

# MGMT

## of Innovation and Technology

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### Digital Product-Service Platforms

— Enabling multiple business models and avoiding the service paradox

### Ledningssystem för innovation

— Reflektioner kring en ledningssystemstandard för innovationsarbete

### Digital service development

— Challenges and future directions for industrial digital services

### Change through Co-creation

— A key to drive transition towards sustainability?



# Att leda digital transformation

Av Martin Sköld

Förändring och digital transformation sammanfattar till stor del årets andra nummer av tidskriften. Dessa områden ligger också väl i linje med den företagsfinansierade forskarskola där fem doktorander studerar olika aspekter på ledning och organisering av digital förändring. Den forskning som görs kan relateras till tre områden: (1) Nya affärsmodeller - i form av vad som krävs för att erbjuda varor och tjänster med ett nytt digitalt innehåll och hur verksamheten tjänar pengar på digitalisering. (2) Ledning och strategi - hur företag driver den mycket mångfacetterade förändringsprocess och kompetensutveckling som behövs för en digital omvandling. (3) Företagets förändrade relationer med omvärlden - t ex leverantörer, kunder och samarbetspartners om hur data får och kan användas och delas.

Den första artikeln handlar om framgångsrika digitala produktservicesystem som kan underlätta värdetillväxt och affärsmodellinnovation. Men etablerade operatörer kan möta ett antal tekniska, ledningsmässiga och organisatoriska utmaningar som behöver hanteras för att kunna dra full nytta av en sådan digital transformation. Forskaren menar också att det är avgörande att fokusera på själva erbjudandet som kan generera ett värde för att undvika en tjänsteparadox. Nya operatörer uppmanas att låta företagsentreprenörer experimentera med både teknik och affärsmodeller för att bygga kunskap, och som input till en delad digital produkt-tjänstplattform som, när den anpassas till organisatoriska uppdateringar, kan bli en grund för flera nya affärsmodeller som kommer att komplettera befintliga.

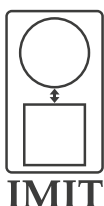
Den andra artikeln inriktas på en vägledande ISO-standard för innovationsledningssystem (ISO 56002) som publicerades 2019. Den här artikeln delar insikter från fallstudier bland annat på organisationer som uttalat har implementerat den här standarden. Insikterna relaterar både till utformning och implementering av innovationsledningssystem. Vidare delas också erfarenheter från att ha använt det standardbaserade ramverket som analytiskt perspektiv även på andra organisationers systematiska innovationsarbete.

Artikel tre handlar om digitalisering som en viktig möjlighetsöppnare för att åstadkomma mer avancerade tjänster. I ett nyligen genomfört nordiskt projekt har forskare bland annat studerat aktuella utmaningar och framtida riktningar för den nordiska tillverkningsindustrin i deras digitala tjänstutveckling. Artikeln identifierar lärdomar och konsekvenser för den här typen av ledarskap.

I den fjärde artikeln riktas fokus på industrier och samhällen runt om i världen som strävar efter att minska koldioxidutsläpp, energianvändning och överkonsumtion av materialresurser. För att uppnå sådana mål krävs mer tvärvetenskapliga metoder som samskapande för att tackla innovation för hållbar utveckling. En nyligen publicerad doktorsavhandling belyser varför och hur hållbarhetsdrivna innovationer kan utformas och utvecklas genom samskapande.



Trevlig läsning!



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# Digital Product-Service Platforms

— Enabling multiple business models and avoiding the service paradox

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By Johan  
Simonsson

Many incumbent manufacturing firms have already started to combine products and services into new offerings with the intention to better address various customer needs. In more recent years, also different digital capabilities such as IoT, sensor fusion and artificial intelligence is increasingly introduced to further enhance these product-service systems. While the combination of products, services and digitalization offers many opportunities to generate new business models, my recent PhD thesis titled *Towards Digital Product-Service Platforms in Manufacturing Firms*, also sheds light on how companies pass through different stages in their digital transformation and how a platform approach for servitization may become a critical success factor.

Although many incumbent manufacturing firms have already started to offer combinations of products and services, most still have less experience from also using different digital capabilities to advance their product-service combinations – even if there are many tempting opportunities. If suppliers for example can gather vast amounts of data from products in use, Artificial Intelligence / Machine Learning may then be used to for example more accurately predict service need, to guide the operator to a better end-result or even facilitate autonomous operation of machines. Several aspects of the transition into digital product-service systems in incumbent manufacturing firms have been less explored and the research this article builds on explores the emergence of digital product-service systems in incumbent manufacturing firms, including the main opportunities as well as the barriers, and investigates how a platform approach may support incumbents in their transformation. The findings for example identifies a need to focus on the most value-generating combinations of products and services, that much of the initial transformation is driven by corporate entrepreneurs, that incumbents seem to transition through different phases, and also that a platform approach may assist companies to align several different shared capabilities, upon which a number of new business models may developed as complements to the existing transaction product-focused business model already in use.

