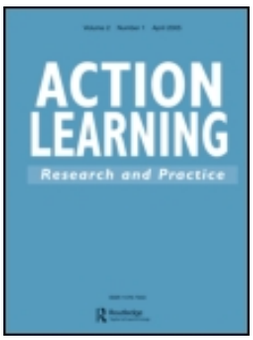

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Systems thinking, lean production and action learning

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Systems thinking underpins 'lean' management and is best understood through action-learning as the ideas are counter-intuitive. The Toyota Production System is just that—a system; the failure to appreciate that starting-place and the advocacy of 'tools' leads many to fail to grasp what is, without doubt, a significant opportunity for learning and improvement.

Two case studies illustrate the application of the ideas behind the Toyota System for service organisations. In each case managers had to 'un-learn' in order to learn how to take the opportunity provided by a systems approach to the design and management of work.

Keywords: *Systems thinking; Action learning; Organizational change*

Introduction

Systems thinking, lean production and generative learning are closely linked, and for many practical purposes are one and the same thing. The model of systems thinking described here is derived from the Toyota production system (TPS), as devised largely by the company's long-time CEO, Taiichi Ohno, and steadily developed by Toyota over the last 50 years. The TPS is probably the most highly developed, best articulated, and most successful example of systems thinking applied to business organization in the world (Ohno, 1978; Womack *et al.*, 1990). Despite this, it is something of a mystery as to why these disciplines have not been applied more widely.

This paper explores this underlying question, first by sketching the basic principles of systems thinking and 'lean' management especially as applied in the TPS, and noting the centrality of individual and organizational learning. These ideas are then applied to service organizations in the shape of two contrasting case examples from loss adjusting and adult social care. The lessons from these cases are then discussed and on the basis of this discussion, conclusions are drawn about management thinking, systems design, leadership and learning which have important implications for both policy-makers and practitioners.

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Systems thinking

Although systems ideas can traced back to Aristotle, Plato (who thought that *kybernetes*, or the art of statesmanship, applied to the state as well as ships), and the European Enlightenment, systems thinking as a general theory first emerged in the 1950s. Since than academics have developed a bewildering number of theoretical and practical variants on the basic theme: Jackson (2003) identifies 10 different systems approaches divided into types A, B, C and D—hard systems thinking, systems dynamics: the fifth discipline, organizational cybernetics, complexity theory, strategic assumption surface and testing, interactive planning, soft systems methodology, critical systems heuristics, team syntegrity and postmodern systems thinking—as well as two more metacategories, total systems intervention and critical systems practice.

More important here than the differences between these variations is what they have in common. At its simplest, a system is something composed of parts but which adds up to more than just these parts. It may be a natural system, an engineered system or a purposeful human-activity system. A human body or an ocean can be seen as a system; and so can a car or a computer. A company can also be described as a system, as can a market, and both as subsystems of the larger system that is an economy. A hospital and the NHS are also systems. So systems thinking is about 'joined-up-ness', and from this interconnectedness flow several important consequences. One is the need to consider the parts not on their own, but in relation to the whole. The poor results of managing the parts rather than the whole—of not using systems thinking, in fact—are perhaps most familiar in service delivery, irrespective of whether public or private.

Another central systems idea is that of feedback, whether negative (self-correcting) or positive (self-reinforcing). Feedback is what allows systems to adapt to the environment and also what allows people to learn. However, although it is relatively simple to engineer predictable feedback mechanisms in mechanical systems, the more complex the system and the greater the number of interdependencies, the more likely that acting on a part of it will generate feedback loops that have unexpected and often perverse consequences in a different part of the system. So, we can predict that optimizing an NHS hospital trust for waiting times and other partial performance measures will have consequences somewhere else in the system. Sure enough, waiting time results have improved, but not the system as a whole, so that hospitals have met their explicit targets, but at the cost of going into the red.

Systems thinking in practice: the Toyota production system (TPS)

Two people who do not figure largely in the systems literature are Taiichi Ohno and W. Edwards Deming. This is odd, since Deming provided a telling theoretical explanation of the sub-optimization caused by conventional management, as in NHS example above, and showed the practical means to manage an organization as a system. Ohno's creation, the Toyota production system (TPS), is the most strikingly

successful example of systems thinking applied to business organization. In May 2006, Toyota posted record net profits of $12bn, and boosted its R&D spending to $8.4bn, while US competitors General Motors and Ford are threatened with bankruptcy. With a global market share of 15.8%, Toyota will soon overtake GM as the world's largest motor manufacturer. How has Toyota reached this pre-eminence? The simple answer is method. The TPS is based on a different way of thinking about the design and management of work and is the product of half a century of applied learning.

