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Practical Pathways to Industry 4.0 in the USA

Siemens Financial Services, Spring 2018

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Siemens Finance Week 2018

The interlinked challenges of digitalization, urbanization and climate change will have profound, long-term effects on all of us. Infrastructure, machinery and energy-generation solutions have to keep pace. This requires significant investments today. And these investments, in turn, need innovative financing solutions.

Siemens Finance Week 2018 provides a discussion platform and seeks to demonstrate how financing solutions can help businesses to meet current and future challenges.

As part of Finance Week, Siemens Financial Services launched a new research paper, 'Practical Pathways to Industry 4.0,' which investigates the key challenges facing the manufacturing industry. Manufacturers and expert management consultants were interviewed and asked to identify their main challenges (ranked in order of importance) to digitalization and automation in practice and what the interrelationships between those challenges are. In addition, they were asked how a successful strategy is built, what skills are required and how that strategy can be financed to produce the best return-on-investment.

Industry 4.0 transformation in practice

An ideal digitalized, automated, Industry 4.0 world is one in which people, machinery and systems are all digitally linked. Getting to the summit of full Industry 4.0 transformation, however, is likely to be achieved in a series of steps, rather than a wholesale and sudden change.

Key Challenges to Industry 4.0

As well as nominating key challenges, interviewees were asked to rank those challenges in order of importance.

Challenge No.1

Developing the digital skills required for a successful transition to Industry 4.0

Respondents clearly defined three key areas of digital skill where shortages are already being experienced: digital production expertise, digital maintenance capabilities and operating & strategic analytics.

Alongside the rising tide of skills shortages,[1] respondents also highlighted the need for their peers to embrace outsourcing for some of the growing digitalization skills requirements.

Challenge No.2

Access to finance for the scale of investment over time that manufacturers need to make in digital and automated technology platforms

Even where the economies of retrofit are possible, or the transformation can be divided into a logical series of steps, the pace and size of investment is often considerable.[2]

All interviewees consider that without access to appropriate and sustainable third party finance, manufacturers are precluded from acquiring the required digitalized technology for effective digital transformation.

Challenge No.3

Creating a culture of collaboration

This is seen as a key challenge in the manufacturing sector.[3] Historically there has been a clear demarcation of roles and responsibilities, Industry 4.0 creates an interconnected environment where multiple perspectives can be combined and viewed in parallel. The extent of collaborative activity also raises issues of trust and respondents to this study note that, as a result, new business model are already being discussed, where such collaborative transparency from the supply-side is matched with longer guaranteed contractual commitments from the buy-side.

Travel Products, USA

Close on the heels of the big six challenges comes the issue of compatibility - that is, migrating information from legacy systems to the digitalized environment. This is an issue in terms of both money and time... It's really time-consuming and firms need to be prepared.

Challenge No. 4
Data & cyber security

Over half of interviewees were of the view that these information security concerns are likely to give rise to a future market in specialized secure data sharing services.

Several commentators made a comparison with existing secure data sharing industries, such as credit referencing, where participants contribute information into an anonymized environment to gain communal insights without fear of data loss, exposure or identification.

(UK) Plastics

Digitization simply allows you to measure more - it provides the means of doing so. For each phase of our development, we monitor, having created our own internal measurements. Quality for instance is a key business concern these days and you can closely measure improvements there, along with their commercial impact.

Challenge No.5
Gaining comprehensive access to a broad enough volume and range of proof points – real examples of successful digital transformation in all manufacturing sectors

Although manufacturers interviewed for this study seem clear about the Industry 4.0 technology solutions that they need to acquire, most also note that a lack of comprehensive access to proof points is hampering manufacturers' investment in Industry 4.0 technology. This clearly illustrate the level and period of return-on-investment.

Challenge No.6
Specialized strategic management skills capabilities to create a clear, phased plan to achieve Industry 4.0

While respondents noted that almost every manufacturer's main board is aware of the urgent need to digitalize and automate, too few have converted this recognition into a clear, phased strategic plan.

