was also affected significantly by the makeup of the force, in particular the experience levels of staff. The experience, and so ability, of members of staff in handling a wide range of complicated situations was regarded as one of the primary indicators of quality.

The career status of a member of staff was expected to be related to both experience and so quality and quality directly. Thus, someone of a high rank was generally expected to be more experienced and to be promoted on the basis of them being better quality than others bidding for the rank. Also a high quality newly recruited cadet or constable was not regarded as high quality until they had gathered appropriate experience.

These aspects of the conversation suggested that the quality of the force as a whole might, therefore, be represented by a combination of the aggregate years of experience and rank profile. This was a representation that would deny the assertion that the proportion of high quality staff was higher than other forces, unless this force was significantly more experienced than others. If experience was the key factor then reputation and recruitment were irrelevant. A quality index of this nature ignored the role of, for example, reputation in recruiting people of high quality - an important presumption in the feedback loop. So, what did recruiting people of high-quality mean in relation to experience or rank? The construction of the initial structure of a simulation model had already highlighted that the mixtures of assertions were becoming muddled and contrary in their logic.

The modeller was working hard to keep the model simple. It was likely that the extent of the iconography associated with a simple view of staffing and demand would become opaque to the client team, and so requisite modelling (Phillips, 1984) was regarded as particularly important. As the conversation continued clarity emerged through the disaggregation of ranks. The force was believed to be able to recruit a higher proportion of cadets and constables of potentially higher quality –

meaning they reached the appropriate quality of experience earlier than others and were also more likely to be promoted to sergeant. Similarly, promotion to inspector (the next rank upwards) was expected to create a cadre of higher quality inspectors. Each rank contributed to the organisation in a different way. This impacted the model by altering it into a chain of stocks and flows representing a police officer moving up the ranks. See, for example, figure 3. In order to make this model work, information was needed on promotions (to understand what drives the flows) and on the contributions of the different ranks to the output of the organisation. In discussion with the client, not only was it felt that different ranks contributed to the organisation in different ways, but that there was also high quality and lower quality staff within each rank.

Figure 3: Extract from a simplified model illustrating chain of stock and flows representing a police officer moving up the ranks ABOUT HERE

To begin to explore the assertion of higher proportions of high quality staff, the client was asked if the organisation has any mechanisms in place that identify 'high quality' and 'low quality' staff. The discussion followed a presumption that the internal appraisal system identified the quality of individual members of staff. A staff officer suggested exploring the actual data on the results of the annual appraisals, and also 'jokingly' suggested that "nobody ever gets a bad report".

Investigation of the data relating to appraisal system outcomes showed that a large majority of the staff are normally graded as a '4' in this system (where the system is based on a 1-5 scale with 5 indicating that the performance of the member of staff is excellent). Was this a fair representation of the proportion of high quality staff? If so, what was their impact compared to that of the minority, and compared to that of staff from other police forces? And, what did relative quality mean for managing demand? These data meant that the appraisal mechanism did not adequately distinguish between the two different quality levels of staff and thus would not be useful in informing the modelling process.

The chain of stocks and flows were further developed by replacing each stock with 3 others; poor quality, average quality and high quality staff for that rank. See for example figure 4. Each of these stocks required an initial number of staff to be assigned to it. The HR department could provide data on the total number in each rank, but not the split between poor quality, average quality and high quality staff for each rank.

Figure 4: Extract from chain of stock and flow splitting each rank into 'best', 'average' and 'poor' quality staff ABOUT HERE

'Expert' judgement was gathered from the client team to seek some basis for the proportions of poor, average, and high quality staff. The modellers were surprised at how close judgements across the executive team members and support staff were on this issue. They were, in general, in agreement on the percentage of poor, average, and high quality staff in each of the ranks, but they were different from those suggested by the appraisal system.

