CHAPTER 1: WHY SERVICES?

WHAT DRIVES SERVICE GROWTH?

The shift toward services is not recent: manufacturers always had to provide services that enable sales of products (professional buyers would bypass them if they didn't offer installation or repair). The difference is that now is significantly more urgent.
Companies pursue service-growth strategies for two reasons: protection against competitors or move against competitors to gain their customers and bigger margins. Both depend on external and internal factors.

External Factors Tied to the Market Environment

1. **Saturated and commodified markets:** demand for products is stagnating or in decline, no new investments, especially for mature markets. Demand for services is increasing so it's important for companies to tap into this market, especially if the installed base outnumbers the new sales. Commoditization has accelerated, this means prices are falling and margins decreasing. Service growth is a good strategy against this because services tend to have bigger margins than products.
2. **Customer pressure:** customers are becoming more professional and asking for more from their suppliers: more services (or they outsource activities), they want to pay for performance instead of goods, they want better support from the suppliers. In response to this companies can either pursue commoditization (lower their margins) or differentiation (build a business around value-added services). A common practice is outsourcing non-core processes to other suppliers and transforming capex into opex, companies can reduce costs and gain flexibility. Companies must take opportunities when appropriate (e.g collaborating with service partners). Another option is to opt for offerings and payments tied to use of products rather than buying products and services.
3. **Proliferation of competition:** four types of competition
    a. direct competition from other industry incumbents: particularly dangerous if they proactively seek service growth to break into competitors' territory and not just as a reaction to the changing economy
    b. new direct competitors from emerging markets: unpredictable and difficult to respond to; they use low cost strategies and innovation
    c. distributors, consultants and pure-service players: difficult to respond to because they control market channels, they have infrastructure for service growth and direct relationship with customers (respond to their needs and weaken the supplier position)
    d. disruptive innovators outside of the traditional industry's boundaries: worst threat; growing digitization = danger of software powerhouses taking over.

Internal Motivations from the Company

1. **Exploit product and technology expertise:** to provide services that restore or improve functionality of products; it's possible to incorporate service components early in the product's innovation process in order to design products for the service market. It's important to analyze data on product usage from the installed base to get feedback on this process.
2. **Capturing customer relationship value:** the relationship with the customer is fundamental; services need a more direct contact with customer, facilitating the relationship and giving the company a better understanding of the customers' needs and operations. Offering a wider range of products and services incentivizes the

customer to pursue a closer relationship. Services can be related to a product's life cycle or be product-independent. Services can significantly boost a customer's lifetime value (net earnings from the entire duration of the relationship) and hence customer equity (sum of discounted lifetime values of the company's current and potential customers). Services can also help in capturing a larger share of a customer's purchases (e.g gas → gas and electricity) and create barriers against competitors. It's easier to maintain customers than acquire new ones, but services can also help with the latter: a company can service competing brands, if the service is good there's potential for the customer to also buy products in the future. Services are key stabilizers, especially in industries subject to economic fluctuations: customers that don't invest in new products still need services for the old ones and may also decide to upgrade them.

3. **Opening new market opportunities:** a company can get more value by venturing into entirely new service business models. This is the most disruptive internal factor on the company rules and business in the industry

CHAPTER 2: B2B SERVICES - CHALLENGES AND CATEGORIES

Business Services: leveraging a vendor's specialized knowledge and skills through activities, behaviors and processes to bring about desired results in customer's assets, processes, operations. Challenges to service growth:

1. **Product-centric mindset:** product-centric companies focus on marketing and selling what they have (product's features and attributes). The interest is in production, innovation, supply chain and their efficiency and effectiveness. The approach for selling services is different: services are intangible, identifying their features is harder and they can change fast => the focus shifts on outcomes achieved instead of features. It's harder for customers to understand what they're being sold so a company's image and reputation become more important in selling services. But trust is not everything, companies need to demonstrate a service's value-creation potential. Pricing is also trickier: for products customers can dissect a product and check the cost of components or measure savings/productivity gains; services' pricing should capture a fair share of value created.
2. **Lack of deep customer insight:** developing, designing and delivering services requires a deep customer insight. Companies should invest in services market research and use value-based segmentation or customer's willingness to pay for deeper insight instead of segmenting markets by products' characteristics.
3. **Cocreate services with customers:** business services rely on active customer's involvement and even cocreation for design and delivery phases. Key performance indicators must be defined and agreed upon with customers and digitization allows for interaction with customers even during service production. Obviously this can introduce some uncertainty since customers are not employees and they can lack knowledge, skills or motivation, they can't be controlled and this can lead to drops in productivity or quality. Solution: user-friendly products, customer training, customer support.
4. **Learn the rules of a service factory:** the involvement of customers in design and deployment makes it hard to standardize and control the quality of operations, there's

a higher chance (compared to product's design and deployment) that something will go wrong. Trade-off between customer satisfaction and service productivity.

5. **Break away from CAPEX logic:** many companies are still deeply embedded in the CAPEX mindset (invest/upgrade physical assets) but in B2B professional buyers only source goods to achieve some outcomes. If these outcomes can be achieved without buying goods (new marketing opportunities, e.g renting or leasing), they will stop buying. The focus should be on OPEX (expenditures required for day-to-day functioning of business), this leads to new types of investments, flexibility and reduced costs.
6. **Gain stronger channel control:** companies rely on channel partners for distribution and after-sales services, but this can impair service growth. Companies should gain more control on what happens on the channel or directly invest in the channel. Channel control is important because services can't be shelved, they are performed locally and their demand varies over time. The two biggest problems are that big distributors already have a key role in serving customers (selling services is part of their business) and often there are multiple intermediaries in the overall channel, each offering many services and jealousy cultivating their relationship with the customer. Sometimes even intermediaries have a product-focused approach and lack the skills to move into services. Companies could find themself in need of bypassing them and offering complex services in their place.

B2B Services categories: classification made on two dimensions.

1. **Service recipient**: service oriented toward a product (e.g restoring/improving functionality) vs service oriented toward customer's activity and processes (e.g management of a specific process).
2. **Nature of the value proposition:** vendor performs a deed vs vendor guarantees achievement of a level of performance. The pricing also depends on this (invoice for time and materials used vs availability/results).

