



Transforming Manufacturing Performance through Wholeness as well as Leanness

Executive Summary

Lean Manufacturing's full range of principles and tools can lead to a total reshaping of an organisation; its purpose, systems and culture. This is the paradigm shift that makes Lean outstanding when it works as a whole. Benefits are then measured not in mere percentage terms but by two fold and three fold improvements. The challenge is in achieving such 'whole systems' improvements when Lean is applied to a specific manufacturing business in unique circumstances, with different processes, structures and rhythms.

It is immediately apparent simply by walking into a factory when Lean has created a whole systems set of improvements. The full transformation can be seen and felt. The place is tidy, the processes efficient, there are no piles of work-in-progress, and the people are empowered by a renewed purpose and culture. Everyone will be proud of the achievement and feel that they are contributing to the impact on the bottom line. There is simply a buzz in the air.

In spite of its impressive range of tools, Lean does not apply fully to every manufacturing organisation, nor does it always create such a whole systems change. This is especially so in those enterprises operating outside of Lean's original home ground of automotive, electronics and consumer goods, in areas such as pharmaceuticals, chemicals, aerospace, defence, process industry, food, capital goods and engineering projects. For many companies it is not appropriate or possible to apply the full set of principles and tools. In others the enthusiasm of management for quick cost-savings has led manufacturers to apply Lean in a piecemeal, tool-based way. The aim has been to 'do Lean' rather than create the paradigm shift within the organisation as a whole.

It is obvious on walking into an enterprise where Lean has only been applied in part, and the paradigm shift has not occurred. There is still something tantalisingly missing. The teams themselves work well enough but the whole thing still has days when it feels like a misfiring engine. People still don't really get any great satisfaction out of their jobs. There just isn't the confidence that were you to rev the engine the vehicle would accelerate smoothly away. A radical change in purpose and culture has simply not been inspired. The benefits are patchy and unreliable.

This article presents the Tricordant approach to transforming organisations. It provides a language and tool set for businesses to achieve a whole systems change where a paradigm shift in purpose, systems and culture happens. It provides the framework to apply the right set of Lean tools, to spot the gaps where other tools are more appropriate and to realise where sector-specific solutions or innovative new approaches are needed.

The Tricordant approach combines 'Wholeness' and 'Leanness' and has been shown to be beneficial in already 'Leaned' sites as well as those currently 'Leaning'. It can deliver an initial 10% to 30% improvement against a spread of key performance measures. The organisation then has the conditions set for 'whole systems' levels of improvement and for a much healthier future.



The Origins of Lean Manufacturing

Lean Manufacturing had its origins as the 'Toyota Production System' (TPS), which was developed by the Toyota Motor Car Company (now renamed Toyota) over the 1950s and 1960s. It was born after the company nearly went bankrupt and realised that it needed to find an economic way to make the relatively small number of cars required for the post-war Japanese market, compared to markets in the USA and W. Europe, but in equivalent varieties and versions. In order to regain their position Toyota's engineers restudied the original Western thinking of Henry Ford (inventor of the production line), Frederick Taylor (founder of Scientific Management) and Dr. W. Edwards Deming (father of Quality Management), re-understood their original intent, and over time refined and transformed this thinking. The key principles of the TPS gradually evolved and started to bear fruit.

"...the Toyota Production System...born after the company nearly went bankrupt."

Toyota and other Japanese car companies started their assault on the North American market in the 1970s. They began to show that they were able to make cars and ship them into the USA faster and cheaper than the domestic producers and with growing reliability (though then with little design flair or style). By 1985 a broad spectrum of batch manufacturing companies from America and Europe were starting to implement the learning from their studies of the TPS and 'Japanese Manufacturing Systems'. The adoption of the ideas was initially done by the automotive, electronics and consumer goods sectors that felt the competition from Japan the keenest. (The British motorcycle industry was dead before it even awoke to the challenge.) The core, closely-linked principles they adopted were called then by the slogans Total Quality, Just-In-Time (JIT) and Cellular Manufacturing.

In 1990, in his book, *The Machine That Changed The World*, James Womack coined the popular phrase 'Lean Manufacturing' to brand the principles and tools that had emerged. He explained the evolution from craft producer, to mass production, to lean production. He highlighted the inefficiencies and waste involved in so-called 'economic' mass-production systems. He carefully compared traditional automotive factories with lean factories.

