

Moving Beyond Modern Quality Management with Systemic Thinking

by
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Early Days – Inspection & Process

Early approaches to managing for quality relied upon threats, targets and wholesale inspection. One came from Louis XIV's finance minister, Jean-Baptiste Colbert (1619-1683), who sponsored the foundation of the Gobelins royal furnishings factory in 1660, putting it under the capable leadership of Charles Le Brun, a leading artist of the day and a skilled administrator. In August 1664, noting the success of the Gobelins venture, Colbert observed that: *"If our factories, through careful work, assure the quality of our products, it will be to the foreigners' interest to get supplies from us, and their money will flow into the Kingdom."*

In the 1920s even 100% inspection proved incapable of providing reliable switches for the fast expanding transcontinental telephone lines being built across North America by AT&T. The statistician Walter Gifford then President of AT&T, set its manufacturing arm, Western Electric, the task of finding a more reliable way of assuring the production which would be of 'satisfactory, adequate and of dependable economic-quality' without recourse to total inspection. Under the leadership of Walter Shewhart (and with the help of two interns named Edwards Deming and Joseph Juran) the control chart was devised and proven in field trials before being successfully introduced as a real-time tool on the production lines of the fast developing US telecommunications industry.

This early use of statistical prediction to replace chance, and even guesswork, represented a dramatic improvement on the earlier methods of quality control based on adherence to fixed specifications. It was accompanied by another paradigm shift in the switch to focusing on the process. Process focus involves monitoring performance to know whether it is "capable" i.e. consistently reliable in turning out a predictably acceptable level of output. Having developed this understanding, the process approach then invites continuous improvement either by changing the process itself, or the inputs to the process. The process based approach has worked extremely well and has produced some dramatic results, so why would we need to move beyond it?

Process & System

Although a process focus is proving itself to be successful in improving business management practice, in many situations it is insufficient and there is a need to look beyond the connected processes to the inter-connected dynamics of the larger system. The practical limitations of process at the overall business management (systemic) level derive from the intrinsic advantages of process at the operational level. These limitations are the same factors which encourage a project oriented approach to process management (as in Six Sigma) where the old boundaries of the function are exchanged for new ones of the project.

At the outset process models assume a single given purpose. We can only talk about the process to make a widget if we accept that making widgets is what we are interested in. In reality, however much we would like things to be this simple, they rarely are. One

person's widget making process is another's process for keeping customers happy and, maybe, another's for just 'pumping' money. Quality management texts are littered with stories of conflicts between the pressures to make and deliver quality products on time. These conflicts are often presented as if they were an aberration. But they are not. They are part of the same system that has different meanings and purposes depending on the perspective of the stakeholder involved. Taking a purely process perspective is reductionist in that it inevitably ignores significant aspects of the situation. This doesn't make it wrong or flawed, but it does mean that it needs to be contextualised within a systemic (fully interconnected) view if it is not to risk either creating conflict or missing the point.

Secondly, process models cope better with linear sequences of events than they do with non-linear sequences, or parallel interdependent events. Once again, we can map the process of making a widget, but what about the complex set of relationships and decisions that got us there: decisions about resourcing and skills, agreements about delivery and sales? There is a world of complexity that is apparent both upstream and downstream of many processes, that has a very real and tangible effect on the narrow issue of quality. Using only a process based approach does not give us the tools we need to deal with the wider issues that effect quality. As a result, we often see quality professionals bemoaning the attitude of the rest of their organisation and either making demands that their colleagues see as unreasonable, or attempting to tell the rest of the organisation how it should work. This in essence was behind Deming's urging to see the company "as a system", a refrain which has been taken up by many in the quality movement. However we would argue that this has often been rhetorical rather than practical and that quality professionals have generally not equipped themselves with the systems based methodologies that would allow them to do this effectively.

The third area of weakness for a purely process based approach is in dealing with 'emergence'. The common definition of systems is that they are more than the sum of their parts. Properties that a system has, and which are not a property of any of its component parts are known as emergent properties. Typically, emergent properties are the most important aspects that we experience about a system. For the system that is a car, one of its emergent properties is 'directed motion' or plain speed. Directed motion is not one of the components of the system, nor is it a property of any of the components - it emerges from their interaction. Despite this elusiveness, it is one of the most important features of the system - without it we wouldn't buy a car. A huge number of quality issues actually have to do with emergence, because often what we are buying is an emergent property. We may be able to define and control the process for making a widget such that it conforms to our specification, but how do we guarantee that when it goes together with other parts it has the required emergent properties of 'widgetness' - or fitness for purpose? Process based approaches on their own are not good at dealing with these sorts of problems. Something more holistic, something that takes into account context and perspectives, in fact, something more 'systemic', is needed to supplement the process focused approach.