## The importance of value understanding

There are almost an endless range of possible

product-service combinations, enabled by digitalization, that incumbents can potentially develop. Out of these opportunities, companies must carefully select a subset for which they can appropriate value, and the cost to develop is manageable. There is significant risk of ending up in a service paradox with underperforming business models, in which the investments into developing new services are larger than the value generated in return. The complexity increases with more advanced offerings, the number of product lines that the service should cover and similar.

## Corporate Entrepreneurship

One successful approach for understanding the value potential is to encourage corporate entrepreneurs to experiment with opportunities and business models. The empirical findings suggest that individuals with an entrepreneurial mindset are well suited to both identify and build proof of concepts for new and innovative digital product-service combinations. Such an effort was also seen to be well suited to build knowledge inside the organization, both within respective team, but also all the way to group management and board of directors. This means that the starting point for the digital transition should be embraced to start bottom-up, rather than top down which is otherwise commonly the case for strategic initiatives within large corporations. Companies should however be aware that an entrepreneurial approach with several independent initiatives, does not scale very well and that components are not easily reused across or between different initiatives.

## A platform approach to digital servitization

Incumbents which desire several different digital product-service offerings should consider a digital product-service platform approach. The thesis outlines such a platform as “a set of physical and digital subsystems and interfaces developed to form a common structure from which a stream of derivative product-service combinations can be efficiently generated.” A digital product-service platform, once in place, also facilitates the rapid prototyping of new product-service offerings, effective scalability and a similar look-and-feel across offerings. A common platform, that is to be shared across several organization structures, at the same time creates new challenges. More specifically, the challenges relate to: (1) platform governance, (2) ownership of various activities, (3) deriving an overview of related product and service development, and (4) the budgeting of product-service bundles.

## Three phases of digital PSS transformation

All four incumbents studied in the thesis appeared to transform through similar stages. The first stage was the entrepreneurial phase, which proved to be an effective starting point for the digital transformation. The complexity of the phenomenon, with products, services, and digitalization, makes detailed strategy documents a challenge and then an experimental approach proved successful to ignite the digital transformation, and to learn more about both technology and business models. All companies understood the power of a common digital product service platform, upon which several different

FORTS. 

business models could be efficiently generated using shared capabilities. Full use of the common platform was however not seen until a third phase, when the incumbents had aligned their organizational approach with their digital product-service initiatives.

**Business model addition rather than transition**

It is known that digital servitization has the power to transform the business models of companies, but the thesis also underline those incumbents will likely face a situation where existing product business model(s) remain rather intact, and new PSS enabled business models are added as complements. One reason is that product business models will remain strong revenue generators for a long time, until the new PSS business models are mature enough to replace them. This means that two partly competing business logics will have to co-exist, at least for some time, within many incumbent firms.

**Managerial Implications and Conclusions**

Industrial manufacturers can generate more value for different stakeholder through digital product-service systems. These new offering may range from simple to being rather advanced. As a starting point,

incumbents need to understand that more advanced business models also require more advanced capabilities, meaning that while more value may be generated as the product service offerings get more advanced, focus must be invested in understanding the related cost. Corporate entrepreneurship is an approach suited to understand the opportunities and to build knowledge. This investment is valuable, not the least, as input when defining a digital product-service platform

**”A digital product-service platform is a set of physical and digital sub-systems and interfaces developed to form a common structure from which a stream of derivative product-service combinations can be efficiently generated.”**

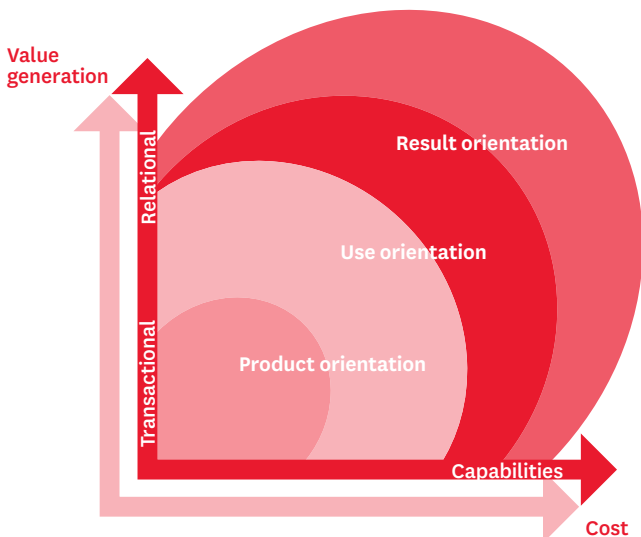
that fits respective firm’s context. If companies then also align their organization structures to support their new platform enabled product-service initiatives, they may unlock a potential to efficiently generate a number of new complementing business models upon shared resources, which should become new revenue streams for incumbents – business models which eventually may challenge the existing product logic.