Toyota's learning began in the 1950s, but it took many years for others to notice. According to Johnson and Broms (2000), in 1982 Ford executives visited Toyota to find out how the Japanese were simultaneously achieving the apparently incompatible aims of lower cost and higher quality and were startled to be told that Toyota had learned it from Ford. Before building their manufacturing plants in Japan, the Japanese had studied what their US competitors were doing, and Ohno in particular had spent time at Ford's Highland Park plant. Highland Park was famous for having built the Model T, which it did extremely efficiently, to the extent that by 1927 it had turned out 15 million models and halved the cost per car.

'Pull' vs. 'Push': economies of flow vs. economies of scale

However, what Ohno saw and what the Americans saw when they looked at this crucible of modern mass production were remarkably different. At the plant, work was standardized in a simple, unchanging flow. When Ohno studied the plant, that's what he saw—a unified flow. As each car rolled off the line, it represented to him a 'heartbeat' that dictated how everything moved (was 'pulled') through the system in a single stream. Today at Toyota the customer order triggers flow: nothing is made without an order, and the customer receives the car within days. Toyota's aim is constant improvement of the flow—producing cars at the rate of demand, the cumulative effect of which is that by the 1990s it took Toyota fewer man hours to build a Lexus than it did a top-line German manufacturer to rework a model at the end of the production line, after it had been made (Womack *et al.*, 1990). Shortly before he died, Ohno was asked what he was working on; 'shortening the time between the receipt of the customer order and collecting the money,' he replied.

Where Ohno saw flow and heartbeat, the Americans saw speed and volume. They saw that the faster they could 'push' work through the lines and the greater numbers of cars they made, the more cheaply and profitably they could do so: the greater the economies of scale. This approach was an extraordinary advance on previous manufacturing methods and was remarkably successful provided that buyers accepted they could have any colour so long as it was black. In little time, however, consumers wanted variety, and it was the need to produce variety that threw into sharp relief the limits of the American paradigm.

The American approach to variety was to produce different models in batches that were as large as possible to maintain economies of scale. To do this they needed to

create what we term 'management factories'—bureaucracies to forecast, schedule, plan, manage inventories and set budgets and targets. This overhead is required because economies of scale are incompatible with 'pull'. If a factory builds to order, it responds directly to demand. If it is not building to order, it must estimate demand and schedule production of the different batches so that they roughly match over time. In other words, the logic is 'push' as opposed to 'pull'. Instead of making only the things that the customer wants to buy the factory must sell what it has made. If, as is usually the case, it gets its estimates wrong (after all, a basic model may have thousands of variants) it must either leave unwanted models to depreciate in inventory or organize promotions or other inducements for customers to buy what they didn't originally chose. 'Push' is to guess what to make, make it, see if anyone wants it, and give someone something to buy it. 'Pull' is to sell it, make it and collect the money.

In this relative economy of means we can begin to see why there is such an accumulated disparity between Toyota and its American rivals. Ohno's vision might be called 'economies of flow'. He remarked that manufacturing should be thought of as a supermarket in which, as a customer pulls a product off the shelf, a little factory behind the shelf makes a new one to put in its place. Crucially, this means that variety must be in the line. To retain economies of flow, the same line must be able to make different models without missing a beat.

In the American system, the function of people on the production line was (and is) to do what the management factory tells them. They are, as Chaplin portrayed in *Modern times*, literally cogs in the machine. The decisions are removed from the work and are used to 'control' people and work (although in the larger sense this control is illusory, because production is unconnected to real demand). Ohno saw that the TPS could not work in this way; nor did he want it to, since the humanization of work was one of the explicit aims of the TPS. Instead, he asked what the people who carried out the work needed to handle the variety as each different model passed down the line. The result was the development of a system that managed flow using the people working within it as the principal agents. This simple act, integrating decision-making with the work, produced a wholly different management infrastructure—and indeed philosophy. The American model is command and control: regulation by management, with its battery of computer and other informational aids. The TPS model depends on regulation by the customer, with workers responding to customer needs and managers making it easier for them to do so: in other words on system learning.