There are four categories based on these dimensions:

1. **Product lifecycle services (PLS):** services that facilitate the customer's access to a manufacturer's product and ensure its proper functioning throughout its entire life cycle. Strictly related to a product + vendor performs a deed on behalf of customer. Generally considered "must have" (e.g installation, maintenance) so customers are less willing to pay for them. Low variance among different companies. They help companies to establish a reputation as service providers. Companies tend to give them away for free to boost sales or in packages (product+services) which hide the service's cost. A better approach is to offer different levels of a PLS or lower the cost (wrt to competition) thanks to innovation and standardization.
2. **Asset efficiency services (AES):** services a supplier provides to help a customer achieve productivity gains from investments made into assets. Still related to a product but now the vendor focuses on achieving a level of performance or specific outcome in using the product. To sell AES successfully, companies need usage data from customers and risk mitigation skills. They're not "must have" (e.g performance monitoring systems), they are an expansion on the core offering so they can lead to differentiation from competitors and customers are more willing to pay for them, especially if the benefits of productivity gains are explained in a proactive manner:
    a. **proactive prevention:** vendor proactively looks for problems that may affect a customer and suggests actions against them

   b. **proactive education:** vendor proactively educates customer on how to derive greater utility from products

This also puts the vendor in a better position for price negotiations (from cost-based to value-based pricing techniques).

3. **Product Support Services (PSS):** services a company provides to assist customers in improving their own business processes. Focus on customer's processes, not products. PSS can be offered along with a product but they're often developed regardless of the underlying equipment. The vendor performs specific, process-oriented deeds to assist customers in their activities, they don't take responsibility for the outcome or perform the activity on behalf of the customer. Since PSS are tailored to a customer's need there's ample chance for differentiation from competitors and customer's willingness to pay is high: they're priced like professional services (according to time and resources used).
4. **Process Delegation Services (PDS):** combination of goods and activities the supplier integrates in order to perform processes on behalf of the customer. Can be small in scope or complex end-to-end processes. Focused on the customer's process. The vendor guarantees a level of performance or a specific outcome. Complex, only market leaders tend to offer them. Six defining aspects
   a. highly customized to customer's needs
   b. integrate products and services into hybrid offerings
   c. high level of involvement from the customer
   d. as a consequence, alignment of customer and vendor interests
   e. supplier must take part of the risk (that's a big part of why customers want these services)
   f. Similarly, gain is also shared.

   Pricing is based on agreed-upon key performance indicators.

CHAPTER 3 - BUILDING A TRUE SERVICE CULTURE

Service culture in a B2B firm: in service business customer interactions are key and the behavior of frontline employees profoundly affects a company. Product-centric companies moving into services must address a paradox: while skills and expertise in production represent a sound base for developing value-added services, a product-centric culture can impair service growth. Two concepts:

- **organizational culture:** shared values and believes that rule the behavior of members of an organization
- **service culture:** culture where one of the most important values is appreciation for good service to both internal and external customers.

Culture depends on the firm's organizational past. An organization with strong shared values often is characterized by:

- the shared values are a clear guidance for task performance
- managers devote much time developing and reinforcing the shared values
- shared values are deeply anchored among the employees

Product-centric values involve manufacturing excellence and product leadership. Product firms may be unwilling to deviate from these values and associated practices like investing in manufacturing assets.

- product-centric values may be inconsistent with new service-centric strategies

- these value may lead to a resistance to change which makes responding to external challenges and opportunities harder
- new employees are formed by existing values and differently thinking newcomers are easily swallowed by the existing culture

Service culture transcends delivering service: service culture touches upon values, beliefs and rules that permeate the organization. Adding service offerings to core product ones doesn't change the manufacturing mindset of a firm. There's a need to involve service-minded people and nurture service culture to succeed in the product-service transition.

Service centric firms are different: customer-oriented, basic philosophy is to serve customers, not selling products. Very different from traditional, product-centric culture. But this doesn't mean that firms should completely change, they have to integrate the virtues of a service culture into their product heritage and culture. Service culture requires additional expertise and skills and emphasizes factors like service quality and proactivity. The objective is helping customers get their jobs done, not just selling the products, so it's important to know what the customers think is valuable when making purchases and how to help them make better purchases. Proactive service management, striving to educate, predict and act before problems occur. This shift in focus makes "overtime heroes" less important, because proactivity means avoiding those incidents that require overtime heroes in the first place.
In many cases, service centric firms are even more knowledgeable than customers themselves on processes and operations so they can come up with new offerings to create more value, enhance productivity and reduce costs for customers.

Four steps for building service culture in B2B:

1. **Service Desert:** firm sees services as a necessary evil to enable product sales, must haves. Beyond spares and repairs, they only drain profit.
2. **Dark Tunnel:** top management realizes the potential in entering the service market and starts investing on service growth (infrastructure, offerings and people). Results often are not immediately visible (service paradox), there are short-term losses and sluggish service growth. It's important to focus on long term goals, but in this phase it is hard for service culture to emerge.
3. **Promising Light:** firm overcomes the service paradox and sees promising results. Some companies don't even experience the dark tunnel and see these results immediately, or quick wins. Quick wins must translate into tangible revenues, they must be used as a demonstration of how services can lead to profit, they must be taken advantage of fast to create momentum and change. In this phase service culture can grow.
4. **Bright Landscape**: significant resources allocated for service growth, services are now their own source of revenue and growth for the company. The services offered are varied and not just must-haves, return on service visible, service-centric mindset spread throughout the company.

Service growth: how to drive adoption. Service growth requires the support of everyone in the company, from top levels to bottom. Service infusion follows an S-curve pattern. People in a company have very varied ideas on service growth and this can affect the success of the company in this field and the speed of adoption of service growth strategies.

We can distinguish 9 basic positions on service growth based on the hierarchical level of the individual (top level management, middle management, frontline employee) and their view on service growth (against, neutral, strongly in favor). Understanding these positions is fundamental to manage internal resistance and drive change for service growth.

1. **Service evangelists:** top level management that show unconditional support for service infusion. They're fundamental for instilling service growth and service culture, but if the service initiative fails (because of rushing without understanding the time, effort needed and internal resistance) it can backfire and make future changes harder.
2. **Board-level bystanders:** top level management with no strong opinion on the matter, critical for building internal support
3. **Board-level detractors:** top level management against service growth initiatives, they view service as something outside the company's true essence
4. **Service enthusiasts:** middle management in support of service growth, essential to spread support for service growth both in the upper and lower levels.
5. **Half-hearted followers:** middle management that doesn't take pride in pursuing service goals, they do it just because they have to. Do not make them service managers.
6. **Outright obstructors:** middle management actively against service growth, if they have influence on others plan the service growth initiatives outside their sphere of influence.
7. **Service promoters:** frontline employees supporting service growths with new approaches and tools
8. **Indifferent frontline employees:** they can give the initiative a try but will drop it if it doesn't yield results immediately. Managers should motivate them
9. **Diehard resistors:** frontline employees that see services as a necessary evil to sell products, they'd give them away for free and in more digitized fields they tend to be reluctant in using new tools like tablets and smartphones.