"The lean producer, by contrast, combines the advantages of craft and mass production, while avoiding the high cost of the former and the rigidity of the latter....Lean production is 'lean' because it uses less of everything compared to mass production - half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also, it requires keeping far less than half the inventory on site, results in many fewer defects, and produces a greater and ever-growing variety of products." (James P. Womack, Simon & Schuster, 1990, p.13.)

Lean – A Whole System's Transformation

The founding principle of Lean is the elimination of waste. The basic idea was common sense: that you will be faster and cheaper if you stop doing things that are wasteful of time or resources; therefore stop doing non-value-adding activities (NVAs), that is tasks that do not add value to the materials you are processing. The TPS in fact defines 'seven wastes': over-production; inventory; waiting; motion; transport; rework and over-processing.

"Lean Manufacturing became an holistic revolution; a paradigm shift."

Founded on the drive to eliminate these seven wastes, Lean Manufacturing gradually developed into a broad, systems-level approach to the production of goods. Lean became an holistic revolution; a paradigm shift. It was not simply about the application of a selection of separate tools and techniques. Lean helped a factory to transform itself as a whole, with each aspect of change needing to be aligned. It required a complementary change in purpose, objectives, processes, technology, flow, control, systems, organisation, job roles, KPI measures, quality, cost, reliability, spirit, culture, motivation and teamwork.



It is important to recognise that Lean was certainly not just about the technical aspects of manufacturing systems such as process streamlining, reducing changeover times, quality control, process capability, kanban and smoothing material flow. It was also about the human and social aspects of work. It changed the purpose and objectives of manufacturing staff, inspiring them to achieve excellence through the ever-distant goals of right-first-time, just-in-time, zero-defect and batch-of-one production. It also required a cultural change, transforming production lines into cellular teams, supervisors and foremen into team leaders, and even the task of tidying-up into adopting the ‘right attitudes’ of the 5 Ss.

The application of specific Lean tools and techniques applied piecemeal are not enough on their own to effect a fundamental transformation in purpose, culture and performance. They are only the means of implementing component parts of an overall organisation development programme. If factories just see Lean as a set of tools, and do not have an holistic systemic vision and strategy, they will only achieve patchy and disappointing results.

Lessons in Wholeness for all Manufacturing Sectors

Although the whole package of Lean tools was not directly applicable *en masse* outside of its core batch manufacturing sectors, it was quickly seen that many of the key ideas could be adopted in part or ‘translated’ for the improvement of the office support functions in factories. A similar process of adaptation of the approach could be made for factories in other industrial sectors, such as process industry, pharmaceuticals, aerospace, capital engineering and bespoke manufacturing. It was then applied to completely different types of organisation. Today aspects of Lean, allied often with the statistical capability improvement tools of Six Sigma to become ‘Lean Sigma’, have been adopted across manufacturing industry, utilities, the service sector, government departments, retail, food, the military and healthcare. There are now consultants even applying Lean within solicitors’ offices.

It is easy to translate individual Lean tools for use outside of batch manufacturing at a superficial and component level. Consultants eagerly sell such an approach to willing buyers, and have been doing so for several decades, but with a very mixed result. Documented studies have looked at the success of industrial organisational transformation projects in meeting their objectives and for instance the success of Business Process Re-engineering (BPR), a derivative of Lean, has been shown to have a 50% – 70% failure rate.

“... a great danger in a superficial, component-level, tool-based view of Lean improvement.”

Process mapping, streamlining, de-bottlenecking, use of SPC and Six Sigma, balanced scorecard measures, pull systems, poke yoke, SMED, TPM, kaizen, team-building, etc., all look attractive, and are relatively quick and easy to apply individually in isolation. There is, however, a great danger of falling into a superficial and component-level application of Lean tools when the goal is a paradigm transformation in performance. Implementing a range of lean initiatives blindly in a piecemeal, tool-based fashion is not predictably beneficial for the organisation as a whole system. The net effect on the bottom line may be good, bad or indifferent. Without systemic alignment any random selection of Lean initiatives might only fortuitously add together to achieve a significant improvement for the organisation as a whole. In some circumstances they may only provide transitory, localised improvement, with the effect on the whole system being minor, or even negative due to unforeseen interaction between sub-systems. The motivational costs of an un-whole, patchy approach to change are possibly more significant than the failure to achieve significant cost savings as they inoculate the staff against attempting further change.