Variety and learning

The central importance of learning also stems from the problem of variety. Ohno was preoccupied with work flow: if every step in the flow operated at the same rate, than any step should consume only those resources required to advance a customer order in that step. That sounds fine when the line is producing just one standard product, but what happens what it needs to produce a constantly changing variety?

To be able to produce variety from the same line, Ohno saw that Toyota workers would need to be able to perform a number of different steps; they would also need to learn how to carry out machine changeovers far faster than had ever been envisaged or designed for.

In the 1950s, it took US plants 10 days to change over a pressing machine from pressing one set of parts to another. In a matter of months, Ohno and his teams had learned to cut changeover times to 10 minutes. He then had a counterintuitive moment. Like others, he assumed that smaller batches mean higher costs. But in fact costs fell. Why? One reason was the need to carry less inventory. A second was that if something was wrong it could be corrected before it could consume more resource and rework further down the line. Ohno realized that costs must be viewed end-to-end, and that time was predictive of costs. Thus, if every changeover could be done in less time than the factory's 'heartbeat'—the rate at which vehicles flowed off the line—then it would be possible to get both variety and low cost, something hitherto thought impossible. This illustrates the importance of apparently trivial things such as suggestion schemes: over the years, the accumulation of individually tiny improvements—shaving seconds off changeover times, eliminating assembly procedures or changing the position of a tool on a bench—can make for huge gains at system level.

Although organizational learning is a much overused term, often invoked but rarely seen, Toyota's TPS is a monument to systemic learning, reflecting a different philosophy of management. Konosuke Matsushita, the founder of the Panasonic, JVC and Technics brands, noted this about the 'Japanese model' as long ago as 1979:

> We will win and you will lose, because your firms are built on the Taylor model. Even worse, so are your heads. With your bosses doing the thinking, while the workers wield the screwdrivers, you're convinced deep down that this is the way to run a business. . . . We are beyond the Taylor model. Business, we know, is now so complex and difficult, the survival of the firm so hazardous in an environment increasingly unpredictable, competitive and fraught with danger, that its continued existence depends on the mobilization of every ounce of intelligence. (Quoted in Labovitz, 1993)

Because Toyota started learning so long ago, and continues to learn, the performance gap is still growing. It is now almost impossible for its US rivals to catch up.

Learning and leadership

Toyota is the role model and the most highly developed example of the potency of systems thinking and action learning in its broadest sense. But why, if the TPS is so successful, is Toyota along with its circle of suppliers still almost the lone manufacturing example? Why doesn't every manufacturer imitate it?

There are a number of answers to this question. If the idea of flow is conceptually simple, it is not simple-easy; it is the simplicity of pared-down complexity, and it has taken Toyota half a century to reach its current mastery. As we shall see in the cases that follow, systems thinking can produce dramatic results very quickly when applied to service organizations where little or nothing is physically 'made'; but it first requires

rethinking the most basic assumptions about the design and management of work, which is a challenge of the most fundamental order.

This profound challenge to the management model-in-use, leads to two related issues concerning leadership style and approaches to teaching and learning in organizations.

An organization organized around 'pull' and flow needs a very different kind of leadership from the traditional command-and-control where decision-making is distant from the work and based on abstracted measures, budgets and plans. Because of the emphasis on the system rather than individuals, however senior, descriptions of the TPS use the words 'leader' and 'leadership' sparingly. Here leadership consists in making it easier for others to achieve mastery and to work with the system to improve it rather than to make heroic changes. The hard truth is that such a conception of leadership is so opposed to what most people have learned, and the archetype of central command is so strong, that many fail to make this step.