Issues for the Development and Delivery of Effective Strategy – managing quality

The modelling requirements had forced out a more precise re-assertion of quality being specifically related to demand management – the link in the strategy map shown in figure 1. The notion that quality was related to experience and that experience was related to handling complex situations, which impacted managing demand, had become clearer in the minds of team members. However, the modelling needs for precision and also simplicity, combined with the nature of system dynamics modelling with its emphasis on stocks and flows had led to an inability to identify which staff were high quality.

Strategically managing quality demanded monitoring quality, which required developing a better understanding of what 'high quality' or 'best' meant with respect to all of the staff, and who were the 'best' staff in the organisation. The expert judgement was sufficient to be able to populate the model that was being constructed, however simply being aware that a certain percentage of staff are high, average and poor quality is not sufficient to adequately manage the organisation. The client needed mechanisms in place that enable them to identify specifically who are their best staff.

The learning which the client gained throughout the high quality staff modelling conversation emphasised that the management of their staff was crucial to the overall success of the organisation, and that the appraisal system was not adequately delivering this requirement. As a consequence of these conversations, which had included the HR Director, he suggested and was supported in undertaking a series of separate strategy making work within the HR division. The conversation also added impetus to making the appraisal system work better.

As the model was sketched out with 'reasonable and plausible' parameters, some initial runs were made to ensure the logic of the model - which had become more complex than originally intended. These runs produced a particularly interesting outcome of major strategic significance. The existing staffing profile was not in equilibrium – there were more junior staff (cadets and constables) than was suggested by stable proportions of staff across the ranks over time. The conclusion was robust against uncertainties with respect to estimated parameters. The changes over time (a five year period) suggested a significant 3.5% increase in the salary bill. When set against expected budget cuts this outcome risked the virtuous cycles resulting from strategic initiatives being switched to vicious through the enforced introduction of 'traditional policing' (shown in figure 1).

It is interesting to recall that the initial prompt for this work related to a fear that external budget cuts would prompt the return to traditional policing. And yet, at this stage of the model building it was possible that the internal dynamic created by an imbalance in the proportions of staff across the ranks was the biggest concern.

Generic Public Sector Issues?

In most public sector organizations staff are the most crucial resource for managing demand. The quality of staff is always important. Understanding what quality might mean with respect to demand management is probably under-explored. Simulation modelling may provide a designed conversation that 'forces' a discussion that not only develops a view of quality, but also the nature of quality over time (and so salaries) and the processes for identifying which specific members of staff are in different quality categories in order that quality can be directly managed. It is likely that appraisal systems are unreliable in meeting this requirement. Exploring alternative balances within the career structure of the organization becomes possible, and also the dynamics of moving from one structure to another comes to the forefront.

(ii) Strategic Conversation 2: Measuring Productivity

The modelling requirements had driven the strategic conversation to a point where the percentage of poor, average, and high quality staff in each of the ranks had been identified. The model now required data that would provide a measurement for each of the categories of quality. For example what did 'high quality' staff mean in relation to demand management and how does high quality compare to average quality staff? The model would simulate how staff dealt with demand over time, therefore it required data on the productivity levels of the different categories of staff. Although 'productivity' is a typical term for a simulation modeller to use, when it was introduced to the client group, they were not comfortable with its use. Policing is a complex activity and they were uncomfortable with attempting to represent it as a single measure. This situation produced a tension between the need to manage the strategic conversation and the needs of the simulation model. In principle the needs of the simulation model would design the conversation, but very often the model needs interfered with a good strategic conversation.

Although it could be possible to have one modeller fulfil both roles, bringing together the two modellers with differing, but complementary skills was believed to be a particular strength of the modelling process. Although the modellers' main skills and expertise differed, they had experience of each others' roles and therefore had sympathy regarding what the other was trying to achieve. However working together as a pair did still cause tension when one was particularly focussed on the clients issues and their reluctance to move towards a single measure for quality whilst the other was particularly focussed on achieving a working simulation model.