Seven Deadly Sins of Service-Myopic Firms

1. **View service as a necessary evil:** service should be a top priority, not take a backseat. Managers should always demonstrate the revenue and profit potential of services built around products
2. **Delegate services away to dealers:** sometimes it's fine to do it, but not as a shortcut or to save costs because generally it weakens the company's position in the market (the dealer interacts with the customer in their place). Companies should take control of the channel or cooperate with dealers.
3. **Give services away for free:** customers will get used to it and ask for more and more. Customers should understand the value provided by services and give something else away in exchange for a service (e.g concede higher volume purchases) and staff should see how much money is actually lost by giving services away for free and feel a pain too when they do it (e.g less salary bonuses).
4. **Treat services just like products:** they require their own specific processes, innovation, pricing, sales and people.
5. **Adopt a laissez faire approach:** executives tend to delegate away the task of creating and implementing a service growth plan to middle management. Service growth supporters are needed at all levels.

6. **Define business as value stacking:** value is not created by the company and consumed by the customer, it should be co-created with the customer. Their insights and innovation ideas are fundamental for service growth.
7. **All talk no walk:** gap between stated goals and real-life actions. Service growth is not just rhetoric for stakeholders, investors, and customers. Executives that think service growth is the way to go should stick to it and not bail at the first difficulty.

CHAPTER 4 - SERVICE STRATEGY, IS IT ALIGNED WITH CORPORATE GOALS?

Service strategy: service growth in manufacturing companies is often seen as a **transition from product to services**. A company has a position in the product-service spectrum, where one end represents companies where services are just add-ons to products, and the other where products are simply vehicles for service provision (and if a competitor's product is better or cheaper, it should be used). In reality, few manufacturers are in those extremes. Most are somewhere in the middle and when companies want to move further into services they should consider this spectrum and their current and target positions in it, how and why should the change happen, what are the challenges. More often, service growth is a matter of **service infusion**, extending the firm's offering to include services but not moving away from products. Investments are made in services and product and services are combined into hybrid offerings. This requires a strategic shift for the company and it requires:

1. **To be driven by the highest level of the company**, since it affects the foundation of the firm
2. **Redefining the mission of the firm:** a firm's mission is its purpose and the ambition of what it seeks to achieve to ensure its survival and long-term growth. Often firms define their mission around products and their sales, seeing services as not coded into the DNA of the organization and this is an obstacle for service growth. Redefining the mission sends a strong signal from the top management about the cultural and strategic shift in the organization and the commitment to service growth.
3. **Redefining the competitive positioning of the firm:** senior management should review the position they want to occupy in the market (business model, position against competition, what customers needs are to be addressed through services…). Most firms position themselves as suppliers of specialty products, with superior quality which justifies an increased price. But today, due to the growing customer interest for improvement in processes and outcomes rather than in product quality, a shift in positioning is needed to avoid commoditization:
    a. **From specialty product to no-frills product:** adopt a low-cost position where services are reduced to a minimum, costs compressed and prices lowered according to the expectations of certain market segments. The company should change business models and reconfigure market channels, focusing on costs and charging for all auxiliary services.
    b. **From specialty products to hybrid offerings:** if customers are willing to pay for value added, a firm can differentiate itself by segmenting the market and offering innovative hybrid solutions combining products and services to provide the customer superior value.
    c. **Do both:** combine low-cost and differentiation through hybrid offerings.

Main problems management goes through with service growth strategies:

1. **Difficulty in charging customers for services:** customers often are unwilling to pay for services, especially those that were previously free. Unsatisfactory margins. Often, an important element for success in implementing a service-growth strategy is the support from top management, they must truly commit to it and do the work.
2. **The time factor:** service growth strategies require time, a structured plan and long-term commitment, results are not immediate. Companies must recognize the time factor and reach a critical mass in services, without which it cannot expect to receive significant benefits. The revenue generated by services depends on multiple factors: it's better for a firm to focus on services related to their core products, firms in a saturated market benefit more from venturing into services, the more stable the market the less profitable is investing in services in the long term.

CHAPTER 5 - CRITICAL RESOURCES AND CAPABILITIES FOR SERVICE GROWTH

Unique resources available to manufacturers and distinctive capabilities based on these resources are needed to achieve competitive advantage through differentiation and cost leadership.

Resources: When lacking assets specific for service growth, a firm can first develop these resources internally or acquire them from the outside and use them to develop services.

1. **Installed base product usage and process data:** manufacturers collect data on their installed base of products throughout their life cycle, during installation and maintenance, or 24/7 through smart technologies. Product usage and process data can be used strategically to gain advantage over competitors by getting a deeper insight on customer's needs and processes. Customers themselves tend not to collect this data and if they do a firm still has access to data from many customers, so it's still advantaged. This data should be acquired, grown and jealously protected.
2. **Product development and manufacturing assets:** manufacturers have access to unique tangible/intangible resources linked to R&D, design and production processes. This gives them advantage over competitors and pure-service players who lack them through cost leadership and differentiation.
3. **Product sales force and distribution network:** manufacturers either rely on direct sales or channel intermediators, this privileged access to direct and indirect sales organizations is another resource for service growth. But a close customer relationship, well established channel structure or strong salesforce are not enough alone.
4. **Field service organization:** a significant part of the revenue comes from field services and spare part sales. Most manufacturers install and offer basic service for goods but don't maximize their potential, they don't venture into new and more complex services (e.g consulting, asset efficiency). Frontline employees are in a good position to spot opportunities for these new services and also for serving customers in a more cost efficient way.

Capabilities: once a firm has the resources it must translate them into distinctive capabilities.

1. **Service related data processing and interpretation capability:** product usage and process data must be translated into a new source of revenue and/or to identify

opportunities for providing existing services at lower cost, innovative package offerings etc. Often manufacturers become more knowledgeable than customers themselves about specific processes so they can provide services to make these processes more efficient. To do so, generic notions such as customer orientation and satisfaction are not enough. Advanced data processing and interpretation skills are needed to help customers achieve productivity enhancement and cost reduction.