Such planning includes methods of evaluating the commercial benefits gained from each phase of investment, organized into a process where each phase is measured, and its impact on the following program phases assessed and suitable adjustments made.

Figure 1
The key challenges for Industry 4.0

Creating a sustainable plan for Industry 4.0

Manufacturing companies and management consultants interviewed for this study were adamant on one very important point – building a sustainable plan for Industry 4.0 cannot be reduced to a single, simplistic formula. Each company's circumstances, digital maturity, market dynamics, management capabilities, talent pool, and financial capacity, is different. Respondents agreed that a coherent approach – a methodology – which interrogates a number of aspects of a manufacturer's business - is the key to building a sustainable plan for digitalization and automation. The methodology emerging from this study reflects consensus among respondents over six key areas:

ASSESSING THE OBSTACLES

- Is your business development vision built on a solid basis of data and factual analysis?
- What are your partner dependencies in the supply or distribution chain – and could they undermine your success or slow you down?
- Do you have enough access to robust and proven business cases where measurable success has been achieved?
- What additional strain will implementing a digital platform put on your organization?
- Is there a danger that your chosen technology investments could become rapidly obsolete in a fast-moving digital world?
- Will your employees be enthusiastic about change to Industry 4.0, or resistant to it? Have you consulted on their fears and/or ambitions?
- Have you assessed the increased risk of cyber security and data security in an IoT environment?
- Have you assessed the skills requirement and availability to run your digital factory?

EVALUATING THE OPPORTUNIITIES

- Have you precisely defined what you expect to achieve through Industry 4.0 growth?
- Where are you placed on the road to Industry 4.0 compared to your key competitors? Ahead? Behind? How much?
- Which are the low investment and which are the higher investment growth opportunities? What will they deliver? Have they been set in priority order? Which are extensible? How will they protect, or create, value?
- How much do you expect to increase market share and/or profitability through:
  - Greater agility through digital data-based insights?
  - Connectivity within your organization & sites?
  - Connectivity with the distribution/supply chain?
  - Improved order-delivery timings?
  - More rapid product development?
  - Better customer service through order tracking?
  - More customized products per customer?

RECRUITING AND TRAINING TALENT

- Have you conducted a skills gap analysis between your current workforce and the requirements for your digital factory? How high is the potential for re-training?
- Have you brought your employees enthusiastically on-side for change? Are they likely to resist?
- Do you already have a 'culture of collaboration' among the workforce? Are their rewards and incentives designed to encourage co-operation and collaboration?
- Have you planned your likely need for skills in:
  - Operational data interpretation
  - Digital environment maintenance
  - Strategic optimization analytics
  - Virtual environment manipulation
- Have you analyzed the available skills market and compared it to your emerging Industry 4.0 needs in a gap analysis?
- Have you identified which skills to develop in-house for competitive advantage and which to outsource?

MEASURING THE EFFICIENCIES

- How much could you save through:
  - Increased uptime through predictive maintenance?
  - Reduced set-up time?
  - Reduced energy usage?
  - Production optimization through IoT analytics?
  - Improved just-in-time production (e.g. through MES extensions)?
  - Error reduction?
  - Overall improved productivity?
- Which of these savings can be best achieved through retrofit and which require full technology replacement?
- Which of these savings represent the quick wins? And which will either take longer or require higher investment?
- What is the staged programme of efficiency initiatives?
- What is their minimum target for achieving measurable success?

DEVELOPING DIGITAL MANAGEMENT

- Do you have full board consensus on digitalization? Are there any board members who are sceptical or lukewarm?
- Is there full commitment to invest properly in Industry 4.0?
- Have you constructed a new business model and rationale for how you will operate in an Industry 4.0 world?
- Do you have a proven management culture of learning, agility and successful change management?
- Do your main decision makers have digital skills and experience? If not, have you engaged proven experts?
- Is there planned investment in management development for an Industry 4.0 operating model?
- What are the new performance metrics for your new digital manufacturer incarnation?
- What management positions are made redundant through digital transformation (if the answer is 'none' or 'few' then the transformation plans may not sufficient).