To move the modelling process forward, the various activities involved in policing were discussed with the client group. For example, every day activities such as dealing with emergency calls, time spent in the courts giving evidence, keeping the peace at football matches, to unexpected demand such as responding to terrorist situations. Due to the reluctance of the client group to discuss absolute values of productivity, it was decided that to get a working simulation model it was the differences between the productivity levels of the various staff categories that were of particular importance. Therefore, rather than focussing on the 'productivity' of an individual officer, the client group were asked to compare the productivity of one

category of officer with another. An anchor point of 1 was set for the productivity of an average quality sergeant (this was chosen as it was a category in the middle of the chain of stocks and flows) and other ranks and quality levels were compared to this category.

During this part of the project, the client group took some time to consider the role of individual managers. Instead of an individual contribution to meeting demand, it was judged that a high quality manager may have a positive impact on the effectiveness of their whole team. Therefore, the difference between an average quality and a high quality manager was that a high quality manager would organise and motivate their team to such an extent that it resulted in increased effectiveness for the whole team.

Issues in the Development and Delivery of Effective Strategy – measuring productivity

The client group was visibly uncomfortable discussing a single measure for the quality of different categories of staff. They explained that their anxieties lay with the complex nature of the activities involved in policing. However, when seeking to understand how the organisation can most effectively utilise its resources there is a need to understand which resources are being used most effectively, therefore it is the comparison between different resources that is of importance. The process of constructing the simulation model provoked debate regarding how different categories of staff dealt with demand, which led managers to consider explicitly the contribution of varying resources to demand management. As 'ability to manage demand' is key to the strategy of the force, this enabled a clearer picture of the operational drivers for this strategy by highlighting which areas of resources management were key to the success of the business and which required careful management.

If the assumption that a high quality manager has a multiplying effect throughout an entire team holds true, then the obvious requirement of ensuring that the organisation has good managers in place is vital to its overall effectiveness. For this to work in favour of the organisation, any promotions process needs to ensure that those officers that are promoted to managers of this level are of the highest quality. All this is obvious, but nevertheless the modelling process highlighted the need for an effective promotions process and this knowledge fed into the previously mentioned strategy making workshops with the HR division. The simulation modelling was able to demonstrate through rough quantification the considerable leverage on overall effectiveness that can be attained by getting the promotions system working well.

Generic Public Sector Issues?

As mentioned above, staff are the most crucial resource for managing demand in most public sector organisations. How do such organizations know if they are using this key resource to its optimum unless they have a measure for the relative quality of staff? However, for many of these organizations the activities of staff when dealing with demand are not amenable to a single measure of productivity. Management may feel uncomfortable in discussing 'productivity', but this is what is driving their organization. Management should, at least, discuss and be aware of the various drivers of staff productivity. An 'ability to manage demand' is not only relevant to the

strategy of a police force, but also to many public sector organizations. An appreciation of the difference in productivity levels between different categories of staff can help to highlight which areas of resources management are key to the success of the business and which require careful management.

The impact on demand management of the proportion of high quality versus average quality managers in other public sector organisations is worthy of exploration. For example, can those managing a hospital ward, or emergency unit impact the overall effectiveness of their team? If so, this places pressure on the promotion process in the hospital to ensure high quality managers are employed to enable the management of demand by the entire team to be optimised. It implies that replacement of the manager by even an average quality manager could potentially have a larger impact than expected on the entire team's ability to manage demand and thus the overall organisation's ability to manage demand. The feedback nature of demand and supply means that good demand management reduces demand and so facilitates good demand management. It is possible that public organizations might treat promotions as career grade rewards and too often see managers as bureaucrats rather than leaders who can significantly influence demand management.