For leaders, the learning challenge of moving to a systems view is sometimes brutal. Systems thinking requires a profound shift in thinking about the design and management of work, reversing current norms to go from 'push' to 'pull' and placing the development of workers, individually and collectively, at its heart:

> The proper role of management is to lead people to understand business as a system of work, a system that links each worker's capacity to serve with a specific customer's needs. The goal of a business is to nurture continually the creative talents of company members. By focusing on its members' activities, the manager will thereby improve the system's capability to serve the needs of customers. To help each employee and supplier realize his or her potential in the company, management's main job is to learn exactly what people do in their jobs and how what they do serves customers. Such learning is difficult, if not impossible, in companies that manage by results. (Johnson & Broms, 2000, p. 2)

Leaders and managers often make the mistake of supposing that tools and techniques can deliver this profound shift in thinking; especially when, for example, consultants teach 'lean' as a collection of techniques—kanban, kaizen, TQM, Five S, Six Sigma. Yet such 'tools' are only the outward manifestation of the underlying systems logic, developed to solve system problems. But unfortunately they can be, and often are, used in a non-systems way as just another means of control. Tools are the least important element in systems thinking (and it may be better to avoid the term altogether—see Seddon, 2003); the most important part is understanding of the organization as a system and thinking in terms of systemic cause and effect. At this point managers can 'pull' together a number of useful learning aids according to the context and circumstances.

At Toyota, Ohno preferred the term 'limited' to 'lean' because the TPS was about increasing capacity and responsiveness in the system and not about cost reduction. The difference is subtle but crucial, not least in convincing employees to participate wholeheartedly in the learning-action cycle without fear of being eliminated. Companies that use only the toolbox without embracing the underlying philosophy are unlikely to gain more than limited and temporary results. For many managers 'lean' has come to mean cost and job reduction programmes.

A third response to the puzzle of why others have not imitated the TPS is to be found in the management education system. With a few honourable exceptions, such as the business schools at Hull, Lancaster, Cardiff and the Open University, it is extraordinary that systems thinking principles are so little taught. However, it is also difficult to think oneself into a new and counterintuitive form of acting; it is easier to act oneself into the new way of thinking. Systems thinking is only truly learned by doing, by action learning: it is only by doing that managers can *un*learn, can find out for themselves where their current beliefs about the design and management of work are flawed, in order to put into place something that works systematically better, and can systemically be further improved. Whilst resistance from traditional command-and-control managers is often strong, once they 'get' systems thinking, there is usually no going back. Converts would often rather move than be forced to revert to a way of thinking they now *know* can't work, and why.

Case studies: lean and learning in service businesses

Here are two examples to show how this cycle of unlearning and relearning can work for organizations that, unlike Toyota, are starting from scratch. Whilst both are service providers, which operate very differently from manufacturing, the same systems principles drive improvement and learning.

1. The loss adjusters with a 'people problem'

A firm of loss adjusters was organized in a traditional way with a head office, regional management and local branches. The branch administrative staff had low morale and the chief executive thought he had a people problem.

The work organization began with instructions to adjust losses arriving in central claims, where staff logged them on to the central computer. Managers focused on getting the logging done by lunchtime, and sent out electronically to the appropriate branch office. Branch administrators were targeted to make appointments with customers within one day of receipt of the work, and the paperwork (claim forms, insurers requirements and so on) would follow the electronic message, arriving two to three days later. Branch-based loss adjusters were targeted to visit the customer within four days, and to write a preliminary report to the insurer within a week. Subsequently the adjuster would seek the necessary information about replacement costs and/or relevant services. Once the adjuster had determined the settlement, a further target was that customers should receive their cheque within a week. Branches were meeting all these targets at 95% or better. Service was therefore apparently good; procedures were clear and well understood. So why was there a morale problem?

Using their traditional management framework, managers were unable to 'see' what was wrong. To make it visible, they had to learn a new way of looking: they had to understand the organization as a system. A team of managers and staff undertook a learning and action process via the 'check–plan–do' steps below and revealed a number of counter-intuitive facts.

The learning and action loop—check-plan-do. Derived from Deming, a simple, standard three-step process called 'check–plan–do', is used generate feedback systemically and incorporate it into the organization:

'Check' asks:

- What is the purpose of this system?
- Demand—what is the nature of customer demand on the system?
- Capability—what is the system predictably achieving against the demand?
- Flow—how does the work move through the system?
- System conditions—why does the system behave in the way it does?

'Plan' asks:

- What needs to change to improve performance against purpose?
- What action could be taken and what would be the consequences of taking it?
- What are the measures against which action should be taken (to ensure learning)?

'Do' says:

- Take the planned action;
- And start again at check.

Check begins by considering the purpose of the system *from the customer's point of view.* In the loss adjusters case the purpose was clear: to settle claims. But how did the customer judge the process? By equity or fairness, and by time or how long it took. The loss adjusters team quickly recognized that although managers knew the key targets for making appointments, visiting, writing reports and paying cheques, they had no idea how long the whole process took end-to-end, from the customer's point of view. All measures were focused on internal activities; they had no relation to purpose.

