DIGITALEAN

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The Road to Transformation

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INTRODUCTION

Since people first started to use tools and communicate, we have been living in a world of transformation. The early days of mankind must have been very exciting: "You can do *what* with that?"! Just imagine the changes your grandparents have seen in their lives from the early 1900s to today. Travelling in the first Stevenson's *Rocket* literally took people's breath away when they reached the dizzying speed of 30km per hour – today, we travel on an ICE or a TGV or a Shinkansen at 300km per hour without a second thought.

In the past 10 years, our awareness of transformation has stepped to a new level. It is only that long since the first iPhone was introduced; and, since then, computers have shrunk from things that filled rooms to ones that can fit on your wrist or in your pocket. And so the need to understand "Digital" and "Digital Transformation" has become critical, as electronics and the software that they deploy are everywhere in our personal and professional lives.

Indeed, in our personal lives we have embraced the ideas of Virtual Reality and digitalisation faster than in our professional lives. We are comfortable with using virtual stores or virtual banks. We don't give a second thought to going on the Internet to find some obscure part or component or accessory that we need or want to make our lives happier. But the rapid move towards a general understanding of Industry 4.0 and the emerging possibilities of digitalisation are taxing many managers, leaders and business people. There is a big challenge to us all at this point in time: to be aware of the BIG WHY!

The BIG WHY

As leaders and managers, guided by technical and socio-economics experts, we need to clearly define and decide WHY we want to adopt digitalisation. We need to define the business case, and set out the reason to invest in systems, software and training, before we jump into the digitalisation stream. Analysis of the current state of digital capability shows huge potential for benefit *IF* all possibilities are realised – but quite a few of the key enablers are not yet fully commercially available. Standards for interconnectedness and communication between devices and systems are still being developed. The promise of integrated, electronics-enabled production systems in the form of Computer Integrated Manufacturing from the late 1980s was slow in being delivered, as initially the systems and protocols were not ready then.

If we are to prepare and start our own Digital Transformation, as leaders we need to think very clearly and deeply about:

1. What are the current issues and challenges facing our business?
2. What possible threats to our business or business model will come through someone else being quicker or better in Digital Transformation?
3. Is there a possibility of creating a new business model for our business?

These are challenging questions for any leader. They are even more pressing because all three need to be considered simultaneously.

There is little point in developing a brilliant current business if a competitor can make it immediately redundant with a step change innovation (Apple and Nokia, for example). Equally, there is no point in missing out on a potential revenue stream if it is there to be taken.

We will consider each of these key elements of Digital Transformation in this ebook. However, at all times, the BIG WHY of Digital Transformation is – and will continue to be – focused on how we create Value, how to deliver it effectively and efficiently to a customer and how to retain some of that created Value for your own organisation.

1. DIGITAL TRANSFORMATION

Transformation, Problem-solving, Organisations and Intelligence

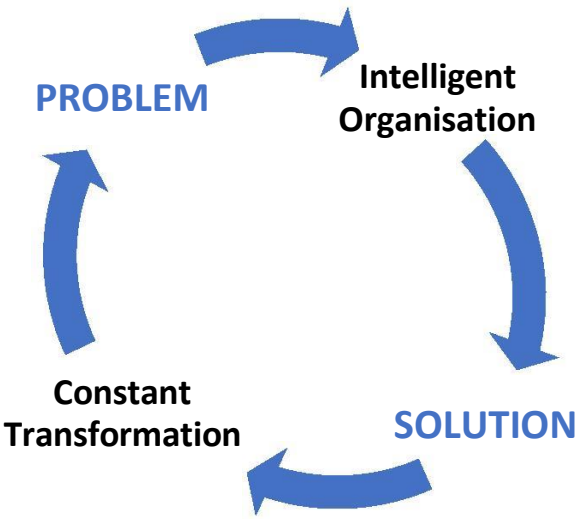
Transformation is the art of steady problem-solving to improve business. There is no transformation without a problem to be solved. Therefore, any kind of transformation can only be successful if it achieves the goal of fixing a problem, thus making the business better. Any kind of transformation must fail if you implement it only to follow a trend or on the recommendation of a consulting company.

