DISCUSSION PAPER

Ambidexterity: Product Development in the NEW

Contents

Objective of this paper

This Discussion Paper explores the importance of organizational ambidexterity in digital innovation for a successful Industrie 4.0 pivot. Organizational ambidexterity is the simultaneous orchestration of exploitation of the core business alongside exploration in new digital business opportunities to unlock trapped value. In this paper, we demonstrate how leading connected enterprises are honing in on ambidexterity and business model transformation to build organizational culture and achieve Industrie 4.0 objectives; and make recommendations on how organizations can proceed.

A Changing Environment

Industrie 4.0 is anchored in connected, cyber-physical smart systems that communicate with each other. These smart systems – systems built on the cloud, Internet of Things, smart sensors, autonomous equipment and vehicles – create and utilize massive amounts of data that support organizations to make efficiency gains in their operations; informing maintenance and performance of smart machines, identifying patterns and insights, and allowing leaders to prioritize their attentions.

As Industrie 4.0 continues to take hold and technologies including artificial intelligence, the Internet of Things, machine learning and robotics become increasingly sophisticated and viable, organizations are undertaking digital transformations to pivot towards innovative digital and platform business models. Achieving this shift requires companies to make strategic investments in new technologies and optimized operating models for the new digital business that offers hyper-personalized experiences, products and services and unlocks new sources of value.

With value creation pivoting toward services, the nature of the manufacturing and high-tech firm is changing significantly. It is well understood that companies have to make much larger investments in organizational learning before fully benefiting from integrating new technologies into value chains.[1] Few organizations are ready to take full advantage of applications of new technologies, and levels of investment vary. At the same time, it is observed that some companies get higher returns on their technology-led innovations than others.[2]

As organizations take a keen focus on technological enablement and the pivot to new digital and platform business models, operating models and efficiencies, they often overlook and underestimate the importance of organizational culture, the employee experience and new leadership and governance models. The resulting disconnect between innovation moving faster than existing organizational frameworks hinders organizations' ability to capture new revenue streams and markets. Businesses need to develop organizational adaptability for the new economic environment, but often struggle to identify the path forward.

New Approaches

This is where the ambidexterity model provides a solution, in that companies should focus on exploiting the stability afforded by their core business, while at the same time exploring innovations and experimentation for digital transformation. Ambidexterity requires a new 'digital way of doing things' in an organization's people, processes and structure. Achieving an organizational culture of ambidexterity is a fundamental accelerator for organizations to pivot to Industrie 4.0, drive quantifiable change, implement agility and achieve long-term business objectives and outcomes at the intersection of human and machine.

What is holding businesses back?

When industrial incumbents aim to create value out of digital business, they face the following challenges:

The org chart revolution

Traditional organizational structures built upon a stable product and business model architecture are no longer appropriate in Industrie 4.0 as companies face an increasing demand for adaptability and flexibility in organizational set-up. Traditional organizational models arranged in hierarchical business, geographical and portfolio siloes simply do not support agile operations or ecosystem collaboration in platform models, thus limiting success in new markets, customer engagements and channels. Red tape hinders innovation: a recent HBR article with a focus on the US links disappointing productivity increases to bureaucracy in the firm; "since 1983 the number of managers, supervisors, and administrators in the U.S. workforce has grown by more than 100 percent, while the number of people in all other occupations has increased by just 44 percent. In a survey by Harvard Business Review, nearly two-thirds of respondents said their organizations had become more bureaucratic in recent years".[3]

1   Brynjolfsson, E., Hitt, L.M. 2000. "Beyond Computation: Information Technology, Organizational Transformation and Business Performance" Journal of Economic Perspectives. 14, 4, pp. 23-48 http://ebusiness.mit.edu/erik/Beyond%20Computation%20-%20JEP.pdf

2   World Economic Forum System Initiative on Shaping the Future of Digital Economy and Society, "Digital Transformation Initiative, Maximising the Return on Digital Investments", May 2018. Available at: http://www3.weforum.org/docs/DTI_Maximizing_Return_Digital_WP.pdf

3   Harvard Business Review, "The End of Bureaucracy", 2018. Available at: https://hbr.org/2018/11/the-end-of-bureaucracy

While there has been a lot of focus on increasing enterprise agility, and some tentative steps have already been taken, the pace of change is thus far lagging. In a survey by VDMA of member companies, respondents evaluated the capability of their company's business model to quickly develop new business models as below average and the weakest innovation capability.[4] Integrating digital organizationally has proven to be challenging, and organizational responses attempted so far have not been fit for purpose:

- **Targets set by the CEO:** Demonstrates leadership ownership and accountability but is often resisted by function leads and lacks instruments for adoption and cultural changes.