Case Study

In the 1990s Simon Thane was the site manager of a UK automotive components factory employing 1500 people. The factory was an Anglo-Japanese joint venture and supplied high-value items 'just-in-time' several times a day, direct to the line-side, to both a Western and a Japanese-owned car plant.

Under the threat of moving production to low-cost countries in Eastern Europe, and knowing that the plant had state-of-the-art technology, and was already fully applying lean flow processes and quality techniques, the site embarked on a programme of quality control improvement, teambuilding, kaizen (continuous improvement programme), the improving of morale and community involvement, improvement of safety and the working environment, increasing of the empowerment of work teams and the clarifying of all team targets. A further 10-30% improvement in the key performance measures was achieved, and the site was voted 'Most Improved Supplier of the Year' by one of the car producers.

Simon subsequently moved to be General Manager of Manufacturing at a nearby major consumer electronics company, then with a turnover of over £500m. Hoping for similar results he embarked on implementing the same range of improvements across an area of the plant, but this time with no significant result! The initiatives fell on stony ground. On reflection the reason was clear. In the first case the initiatives applied luckily happened to work within the structure of the organisation, creating aligned change at the whole-systems level. In the second case the historical organisational structures opposed the successful implementation of these same initiatives. Failure the second time could have been foreseen and avoided by taking a whole systems view of the proposed change, and applying the approach and tools below. All good in hindsight!

What is 'Wholeness' for an Organisation?

At this stage it is important to clarify what is meant by a 'whole systems' view of an organisation. Using the analogy of the human body as an example of a 'whole system', and that of human fitness and health, is useful here.

To enable human beings to become fit, healthy and respond to the stresses of their changing environment, they need to be recognised as complex, integrated systems. Health is about ensuring the body's sub-systems work well together and are in balance. The primary organs (heart, lungs, brain, eyes, etc.), the mind and its psychology, the connective systems (blood, nervous, and lymphatic systems) as well as the other supportive components (bones, muscles, etc.) must each be healthy and whole and interact with the other parts in a balanced, healthy way. The whole body maintains this balance through feedback loops run by the nervous and endocrine systems. People need a medical or biological language to describe how the parts of the body interact to create the functions and behaviour of the body as a whole.

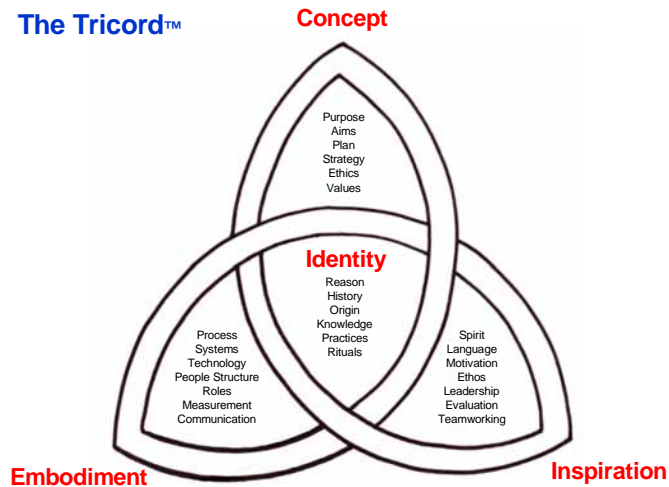


"We need a whole systems language to describe....the functions and behaviour of the organisation as a whole."

Similarly, manufacturing organisations seeking to become fit and healthy and meet the changing demands put upon them, need to recognise that they are complex, integrated, social and technical systems. To be healthy their sub-systems, their primary 'work units' (lines, cells, production departments and front-line teams, etc.), their connective systems (HR systems, finance systems and IT systems, etc.), as well as their other supportive component parts (reception, stores, building facilities and utility services, etc.), each need to be healthy and interact with all the other parts in a balanced and healthy way. The performance measurement, evaluation and communication systems should provide feedback loops to control their functions and balance the organisational life. Managers and staff need a whole systems language to describe how the parts inter-connect and align to create the functions and behaviour of the organisation as a whole. The Tricordant approach provides such a language.