The best sample is the current (at the time of writing) CoVID-19 pandemic. The speed of transformation from office work to remote work was driven by the problem of not being able to work in an office any more but still having the business need to do some work. Within days, collaboration technology like Zoom, Teams, etc. gave us the opportunity and means to solve this problem and to transform from a real room into a virtual room. And the pressing need led to remarkable speed in the adoption of these tools.

The baseline for problem-solving and transformation is an intelligent organisation, the system people are working in, and their ability to be able to work on the organisation.

Intelligence in this case means creating and having a model that reacts properly to inputs from the outside environment and is able to improve continuously, by recognising its failures so that it can act better next time. This means that an organisation must be able to learn continuously, constantly.

Figure 1: Intelligent Problem-solving



Our model is based on both Digital and Lean Principles, which leads us to the following conclusion:

> *Transformation is successful by using both Digital and Lean Principles to solve the problems of the business, again and again.*

And this poses one of our first and biggest problems: How can we identify the problems – how can we "see the forest when we are surrounded by trees" – when we are blinded by the everyday things that prevent us from seeing the big and small pictures, the issues that rob us of efficiency and effectiveness. We also have to be careful that we are not distracted by background noises – but focus always on the BIG WHY..

Facts and Data

We all have experiences and our experiences are very personal. We "see" the world based on our previous understanding; we are wired in a specific way to interpret our world. We know this as Neurolinguistic Programming. The big challenge facing us as leaders on a Digital Lean Transformation Journey is to capture real FACTS and DATA, to be able to break through our basic biases, and to be able to see TRUE processes, issues, challenges and opportunities. We need to break through this "invisible box" if we are to create and develop a valuable future, if we are to turn data into actions to improve our processes.

The advent of Industry 4.0, and the Digital Transformation possibilities that arise from it, provides a potential solution to one of the biggest problems faced by managers and engineers since the start of the Industrial Revolution. How can we have real FACTS and DATA about our processes? In many businesses, if you ask a manager or worker "What went wrong?", you can often feel that the answer is not fully correct. We have seen examples over the years where the "Bart Simpson" reply was used: "It wasn't me – and I won't do it again!". While this seems like a joke, it often can be difficult in a working environment to get real FACTS and DATA.

By carefully considering where and how to place sensors, we finally can solve the question of data integrity, which provides us with the opportunity to focus our Lean improvement efforts where they can best deliver benefit. Toyota spends so much effort to create a "No Blame" culture to ensure that when they ask "What happened?", they are most likely to get a true answer. Digital Transformation gives us an opportunity, if we are thoughtful about how and where we place sensors, to capture truth, too. A data sensor gives us the facts, without varnish, or nuance. It is up to us to be able to use this data to inform our insight into how to make things better.

Sensors and Data

In 2007, on a visit by one of the authors to the Harley-Davidson engine manufacturing facility in Wawatossa Drive, Milwaukee, the plant director was speaking about the company's early steps in sensorising its machining centres. With five machines fitted with sensors in a hall containing over 100 machines, the obvious question was: "Why are only five machines fitted with sensors?". The answer was COST. At that time, it cost nearly $10,000 per machine to retrofit sensors – just to capture basic vibration and temperature readings.

That was then; today, with the widespread availability and low cost of sensors and the nature of the IoT and industrial wireless networks, it is much, much cheaper to fit the same, if not even better, sensors to equipment. The cost barrier has been smashed.

But, once again, we are faced with serious issues when it comes to deployment of sensors:

- Why are we using them?
- Why do we want to fit them?

Is it just to be able to say we have adopted digitalisation? Or do we really understand our BIG WHY?

If we can get real-time data to be able to manage our processes in real time to improve our performance in real time, that is a real opportunity to be taken.

If we go ahead and fit sensors to our machines, processes and facilities, we need to know what we are going to do with the data we will capture. Otherwise, we are in danger of simply creating redundant or dead data in a data junkyard.

More importantly still, we need to have a fundamental understanding of our machines, processes, systems and facilities to be able to divine insight, understanding, knowledge and improved action from the data. We need to fully understand the basics of our processes, to be able to sift out the noise in the data and get real insight that will help us direct action to increase our created and delivered Value.