When the team plotted the end-to-end claim-to-settlement times on a capability chart (a chart that shows what the organization is predictably achieving) they were startled to discover (as is always the case) that under current conditions a claim could equally well take 10 or 120 days, with an average of 60. In other words, the system was stable (a sort of good news), but (not so good) over a very wide range.

This was a revelatory experience. Managers could see instantly that, given that they accepted the theory behind the capability chart, there was no point in arguing about why some cases took so long, or praising people who closed cases in 10 or 12 days. The variation was in the system. Where did it come from? Here was another revelation. When the team, now wholly committed to discovering where the real problem lay, dug deeper, it found that by the time the paperwork reached the branches, it was riddled with 'dirt'—errors that would stop claims moving forward 'cleanly'.

Thus 80% of claims had wrong or missing postcodes, addresses or phone numbers, lacked some information or had been sent to the wrong branch. Most of the 'dirt' was

introduced (as Ohno would have predicted) in the sorting, batching and queuing in central claims, compounded by the pressure to log them into the system by lunchtime. Evidently, pursuing 'dirty' claims (which the branch adjusters were obliged to do to meet their targets) was not very productive: they were just building inventory and rework. The final turn of the screw was that to catch up with the backlog, the adjusters would come into the office on Saturdays to write their file notes and reports, which arrived on the administrators' desks on Monday morning, for typing up within 24 hours (another target). Monday morning was when administrators were most occupied with answering calls from customers asking what had happened to their claims (we call this 'failure demand'—demand caused by a failure to do something or do something right for the customer; it is the consequence of poor service design).

Now managers could 'see' why branch administrators were so unhappy. It was as if scales had dropped from their eyes. From a systems perspective it was obvious that the internal targets and specifications were not only not helping people do good work, but by focusing them away from their customer purpose, they were actually preventing it.

Having made this discovery, in the next 'plan' stage, they used that knowledge to quickly alter the work design. When work arrived at a branch, the first action would now be to 'make it clean', so that the adjuster could close the work on the first visit. The 'making clean' work could and should involve the customer, so he or she could likewise 'see' the process and expectations could be managed (people are happy to cooperate in getting their problems solved quickly and efficiently). End-to-end settlement time became the new measure-in-use and it fell to an average of 20 days in a matter of weeks, despite the existence of a backlog.

A seasoned systems thinker might argue that ideally the work would be cleaned at the front end—in central claims. But first, everyone in the business had to unlearn the old thinking and methods and learn to think and work in the new way. The intervention was designed so that branch staff should participate in the learning experience and act their way into the new way of thinking. This made it easier to implement subsequent improvements. Having made a step-change improvement across the organization, work began to identify causes of variation (things that make time go longer in this case) within and across branches, as well as in the centre. As they were identified and acted on and as people and the organization learned, time shortened, productivity improved and morale rose. The eventual result was a fourfold increase in productivity from the same resources.

None of this could have happened without the initial process of discovery. The previous management approach would never have specified the eventual outcome as a target. Their mental model, of 95% targets achieved, everyone working to procedures and so on, could never conceive of such a significant improvement without extra staff. Managers first had to learn how to 'see' their presenting problem (unhappy administrators) in a systems framework. Then managers and staff had to learn together how the current system worked (or did not work), and how to replace it with a better one, using the feedback it generated in a continuous process of improvement.

2. Learning in action—reshaping adult social care

Another voyage of discovery, this time with larger and more contentious implications, concerns the UK's service for delivering adult social care. This composite case is developed from work over the last year with five local authorities to help improve their care services. Whilst their circumstances varied, the quality of service was broadly similar and each showed similar dysfunctions of the present system, which we take to be representative of the UK as a whole.

Background. Adult social care, like many public services, is on the edge of crisis. Long a Cinderella among public services, it costs £14bn a year and through local councils and the NHS provides support for 1.5m of society's most vulnerable members. A recent authoritative report quotes a litany of failings, including inadequate levels of care, poor quality, inflexible services and restricted choice, aggravated by staff shortages and constant resource pressures (King's Fund, 2005). The pressures can only increase as the population ages: one calculation if nothing is done is that the bill will treble in real terms by 2050.

