Arthur D Little PRISM

Integrating lean principles into digital transformation

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With the advent of digital, many organizations are looking to move away from lean management, in search of more radical performance gains. This article explains why lean principles are still vital, and how integrating them into digital transformation can be a highly effective way of simplifying the process. This allows companies to identify and apply the most effective levers for the digital journey.

"We're through with lean – it's time to go digital!" will sound familiar to the ears of many executives today. At first sight the idea of abandoning lean and trying something "new" that delivers more radical improvements seems appealing. However, although lean and digital initially appear largely unrelated, ignoring lean principles may be risky, and can even prevent digital transformation projects from being successful.

Successful companies have achieved outstanding performance by incorporating lean management at the center of their corporate transformation. However, even in those companies for which lean once transformed ways of working, the limits of what can be achieved have almost been reached. Numerous companies suffer from lean "fatigue", with managers frustrated with results that are increasingly incremental.

The shift to digital

At the same time the potential of digital technologies to transform performance is now widely recognized. However, most companies struggle to find the right approach to effectively grasp the benefits of this digital promise. Indeed, choosing from among the plethora of new options provided by digital technologies is a real challenge. Typically, it is unclear where to start and how to prioritize a company's efforts and resources to drive tangible results. While some companies have been able to achieve a radical performance increase of up to 50% or more, many have become stuck in a situation in which initiatives happen in silos, efforts lack coordination, and successes are limited or even non-existent.

Recent experience has shown that integrating lean principles into digital transformation can be a highly effective way of achieving radical simplification of the process, allowing companies to identify and apply the most effective levers for the digital journey.
In this article, we therefore explore the challenge of building digital transformation on the foundations of lean management. Starting from traditional lean excellence, we will indicate how companies can select the right technological building blocks based on their specific value creation potential. Subsequently, we will illustrate how to use lean principles to radically simplify the value stream and explain why digital "shortcuts" typically fail. Finally, we will highlight the need for a new, combined lean/digital capability which paves the way for sustainable competitive advantage.

"Traditional Lean Excellence": The lean foundation of outstanding organizations

Companies that rely on lean principles achieve relatively high performance levels compared to their competitors.
A recent Arthur D. Little automotive study classified the lean lifecycle into three phases and determined annual company growth rates in each phase. Using a key automotive productivity indicator ("hours per vehicle") as a measure, the correlation with lean implementation was analyzed. (See Figure 1.)

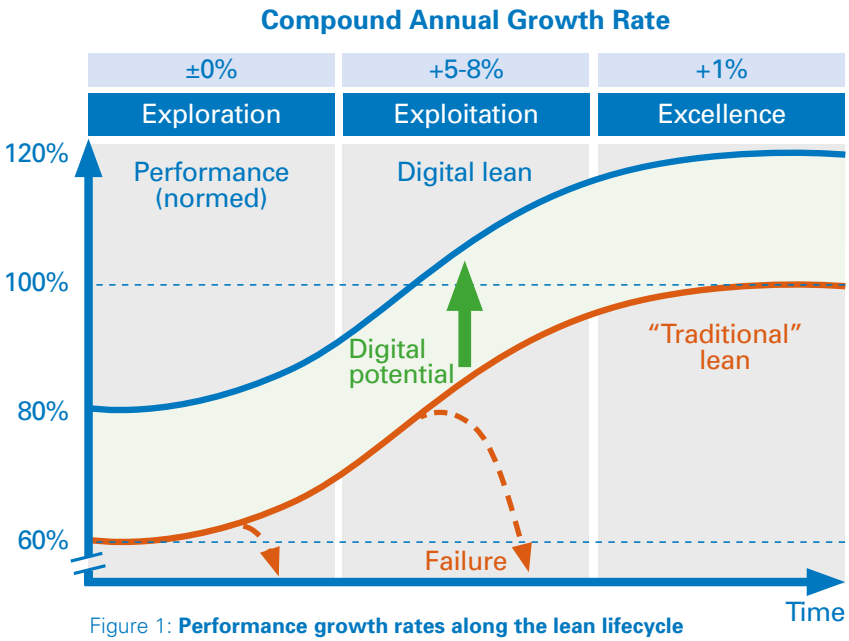

Figure 1: **Performance growth rates along the lean lifecycle**
Source: Arthur D. Little, the HARBOUR Report 2008

Performance growth of up to 8% is common during the Lean Exploitation phase. This decreases as performance improves, and tends to stabilize at around 1% in the Lean Excellence phase. Digital technologies have the potential to make a further step-change improvement across all phases. Similar trends have been identified in other industry sectors.