(iii) Strategic Conversation 3: Public Expectations

Figure 5 (which is an extract of figure 1) shows that from the initial strategy work, the client group believed that public expectations could have a significant impact on the amount of demand faced by the force. There was a realisation that if the public perceived that the force was doing a good job (through their ability to meet demand), then the expectations of the public would increase and thus the demand they put on the force. This forms part of a controlling feedback loop. If the force is able to meet demand, this increases public expectation of the force. Their increased confidence in the force means that they place demands on them. Without additional resources, this could lead to the force being less able to meet demand, thereby reducing public expectations. However, significant delays in this feedback loop affect the nature of the dynamic with the potential of ability to manage demand, and thus public expectations, moving in one direction then the other. If public expectations were too low then the public could lose faith in the Force and this could result in the public turning to, for example, private policing where other organisations are called upon to keep communities safe. However, if public expectations became too high, this could result in excessive demand for the force with a limited resource. However, the delays could also mean that traditional policing kicks in before expectations are dampened.

Figure 5: Extract from figure 1 showing drivers and impact of public expectations ABOUT HERE

Figure 5 also shows that national performance indicators are believed to have an impact on the demand faced by the force through public expectations. These performance indicators are decided at a national level and pushed onto police forces. They may require unrealistically high performance standards, which, if they are to be met, can result in overly high expectations from the public, thus leading to increased demand.

Issues in the Development and Delivery of Effective Strategy – public expectations

There had been unanimous agreement between members of the management team that public expectations impacted the demand faced by the force. However, how can such an impact be measured? The difficulty with such measurement has been highlighted through modelling work carried out for other forces (Newsome, 2007). Identifying the key drivers of organisational performance is imperative to strategy development, however an understanding of the potential impact of these drivers through quantification was expected to lead to a fuller appreciation of their importance. Without a sense of the size of the impact that a driver can have on an organisation's performance, the strategy development process cannot provide a clear judgement on potential future outcomes for the organisation.

Generic Public Sector Issues?

Public sector organisations exist to serve the public. Therefore, for any of these organisations, if the expectations of the public are reduced, then the public are less likely to make demands on the organisation. This highlights public expectations as a key driver of demand for any public sector organisation. As noted above, gaining an appreciation of the potential impact of this driver can be problematic. However, it does require careful management. Allowing it to increase excessively could create demand that is beyond the scope of the resources of the organisation, whereas a reduction in public expectations could lead to the public turning elsewhere for services, thus questioning the role of the organisation and the quality of the service it provides. Developing an understanding of the interaction of this negative feedback loop on other positive feedback loops – understanding the impact of delays and what might be the level of unrealistic performance indicators – may be a crucial factor in delivering effective public services.

Discussion

Generic Public Sector Issues?

There are, of course, always generic issues for organizations, however in this case we were interested in the response of some managers who had experienced other public sector organizations. We were taken by the reflection that they had wished that the same sorts of issues and processes had been able to inform the strategic thinking of, in particular, health service provision, fire service, armed forces, etc. It seemed to us obvious that issues about how to make sense of demand-supply tensions would be of paramount importance in these type of organizations, but the literature shows very little evidence of deep thinking about the nature of supply – quality and productivity, or demand expectations.

Unexpected outcomes of a modelling conversation

The *process* of building the system dynamics model was used to stimulate a strategic conversation with the client group. It was anticipated that this process would enable the client to explore, and more fully understand, the impact of the key drivers they

had judged to be a successful strategy. System dynamics has a history of being used to improve understanding about a system (for example Forrester, 1961, Morecroft and Sterman, 1994, Sterman, 2000), both with individual and groups of people (Vennix, 1996). Other simulation methods have also been used in a similar manner (Robinson, 2001). In this study the aspects of quantification and completing a running model became more significant than expected and supplemented in important ways the benefits from the strategic conversation prompted by the modelling. Indeed the feedback elements of system dynamics modelling turned out to be less important than the flow modelling. Warren (2008) demonstrates how understanding stocks and flows can be as important as modelling feedback relationships.