Industrial manufacturers have an interest in digital product-service systems as additional value can be generated for different stakeholders when products and services are combined. These new offering may range from fairly simple to being rather advanced, and managers should be aware of the following:

- It is important to understand both the value generated from product-service systems, and at the same time, the cost associated with offering delivery
- Digital capabilities, such as cloud computing, artificial intelligence and 5G, may facilitate even more advanced offerings, but at the same time adds more cost

- Experimentation is a good way to verify the attractiveness of different ideas, but also to learn about, for example the complexities of digitalization and its related costs. Managers should encourage an entrepreneurial mindset, and truly learn from different proof-of-concepts.
- Using a platform approach to enable digital product-service systems can be a good approach for firms that intend to scale multiple digital product-service offerings. Through the platform, several new business models may be generated upon shares capabilities. However, managers must then also learn how to govern and manage the platform in an efficient way. The platform should become a company-wide resource and it must for example be clear for all parties how budgeting is made, and how decisions are made, and priorities set.
- Manufacturing firms with a tradition of developing products should expect that the new services-based business models rather complement than replace existing transaction based business models.

**Industrial Product-Service Business Models**



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# Ledningssystem för innovation

– Reflektioner kring en ledningssystemstandard för innovationsarbete

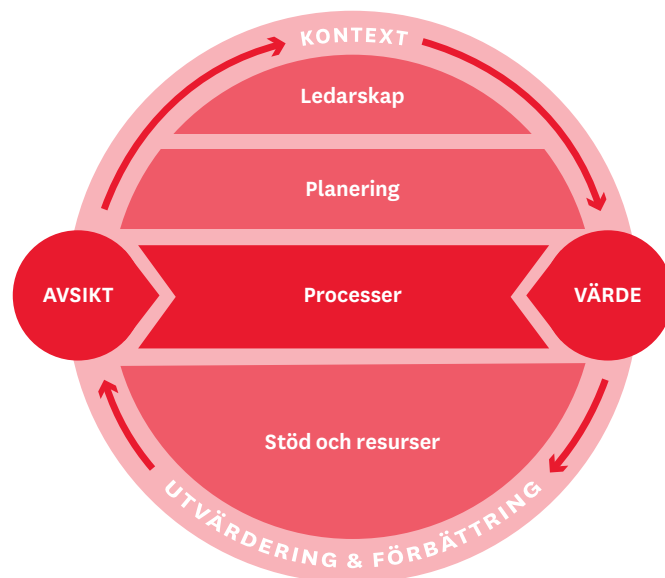
Av Ingrid Kihlander,  
Magnus Karlsson &  
Mats Magnusson

En vägledande ISO-standard för innovationsledningssystem (ISO 56002) publicerades 2019. Den ger möjlighet att följa hur ett sådant ramverk kan stödja organisationer som vill stärka sin innovationsförmåga med hjälp av en systemansats. Den här artikeln delar insikter från fallstudier bland annat på organisationer som uttalat har använt ISO-standarderna för att implementera ett innovationsledningssystem.

Det saknas inte insikt om att innovationer behövs för att möta framtida behov. Det saknas inte heller ambitioner att skapa innovationer. Frågan för oss är snarare hur vi kan få det att hända och hur vi kan gå från enstaka händelser och separata projekt till att bygga uthållig innovationsförmåga. De innovationsinsatser som görs idag riskerar att vara alltför fragmenterade samtidigt som det är enkelt att underskatta den omfattning på insatserna som verkligen krävs (Karlsson & Magnusson, 2019). Här finns behov av att använda ett angreppssätt som länkar samman och hanterar nödvändiga faktorer som bidrar till innovationsförmågan, såsom ledarskap, processer, kultur och stödstrukturer. Intresset för en sådan systemansats (som är både systematisk och systemisk) har ökat både i akademien och i praktiken, där publiceringen av den vägledande standarden för innovationsledningssystem ISO 56002 (ISO, 2019) kan ses som ett tydligt tecken.

Ett innovationsledningssystem är ett ramverk som stödjer organisationer att innovera och leverera värde och där en uppsättning innovationsstödande faktorer samverkar. Genom att fokusera på strategi, organisation, processer och stöd samt möjliggörande metoder och verktyg kan innovationsledningssystemet länka strategiska och operativa aktiviteter som är avgörande för framgång. Ett viktigt antagande är att systemet endast fungerar effektivt när alla dess beståndsdelar finns på plats och att den "svagaste länken i kedjan" begränsar sannolikheten för att lyckas. Därför blir förståelse, bedömning och förbättring av systemets delar samt hur de samverkar på systemnivån ytterst viktiga.