- **Chief Digital Officer in the C-Suite:** Provides a signal of intent to the internal organization and external market, however has limited impact if targets for portfolio, business and function leads are lacking.

- **Digital Lab:** Establishes a Center of Excellence for innovation and asset creation, however is often difficult to integrate into the core organization and risks creating a cultural division.

- **Digital pilots at the departmental level:** Establishes "Islands of Excellence", but which often struggle to proceed to implementation and scaling, and risks creating incompatible approaches with the core.

- **Collaboration with start-ups:** Facilitates access to outside innovation, however this is often limited to beyond the boundaries of the organization and is difficult to transfer in and be adapted.

Developing with digital clock-speed

Despite organizations making significant investments in digital technologies, many are not seeing a significant return on this investment in the medium and long-term. A recent survey of 900+ large companies in the 21 biggest industrial countries around the world found that only 13 percent report they were achieving greater efficiency, cost savings and business growth from their digital investments.[5] The issue lies partly in the rapid nature of digital innovation: combining digital technologies with the building blocks of the industrial core business means that the clock speed in development significantly accelerates up to the unfamiliar speed of software and digital technologies. Organizations struggle to reconcile their exploratory, rapid-prototyping, fail-fast digital R&D activities with the stable and formalized processes of the core business.

Culture of learning and experimentation

Organizations and employees have to build up new digital capabilities in technology and business model innovation. In organizational cultures dominated by protecting and continuously improving the core business, additional capabilities have to be fostered, such as a willingness to experiment, take risks and work flexibly. The issue goes beyond human resource questions: it is about a fundamental shift in the whole organizational culture, from the leadership level to frontline staff. Innovation is often overwhelmed by enterprise functions – HR, Finance, Legal, IT – and their long-established checks and processes which seek to maintain the status quo. Meanwhile, as companies primarily focus on the day-to-day business and scarce human resources which makes it difficult to create extra time for employees and managers, a study by VDMA showed that many managers find it difficult to satisfactorily manage the balancing act of focussing on the current business whilst acting exploratively.[6]

Collaboration at the edge

Since digitization does not respect the boundaries of functions and disciplines, but rather requires a holistic end-to-end process perspective, the ability and willingness to collaborate across functions, disciplines and organizational frontiers is crucial. A study by Fraunhofer Institute for Industrial Engineering IAO, Stuttgart, for Ingenics found that an inability

4   VDMA, "Führung und Innovation in Zeiten der Digitalisierung", 2018. Available at: https://businessservices.vdma.org/viewer/-/v2article/render/26890390

5   Accenture, "Industry X.0 Combine and Conquer Unlocking the Power of Digital", 2017. Available at: https://www.accenture.com/t00010101T000000Z__w__/gb-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_26/Accenture-Industrie-XO-whitepaper.pdf

6   VDMA, "Führung und Innovation in Zeiten der Digitalisierung", 2018. Available at: https://businessservices.vdma.org/viewer/-/v2article/render/26890390

to change within the organization was the main obstacle to Industrie 4.0 implementation in nearly one-third (31 percent) of companies surveyed.[7] First responses to disruption have often seen companies starting with 'pockets of innovation' within the company, such as labs or incubators, however the struggle is taking incremental innovative thinking cultivated in the test beds and embedding this at scale across the broader organization, bringing the whole staff on board. Adopting innovative outputs from the internal incubators/labs often loses momentum as innovations face off against cumbersome business processes and stifling bureaucracy.

How, given the challenges thus far, can we build organizations that accelerate value creation from digital business models?

Leading companies understand how to connect the traditional core and the emerging new. In the case study below, we give deeper insights into the intra-company set-up of the TRUMPF R&D ecosystem:

The R&D Ecosystem at TRUMPF

Falling lot sizes and increasing order complexity: these days, the demands on sheet metal production companies have fundamentally altered. Up to 80 percent of the processing time is taken up by indirect processes and 50 percent of the orders in a sheet metal production have lot sizes of four or fewer parts. Recognizing the changing nature of the sheet metal fabrication industry, TRUMPF supports its customers through its Smart Factory solutions to operate in networked, automated process chains with optimized end-to-end workflows by offering new digital products such as indoor tracking solutions as well as connected machine tools. At the same time, in the spirit of leading by example, TRUMPF Machine Tools R&D is transforming its internal processes to become a networked, adaptive and agile organization.

The overarching principle of this transformation in R&D Ambidexterity, that is, optimizing TRUMPF's existing well-known products, whilst simultaneously establishing new digital products, data-based technologies and competencies

for the Smart Factory at the very core of its traditional machine tool development business.