If a sensor is placed in the wrong place, it might miss the recording of a key event. If the wrong type of sensor is used, it may not be able to register the event. If a sensor breaks down and we do not know it, then we might think that all is OK with our process and not move to action in time to prevent losses occurring.

And finally, the major challenge for managers is what to do with all the data? How can we suddenly become data scientists, or process specialists? How can we develop the capabilities of our own people or those of our contractors to be able to understand the insights that the data potentially holds?

Thinking Hurts – and New Skills Require Work and Pain

We all are happy following a routine. From getting-up time to going back to bed, we form habits: coffee or tea, where we sit – all sorts of habits. We create these habits because we like them and often because, once we have decided what we like, we don't have to think about the decision process again.

Thinking hurts – if we have to look at a problem, to try to see what is going wrong or even what is happening, if we have to work our brains to understand all the little pieces of information that the process or the problem is trying, or not trying, to tell us … it all involves brain work. Like physical work, brain work requires energy, too. Tell me that you haven't experienced a "sore head" after thinking hard to try to solve a difficult problem, or after a day back in lectures after a few years away, or from "Zoom fatigue"?

In the rapidly evolving world of Digital Transformation, we are all experiencing problems and questions that we have not seen before. We don't have "habits" to fall back on, to fix the problem without thinking. So, we have to think to evolve our understanding so that we can build our capability in the "new" age. And this fresh thinking hurts.

We need to get ready for and accept that the new digital age will be a challenge. We have to accept that it will hurt until we come to a point of control, where we have taken the unknown and made it known.

We have a choice at this point of change in business and society. If we decide to avoid the "hurt of thinking", we can devolve the problems and pass them on to some "digital whiz kid" or an external consultancy, effectively outsourcing the solution. If we do this, as leaders and managers we will become less and less able to understand and develop our processes using the new technology. We don't all need to be able to programme in C++ or Python but we

should at least know what they are and develop our understanding of where and why they can be applied.

Thinking hurts – but only until you are used to it! Once we open the black box of emerging technologies, we create the chance to add significant value to our businesses because, as experienced leaders and managers, we will be able to bring that experience, those accumulated, unresolved issues, to the new technology for solutions. In this cross-over between new and emerging technologies and business experience is a wide open space for improvement.

There is always a resistance to change. People get comfortable in doing what they do and they don't like changing. To bring about change in an organisation, we need to be aware to this resistance to change. We need to think about how to try to address the issues that may have arisen in the past and find ways to move the process forwards. It is well-known that most projects fail – they fail to deliver 100% of what was expected at the planning stage – but most projects also achieve improvement, maybe not all of what was expected but usually 75% or 85% and it's always well worth having this improvement.

The approach outlined in this ebook will help to overcome some of this natural resistance to change and will support delivery of positive integration and use of Digital Transformation.

Mechatronics and Automation

The urge to do things more easily arguably dated from the invention of the wheel, thousands of years ago. And from the early days of manufacturing, engineers and business people have been trying to do things more easily. Automation is not new: in Sweden, on display, in the Husqvarna Museum, is a fully-integrated manufacturing system with seven to 10 discrete machining processes to automatically produce rifle barrels. This is not particularly amazing, you might say, until you realise that the automated process was created in the early 1800s and that the individual machines were driven by leather belts from a water wheel. The transfer of rifle barrels from process to process was performed by springs and levers, with no human intervention, 200 years ago.

We need to stay current with the possibilities of our own age. Today, we have access to levels of production and process automation that were unheard of even 20 years ago. Very few machines today do not have some software incorporated into their design. We need to know what is possible – what options are available to us – and we need to decide how and why we will use them.

The possibilities of automation have now firmly arrived into the service world too, from the automated preparation of hamburgers (cheaper than paying minimum wage in some cities) to the introduction of "bots", automated customer response pieces of software that allow repetitive, simple tasks be automated, freeing up staff to be able to tackle more demanding, value-adding tasks that would benefit from the use of brain power.

The more we build the capability of our people and of our supply chain to create and support automation, the more effective and efficient we become. But we need again to ask the BIG WHY:

- Why do we want to automate?
- Where do we choose to automate?
- Do we fully understand our processes?