Needless to say, the sector is covered by a comprehensive array of targets and centrally mandated specifications, monitored by inspectors and auditors who grade providers via a 'star' system, from none to three. Despite this elaborate performance management framework, reports show that these services are not serving their customers well. A recent Green Paper reveals the government's solution to the gathering crisis as 'choice'; handing direct funding to individuals to select their own provision and thereby seeking to pressure providers to perform better in competition with the private and voluntary sectors and via the spread of 'best practice'.

Discovery, action and learning. When the five councils involved embarked on 'check' to find out the nature of demand for adult social care from the customer's point of view, the first shock was to discover that they had no way of knowing. The data did not exist. Ironically and typically, they had huge amounts of information about activity—the time taken to make an appointment or assessment by different functions, how many people received home help or institutional care, even the percentage of phone calls answered within three rings—all as specified by the official targets. But this mass of data yielded no useful knowledge about real demand or real capability—the things that customers needed, and how long it took to solve their problems from first contact to the arrival of the right care.

A second shock derived from the first. It was entirely logical that departments possessed so little knowledge of their customers' real needs, because they were shaped to respond to the concerns of the centre. Because the measures were detached from purpose, customers' issues were lost from view and the de facto purpose of the services had become satisfying activity targets rather than client needs.

Getting the necessary end-to-end data, the first step in the systems approach, is itself a huge and sobering learning exercise. Managers cannot obtain such information by abstraction or command; the only way is to engage with those who do the work, to

listen carefully to what customers are asking for and to plot the flow of work from beginning to end, case by case. Although the actual numbers differed for each council, they found in each case that getting help was a more or less arduous obstacle course. In one authority, users had to go through an average of 81 steps to obtain domestic and 82 steps for residential care—dubbed by one staff member 'the London Underground' because clients were sent round and round. Of all actions taken, only 5% comprised value (i.e., were directly related to the purpose of obtaining care).

End-to-end times were predictably all over the place. It often took a client several phone calls over several days even to establish meaningful contact. Calculating how much the client would have to pay could easily add two or three months. Leaving out these variables, in one council from requesting help to receiving It took an average of 68 days but could range up to 230 days; in a second the average was 20 days but the range stretched to 80. The installation of walk-in showers—a high-frequency demand—could take years. (Incidentally, the figures bore no relation to the authorities' star rating.)

When staff started analysing the nature of demand, they learned that much of it was 'failure demand'. But because the official specifications make no distinction between 'value' and 'failure' demand, managers and inspectors do not 'see' this major cause of waste. Removing failure demand is almost always the most significant lever for increasing capacity in a system. Of the calls coming in to the five councils, around half was failure demand, and for one that had a call centre, it was 86%.

For many services ministers require local authorities to use call centres, on the superficially plausible grounds that a dedicated unit for answering the phone and getting the client to complete the first set of forms will free up frontline workers to deliver care. In practice, the call centre is just another queuing system at the front end, and just as with the central loss adjusters in the earlier case, one that is very likely to produce error (mis-categorising callers, sending them to the wrong department, etc). When demands arrived in departments, clients would be asked to complete more forms, as the departmental response was often 'is this for us?' in order to 'protect our budget'. Any problems (and there were many) resulted in further calls to the call centre.

The same phenomena occurred throughout the system. Duplication and rework were everywhere. To meet internal targets whilst protecting their own budgets, staff passed on clients to other functions, where details were re-entered, they were reassessed and the whole bewildering process started again. From the customers' point of view, the service was un-joined up, bureaucratic, unpredictable and even frightening. Many who needed help deteriorated as they waited. Often the help provided was ill-fitting and resources were wasted on 'over-specified' care. It hardly needs to be added that provider morale was low—no one likes giving poor service—and costs were extremely high.

After the shock of 'check', the council teams got to work redesigning systems based on flow and designed around doing the value work as defined by the client need. However, the going was not always easy. The teams discovered the importance of

system conditions—the 'givens' which make the system function as it does—such as the central imposition of call centres and other statutory rules and regulations. In one local authority, 60% of care calls were concerned with bathing difficulties (analysis shows that perhaps the single most important factor in keeping people independent is a level-access shower or bath). The simplest and cheapest way to provide this would be to employ specialists to do the work but there is a regulatory requirement for every shower to have a detailed specification and three quotes from builders. Installation can easily take months or sometimes years—by which time, sadly, the client's condition may have deteriorated to the point where much more expensive care packages are necessary. This demonstrates the extent to which well-meaning regulation can become a major barrier to improvement.