Many quality managers will protest that they already have a holistic view of their organisations, and in our experience this is often true, but it is usually either based on intuitive, tacit models that are difficult to share with others in the organisation, or on linear process models such as EFQM. Both lack precision in representing the connectivities and vital interdependences that characterise the real world which only truly systemic models can provide. Systems thinking as a management discipline emerged in the 1950s some two decades ahead of the formalised quality movement started by BS5750. In parallel with the quality movement in the 1980s it led to the developed a whole set of tools, models and methodologies to deal with the issues described above. There are three strands to the systems movement that are of particular relevance: soft systems methodology (SSM), system

dynamics (SD) and viable systems modelling (VSM). In the context of quality management, the significance of the VSM (Figure 1) is that it provides a rigorous tool for understanding the organisational context of quality. Ultimately, quality itself is an emergent property of the system. Our ability to control and predict quality depends on how good our model of the system is. VSM provides a framework for modelling the specific key relationships necessary for the organisation to remain viable through time. Modelling the relationships between different parts of the organisation shows how the operation of the system drives behaviours, affecting everything from basic operations through to the politics of strategy formation. This also provides a good platform for planning organisational change.

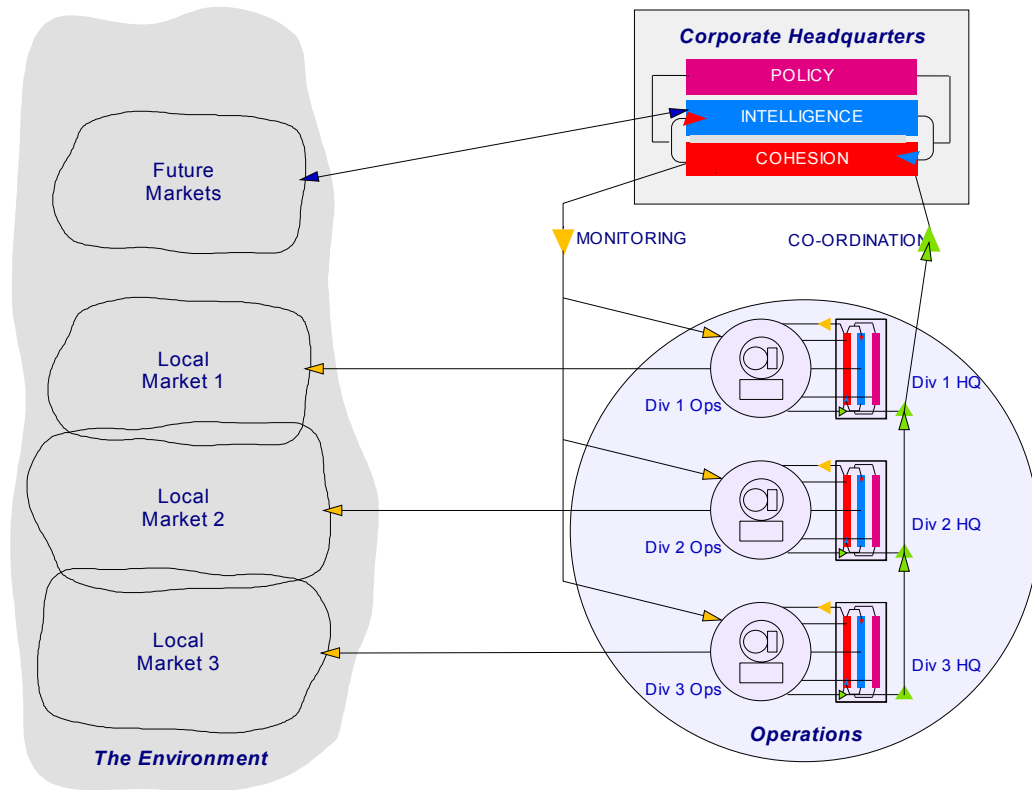


Fig. 1 The Viable System Model

Feedback & Feedforward

The nineteenth century approach to quality management relied on the principle of feedback in which a process produces a product which is inspected according to set criteria, and defects go through a feedback loop into the original process for rework. The modern process focused approach follows a double loop structure, process outputs are measured, hopefully using some form of statistical analysis (such as CuSum and SPC charting), but this time the first feedback loop is directed at changes to the process and/or its inputs. In addition, there is a second loop which looks outside the production process to assesses the suitability of the measurement criteria and drive continuous product, as well as process, improvement. Obviously, the double loop, process based, continuous improvement approach is a big improvement over the single loop inspection model, and represents a big leap forward conceptually and in terms of practical performance. It was Edwards Deming who first clearly introduced the significant second loop to his audiences in Japan in 1950 when he drew his famous chart of 'production viewed as a system' in which customer feedback was