Whatever the industry, outstanding lean organizations tend to be strong in the three "lean pillars": leadership and culture; targets and performance management; and Kaizen platforms. (See blue box.)

The three lean pillars of outstanding lean organizations

Pillar 1: Leadership and culture

Whether in daily routine or in times of transformational change, leadership and distinct roles and responsibilities provide the cornerstone for effective collaboration. Clearly formulated expectations, derived from top management's vision and based on a cross-functional understanding, help to make management and delegation effective. This mindset nurtures the culture of continuous improvement.

Pillar 2: Targets and performance management

Continuous improvement and transformation start with setting clear targets. These targets need to be designed both vertically (the organizational hierarchy) and horizontally (reflecting the required end-to-end value-stream orientation). Performance management assures the effectiveness of measures taken through better leadership quality and clear focus on the waste-free value stream.

Pillar 3: Kaizen platforms

Lean is not only about methods and tools, but also about addressing the right problems and using the right set of employees with the right problem-specific approach. Continuous improvement can be seen as continuous training, and is a sustainable way of developing employees. The Kaizen platforms, whether for self-contained improvements, problems within a defined organization unit, or cross-functional/cross-site problems, need to be integral, not additional to, the design process.

However, despite the widespread understanding of these principles, many lean journeys fail. Companies often focus too much on tools rather than philosophy, and on waste removal rather than customer value. Disappointing incremental improvements and lean "fatigue" are common symptoms of this failure.

The challenges of improving performance through new digital technologies

The advent of new digital technologies undoubtedly provides huge opportunities and levers for making a further step change in performance. However, companies that simply introduce new technological devices and systems, without considering the value stream holistically, run the risk of failure. There are several reasons for this, for example:

- Issues related to deficient value streams and/or poor data quality are seldom overcome by using sophisticated technologies
- Digitalization of processes with poor (data) quality make existing shortcomings even worse
- The local, workplace-specific application of technological gadgets seldom leads to radical simplification at the enterprise level
- Technologies which, at first sight, seem easily applicable may lack maturity, causing frustration for employees
- Radical simplification requires a holistic approach to value-stream transformation.

Selecting the right technology building blocks based on their value-stream potential

Overcoming these challenges requires excellent knowledge of available technologies and a deep understanding of how and where they can affect the value-stream – this is where the three lean pillars are invaluable.

Each company needs to configure its own set of technological blocks, to address its organizational characteristics and priorities. Five categories of technological building blocks are defined in Arthur D. Little's digitalization framework, "Future of Operations". (See "Future of Operations in the digital world", Viewpoint 2016.) This classification helps companies to trace operational needs to the relevant building block:

- **Cognitive:** using pattern recognition based on (big) data for automating tasks (e.g., big data/advanced analytics, bots, autonomous transport systems)
- **Connected:** incorporate machines, tasks, etc., through the cross-functional use of information (e.g., collaborative, smart machines and robots)
- **Virtual:** leverage productivity by decoupling and transforming physical conditions into virtual spaces (e.g., cyber-physical systems, augmented reality)
- **Human centered:** design new workplaces through the use of collective knowledge (e.g., collective intelligence, virtual workplace)
- **Value-add:** define new business models through the use of new core technologies (e.g., additive manufacturing/ 3D printing)

These building blocks are interconnected, and therefore need a holistic and integrated design approach. They apply across the organization, in both core operational functions such as manufacturing and logistics, and in support functions such as robotics process automation ("RPA") in production planning and finance.

By adopting lean principles, including a classic lean value-stream analysis, it is much easier to identify the right areas and the levers to make the change. (See Figure 2.)