Outcomes. Redesigning the work against demand and skirting round obstructive system conditions where it is impossible to eliminate them can produce a system where clients can get a care decision either on the spot or after a single visit. This involves putting people with appropriate expertise at the *front* end of the system, as first port of call, instead of hiding them away at the back—which is counterintuitive for most managers. Putting the client in possession of all the information, including costs, produces instant gains. Simply giving clients an upfront estimate of costs removes enough failure demand to free up workers to concentrate on their proper job of solving people's problems—in effect increasing capacity.

After a few months, results at one council showed that elapsed time from making contact to receiving care and establishing its cost fell from three or four months to an average of three days. The 80 steps required previously have been reduced to 11. Where before the de facto purpose of the system was 'getting ratings and stars', it is now geared to its intended purpose, maintaining people's independence and dignity. This is borne out by user feedback where clients who used to complain of not being able to get through to anyone who could help, having to answer the same questions time after time and of having a choice only between inadequate care and none at all, now felt that they were being listened to, knew where they were in the system and had a degree of control. One social worker said it was the first time in years that she had actually spent the week as a social worker.

The overall result of these changes is much better service at much lower cost. It is hard to quantify cost savings precisely because of the fragmented way in which councils budget. But the reduction in failure demand, faster assessment and care provision and the removal of many people from needing care at all, all have huge positive implications for costs and the ability of councils to cope with the care demands made on them in the future.

A wider point. There is a wider and radicalizing political lesson here. By showing how much further their existing resources could stretch, the experience of the five councils reframes the political debate around choice—an expensive option if people can get what they need from existing arrangements. In any case, without a system redesign, choice by itself will deliver nothing different from before.

Discussion: lean and learning

From the same 'lean' principles the Toyota and the service case studies generate different types of learning. In Toyota, after a half-century of experience and of honing the system, learning is cumulative, incremental and highly institutionalized, and reflected in literally hundreds of thousands of improvement suggestions put forward by shop-floor employees every year. The vast majority of these suggestions are acted on, thus ensuring that the TPS learns from what individuals learn. The TPS is thus a potent expression of Toyota's accumulated human capital. In the service cases, on the other hand, where the organizations were new to systems thinking, the initial learning was more akin to a process of discovery, the essential first step in radical redesign and (as a consequence) cultural change. Today's leaders of service organizations are in a similar position to Ohno when he first discovered some counter-intuitive truths. Because of the way the learning is generated, however, in these cases too the learning is absorbed back into the system.

Whether institutionalized as at Toyota or made explicit through a process of discovery in the service examples, in all cases the action-learning model proceeds as follows. Central to all systems thinking is the idea of feedback. In physics, feedback is the return of part of the output energy to its input, modifying the latter's characteristics. In organizations, feedback in the sense that we use it is information generated by the work that triggers action to improve the working of the system. At Toyota the practice is so well internalized that it takes place in every cycle as part of the job. In the service organization examples, the loop is explicitly articulated in the iterated 'check–plan–do' cycle.

The power and originality of the TPS lies in the fact that the feedback or learning loop connects *downstream* to the external or internal customer, whereas in conventionally managed organizations feedback connects *upstream*, to the manager. The TPS, and lean systems in general, work by using the knowledge generated by each learning cycle to improve the working of the system *in ways that add value for the customer*—for example, by reducing end-to-end delivery time or improving quality. Crucially, because the loop includes and derives from the customer, frontline employees are integrally part of the process; they are the first organizational node in the loop. So decision-making is incorporated in the work—whether at Toyota in the ability (and responsibility) of assembly workers to stop the line if there is a problem, or in service organizations where such control is necessary for employees to respond to the variety of customer demands.

It is the variety of demand that makes the crucial difference between service and manufacturing organizations. In Ohno's production system, demand is mechanical, concerned with a finite number—which admittedly can be large—of colour and model variations. Demand into service organizations, by contrast, can vary as greatly as the customers who co-create the service. It follows that to connect the learning loop with the customer requires frontline employees to be integral to the understanding of and response to customer demands.