2. **Execution risk assessment and mitigation capability:** risk is uncertainty in outcomes of some significance. Execution risk is uncertainty about whether contractually agreed-upon service outcomes will be achieved. Sometimes companies underestimate the resources needed to achieve an outcome. The ability to assess and mitigate execution risk is essential to balance between designing innovative yet competitively priced service offerings and meeting internal profit targets. Execution risk can be mitigated in three ways:
    a. price buffers in order to safeguard contract profitability; this can fail if the price to cover the risk is so high compared to competition that customers are unwilling to pay for it
    b. pooling risk across multiple accounts; this requires a sufficiently large customer base.
    c. in-depth analysis and understanding of archival contract performance data; powerful source of differentiation but requires specialized skills that can be outsourced or grown internally
3. **Design-to-service capability:** product and service innovation must interact synergistically for value creation rather than in an addictive manner. By prioritizing the service component throughout the product innovation phase, manufacturers can gain a competitive advantage through differentiation (hybrid offerings) and cost reduction. Pure-service companies are at a disadvantage in this field because they lack access to the product's underlying physical features and have no influence in its design.
4. **Service sales capability:** selling services needs a different approach from serving goods: service requirements are identified in close contact with customers, the sales process tend to be longer and more complex, salespeople have to interact with decision makers in the customer's organization on different levels and they must be able to develop the right argument for the right person. They can rely on specific documentation and communication tools for demonstrating value to customers. Frontline employees facilitate sales, observe customer operations first hand so they can spot new opportunities for service improvement or cost reduction.
5. **Service deployment capability:** firms should take a production-line approach to service operations for efficient execution, standardizing back-office service processes while achieving front-office customization at the same time. Three important domains
    a. learn how to achieve repeatability and economies of scale of services
    b. modularity of service elements
    c. proactive management of service delivery costs.

Roadmap for building a service portfolio: with these resources and capabilities a company can set the trajectory for service growth.

1. **PLS:** natural starting point for a company wanting to build a service portfolio, because even product-centric companies tend to offer PLSs (repair, maintenance). PLS companies can improve their competitive position by offering the same

must-have services as their competitors but at a lower cost, or by having a better understanding of what's valuable for customers in PLSs and consequently charging more for a better service, or even by charging for PLSs that were previously free. Firms should develop their PLS offering since it's a low hanging fruit that can be picked first before moving to more complex services and also they help create a trusting relationship with customers.

2. **FROM PLS TO AES:** a good step further is to move toward AES since there's still the safety of working in services still related to the product, the only change is that now the company helps customers achieve productivity gains from product investments (e.g monitoring performance to be proactive in maintenance). This requires new resources and competencies.
3. **FROM PLS TO PSS:** another possible move is to take advantage of the knowledge a firm has on customers' processes and assist them to achieve better performances (e.g consulting, training) but not doing the process on their behalf. This too requires new skills and resources and it especially benefits from data analytics.
4. **FROM AES/PSS TO PDS:** in this case the vendor performs the customer's operation on their behalf and takes responsibility for the performance achieved. Complex services requiring lots of skills and resources, so only a few companies move in this field. They can leverage on the resources and capabilities already built with AES and PSS. AES and PSS also should've helped the company build a trusting relationship with customers, a reputation, which is extremely important in PDSs since they often require substantial and long-term commitment. It's also for this reason that we rarely see a direct move from PLS to PDS.

Once managers know the company position and the trajectory they want to move on, they should assess if the company is ready to actually do it. The assessment should be industry-specific. If a company deals with different industries, separate assessments are needed for each of them. Then, areas of critical competencies required for service growth are identified (some could be outside the 5 described before). Then the extent to which the firm controls the competencies needed for each domain is evaluated. Everything must be scored so that in the end we can compute an overall score that determines if the company is ready or not for the move.

CHAPTER 6: VISION AND LEADERSHIP - ARE YOU READY FOR THE CHANGE?

Once the service growth strategy is set, aligned with the mission, and resources and capabilities reviewed, vision and leadership are what drives the change. The transition from products to services requires a major cultural shift and often the resistance comes from the inside. For this reason the support of top management is needed. Most frequent arguments against service growth:

1. Investing in service growth takes resources away from product manufacturing, a well known and comfortable source of profit. Results are not immediate and profitability may initially decrease.
2. Selling services is hard and time-consuming, especially because manufacturers are accustomed to managing stable, profitable and predictable business models. They tend to have little knowledge or incentive to focus on a business model which is very different.

3. Services can reduce product sales (e.g sell the use of the product instead of the product itself, increase utilization but reduce product sales). A single firm, however, can't stop innovation and if the competitors start to delve into services, not doing the same can be detrimental.
4. Services feel like they don't fall into the scope of the company's activities: service strategies create conflict, confusion, tension, significant culture shock and changing business model requires new skills, business practices and behaviors.

According to Kotter, there are 8 steps to enable service-led growth. There may be short-term negative effects and some rapid adjustments may be required due to the quick changes in the market, but leaders need to stick to service growth, remember the overall objectives, and try to quickly reach the inflection point.

1. **Establish a sense of urgency:** this should start from the top management levels (even the CEO) and spread toward other employees, but it doesn't always need to include the entire company (especially if it's a big one). There should be a clear view of what the target of the strategic renewal is. The urgency can come from two situations:
    a. a burning platform or a future challenge the company is headed towards, change is required for survival
    b. when the company is doing good there's less incentive for change, especially if it disrupts business (like a transition to services can do), so management should present it as seizing a strategic and exciting opportunity. If the company doesn't do it, a competitor will, stealing away clients and making future moves into services much more difficult.

    Urgency is "high enough" when about 75% of the organizational unit's management is convinced that the current situation is unsustainable and change is needed.
2. **Form a powerful guiding coalition:** start with few members, but it needs to grow to drive the change process successfully. It should include representatives from all levels, they should have equal status and should be powerful in terms of experience, titles, reputation, relationships etc. Better if they're volunteers. Can also include key customers, union leaders, distributors. No need to include the whole top management, avoid board-level detractors and focus on reaching a critical mass of the right people: supporters. When building the coalition, the change leader should diagnose the resistance.
3. **Formulate a vision:** the vision should focus on seizing opportunities or a burning platform. It should be a picture of the future that is easy to communicate, with clear goals that appeal to employees, customers and stakeholders. It should also be emotionally appealing, inspiring change. It should address fundamental issues about how the business should be conducted. The guiding coalition should be prepared for negative reactions, but in general the vision should instill positive feelings like openness and optimism, fear-inducing language should be avoided.
4. **Communicate vision and strategy for buy-in:** in order to attract new internal supporters, vision and strategy should be communicated through meetings, speeches, newsletters etc. The buy-in can be hard if the transition to service needs some sacrifices, like job losses due to automation of the back office. Employees' negative feelings should be managed in a sensible way. It's also important that the vision and strategy are not only communicated but also actively supported by the management's actions.