- Have we fully understood how and where we are adding Value?
- Do we know how to support and develop automation?

If we don't have this deep understanding of our systems, processes and value chain, we run the risk of automating in Waste. And waste is a real certain way of destroying Value.

Over a long period of time, a team member in a Toyota plant was observed pushing a trolley of parts from a pre-assembly and parts storage area to the production assembly line. Day after day, he pushed full and empty trolleys over a 30m track – until a significant hop-up in automation was installed: a simple automated guided vehicle (AGV) system. Toyota had been slow to move to the AGV system until they fully understood the process, until they had developed the process to a point of stability. Once they had stabilised the new process and had fully understood:

1 The process;

2 The objective to be achieved through automation;

3 The technology to be deployed,

they built their own AGV system. Then they moved rapidly to deploy the new system, and to deploy the technology in other areas, based on their experience.

Once the three elements (process / objective / technology) had been addressed, Toyota had:

- Created the internal ability to study and deploy at pace across the facility;
- Learned how to master the process before they moved to widespread deployment;
- Created sustainable technological capability within their own team.

We need to understand the basics of new technologies sufficiently to allow us to integrate mechanics, electronics and software into our operations in a sustainably-competitive way. Toyota could have easily bought an AGV system from a supplier, but they would have lost the opportunity to understand the technology and to understand the full extent of its potential application throughout the facility. The development of the AGV system led to even further deployment of material transfer in an already highly-automated facility.

This point of understanding and building capability is particularly interesting in terms of Digitalisation and Digital Transformation. If we see Digital simply as a black box, we will be restricted both in its deployment (because we won't understand what is possible) and to a set of suppliers for the technology. Until we truly understand a problem and structure the solution appropriately, we cannot outsource the solution – you can't outsource problems or buy sustainable problem-solving.

We really need to invest in understanding "inside the box" if we are to be able to deploy the full benefit of Digitalisation. This links very closely with a deep understanding of Lean Thinking. **We need to understand before we can advance**. Once again, this is not completely new thinking. If we go back about 3,500 years to the Chinese Tao, we hear this wisdom:

I hear - I Forget

I See - I Believe

I Do - I Understand

This basic philosophy is still as valid today as when it was written. Having had the honour to work closely with Professor Yamashina, formerly of Kyoto University, for a number of years, one of his many sayings has always resonated:

I Take Care - *I Improve*

I Master - *I Innovate*

Unless we take the time to deeply understand the technology, as well as the ideas underpinning Digitalisation and Lean Thinking, we always will be just skimming the surface of possibilities. We need to take the time to develop our understanding, to care enough to make things better so that we can move to mastery of our business, our process and our chosen digital technology and lean process deployment if we are to innovate successfully. There is a high degree of truth in the saying that it takes 10,000 hours to master something. We will come back to this point later as we discuss interaction between experienced and inexperienced staff members, and how to get the real benefit for an organisation from a respectful mixing of the two. The key point, though, is that we must start, we must make the decision to engage with Digital Transformation, we must use and develop what we know as Lean Thinking.

So – start!

The Work-force of the Future – New Technology Needs New Skills

Since people started settling down rather than hunting and gathering, they worked in agriculture, crafts and the trades and have been trying to make that work easier. The creation of basic tools helped us get the job done more easily. In recent times, we have seen shortages of skilled workers evolve. There are not enough programmers or mechatronic experts, healthcare workers or skilled machinists. There are not enough skilled people and many of the required skills are for roles that did not exist 20 years ago. As well as a shortage of skills, we are seeing the need and the opportunity for people to work longer. We are generally healthier and better fed than previous generations – and our life expectancy is getting longer, generation by generation, about one year in five years.

These factors are leading to some interesting developments, possibilities and challenges. As the technology of processes develops, it becomes ever more relevant and necessary to have a knowledgeable human intervention as and when an input is required. Work will become more mental, cognitive and segmented. People will use more of their brains than their brawn. The experience of staff becomes ever more important. But, if this staff is getting older, then we need to use technology to overcome the “ravages of time”. The development of “co-bots” (co-operative robots) means that ageing humans can continue to contribute their experience and ability in a physically non-demanding way. The future of work is likely to be one where knowledge and experience are regarded as highly valuable when augmented with technological support and assistance.