**En internationell standard för innovationsledningssystem**  
2019 publicerades ISO 56002 (ISO, 2019) – en internationell vägledande standard för innovationsledningssystem. Ett ledningssystem kan definieras som en uppsättning kopplade och interagerande element som formar riktning och mål för en organisation



Figur 1: Innovationsledningssystem (efter ISO 56002)

samt processer och stöd för att uppnå dessa mål. ISO 56002 är strukturerad runt elementen Kontext, Ledarskap, Planering, Stöd, Processer, Utvärdering samt Förbättring (se figur 1). Denna struktur känns igenom från andra standarder för ledningssystem (t ex kvalitet och miljö) – vilket är avsiktligt i syfte att

**”Att prata om standard och innovationsledning möts inte sällan av skepsis. Är en standard för innovationsledning en motsägelse?”**

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# ”Forskningsresultat ... [har] visat på ökade innovationsaktiviteter, ökad bredd av olika innovationsaktiviteter, samt positiva effekter på innovationsförmåga och affärsresultat.”

underlätta för organisationer att relatera till och integrera med befintliga ledningssystem.

Det finns flera ramverk för innovationsledning tillgängliga, från både forskare och konsulter, som alla kan sägas ha sitt värde. Samtidigt kan mångfalden skapa förvirring för de som söker stöd i hur innovationsförmåga kan utvärderas och förbättras. Det blir då intressant med stöd i form av en standard som erbjuder gemensam terminologi och utgångspunkt, och som är framtagen av representanter från olika sektorer och olika delar av världen.

Att prata om standard och innovationsledning möts inte sällan av skepsis. Är en standard för innovationsledning en motsägelse? Här bör det dock förtydligas att ISO 56002 handlar om vägledning för att bygga innovationsledningssystem och inte standardisering av utkomsten från innovationsarbetet, d.v.s. innovationerna. Inte heller syftar standarden till att vara ett föreskrivande recept utan utgör ett vägledande ramverk.

Det har lyfts kritik kring ISO 56002 så som att vara alltför generell samt att inte fånga det komplexa och iterativa i innovationsarbetet. Forskningsresultat från Spanien kring deras motsvarande nationella standard (publicerades 2002) har dock visat på ökade innovationsaktiviteter, ökad bredd av innovationsaktiviteter, samt positiva effekter på innovationsförmåga och affärsresultat.

## Insikter från tillämpning av ISO 56002

Insikterna som presenteras här är kommer från en övergripande analys av studier kring utformning och implementering av innovationsledningssystem (se Hyland et al. (2022) för fullständig redogörelse samt ingående fallstudier). 16 fallstudier från olika delar av världen (Nord- och Sydamerika, Europa samt Asien) och olika typer av organisationer (privat, offentlig och idéburen sektor) ingick i analysen. Fallen valdes för att fånga olika perspektiv och insikter kring systematisk innovationsledning och uppbyggnad av innovationsförmåga. Ett antal organisationer som kan anses som 'early adopters' av ISO 56002 studerades men också andra utvalda

fall som bedömdes belysa det övergripande syftet (här användes ISO 56002 som analytiskt perspektiv).

Även om de studerade organisationerna var olika och kommit olika långt i sitt arbete kunde både systematiskt och systemiskt innovationsarbete påvisas. I analysen tvärs fallstudierna kunde flera framgångsfaktorer identifieras: en tydlig innovationsstrategi; en stödjande innovativ kultur (medarbetare, ledarskap); nätverk och möjligheter för medarbetarna till kompetens- och förmågeutveckling; högsta ledningens åtagande och engagemang; samt en systematisk process för att hantera olika typer av innovationer.

Analysen visade att implementeringsresan kunde starta underifrån-och-upp eller uppifrån-och-ned och i flera fall vara en kombination. Detta visar på vikten av att reflektera över hur den egna organisationen bör starta och vilka delar av innovationsledningssystemet som bör fokuseras först (utan att tappa helheten) men också inse att systemet kommer att utvecklas som en del av en längre resa. Det var också tydligt att en gemensam terminologi var viktig för att skapa gemensam förståelse och få med människor på resan.