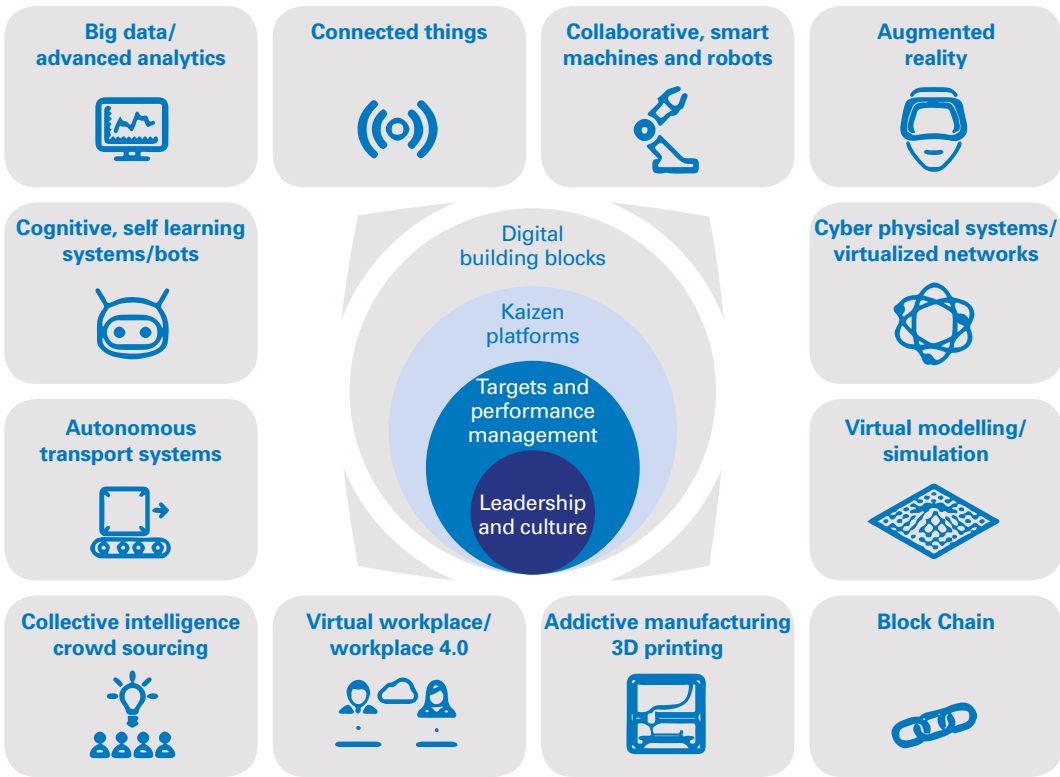

Figure 2: **Combining lean principles with selected technological building blocks**
Source: Arthur D. Little, Future of Operations

Assessing the digitalization potential of the value stream

As we have said, radical shifts in performance can be achieved by embedding new (proven) technologies in the value-stream to overcome factors that have traditionally limited performance. The full digitalization potential of the value-stream may be derived using a design approach based on two key questions:

1) Which physical process steps can be automated by mature and proven technologies?

First, design a lean value-stream on the greenfield. Simplify the value-stream radically by eliminating interfaces through consolidation and integration: make the value-add visible. For each process step, especially for the non-value-adding ones ("waste"), ask why this step needs to be processed by an employee and by what technology it should be automated. The immediate use of mature technological building blocks on standardized processes will deliver more reliable processes with less failures. Significant increase in productivity is the consequence of shifting the focus from eliminating waste to creating value-add.

The greenfield value-stream design will differ radically from the current value-stream: it reveals its digital potential.

2) Which remaining non-physical (information) process steps can be radically digitalized?

Second, automate and digitalize manual information processing and standard decision-making. Strive for a fully automated target condition in which the employee is just monitoring and confirming automated quality gates. Reduce manual intervention to zero.

Especially for high-frequency routines, in which employees transfer data between programs, or even for very complex decisions, robotics process automation, artificial intelligence or decision-supporting systems radically simplify administrative information flows.

Digitalized information flow does not only produce less failures and accelerate workflows significantly, but also creates new value and optimization opportunities through the digital visibility of big data.

Developing lean digital capability to build a long-term and sustainable competitive advantage

The ability to effectively and efficiently digitalize an organization's value stream is, unquestionably, a source of future competitive advantage.

Identifying and integrating the most appropriate digital technology into the value-stream requires a profound understanding of all related business processes, as well as the technologies on offer and their relative maturity.

As with lean management, developing the required capability and establishing the required mind-set throughout the organization remain a top-management issue. The more employees and managers adopt this new lean digital mind-set, the sooner efforts to digitalize will succeed in delivering step changes in business performance.