5. **Empower others to act on the vision:** address the obstacles that hinder employees from acting on the vision. These obstacles can be mental barriers or real ones, like the need for training, organizational structure or inadequate processes. Board-level detractors are a big obstacle that can obstruct the overall effort and should be treated in a sensible manner. Another major obstacle is using product-oriented performance metrics (instead of appropriate service-oriented ones).
6. **Create short-term wins:** performance improvement and yearly goals should always be celebrated and used to keep momentum for service growth. Not seeing results for 1-2 years can raise doubts about the initiative. Short-term goals should be obvious, unambiguous and clearly linked to the vision and strategy: service quality, response times, profit per service unit etc. These goals can also help monitor the effectiveness of the service growth strategy and see if changes are needed.
7. **Do not let up:** when change has momentum, the cultural/political resistance is held back, but still it takes 5-10 years for change to sink into a big company, so it's important to focus on human resources and make sure the right people are put in the right job, do not declare premature victory, and deal with the problems that come from a high rotation rate: shortage of experienced service employees and difficulty in anchoring change.
8. **Make change stick:** new behaviors should be rooted in shared values among employees. Two factors:
    a. people need to see how the service growth strategy has boosted the company's performance, improvements should be clearly communicated
    b. when a new generation of top management is appointed, they should also personify the service culture to avoid undermining years of service transformation.

CHAPTER 7: PRICING SERVICES FOR PROFIT

Making most of existing services: launching new services is challenging and risky so before doing it, it's better to exploit the full potential of already existing services. A way to do so is turning these services from free to fee. Many suppliers assume it can't be done if competitors offer them for free, or they assume customers don't value these type of services or even the supplier itself sometimes doesn't realize that the activities performed are services. Steps to capitalize on these services:

1. **Establish an inventory of existing services (invoiced and not):** this generates awareness among employees about the breadth and depth of services offered. Once a service becomes visible, it can be defined and measured (what does it mean performing the service, key elements, costs etc.). This can raise awareness, show if a service is not profitable and prepare employees for change, if needed. It can also reveal differences across units and territories.
2. **Leverage best practices from within the company:** we can use outside sources but the company's own best practices can often be used to find new opportunities to improve existing pricing practices. Even small changes in prices, presentation, service elements can have a great impact (e.g identify single elements of a bundle with their associated price instead of having just one final price)
3. **Understand how services should evolve over time:**
    a. **Keep it free:** sometimes because of competition or commoditization it's preferable to keep the service free, but the customer should give something

else in return (e.g increased purchasing volume, recommend the company to another customer etc.)

b. **Stop or delegate service provision:** if the customers don't value the service at all, it should be stopped or in some cases delegated to a distributor, an alternative way to serve the customer but at a lower price.
c. **Free to Fee:** most difficult, because customers don't want to pay for something that was previously free. This step depends on market conditions (company's market share, customers' willingness to pay for added value). Paying attention to customers' operations is fundamental to find opportunities to turn services from free to fee. It all depends on what customers think is valuable in a service. This passage can also be gradual: first the company makes the customers aware of the service's existence and the value it creates, then they attach a price tag to it without charging for it, then we truly move from free to fee.

Another possibility is to offer a baseline service for free and make the customer pay for options on top of this basic offering.

How to price services: it depends on the type of service.

1. **PLS:** typically priced based on time and material used to perform the service (cost-plus pricing). If a company knows general costs and margins required, PLSs can be offered for a fixed price. The main source of profit with PLSs are spares and repairs, while other services are generally considered must-haves and customers are not willing to pay for them. Companies tend to give them away for free to boost sales and avoid negotiations. It's also difficult to differentiate from competition. But PLSs are useful for a company's reputation and to create a relationship with the customer.
2. **PSS:** pricing based on time needed to perform the service (cost-plus pricing).
3. **AES:** value-based pricing, customer pays for the achievement of some agreed-upon performance level. AES are not basic services, they're easier to sell independently from the supplier's core offering and customers are more willing to pay for them, especially if the potential for value creation is clearly explained by the supplier. Pricing AES requires data processing and analytics skills, it may even need a time of providing the service at a loss in order to acquire the experience and data needed for the pricing.
4. **PDS:** similar to AES. PDSs involve complex gain-sharing agreements, the cooperation with the customer to develop performance indicators that will be the basis for pricing. PDS are risky, companies can underestimate the resources and skills needed for a specific outcome, or the customer's action can also affect performance and the supplier can't control them. Pricing PDS is difficult, the interests of both customer and supplier should be aligned. Fast prototyping and engaging in your own learning curve can help.

Aligning prices with core value proposition: pricing initiatives will fail without this because prices play a key role in positioning and communicating value to customers. A good value proposition identifies what a customer gains from the service and how it's better than the competition. 5 common traits of good value propositions:

1. emphasize on values that resonate with target customers
2. identify next-best alternatives and communicate how your service creates more value
3. quantify how the service affects the performance metrics the customer's interested in

4. document and back up these claims with tangible proof
5. difficult to copy over time

Value is the monetary worth of technical, economic, service, and social benefits the customer receives in exchange for the price paid for the offering. A value proposition should demonstrate how a company's service creates more value than the competition so $Value_{COMPANY}$-$Price_{COMPANY}$>$Value_{COMPETITOR}$-$Price_{COMPETITOR}$. The difference between the two is the incentive for a customer to choose one or the other. We can identify 9 potential bases for developing a value proposition based on value and price:

1. **Inferior proposition:** these are the cases where the value is the same as the competition while the price is higher (VP4) or the value is inferior and the price is higher (VP7) or equal (VP8). Hard to convince the customer
2. **Undifferentiated proposition:** weak position where the value and price are the same as the competition (VP5).
3. **Propositions with potential of resonating with customers:** superior value for superior/equal/inferior cost (VP1, 2, 3), equal value for inferior cost (VP6), inferior value for inferior cost (VP9). VP3 is the most challenging and typically used when a company wants to expand to a new market or gain more customers at the detriment of competition. VP6 can be effective to undercut competition and grab market share but requires the company to know what the customers want exactly (no more, no less) and how to cut costs in service provision.

In general, value propositions depend on the company's skills, resources, competition and environment. Different value propositions can coexist in the same market.

CHAPTER 8 - SERVICE INNOVATION

Service innovation: rebundling of diverse resources that creates novel value for the beneficiaries themselves or their assets, activities and processes in a given context. This definition includes all types of services and is customer-centric. Companies often invest only a small share of resources for service innovation, focusing on it only when a new product is ready for launch. Service innovation is risky, requires big investments in capital and human resources. It's also difficult to create entry barriers to prevent imitation from the competition (the time between the definition of a service and its commercialization must be short). The innovation processes for products and services have the same stages (from idea generation to commercialization) but service innovation has its own specificities. Service-specific hurdles (intangibility, active role of the customer, variability, perishability, nonownership, shorter distribution channels) impose different requirements on development than products do. There's also different emphasis on different stages of development: product innovation focuses on prototyping and technology development, service innovation on market introduction and pilot testing. Companies often lack resources and experiences to deal with service innovation and the mindset change needed for its success. It can be helpful to have a team specifically dedicated to service innovation (but also capable of cooperating with the product innovation team to develop hybrid offerings).