Exempel på aktiviteter kan hämtas från två av de studerade fallen som uttalat har använt ISO 56002 som bas för implementering av innovationsledningssystem. Även om dessa två organisationer verkar i olika sektorer och med bas i olika världsdelar (ett japanskt teknikbaserat företag och ett svenskt större sjukhus) kunde flera liknande aktiviteter identifieras. Båda organisationerna tog explicita beslut att (1) ett innovationsledningssystem skulle implementeras, (2) ISO 56002 skulle utgöra basen, och (3) en internt ansvarig funktion utpekades för att hålla ihop arbetet. I båda organisationerna gjordes initialt en gapanalys med hjälp av standarden vilket gav underlag för efterföljande arbete. Organisationerna har haft stort fokus på kompetens- och förmågehöjning hos medarbetare där utbildningar (t.ex. i metoder för att fånga behov och skapa värde) samt coachningsprogram varit viktiga byggstenar. De har också haft ambitiösa mål om hur många anställda som ska ta del av insatserna. Vidare har dessa organisationer

arbetat tydligt med att bygga kultur och aktivt kommunicerat både internt och externt för att stärka detta. Slutligen har de arbetat mycket med hur mätning kopplat till innovationsledningssystemet (både aktiviteter och effekt) ska utformas men är samtidigt ödmjuka inför att mätningen bör utvecklas kontinuerligt. Båda organisationerna är försiktiga med att beskriva konkreta effekter av implementeringen än så länge. Dock vågar de uttrycka att flera indikatorer visar på en ökad innovationsförmåga.

Fallstudierna omfattar även organisationer som använt standarden, om än inte för att formellt implementera ett innovationsledningssystem. I ett svenskt skogsföretag (där arbetet kring systematiskt innovationsarbete pågått en längre tid) användes standarden som bas för analys av innovationsförmågan, för att identifiera gap samt för att skapa medvetenhet hos högsta ledningen kring frågorna.

Sammanfattningsvis erbjöd den vägledande standarden ett relevant och trovärdigt stöd för organisationer som ville förflytta sig. Genom att få stöd av ett ramverk för helheten kunde svaga element i systemet identifieras och adresseras – element som annars skulle hindra ett effektivt innovationsarbete. För de fallstudier där standarden användes i huvudsak som analytiskt perspektiv (d.v.s. ISO 56002 hade inte använts aktivt tidigare) upplevdes nytta genom att strukturen möjliggjorde reflektioner angående vad som kunde göras men också validering av insatser som organisationerna redan gjort.

### Praktiska implikationer

För organisationer som vill stärka sin uthålliga innovationsförmåga och få större effekt av sitt innovationsarbete är en uttalad systemansats nödvändig. Helhetssyn krävs eftersom systemet inte blir bättre än det svagaste elementet. Ett ramverk som ISO 56002 ger "ett gemensamt språk" samt säkrar att systemansatsen omfattas. Konkreta steg för att komma igång kan vara: ta ett aktivt beslut att implementera systematisk innovationsledning med en systemansats; utse en ansvarig person "som håller i kartan" för implementeringen av ledningssystemet; genomför gapanalys i förhållande till ramverket; planera den övergripande implementeringsresan (underifrån-och-upp, uppifrån-och-ned eller en kombination utifrån den egna organisationens förutsättningar); fokusera på att stärka utvalda element utan att tappa helheten (fokus väljs utifrån gapanalysen); kompetensutveckla ledning och ledare; sätt upp mätetal för hela systemet och utveckla mätningen över tid. Slutligen, ha ett långsiktigt perspektiv och tålamod för att få systemet på plats och låt det utvecklas över tid.

### FORTSATT LÄSNING:

> ISO (2019) ISO 56002:2019 Innovation management – Innovation management system – Guidance, International Organization for Standardization.

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# Digital service development

## — Challenges and future directions for industrial digital services

By Magnus Persson  
& Peter Magnusson

Servitization has for decades been a strategy for manufacturing companies to develop their businesses. Digitalization is an important enabler to accomplish more advanced services. A recent Nordic project has, among other things, explored current challenges and future directions of the Nordic manufacturing industry in their digital service development; in this article we pinpoint some learnings.

Many manufacturing companies have for the last decades strived to enhance and diversify their offerings by adding services to their offerings. Some companies have even started to offer solutions instead of products, they have become servitized. Digital technologies have opened new routes for developing services, nevertheless many companies struggle with the challenges to develop successful and profitable services. This article focuses on the challenges with developing and implementing digital services for manufacturing companies. It reports some of the results from a collaboration project between Chalmers University of Technology, Center for Service Research (CTF) at Karlstad University, Danish Technical University and Aalto University funded by the Nordic council from January 2020 until March 2022. In the study virtually all companies used digital

the Covid pandemic forced many companies to quickly develop new digital solutions to handle services on distance.

### The use of digital services in B2B

In the study we identified four areas where digital services seem especially useful for manufacturing companies: Interaction, Availability, Utilization, and Configuration.

**Interaction.** One of the few good things with the global covid-19 pandemic is that it was a trigger for virtual communication using digital applications such as Teams and Zoom. It has been a forced learning experience for many B2B companies. Many also claim that they will continue to use more digital interactions post pandemic.

**Availability.** Services to help customers increasing availability for, e.g., preventive maintenance using digital solutions for remote con-

In some industries it has become, more or less, a hygiene factor to enable reporting of different KPIs such as 'actual up time', 'time between failure', etc. using sensor technology. A challenge is, however, still the ownership of the collected data, an issue often negotiated on a per site installation level.