highlighted as importantly as process feedback. Even so this method has its limitations, and the most obvious is that feedback is by definition reactive and based in the past. It can be argued that the customer feedback forming part of the second loop is not purely reactive and does in fact represent new expectations of the process. This is true, but it only represents one aspect of the gap between what the process needs to achieve and what it is capable of achieving.

Suppose that instead of a traditional feedback approach, we used feedback and feedforward, what would that tell us that we didn't already know? Well, in common with SPC, it would tell us whether the process was behaving in a stable way according to the criteria we had set for it. In addition, feedforward can help us by interpreting the statistical data and indicating the most likely meaning for changes in performance and therefore what the future performance is likely to be. If change is occurring it can identify whether it is most likely to be a) an isolated event; b) a step change in performance, up or down; c) a gradual change in performance, up or down, or d) whether the system has become unstable and therefore unpredictable. Dealing with real time data and using feedforward methods significantly extends our control of the process through time. It allows us to take steps to manage situations and problems before they have fully developed, reducing the risk, or extent, of any underperformance. Of course, the capabilities of feedforward are limited by definition of the future, and process-tuned algorithms have to be carefully crafted to reflect the 'most likely' assessments consistent with known criteria.

First Metre

While working with a major US telecoms company some years ago the first-named author was struck by the power of the industry's 'last mile' metaphor that had served it so well through the last century. It was apparent that now that technology was but a commodity available to all competitors, all customer support, at whatever stage in the relationship, would become the main business differentiator. Interest was therefore moving back from the traditional 'last mile' focus to increasingly concentrate on the 'first metre' issues of customer capture, requirement service definition and service provisioning.

Using the 'first metre' metaphor over the past few years has been helpful in concentrating the attention of participants from many types of business on the critical first steps of any process or project journey. Whether it be a national gas company re-organising its control centres, or a government agency re-organising itself, the 'first metre' outlook has proved powerful in shaping attitudes and bringing about change. For it is here, at the outset of implementing business projects and processes, that so many simple short cuts are traditionally taken without due consideration of the consequences. And the consequences can be severe. The UK government estimates its failure to heed this message has cost tax payers over £1.5 billion on IT projects alone in the past six years.

Iconic Quality

To date much 'quality' is what we term iconic-quality – quality which is primarily (though not exclusively) directed at influencing customer perception and results in a badge, a certificate or some other re-assuring totem which can be displayed on publicity, vehicles, or brass plaques in the entrance lobby. A whole industry exists to sell icons to industry that proclaim acceptance and conformity to standards. You get what you pay for and the value received will usually be proportional to the effort invested by the recipients, not the suppliers. Some would say that quality is the marketing department's best ally. Indeed one of the biggest drivers for certification is doubtless the fear of losing business rather than a

primary concern for improving product quality. Iconic-quality can lead too easily to what we call 'ironic-quality', when what is claimed by the suppliers (by whatever slogans or third party means they prefer) does not match what is experienced by the customers. We all have come across examples of this in our daily lives, albeit away from our own offices and factories.

It was Walter Shewhart who first introduced the term economic-quality. Some thirty years later in the 1960s Genichi Taguchi developed the loss function and applied it to quality management. He said: "*The quality of a product is the (minimised) economic loss passed to society once the product has been shipped*". Unless the supplier can reduce unit production costs as well as increase the feature-set, profits will soon disappear. In fact Genichi Taguchi defined world class quality (as long ago as September 1960) with reference to his loss function work as being "*on target with minimum variation*". In conclusion we need to remember, in deciding how to approach the future, the observation of Edwards Deming who often told senior managers that "*Survival is not obligatory!*" Each of us has to decide between iconic- or economic-quality. The key for practitioners lies in how they approach the 'first metre' of the quality journey and how they use systemic thinking to guide process working. Colbert set us all a good example with the precedent of the Gobelins factory. It is worth recalling that he was Minister of Finance. Would that all today's financiers were so visionary in their business activities.

February 25, 2004