The Tricord™



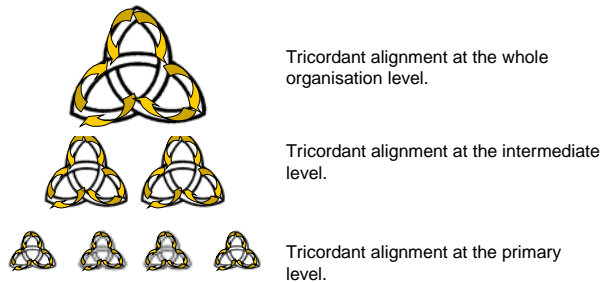
The Tricord™ in the diagram on the left, describes all aspects of an organisation as a whole, and indeed each of its organisational sub-systems that need to be aligned for the whole to be healthy.

It is the alignment of the three outer dimensions of the Tricord, acting in balance around the central core, that creates the whole and healthy organisational system. For a fuller description of the Tricord see www.tricordant.com.

When one part of the Tricord is incomplete or unaligned then an organisation will tend to be dysfunctional, under-producing, cost-adding, demotivated and incapable. If all dimensions of the Tricord are present and aligned with each other, then the organisation will be whole, productive, vibrant, capable, competitive and successful. The Tricord therefore provides a diagnostic tool for assessing 'wholeness'.

The Tricord is also a 'fractal' pattern of organisation. The same pattern is true at every level of the organisation: the organisation as a whole; its sub-systems (i.e. divisions, sites, functions) and its sub-sub-systems (i.e. shop-floor lines and cells, and front-line departments and teams), down to the design of individual jobs.

Multi-Level Tricordant Alignment



“When there is whole systems alignment and balance then the organisation is ‘tricordant’.”

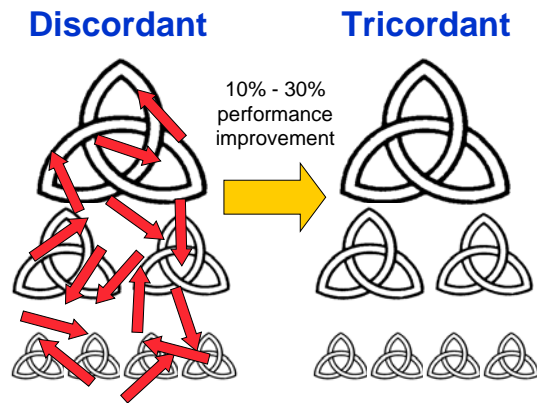
Tricordant alignment is a universal pattern that needs to exist at every level of an organisation. It is like lettering in Brighton rock; the same pattern runs through the whole. The Tricord is like a hologram pattern: break a bit off and you can still see the whole image. When there is whole systems alignment and balance then the organisation is 'tricordant'.



“...a systematic methodology and set of tools to align organisations.”

The Tricordant approach is a systematic methodology to help organisations align themselves, equipping them to become tricordant at the whole systems level. The approach can be used by a multi-disciplined, multi-level team drawn from across the organisation, supported by facilitators.

The Tricordant approach has a kitbag of supporting tools that is used by the team at key stages in the process. A one or two-day workshop is required to gain a basic appreciation of the approach, the tools and how they work together. For further understanding of the approach and tools see www.tricordant.com.



The Tricordant approach identifies gaps and red arrows (points of friction and cost in the whole system) and enables solutions to be created and barriers removed. It ensures that the right work is done at the right level. It enables jobs to be designed that are value-adding and that motivate and enable people to use their full capacity. It ensures that people work in motivated teams, and that these teams group into the right sections, divisions and organisations. It is into this whole systems structure that the appropriate Lean tools can be applied to greatest effect.

A Whole Systems Approach beyond the Piecemeal Application of Lean Tools

The Toyota Production System was able to achieve whole systems-level transformational change in its original sectors. Its kitbag of tools was developed in this manufacturing context and there enabled staff to map process flows, eliminate waste, improve process capability and release team-based continuous improvement. It was very successful for Toyota and many other manufacturers in similar industries. Applied in full the cumulative effect of applying all the principles and tools was to create a ground-breaking shift in thinking, which redefined purpose for staff and changed culture. Achieving such a paradigm shift, involving all domains of the tricord in parallel, was the core transformation which made Lean really different when it worked in full and released the maximum value of the approach.