**Optimization.** Beyond maintenance and supervision are services aimed at increasing customers' effectiveness by helping them to better utilize their installed products. This also includes advanced services where suppliers can offer consultancy related to the customers processes. Digital technology is decisive for these types of services where, for instance, captured data of historical and current usage can be analyzed to optimize a machine or even a whole process. This can also be a vital input for suppliers and their future product and software development.

**Configuration.** Configurators has evolved during the last decades to ease design, marketing and sales efforts. Configuration services are not primarily offered to the customers. They rely on advanced technology, often AI, and online information on available components. Configurators can revolutionize the *pre-sale activities*, where sales people, or even customers, easily can configure a customized product.

### Challenges in developing digital services

**Ownership of data.** In order to provide availability and optimization services the issue of digital data ownership must be solved. Many suppliers are stuck in a Catch-22 that could be described as: "for helping customers the suppliers need data access – the customers want help but do not want to expose their data". Many cus-

**“The Covid pandemic forced many companies to quickly develop new digital solutions to handle services on distance”**

services, and more than 75% to a large extent. The Covid-19 pandemic starting in beginning of 2020 has also largely affected the manufacturing companies in the study. Interestingly,

trol/supervision have been around for long. Due to the pandemic many B2B companies have been forced to quickly develop new digital solutions to remotely handle services on distance.



tomers are afraid of letting suppliers use their data for optimizing, as these improvements could also be used by their competitors.

#### *Competence to analyze big data.*

Figures are worthless if they cannot be analyzed and given a meaning and being used for business actions. People being able to analyze big data sets are deemed as vital for unleashing the potential of digital data, however, they seem to be a rather scarce resource.

*Translate into customer value.* Introducing advanced digital services (e.g., optimization) require more than technology competence. It calls for a systemic view of the customers operation. This goes far beyond merely collecting data, it requires a thorough understanding of the customers' situation (context and usage). A transformation from focusing on what the "product is" to what the "product can do" for the customers. This is indeed a competence missing in most traditional manufacturing companies, but decisive for offering advanced digital services.

#### **The use of platforms in digital service development**

Developing fully unique digital services for each individual customer would be very costly, and also imply long delivery lead-time. Hence, many manufacturing companies have a long history of adopting a platform strategy in their product development. This means that they use a common basis, the platform, for the different variants. Customized products are realized by small adjustment in some of the components. It is becoming more and more common that manufacturing companies, confirmed in our study, also adopt a platform strategy in their service development and service offerings. The platform strategy makes it possible for companies to offer services that are customized for fulfilling the specific customer needs, but the different service variants will have a lot of commonalities. A platform in a service context can be the use of a common process or instruction for developing and offering the different service variants, or the knowledge developed in a company of the customer needs in a specific market segment. Platforms can also consist of a number of service modules, holding different service attributes. These modules can be combined in different ways to fulfill individual customers' needs in an efficient way. The companies in our study have gained benefits from their use of service platforms, for example *shorter development and delivery lead-time, decreased development cost and improved quality*. But it has also become easier to align service offerings across products and regions,

and easier for the customer to grasp sometimes complex offerings.

#### **Challenges in adopting a platform strategy**

Even if the use of a platform strategy in the development and offering of services can give a lot of benefits its implementation is not without challenges. One challenge is whether a top-down or bottom-up approach is the best to use when defining and developing the platform. Taking a bottom-up approach implies being closer to the actual customers, and thereby able to easier map the different needs that the platform and service modules should fulfill. But, the risk with this approach is that it often becomes difficult to have one single common platform for the whole company due to that different customers, or markets, can have very different needs difficult to realize in one single platform. Hence, one solution is to develop more than one platform, this will however negatively affect the economy-of-scale. Adopting a top-down approach, on the other hand, implies a centralized development of the platform. Here it is usually easier to develop one single platform for the whole company, resulting in positive economy-of-scale effects. However, a challenge in this approach is to ensure to have customer involvement in the development, otherwise risking that the platform will just be able to realize parts of the service variety demanded by the customers. A third challenge identified in our study is that there are sometimes conflicting requirements from different organizational functions in the platform development. Conflicts that are not easy to resolve, or manage.

#### **Managerial implications and conclusions**

It is essential for managers to understand that digital services require more than technology competence. To unleash the potential of digital services, companies need to ensure sufficient competence for analyzing big data. Furthermore, the gathered data must be transformed into value for customers and suppliers, in other words, companies need to transit from a goods logic to a service/value logic.

Adopting a platform strategy is beneficial for developing, implementing, and offering different services and services variants fulfilling individual customer needs in an efficient way. However, companies need to work both cross-functional as well as to balance between a top-down and bottom-up approach in the platform development. This is a delicate balance between adaptability (many platforms) and economies-of-scale (few platforms).