Balancing modelling needs with good strategic conversation – facilitator roles

Two modellers were involved in each of the group modelling sessions. One modeller focussed on managing the strategic conversation whilst the other focussed on the needs of the simulation model. There is evidence to suggest that it could be possible to have one modeller fulfil both roles when mixing methods. For example, Munro and Mingers (2002) have noted that it is common for individual OR practitioners to mix methods. Pollack (2009) discusses work where a single person swapped easily between paradigms. However, other mixing methods literature supports the need for separate people to fulfil different roles when multiple methods or methodologies are combined in an intervention. This is likely to be needed due to the range of skills that is required (Mingers and Brocklesby, 1997). When separate roles are considered in the literature the distinction is often made between process facilitation and content facilitation (Andersen and Richardson., 1997; Cropper, 1990; Eden, 1989; Huxham and Cropper, 1994).

In this project, the strategic enquiry initiated in the qualitative strategy making process was continued during the quantitative system dynamics simulation model building process. This meant that the skills required to progress the strategic enquiry were required in parallel with the simulation model building skills. Throughout the project, one modeller had the responsibility of protecting the veracity of the model building process and the other had the responsibility of protecting the strategic enquiry process. The authors firmly believe that both these roles could not have been undertaken by one modeller, instead 2 modellers with differing, but complementary skills are required. For this project, the 2 modellers also had experience of each others' roles and therefore had sympathy regarding what the other was trying to achieve. This is seen to be of further benefit to the successful integration of the 2 roles.

Complementarity of Soft and Hard Modelling

This work could only have been conducted in a Group Model Building manner with the use of the soft modelling as a basis for client involvement and ownership. Throughout construction of the quantitative simulation model, the client group's interest was retained by continually returning to the strategic questions. In addition, the structuring of the simulation model emerged from the structure of the soft strategy model. However, equally the significant outcomes were dependent upon the client group understanding the nature of simulation modelling i.e. the need for

quantification, and the output from the simulation model itself. For successful modelling during strategy making, complementarity of 'soft' and 'hard' methods may be crucial in enabling quantitative models to have a role to play. A strategy process, enhanced by promoting clarity through having to answer questions required to build a quantitative model, proved effective in this instance.

Closing Comments

For years we have been making the case, on training programmes, that pondering what would be required to construct a simulation model - structure and data – would provide a structured enquiry that would facilitate the design and development of appropriate information systems and mechanisms to monitor and control business performance. This experience significantly reinforces our belief in this recommendation!