Customer integration within service development

Customers are often involved with product development (e.g focus groups, pilot testing), but with services their role becomes even more important. They have different roles for the different stages of innovation: during the ideation and concept definition stage they are sources of ideas and demands; during the development they are codevelopers and testers;

after launch they're buyers, source of feedback. Service innovation can be a response to customer's demand (company has to be quick and ready to seize the unexpected opportunities) or it can be a result of a systematic process. In this case we can have:

1. **Improvement of existing service:** company uses usage data, incident reports or complaints to improve the service (reactive)
2. **Incremental service innovations:** surveys, focus groups or in-depth interviews to better understand the customer's business(reactive)
3. **Radical service innovation**: lead-user methods to better understand processes and needs of lead customers, customer test drives to test new ideas, ethnographical studies to understand customers' behavior and preferences wrt to a specific service in their natural environment (e.g live in the customer's shoes) (proactive)

Customer's customers

Often customers lack the resources for advanced R&D so a company should capitalize on their product expertise and create services that satisfy not only the customer's needs but also the customer's customers' for a better value proposition and more competitiveness.

Digitalization

Digitalization also contributes to service innovation, especially for data gathering and analytics, which helps competitiveness (intellectual property, patents etc for algorithms, interfaces etc.). All companies should try to envision where technology will head in the future and what service opportunities it will bring. Technology constantly changes the competitive landscape, now small agile firms can compete with older and bigger ones. But it's also a double-edged sword: service innovation should always focus on what the customer finds valuable, not what it's technologically possible.

Generating ideas within the firm

A firm can systematically identify all commercially viable and profitable service ideas during big sessions which can include internal and external stakeholders and last for days, but typically ideas come from shorter and more focused workshops. Good way to identify ideas:

1. briefly describe central idea
2. give two main reason that justify it
3. identify two major obstacles
4. detail the necessary support required from management
5. outline an approach for successful launch

Then, a fine grained analysis of value creation areas can be done to define the features: customers' goals → benefits and/or sacrifices for value creation → specify features. Companies should invest in getting to know their customers to identify underlying needs and anticipate potential impact of new services on their activities (seek directions of growth). Lastly, it's important to evaluate attractiveness and feasibility (resources and capabilities) for each new idea (there could be lots of ideas!) and prioritize accordingly.

CHAPTER 9 - SERVICE PRODUCTIVITY

Service Blueprinting: Understanding, cocreating, monitoring and managing customer experience rank among executives' top priorities. Superior customer experience can help with differentiating against competition. Customer experience involves different aspects like branding and technology, and it's made by a collection of different contact points between

the company, the customer and third parties. A major hurdle in creating a service that satisfies customer's expectation is to describe not only the general concept but the process by which the service is designed and deployed and communicate the steps clearly to both the customer and employees involved. A powerful tool to design services is blueprinting. A **service blueprint** is a map that shows the customer experience and service system so that all the people involved (e.g customers and employees) can understand it regardless of their individual point of view. It identifies the service's critical points and how to design and deliver the process, it's a common language between management, employees, customers, stakeholders. Some **advantages**:

1. Customer-centric: blueprinting is based on the customer's perspective, it focuses on their needs.
2. It also allows for a better understanding of the process from the customer's point of view, so it can reveal if there's a lack of customer insight or if the process doesn't reflect the customer's needs.
3. Helps with service innovation, to consider a new service idea and its ramifications.
4. Well suited to review an existing service in search of differentiation opportunities.
5. Gives a better understanding of the process that can help to find opportunities for cost-reduction while still satisfying customers' needs.
6. Valuable human resources tool: enables everyone to see how the different parts of the organization cooperates in bringing a service to life.

Some important **definitions** for service blueprinting:

1. Front-office vs back-office: visible elements of service operations (can be related to the service staff or the tangible aspects related to the staff) vs invisible elements.
2. High-touch vs low-touch services: interactive or provider-active vs self-service or machine-to-machine. High-touch services have more customer interaction so front-office is more important, low-touch are more related to the back-office.

Components of a service blueprint:

1. Customer's action: sequence of steps the customers take before, during or after purchasing and/or experiencing a service. In B2B markets, customer organizations have multiple stakeholders that come together in a buying center, so it's important to distinguish between roles (user, buyer, payer) when exploring customers' actions.
2. Visible contact-employee actions: visible actions performed by contact-employees. The line of interaction separates them from customers' actions. Crossing the line can either improve the customer experience or jeopardize it (e.g talking with a manager during on-site repair)
3. Invisible contact-employee actions: separated by the line of visibility from the visible actions.
4. Support processes: activities performed by other employees and technology needed to perform the service. Separated from the previous category by the internal line of interaction.
5. Physical evidence: all tangible items to which the customer is exposed during the service process. Affect customer's perception of service quality.

The **steps to create a blueprint:**

1. Define the scope: who is involved, where does the service start and end etc.

2. Assemble a blueprinting team: people who contribute in providing the service, both contact-employees and not. Their job is to understand the customer's needs, their own role and how it interacts with the others, and how to effectively implement the service.
3. Gain deep customer insight: what customers expect from the service, what they think their own role and involvement should be. This can help reveal inconsistencies in different points of view not only between customers but employees too.
4. Blueprint the service process: start from customer's action and move toward physical evidence. At first focus on broad customer's actions to see the big picture, leave out details and focus less on support processes, then refine the blueprint through several iterations. The level of detail depends on the project's purpose.
5. Implement and monitor blueprinting results: blueprints can be used to create a plan of action for launching new services, improving old ones, differentiation etc. Different plans of action for different departments, but they all should be aligned with the master blueprint and the team should meet periodically to monitor progress.

Industrializing service deployment: to secure profitability of service operations, a firm should adopt a product-line approach to services, but also keep in mind the difference between products and services. Productivity is typically defined as units of output divided by units of input, but in services there's a trade-off between productivity and service quality (e.g less employees = more productivity per employee but overall worse service quality because longer waiting time). Manufacturing-based productivity models are based on the constant quality assumption, but changes in manufacturing resources and systems affect service quality. So we should use a different definition for service productivity. Service productivity is based on:

1. Efficiency: means necessary to achieve a certain output. These means are the inputs provided by the supplier (human resources, equipment etc.) but often they also include customer inputs. Using resources as inputs efficiently = efficient service.
2. Effectiveness: ability of the firm to do the right things to achieve its objectives, produce the level of quality expected by the customers. Outputs of a service have 2 components: quantity (service volume) and quality (service outcome).
3. Capacity utilization: how the capacity of the service is used wrt demand. If demand matches supply then capacity utilization is optimal; if demand demand is superior the capacity is still fully utilized but there could be a drop in service quality; if demand is lower than supply the capacity is underutilized.