All this needs to be created, developed and delivered as we co-create the future of society in rapidly passing knowledge and experience to the next generation and the next level of process sophistication. Our work will become more digital-lean for our associates and members, which will require our managers and leaders to develop digital-lean leadership styles to capture and develop the value that the transformation will provide. We can be sure that the development of business and management approaches will not stop with Industry 4.0 … there will be 5.0, 6.0 and ever more developments.

This massive change we are in the middle of requires all of us to develop a different kind of skill set. According to the World Economic Forum, the most important skills to allow us to act and work in the complex environment of change include:

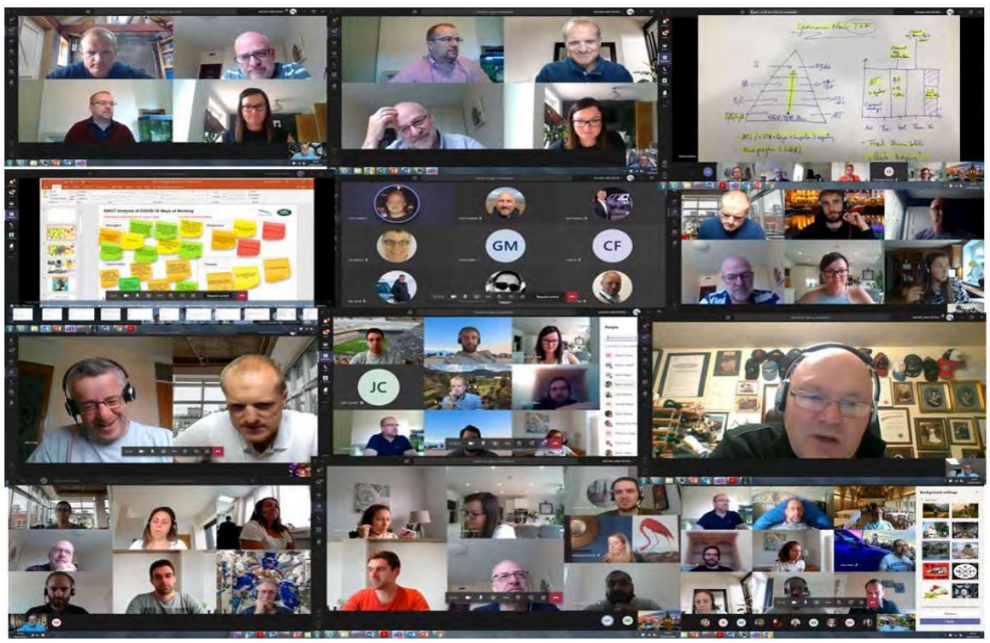
- Complex problem-solving;
- Critical thinking;
- Creativity;
- People management;
- Coordinating with others;
- Judgement and decision-making;
- Cognitive flexibility.

This new environment requires a different style of management and leadership: more human-focussed; guiding and coaching, instead of ordering; more flexible, with flatter hierarchies; and more interaction, with visibility. “Challenging by serving” becomes the role model.

In the remote working environment of CoVID-19, we learned very fast how to lead in an remote and challenging world. In this new world, leading means to create an environment, that has:

- **Intent:** Having and following a plan everyone is behind to get through challenges as well as adapting the plan if the situation changes;
- **Trust:** Empowering your people, linking brains to get the best, having respect and gaining the trust you need as leader;
- **Communication:** Laughing, being with all on the same eye level, being transparent, switching on the cameras and interacting as much and as often as possible.