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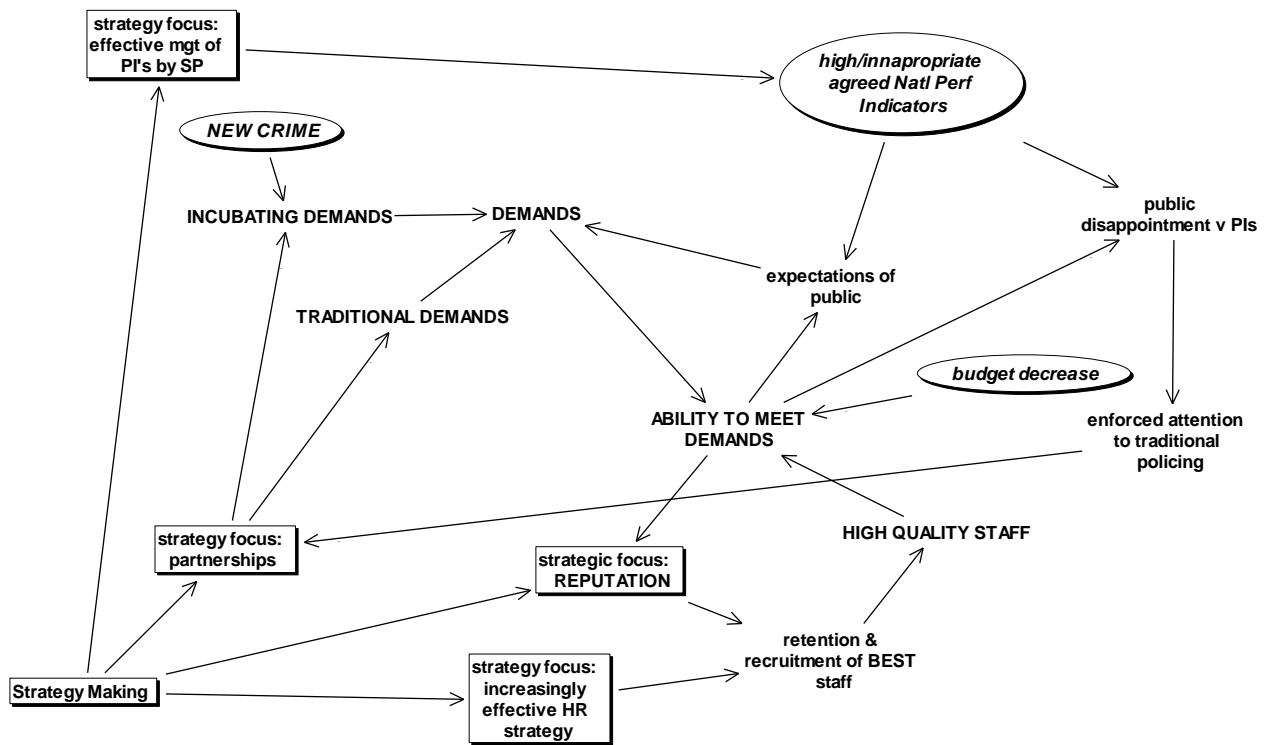Warren K (2008). *Strategy Management Dynamics.* Wiley: London.
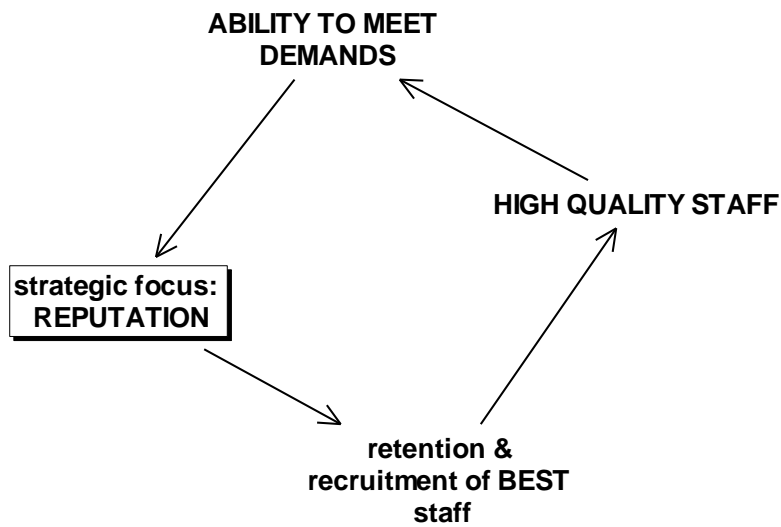
Figure 1: Summary map of the feedback structure