The objective is finding balance between these 3 aspects: too much focus on efficiency can jeopardize future sales and customer satisfaction, customizing the offer too much can jeopardize the overall profitability, excessive standardization can alienate customers. Balance can be found with market studies, blueprinting, employee training and exploiting digitization to cut costs and improve performance. Another important element is the order in which a company launches services: industrialize the services oriented towards the products first. A supplier can even influence customer behavior to improve service operation by doing preventive maintenance and troubleshooting for example. As always, the relationship with the customer is fundamental for a better match between expectations and experiences. Technology can help overcome the trade-off between productivity and service quality: data analytics for decision making can transform a service from reactive to proactive and predictive, automation can lead to cost cuts.

CHAPTER 10 - SERVICE SALESPEOPLE

There's typically a strong resistance to change from the sales organization: one third of industrial salespeople easily transition from selling products to services, one third needs the support of the management to do so and one third prefers to be reassigned to sell goods. Being a good product seller doesn't automatically translate into being a good service seller, because selling services requires different skills and abilities from selling goods. Traditional sales steps (from prospecting to closing and follow-up) can work well with PLS since they're strictly related to products, but for other types of services there are **four main differences**:

1. **Underlying tenet:** selling goods requires the persuasion model, while selling services is based on the co-creation logic.
2. **Requirement definition:** selling goods requires meeting customers' expectations based on their stated needs, for services both parties must discuss and agree upon result-driven specifications.
3. **Network complexity:** in selling goods the salesperson interacts with a limited number of stakeholders, for services the interaction involves a wide network of stakeholders in both customer and vendor organization.
4. **Outcome orientation:** in selling goods the objective is closing a deal (hunter logic), for services it's more important to build and nurture client relationships in order to gain their loyalty (contract renewal) and open up opportunities for adding more value (farmer logic).

Associated **sales capabilities needed**:

1. **Understanding customer's business model** and knowledge on how the vendor can contribute to reduce costs or improve productivity on the customer's behalf
2. **Managing customer's expectations:** salespeople need the ability to adroitly say no in order to safeguard against commitments that can jeopardize future profitability in contract execution. The customer should be informed on what the service can and cannot achieve.
3. **Developing strong network ties** in both the customer's and vendor's organization. They need the ability to access customer contacts that are typically not targeted, at all levels of the customer's hierarchy, and manage internal networks to compete for scarce resources in the vendor organization.
4. **Tangibilizing customer outcomes:** service salespeople need to sell outcomes, not service features or functional benefits.

Differences between product salespeople and service salespeople:

1. **Learning orientation:** people who are more learning oriented, who devote a significant amount of time in improving their skills and think their sales capabilities are reflective of their own level of effort, are successful service salespeople because the process is more complex, longer, with more stakeholders and data sources; people who are more performance oriented perform better in selling products.
2. **Customer service orientation:** customer service-oriented people tend to be successful service salespeople because they put the customer first, they strive to provide personalized quality service to customers but also keeping in mind the company's interests.
3. **Intrinsic motivation:** enjoying the sales task for its own sake and not because of external reasons like compensation or recognition works better for selling services,

while extrinsically motivated people are associated with high-performance and work better in selling products.

4. **General intelligence:** selling services is complex and demanding so it's important to be able to incorporate knowledge from many domains.
5. **Emotional stability:** the process of selling services usually takes longer, requires a bigger commitment and it's riskier, emotional stability helps in taking on the task. It's also useful to resist temptation to give away services for free, to be capable of saying no to customers when it's required to maintain profitability, to deal better with the transition from free to fee which requires complicating the relationship with the client and even the risk of losing them.
6. **Teamwork orientation:** selling hybrid offerings requires the cooperation of people from different backgrounds (salespeople, engineers etc.), a service salesperson alone doesn't have all the knowledge required for hybrid offerings so they must be able to give up independence and work in a team.
7. **Introversion:** extroversion is associated with the need for extrinsic rewards, while introverts are more sensitive to punishment. Working in a team to sell hybrid offerings typically doesn't have explicit rewards so introverts are better at selling services while extroverts are better for products.
8. **Visionary thinking:** selling services is complex, so it requires a global, big-picture way of thinking with a focus on broader and future opportunities; also service salespeople often interact with high-level managers who generally appreciate this way of thinking.
9. **Nurturance:** useful for co-creation and customizing solutions for clients.
10. **Openness:** willingness to try new approaches, learn and experience new things.
11. **Assertiveness:** ensures the salesperson keeps both parties' interests in mind.
12. **Perfectionism and consciousness:** focus on details and deeper understanding of the customer's needs to take on this complex and long-term task.

Given the magnitude of the change involved, top-level management should be involved to lead the transformation. Managers should find ways to embed salespeople deeper in their own firm and customer's organization. Emphasis on teamwork, customer service, training. All these changes are possible only if the services are actually profitable so efforts in ensuring that are needed.

CHAPTER 11 - ORGANIZATIONAL STRUCTURES AND SERVICE GROWTH

Service growth requires a closer relationship with clients and a deeper understanding of their needs and for that changes in the organizational structure and relationships are needed. Creating a separate service unit with profit and loss responsibility can enhance services' financial performance, but at the same time there's the risk of strengthening silo thinking, which jeopardizes hybrid offerings. There are two dimensions that characterize an organizational structure:

1. **product-focused vs service-focused:** in product-focused structures strategic business units are organized according to categories of products, in service-focused structures functions related to service development, sales and deployment are managed through one or more service-specific units
2. **geographically-focused vs customer-focused:** in geographically-focused structures the organization is designed according to geographical positions (e.g

regions divided into local sales companies), this is good for a better understanding of local culture and regulations, closeness to clients, less dispersive; customer-focused structures are organized around specific customer-facing units.

An organization can make changes in its structure according to these two dimensions. There are 4 change patterns:

1. **Service orientation in product-focused structure:** a product-focused firm interested in service growth can, as a first step, establish separate service entities within the existing product units; dedicated service managers have the responsibility to launch new services and the same decision-making authority as product managers.
2. **Hybrid structure:** companies that want to become more customer-focused without changing too much can establish dedicated front-office teams for key customers or specific customer segments.
3. **Service-focused structure:** moving to a service-focused structure requires establishing dedicated service-focused SBUs with full responsibility for service operations and strategic service business development. Exclusive focus on service growth. Many firms with dedicated back-office service units in the central organization also have separate service organizations with specific service sale teams on a local level. Some companies have a separate service division but offer services also through the product-focused units. It can also happen that companies go back to 1 and reintegrate service business into their product units.
4. **Customer-focused structure:** a service-focused structure has the risk of keeping knowledge and expertise in organizational silos, no synergy between product and service businesses, lack of cooperation between product and service units serving the same customer, service units with no authority over other parts of the organization because they're too new. The solution is a customer-focused structure, but companies moving this way should also be able to track profitability of product and services as well as service-centric performance metrics. These companies have product and service units but also include customer-facing units that share product and service functions (pricing, marketing, R&D…) and have authority over what product-service combinations to offer and flexibility over the prices suggested by other units. These structures often include KAM (key account management) programs to serve a global customer base while still creating more value from the relationship. KAM also helps with coordinating prices geographically to avoid competition between sales companies and consequent price reduction. With the growing interest for global and remote services it's important to offer similar service levels and terms and conditions regardless of local markets.