Figure 2: Working through the CoVID-19 Pandemic

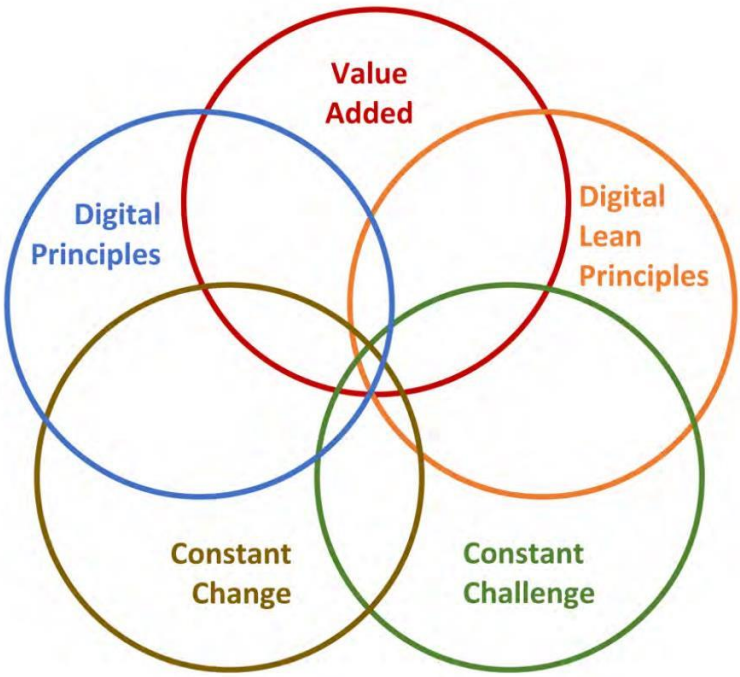


These are basic principles to lead through all challenges caused by any kind of disruption, but most especially in a Volatile, Uncertain, Complex and Ambiguous (VUCA) world. If you look closely at the lean principles in this ebook, you will recognise that Lean Leadership – leaders showing respect to people – and the continuous problem-solving concept are fundamental to act, work, lead and mange in an environment of constant change. As a small example of this change, **Figure 2** shows how many of us have been working during the CoVID-19 pandemic. Physically distanced, we have developed the ability to communicate, to use the available technologies and to keep the work flowing.

The Five Rings of Digital Transformation

To try and make sense of the Digital Transformation Journey, we present the Five Rings of Digital Transformation.

Figure 3: The Five Rings of Digital Transformation



The Five Rings are presented in an effort to break the Digital Transformation Journey into manageable elements, to give us a means of breaking the journey into pieces of work that are measurable, deliverable and challenging, too. Once we have decided and agreed on the BIG WHY, we can start to put the Five Rings together to help us on our journey.

THE AUTHORS

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HEIKO GIERHARDT is a top team executive and a curious engineer with long-standing international experience in the automotive industry and a proven record of success in various roles in Supply Chain Management, Project and Launch Management, Quality, Purchasing Manufacturing, as well as in Lean Management. He works for Jaguar Land Rover as Programme Director, Global Purchasing. He is also Adjunct Assistant Professor in the Trinity College Dublin Business School, where his focus is on Organisational Excellence. He inspired by working in a complex and dynamic environment. His passion is to create and lead high-performing organizations to face the challenges of complexity and change successfully: developing people and establishing a space they enjoy to work in make him happy. His other baseline is the ability to collaborate across cultures, functions and borders with respect and focused on common and challenging objectives: he simply enjoys creating value by working together with others.

STEFAN SCHMIDT worked from 1984 to 2020 in the automotive industry with a focus on industrial planning, logistics, strategy, facility management and total productive maintenance, life-cycle costing in R&D, lean, change and quality management. Holding Dipl.-Ing. Feinwerktechnik and Dipl.-Ing. Wirtschaftsingenieur, previously he was employed as a research associate at the Technical University of Dortmund in the special research area of material handling systems piece goods, after gaining work experience in Japan and the USA. In addition, he lectures and guest lectures at universities and technical colleges, as well as delivering training at the Centre for Technological Cooperation and the Chamber of Industry and Commerce in Munich. He is the author of numerous articles in technical journals and newspapers, and the editor of the books, *Management of Production Facilities (TPM)* and *Kaizen for Rapid Changeover*. He likes hilly terrain, with easy 6,000-metre high mountains along the trail.

In Time;

2 In Quality;

3 In Capacity;

4 In Cost;

5 In Plant.

JLR has transformed from using a single internal data source (APQP), which was not linked with other internal data and so was never up-to-date, to using all relevant data internal sources and supplier data, in order to create patterns and links, so gaps and conflicts can be identified and understood

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