Insight for the Executive

In order to be successful and overcome typical barriers, companies need to ensure that lean principles are well integrated into their digital transformation efforts. Companies need to:

1) Select the right building blocks based on their specific value creation potential. This requires a broad and profound knowledge of state-of-the-art technologies
2) Use lean principles to radically simplify the value stream. A digital greenfield design can be used to identify the digital potential in the value-stream
3) Avoid digital shortcuts, as they typically fail or lead to disappointing or unsustainable results
4) Start developing a lean digital capability, which will form the basis for a long-term and sustainable competitive advantage. This implies a cultural change in the organization and requires top-management attention.

Completing these four actions will allow companies to achieve radical shifts in performance levels by combining digital and lean. Returning to the opening statement of this article, the conclusion is simple. It is time to go digital – but this means that lean principles are more needed than ever before to help transformation efforts succeed over the long term.

Case example: Unlocking the digital potential of a logistics player

Figure 3 shows a logistics industry example, in which the application of digital greenfield design led to a reduction of 50 – 80% of traditional manual tasks. The digital value-stream heat map visualizes the radical simplification of the value-stream of this company.

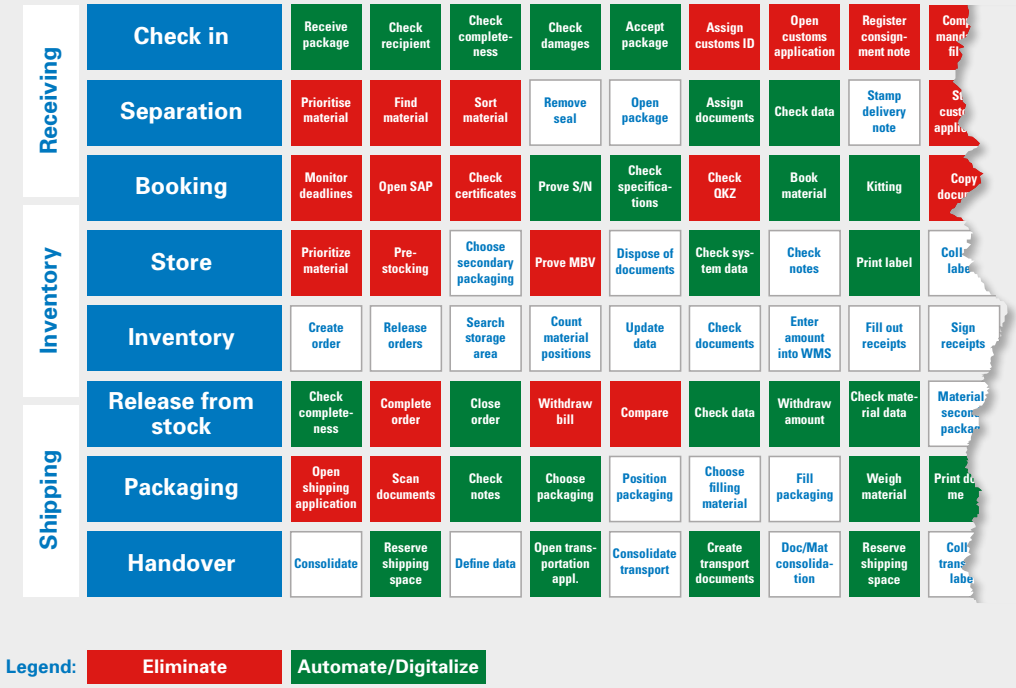

Figure 3: **Digital value-stream heat map visualizing radical simplification for a logistics player**
Source: Arthur D. Little

One-third of the initial process steps and tasks were identified as waste, and hence eliminated.

For another one-third, technological building blocks for automation and digitalization were identified. Autonomous transport systems and robot-driven storage removed all walking distances. As a result, productivity increased dramatically, by 20%.

Another important building block was the substitution of manual reading of non-standardized documents and data entry by automated scanners with machine learning. This allowed additional productivity gains through parallel processing.

The use of smart tags (bar codes), including all relevant data for processing along the entire value chain, was combined with the use of smart gloves, which scanned the bar codes by one pick. The failure rate in data entry was heavily reduced, and real-time data allowed a significant acceleration of the material flow in the warehouse.

Finally, the remaining one-third of the process steps was subjected to a radical workplace redesign with completely different requirements for the employee.

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