This requires partly a fundamental shift in how the R&D practice operates. The key to achieving this? A network of interdisciplinary teams for a networked factory of the future. All stakeholders in the R&D ecosystem acknowledge that collaboration is the key success driver of achieving digital transformation. It means development teams across the R&D spectrum working together with partners, universities and start-ups for the maximum benefit for customers.

What does this mean in practice?

- Artificial intelligence and traditional mechanical engineering practices come together, blending disciplines in networked, interdisciplinary teams: e.g., machine tool designers work side-by-side with data specialists responsible for improving intelligent machines' self-optimization capabilities.

- As products become increasingly complex, a wide range of skills is needed to develop and commercialize them: rather than being isolated in separate labs, with TRUMPF's TruConnect, teams across hardware, software, services operate in a connected ecosystem, with close links to R&D, sales, partners and customers.

- Preparing for the digital business requires building dynamic capabilities for networks and ecosystems: new leadership roles have been introduced to facilitate Smart Factory R&D teams to interconnect flexibly, including product owners, focussed on managing technical content, and agile leaders, responsible for creating appropriate organizational frameworks underpinned by a culture of adaptabilities, continuous learning and cross-boundary collaboration.

With these adaptive organizational structures, TRUMPF demonstrates leadership in strengthening the role of the team and enabling its communities to collaborate and self-regulate, and in doing so better delivers for the needs of the Smart Factory customer.

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7   Ingenics, "Industry 4.0 – a revolution in work organization", 2014. Available at: https://www.ingenics.com/assets/downloads/en/internal/Industrie40_Studie_Ingenics_IAO_en_VM_Print.pdf

Recommendations to achieve ambidexterity

Digital Organization Models

Current organizational models – traditionally organized around siloes – have supported production at scale but are not conducive to the Industrie 4.0 environment and ambidextrous models. Companies need to view their organization holistically, evolving from a 'pockets of innovation' view to taking a comprehensive approach that evaluates every department and business process and considers how changes will impact the entire enterprise, business processes and the employee experience.

We observe a variety of organizational set-ups to cope with the challenges and tasks of digital innovation and transformation, catering to where a business finds itself on the maturity curve: models range from establishing an innovation hub that spans the breadth of the enterprise, to establishing accelerator programmes or digital subsidiaries, or acquiring capabilities through acquisitions (see Figure 1 below).
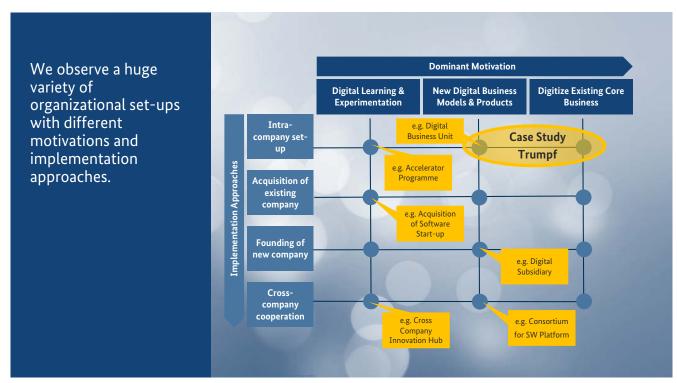
Organizational DNA

Leadership, culture and people management have been identified as key success factors in transforming to a digital organization model. In short, culture as the sum of the organizational DNA, values and practices is a prerequisite for constantly keeping an organization relevant and achieving ambidexterity.

Culture

A company's pronounced orientation towards the future is a key driver of creating a new organizational philosophy for innovation. In an ambidextrous model, a collaborative culture is required to disseminate innovation across the enterprise and secure employee buy-in to the mission.

Figure 1: Digital Organization Models

We observe a huge variety of organizational set-ups with different motivations and implementation approaches.

Source: Plattform Industrie 4.0

Leadership

Leaders in connected enterprises should set the example for digital culture and leadership, demonstrating innovative behavior and positioning culture as an accelerator of quantifiable gains. Leaders will need to balance ambidexterity, focussing on the current business without losing sight of the future and acting exploratively. Roles such as Chief Agile Office at TRUMPF and Chief Transformation Officer at Siemens can be considered to lead the dissemination of ambidexterity across the enterprise.

People Management

Achieving successful Industrie 4.0 transformation is primarily a management and people issue. Aligning the organization to Industrie 4.0 outcomes and facilitating people to embrace a digital culture and mindset is equally as important as the technology used.

Outlook & Future Research

In 2019 the working group "Digital Business Models in Industrie 4.0" will explore the different organizational set-ups for digital business and their impacts concerning structure and culture on the organizational level as well as the required hard and soft skills on the individual level. We will publish more of our findings and recommendations on how to organize, lead and collaborate in digital business inside companies and in cross-company cooperation.

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