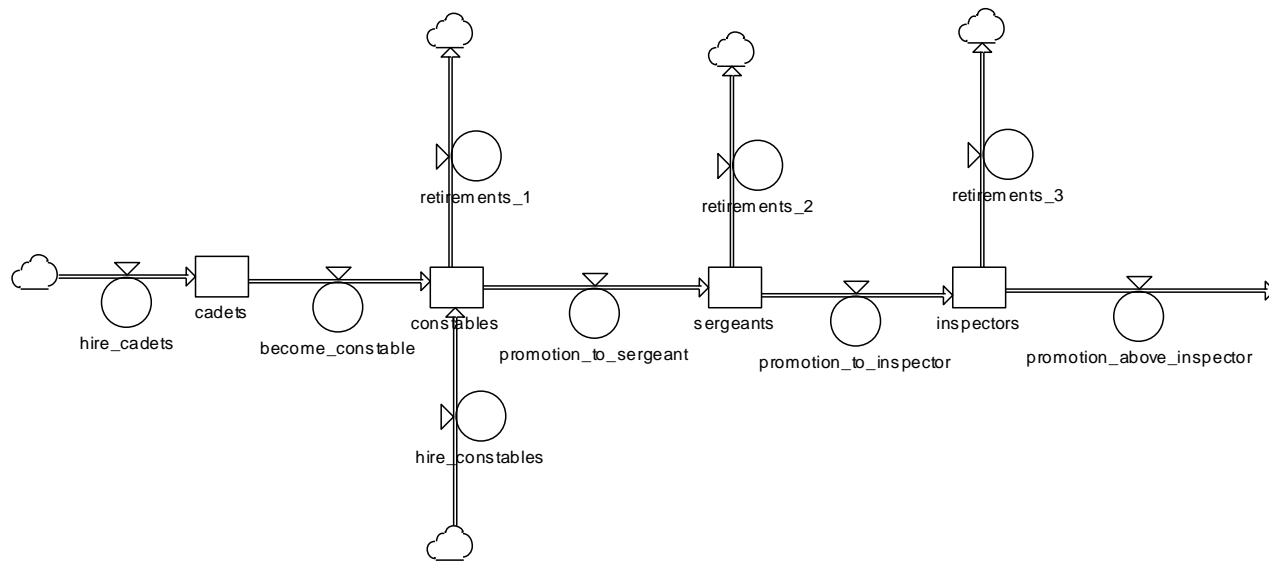Figure 2: Extract from figure 1 showing impact of 'high quality staff'