However Lean does not provide all of the answers all of the time. As one gets further away from this heartland so fewer of the tools apply and many apply less fully. A reduced subset of tools applied in a component fashion has a much-reduced chance of triggering the key transformation in purpose, systems and culture.

“By using the Tricord... you can reach a solution for your specific sector.”

The Tricordant approach offers a model and language for reviewing any organisation as a whole system. It has been developed from first principles and is generic for organisations across all sectors. Its goal is a paradigm shift in purpose, structure and culture. It equips the ‘organisation architect’ and provides the framework in which Lean tools can be best applied.

By using the Tricordant approach each organisation can reach a solution for its unique circumstances. Some parts of the solution may well borrow tools from Lean, others parts will borrow from elsewhere, and others may need new thinking and innovation. How they all knit together into a particular pattern will be unique for each organisation. Developing this organisational understanding comes from a deeper appreciation of how the parts make up the whole. The Tricordant approach equips you to ask all the questions that need to be asked, so that all the component pieces fit together, thus releasing fundamental change and renewed energy.

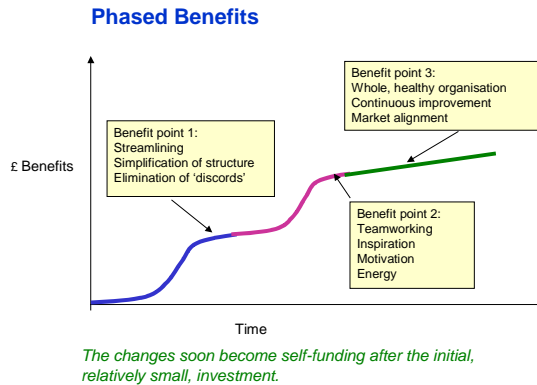


Evidence of Benefits

There is potential in most organisational systems to get significant business benefit through alignment of the whole systems at each level and between levels. This is equivalent to restoring the organisation to true health.

“an initial further 10% to 30% improvement against a spread of key performance measures.”

The Tricordant approach combines ‘Wholeness’ and ‘Leanness’ and has been shown to be beneficial, both in already ‘Leaned’ sites and those currently applying Lean. It can deliver an initial 10% to 30% improvement against a range of key performance measures. The organisation then has the conditions set for ‘whole systems’ levels of improvement and for a much healthier future.



The examples below are of work with which the directors of Tricordant Ltd. were personally involved prior to establishing the company in 2005. They are of whole systems projects done in major, successful organisations.

Pharmaceuticals Manufacturer	Restored whole systems balance for 700 staff across all organisational levels.	Initial savings of £1million p.a. even before efficiency, quality and service benefits started to emerge.
Household Product Supply Chain	Aligned forecasting, with manufacturing and logistics to purpose. Delegation to the right level brought motivation.	Reduced warehousing from over 10 to 2 which were then focused on key areas of customer service – saved £10million.
Automotive Components Manufacturer	Restored order by disciplined production control system. Aligned targets for each whole work team. Kaizen site-wide. Inspirational programme site-wide.	Profitability 4% to 17% Customer Quality 200ppm to 18ppm Delivery error 10% to 0.16% Kaizen ideas per month 800 to 1300 Efficiency 85% to 100.4% Stock Accuracy unknown to 98.5%
Government Organisation	Aligned purpose to people, delivery to empowerment.	£40 million savings p.a. identified.
Strategic Health Authority	Aligned specialist surgical services with patient needs and developed collaborative clinical networks.	Reduced delays in treatment for patients and improved quality of care through improved cross-hospital working.

Next Step

If this article has sparked your interest then one of the Tricordant team will be pleased to visit your site at no cost to discuss further the Tricordant approach and its relevance to your business. To arrange to put a date in the diary please contact Simon Thane, Director, Tricordant Ltd., Tel: 01558 823927, Mob: 07989 112062, E-mail: simon@tricordant.com .