*This article is based on findings from a Nordic collaboration project between Magnus Persson (Chalmers University of Technology), Peter Magnusson (Karlstad University), Melanie Kreye (Technical University of Denmark) and Taija Turunen (Aalto University), funded by the Nordic council. To get a copy of the project report "Engineering Service Network - The future of research on services in the manufacturing industry", send an email to magper@chalmers.se.*



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# Change through Co-creation

— A key to drive transition towards sustainability?

By Liridona Sopjani

Co-creation implies making something together by sharing equal agency, power and responsibility. It has emerged as an approach to actively involve a network of actors in the design and development of new sustainable systems. A PhD thesis published recently studied the co-creation approach and its outcomes in the context of design and development of sustainable transport and built environment innovation.

Many industries and societies around the world aspire to reduce carbon emissions, energy use, and overconsumption of material resources through sustainable innovation. However, such innovations are complex and systemic due the link between production and consumption patterns as part of total ecological impacts of innovation, rebound effects of innovations driven by consumption behaviors, incorrect applications of innovations leading to less sustainable outcomes than expected, and behavioral change and social acceptance leading to high levels of uncertainty.

In addition, there are social issues such as inequities and inequalities emerging from lack of representation, access and social inclusion which challenge the way future solutions around sustainable living are thought and designed. These all raise the necessity for more transdisciplinary methods such as co-creation in innovation for sustainable development. The question is how.

## A approach to drive systemic innovation

Liridona Sopjani's research on co-creation sheds light on why and how sustainability-driven innovation need to be designed and developed together with end-users and ecosystem stakeholders. End-users, supply chains and relevant stakeholders are increasingly seen as active and critical to the development processes of new sustainable systems. Her PhD thesis aimed to study the involvement of multiple actors in co-creation of new sustainable systems design and development, the process and potential outcomes for transition.

In her thesis, Sopjani lays out the concept of 'shared design authorship of sustainability', an idea which aims to democratize the process of how new sustainable systems can be designed and developed. Instead of the traditional model of the designer as the rationale planner and the firm as the central entity of technological innovation, Sopjani's PhD thesis suggests that design

can be shared among an ecosystem of actors working together in equal, reciprocal, and caring relationships.

Based on design, innovation, and technology studies, Sopjani conceptualizes co-creation as an intertwining and immersive design approach to systemic innovation and transition. It immerses its participants while generating new input and outcomes with each iteration. She argues that co-creation promotes new roles and new forms of agency at the societal level, challenging the hegemonic view of technological innovation design practices and existing human practices by ensuring shared responsibility and accountability over technological solutions. Through co-creation, people, whether in individual or organizational role, share similar power and agency on activities, processes, and strategic direction of innovations. For new sustainable systems design and development, this may be a more effective way to transition given the complexities, multiplicity, and multi-dimensionality of sustainability issues.

Sopjani's research work was carried in living labs set in everyday life contexts such as places and spaces where people carry out their everyday life and work. Her work is experiment based and immersive, where she and her research subjects are actively involving in the living lab setup. She sets up new systems into everyday life as suggested *proto-designs* (unfinished features of new sustainable systems, not-yet commercially available, or not-yet embedded in society). They are used as 'thinking and doing devices' to steer the stakeholders. The method involves a process of generative iterative loops engaging and orchestrating participating actors continuously. Researchers and designers act as facilitators crafting proposals that prompt participation of the ecosystem. The method is deliberately set to enable multi-stakeholder participation, such as public and

private as well as civil society.

Sopjani was part of several large-scale research projects between 2015 and 2021 in Europe, and her thesis reports cumulative work done within three living lab experiments. The thesis research was carried in the context of new sustainable systems development in transportation and built environment using mixed methods.

## A co-creation recipe

The thesis presents in depth results on how co-creation can be carried out. Sopjani finds out that motivations play a central role in the activation of co-creative activities among individuals and organizations. Shared environmental concerns and uncertainties surrounding new solutions to environmental problems were strong motivations of diverse stakeholders' involvement in her projects. She identifies three key drivers such as a strong desire to move towards sustainability thus being open to change, the need to reduce uncertainty surrounding change to sustainability, and the ambition to influence others and make change visible.

Though, not every stakeholder is involved in the same way. In her study of end-user involvement, she identifies a spectrum with four types of involvement patterns from non-users to very active users, distinguished by distinct roles such as *vigilant users*, *passive collaborators*, *active decision makers*, and *ambassadors*. Each showed to be critical for new sustainable systems although contrasting e.g., ambassadors build momentum of support and vigilant users inhibit or challenge the systems further. The role of non-user group was found to be particularly relevant to design of new sustainable systems as they can delay the transition if not involved and included.