Figure 3: Extract from a simplified model illustrating chain of stock and flows representing a police officer moving up the ranks
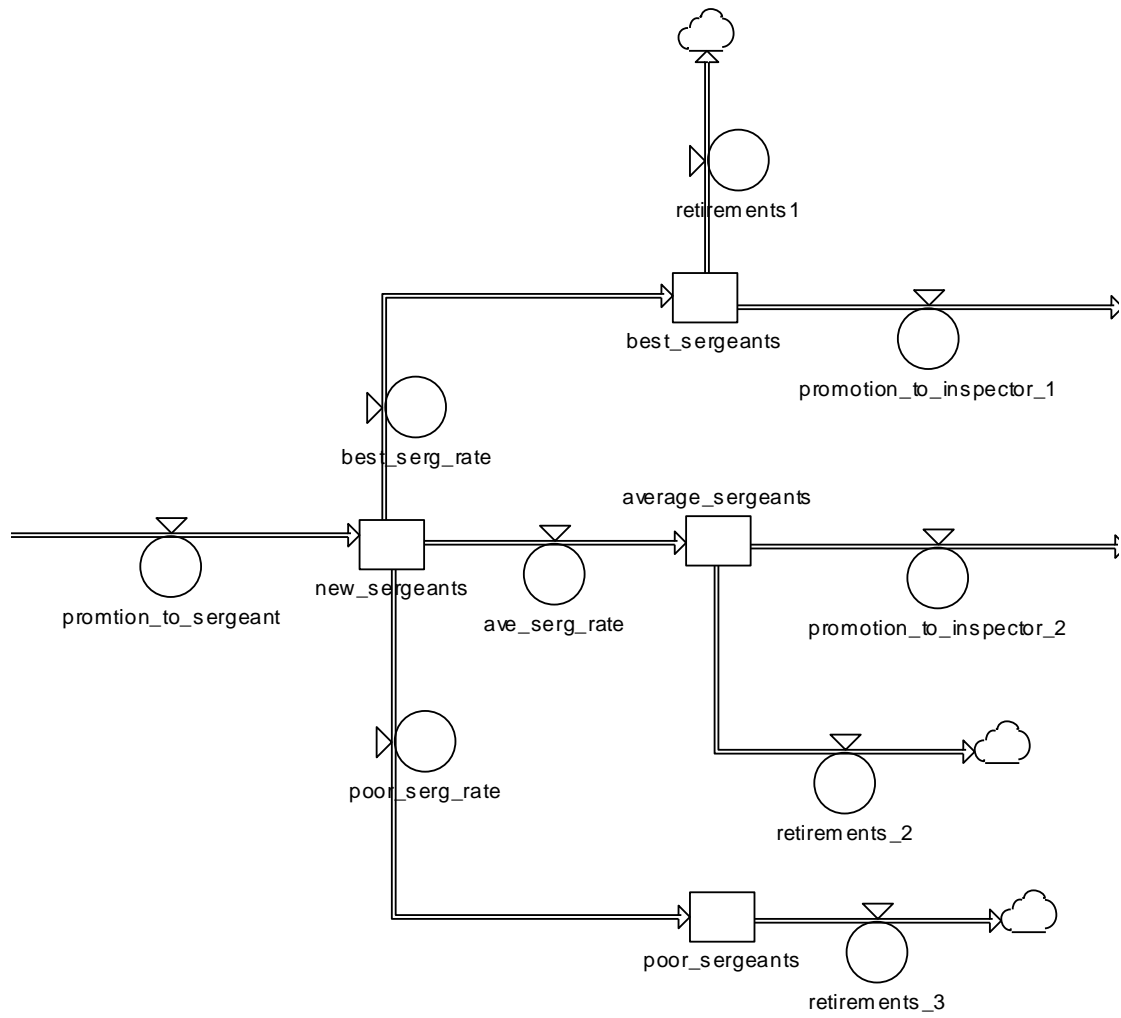
Figure 4: Extract from chain of stock and flow splitting each rank into 'best', 'average' and 'poor' quality staff
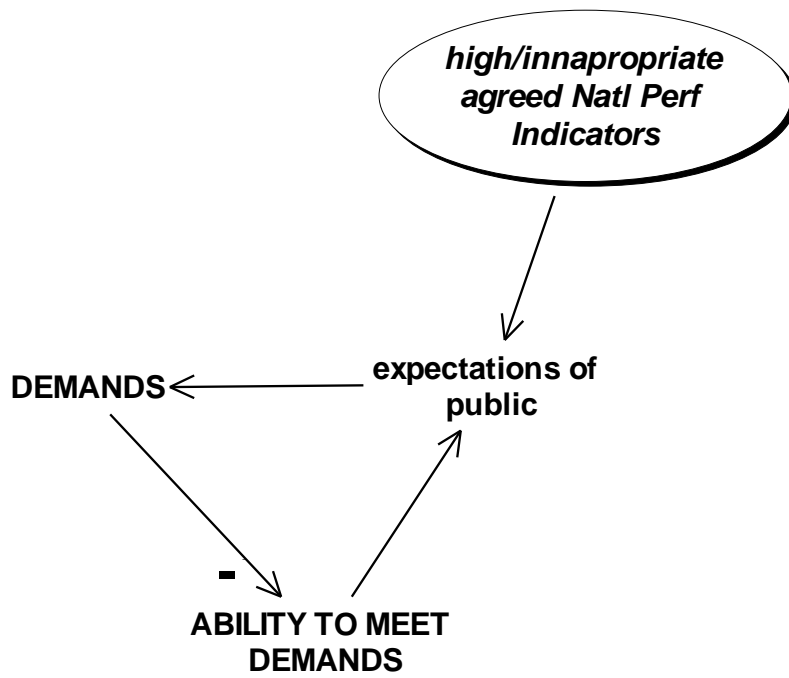
Figure 5: Extract from figure 1 showing drivers and impact of public expectations