INTEGRATED STRATEGIC FINANCE

- Start with vision and finance. What sources of finance (OPEX/CAPEX) can you access for Industry 4.0 investment, including own capital, relationship banks, specialist industry lenders and financiers & government?
- Have you considered how you will finance all aspects of digital transformation, including originating your strategy, creating a culture of collaboration, and operationalizing your plans?
- How does this match up with your strategic growth vision and the technology investment required?
- Do you have financing partners who have the willingness and the skills to work with you to create financing options tailored to your specific circumstances?
- Is your CFO a 'virtuoso' in linking Industry 4.0 initiatives to financial outcomes using all available financing techniques?
- Have you analyzed which investments can be acquired on a pay-to-use basis, and which on pay-for-performance?
- How reliable are the financial and competitive benefits the investment is expected to deliver? ('sustainable financing')

Financing 4.0 to enable a sustainable plan for Industry 4.0

As a strategic first move, manufacturing organizations should seek to understand the potential access points to financing for digital transformation.

The repositioning of financing, as an early consideration, potentially serves to open the range of technology investment options available as part of strategy development in the quest for Industry 4.0.

"Finance 4.0" – is a fast-developing sector with emerging flexible structures developed on a client by client basis.
These flexible financing tools are being combined in a multiplicity of ways to enable the investment required for Industry 4.0 over time:

Pay to access/use equipment & technology finance

Enables the acquisition of a system or piece of technology. Hardware, service, maintenance and other soft costs can be embraced in a single agreement. Periods can be flexed to match payments to the financial benefits gained. Special arrangements can also be put in place which help to accelerate future technology acquisitions.

Technology upgrade and update

Manufacturers want to access technology innovations as they appear (particularly in the light of shortening digital innovation cycles).[4] Finance can also offer options to upgrade technology during the financing period, whether to replace certain elements with newer models, or retro-fit enhancements into the main technology platform.

Software finance

By definition, most Industry 4.0 technology solutions involve both hardware and software. Because specialist financiers understand how the software is implemented, and the benefits in practice that it is likely to deliver, they can understand the associated risk and embrace the software element into a total financing package.

Pay for outcomes

These arrangements base payments on the expected business benefits, or 'outcomes', that automation or digitalization technology makes possible.[5] Actual financial savings – such as reduced electricity consumption - are used to subsidise or even totally fund monthly payments, making the technology cost-neutral for the manufacturer.

Transition finance

Manufacturers do not want to start paying for their Industry 4.0 technology platform until it is installed, tested and operational. Finance 4.0 recognizes the challenges of transition, and offers financing arrangements that defer payment for a new system until it is reliably up and running, eliminating any period of cost duplication for the manufacturer.

Working capital solutions

Finance can be optimized in more areas than technology acquisition. Improved competitiveness can lead to sudden growth – which exerts pressures on supplies, inventory and overall cash flow.

Financing services – usually based on some form of invoice finance – are available to help manage the wider financial challenges that success through digitalization brings.

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1 See also, EEF, An up-skill battle, 28 Mar 2016

2 See also: Germany Trade & Invest, The Machinery & Equipment Industry in Germany, Issue 2017/2018; PwC, Companies worldwide are investing heavily in digitization, 13 Apr 2016

3 See also, Deloitte University Press, Industry 4.0 and building a culture of responsibility at the workplace, 31 Oct 2017

4 According to Siemens Financial Services research, published in *Investing in Success* (2016), **67%** of manufacturing respondents observed that technology replacement/upgrade cycles are shortening

5 This whole subject is discussed in a Siemens Financial Services research paper, Opportunities and Outcomes, February 2017

Published by
Siemens AG 2017

Siemens Financial Services, Inc.
170 Wood Avenue South
Iselin, NJ 08830

Updated (unless stated otherwise): February 2018

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