Furthermore, unlike common belief that interests align stakeholders in co-creation, the findings show that common visions and interests

are not enough. Her studies on different actors showed that stakeholders are not always aligned and often met with certain traditions and ways of working with diverging communication languages. To make co-creation advantageous for participating actors, certain organizational aspects need to be cleared out: 1) which types of actors are involved, 2) who is the initiator, 3) who can join and under what conditions, 4) ways of accessing end-users and which social groups are represented, and 5) which methods are to be used.

Given divergences and multiplicity of stakeholder interests, a common design language enables steering actors and actions, i.e. "proto-designs act as language-communicating tools to enable an interface". Activities undertaken simultaneously showed to be supportive of co-creation. Sopjani's study identified five interdependent activities: matching systemic innovation requirements by combining the competencies and resources of diverse actors; facilitation to steer the group of actors into actions; engaging end-users early on; offering users opportunities to engage on their terms; and capturing and mediating mutual learning by bridging development with implementation.

### **Generative learning, strategic direction, and social change**

Research on co-creation outcomes is still in infancy, lacking empirical support. Sopjani's thesis provides initial empirical support suggesting that co-creation generates multi-dimensional learning and strategic direction. The key indicators are: generating and simultaneously validating new sustainable concepts; supporting design and development as well as implementation phases of new sustainable systems; generating considerable input on practical logistics and restraints of new sustainable systems, and enabling accurate environmental assessment of new systems through user involvement; and generating reliable feedback for all parties involved while expanding the opportunities for new networks.

The outcomes are built trust in new energy-efficient and carbon-reducing alternatives, validated logistical workability of new sustainable systems and their true impacts, and stimulated engagement in new sustainable system development. She concludes that co-creation, when well organized, could improve the efficacy of development processes because of several linear processes of innovation are integrated into one e.g. design, development, marketing, communication and implementation. Although more quantitative studies may be necessary, Sopjani's results show that co-creation approach is strategically relevant for transition to new sustainable systems.

Sopjani's thesis highlights further the role of end-users in co-creation. She writes that having

end-users involved in co-creation is not only beneficial for new systems development but also for stimulating changes in users' everyday life practices. Her argument is that when people are involved, they are also exposed to new ideas about their everyday life practices. The experience of involvement in designing new sustainable systems itself cultivates openness to change as people get immersed in trying out those possibilities in the context of their own everyday life. In her study of end-user practice changes, she observed how participants' views on the private fossil fuel cars versus shared electric car services changed during six months trial. She describes that the participants were contemplating and reflecting throughout the period of involvement. The results showed that day-to-day direct involvement encouraged reflection and reassurance about how the participants used, engaged, and lived with material products, hence also on their contribution to the overall environmental impacts of their behavior.

Her results suggest that end-users feel encouraged to continue involvement in sustainable innovation and become more actively involved in discussions about sustainable solutions e.g. at home and at work with peers and colleagues. In one of the cases on sustainable mobility, she describes how end-users were researching and supporting the implementation of the mobility solution in the like of the other stakeholders. She writes that the end-users wanted to partake and be identified with the experiments; they wanted to be seen as acting towards sustainability; and, were providing input and feedback at all capacities they could. Sopjani suggests in her thesis that co-creation with end-users can facilitate exposing them to new behaviors. It addresses also the discrepancy between new sustainable systems and behavior changes needed in society.

### **A new practice**

Co-creative practices can be carried within organizations, outside the organization, between organizations, and in an ecosystem of completely different individual, organizational, and community stakeholders.

Its advantages include enhanced ability to consider activities from multiple perspectives, enabled intersection between various professional and non-professional actors outside their respective places or organizations, holistic understanding of the systemic nature of sustainable innovations, opened potential for creating more diverse

offers, and new collaboration opportunities. In addition, access to diverse competencies and resources and complementing stakeholder technical expertise were found to support dealing with complex challenges that were outside individual actors' capacities.

However, co-creation does not happen just by having common interests and goals. It requires organizational structure as well as new managerial approaches to be steered and advanced. Sopjani finds that the approach is still new in practice and several managerial barriers exist such as alignment of concrete tasks and responsibilities, managing conflicting interests and needs in the co-creation activities, conflicting organizational cultures, and requirements such as time and effort to carry the work.

Despite managerial challenges, organizations need to focus on increasing the active involvement of end-users, non-users, and related stakeholders in their new sustainable systems development including products or service offers. Co-creation is a powerful approach to ignite the representation and practical applications of innovative systems in different social contexts. In the context of transport and built environment industry, co-creation benefits directly the stakeholders in the industry given their multi-level complexity as well as broad user-stakeholder diversity affecting issues of equity and justice critical to a sustainable future.



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Liridona is a design researcher and transdisciplinary thinker in sustainable systems design and transition. Her research work aspires to contribute to the design and development of radical sustainable circular systems and everyday life practices. Her work involves research and development within sustainable transport and energy systems through co-creation.



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