In manager-facing systems, customers are not directly part of the feedback loop. Frontline employees react to managers, not customers. Managers in such systems

assume their measures (for example, targets, activity measures, service-level agreements, customer satisfaction) are proxies for the customer experience, but in truth these measures prevent these systems from absorbing variety. Hence costs are high and service is poor. Numerical targets and specifications, measuring activity, service-level agreements and surveys that ask the customer 'how was it for you?' are features of conventional 'push' management systems, in contrast to the purpose-related measures that are a feature of 'pull'. Learning in a management-facing system is generally about gaming the system, meeting targets and 'doing the wrong thing righter', to use Ackoff's term (Ackoff, 1999). He pointed out that doing the wrong thing righter does not constitute learning and that it is therefore 'much better to do the right thing wrong than the wrong thing right, because when errors are corrected it makes doing the wrong things wronger, but the right things righter'. In a customer-facing system, feedback teaches people to do the right thing righter.

Conclusion: the challenges for leadership and learning

These cases provide some pointers in response to a puzzling question underlying this paper, namely why systems thinking and the lessons of Toyota's TPS have not been embraced more widely. In brief, these are the challenges and risks posed for both leadership and learning by the requirements of such fundamental re-thinking.

Leadership . . .

With its centrally imposed targets and specifications, the public sector provides good examples of the difficulties for systems thinking in hostile terrain. Here, taking responsibility for the system requires real leadership and it is much easier to accept the centrally mandated model and play within its rules. Stepping out of line is likely to attract unwelcome attention, which is partly why the examples here are not named. Thinking in systems terms requires authorities to put aside the targets and specifications obstructing improvement knowing that the eventual gains will put the targets in the shade. This begins as an act of faith since nothing is known about real demand and capability at the outset; but as discovery creates knowledge and learning , confidence Isbuilt in making the right sort of change.

However this is not the kind of discourse that impresses inspectors and auditors, who are only concerned to find the requirements as dictated by their specifications. There is more bad news to face up to. It is not just that looking at an organization for the first time as a system reveals disturbing quantities of effort and expense that add no value; it also leaves no doubt that the largest part of the problem is today's way of managing. Facing up to the fact that they have unwittingly been making matters worse, not better, is a fundamental learning point for managers, and one almost impossible to accept until they see it with their own eyes.

Today's public services are run on a quintessentially centralized, command-and-control model. Because it reverses the information flow, a systems approach pulls the rug from under the traditional leadership model based on authority and hierarchy. If decisions are made on the basis of accumulated knowledge and learning, hierarchy

and authority cannot have the final say. 'The implication is that leaders need to make a fundamental decision: Do they want to be told they are always right, or do they want to lead organizations that actually perform well?' (Pfeffer & Sutton, 2006).

. . . and learning

Both the service examples discussed were previously non-learning systems; the activity measures used taught employees and managers nothing about customers, their needs or how to satisfy them. It taught them only how to meet arbitrary targets. By contrast, in the redesigned organizations, the learning is captured and accumulated in a continuing process. The beauty but also the difficulty of discussing learning in a systems context is that it is not a discrete and separate activity. Training in some of the techniques that enable mastery of the TPS, say, is another matter; but the learning in the check–plan–do cycle is both integral to and implicit in it. The learning is generated by the work and makes no sense without the action, while the action is impossible without the learning. Without the learning, the system, in the sense of a dynamic self-referencing entity, ceases to be a system.

While the TPS was a system designed to make cars at the rate of customer demand, a service system needs to be designed to absorb the variety of customer demand. Thus while control in the TPS means, for example, standardized work design, control in the service examples means workers determining the most efficient process for each piece of work (demand), meeting only the requirement of the customer, safe in the knowledge that doing so would mean operating at the lowest cost. As with measures in the TPS, measures used for understanding and improvement are derived from the work. In the TPS this means measures of flow and material (physical) features; in the service cases it means measures derived from the purpose in customer terms. The TPS and the service cases put people in control of their own work, engaging their ingenuity in improving the same and the system is created and developed by managers getting out into the work, leading the effort.

Both the TPS and the service examples are designed against demand and focus on improving capability by building human capital. The pay-off of intelligent organization and accumulated learning is the ability to do more with less: to provide better service at lower cost. The learning rate of such organizations automatically keeps pace with the changing environment. Providing, of course, that the political and regulatory framework allows it to do so.

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