Typical moves: 1→3 (or go back 3→1), 1→2, 3→4. Generally, large differences in local markets favor geographically-focused structures, while customer-focused structures are preferable when customer segments instead of types of products should form the basis for how to organize, similar services and terms and conditions apply regardless of local markets, and customers favor international agreements and centralized procurements. Changing structure is rather straightforward (create new units, merge old ones), but the associated cultural change and change in human resources, changes in authority and responsibilities require strong leadership to overcome internal resistance and even changes in the business model itself (incentive systems, financial metrics…).

The degree of separation between product and service units depends on the structure and sometimes too much of it can lead to **silo thinking**: a mindset where certain departments are reluctant to share information and resources with others in the same organization, particularly problematic in a customer-centric culture where cooperation is required to solve the customer's problems. To avoid this, management needs to understand the different parts of the organization and how they're connected, people's motivations and incentives, to identify the root cause of the problem. Often it all comes down to leadership conflicts and weakness: leaders need support from the managers who in turn have to incentivize the staff, show how a new organization can benefit the company, secure commitment and accountability from key decision makers (hard measures: incentives, metrics, allocation of power + soft measures: promoting a culture of cooperation).
We want a formal separation between product and service units/back and front offices, but we still need at the same time a structure that facilitates the flow of knowledge and experience between them, especially in more customer-centric designs; so it's useful to have a central-level strategic center that transcends boundary with employees with experience in different products/services, in-depth knowledge of customers' needs and boundary-spanning skills to overcome silo thinking.
Organizations that achieve both local responsiveness and global efficiency typically have a high degree of interdependence between front and back office. Strategic service units with global decision-making authority can help with silo thinking. Central structures are needed to support business development and help local units with competence and skills. The same way we need balance between separation and integration, we also need balance between centralization and local autonomy depending on strategic requirements: if the objective is to leverage global skills and scale to increase efficiency, more centralized decision-making is required; if there's a large variety between markets, a focus on customer-specific differences is preferred and in general more flexibility favors service growth because it's easier to seize emergent service opportunities. It's also important that in moving from product-oriented to customer-oriented services, the decision-making authority shifts toward the lower levels in the hierarchy since that's where the interaction with the client happens. Leading local units in general can act as catalysts for more service orientation at other subsidiaries as well as headquarters. Sometimes, to foster cooperation between central and local units, managers are encouraged to change their positions for some time (from central to local and vice versa). Information and experience on local markets, new services ideas that come unplanned from customer-specific needs, all this knowledge should flow between independent sales companies thanks to globally linked processes managed by a central organization.

CHAPTER 12 - CHANNEL-PARTNER MANAGEMENT

To really take on the service job, companies need an extensive network of dealers to cover the territory and ensure customer access to service. Service growth often requires local presence and it can be achieved through channel partners, especially in traditional product firms. Distributors are powerful intermediaries but if they oppose or are not aligned with the company's service growth strategy they can compromise it. It also depends on the market: in Europe companies tend to prefer providing services in-house to build better customer relationships and the internal service factory, which is a competitive advantage. Choosing between delegating or providing a service in.house has implications on how to control the service channel, manage the service portfolio, and interact with customers. Sometimes the choice is out of the company's hands because of legislation or because its legacy and

previous strategic decisions made it very difficult for the company to strongly influence the channel in the short term. But in the long term or when launching new services companies should have a clear idea of how to align with partners. Big companies often have an extensive partner network which, if properly harnessed, can be used to propel service growth. But it can also go the opposite way if partners are disloyal, opportunistic or unwilling to embrace change. The solution in this case is not to bypass them or invade their domain, but show them how service growth will make them more profitable and competitive (with rewards and incentives, information exchange, service capability-building activities etc). Many companies actually operate with a combination of in-house service organizations and independent dealers (hybrid solution). Or they can acquire the independent dealers to get closer to the client. There are different **challenges for internal and external service delivery**. Internal:

1. Costly, it requires a lot of time, resources and competences (some taken away from products)
2. Less flexible
3. Needs coordination between internal units and markets
4. Risk of channel conflict with partners

External:

1. Many dealers are product centric, their competences must be assessed first
2. Dealers have different interests than manufacturers
3. More customization because dealers are local = less standardization
4. Dealers gain customer's loyalty

Factors influencing the service-channel strategy:

1. **Offering-specific factors:** if services are not very related to the company's product they should be delegated to partners, if services are profitable, difficult to imitate, high-volume, highly predictable, they should be provided internally. Internal service delivery is useful for building and maintaining customer relationships and ensuring customer performance. Typically front-end, high touch services should be delegated while back-end, low-touch services should be in-house. Digitization can make services more low-touch and back-end and reduce reliance on partners. Services related to other companies' products should be delegated.
2. **Firm-specific factors:** product-centric firms invest few resources in services so they typically rely on partners for services. Internal delivery helps with getting a better understanding of the customer's process and with creating hybrid offerings. It reduces the risk of having disagreements with partners on customer and service data management. Interdependence, transparency and efficient information exchange benefit the in-house option. If services are costly, inefficient or low quality, it's better to delegate. External delivery is also useful to get a better reach geographically, while avoiding large investments. It provides flexibility and useful knowledge of local culture, regulations etc. Sometimes partners lack the proper skills and competencies to deal with services and they should be trained.
3. **Market-specific factors:** in slow-growth industries services become more important and internal delivery is preferable, in high-growth industries investing too much on services can be detrimental so channel partners play a larger role. External delivery is also preferable when the service market is limited and the installed base small. Product-service integration, growing customer interest for hybrid offerings and the use of international agreements to stimulate uniformity across local markets,

turbulent markets which require to be closer to customers to adapt to quickly changing conditions all support internal delivery. External delivery gives more flexibility, knowledge of local markets and possibility to share financial risk.

After choosing the channel-partner strategy that fits the company best, the company should evaluate their current partners and decide if it's the case to strengthen the relationship or find new partners.

1. Define the partner profile: what the company is looking for in a partner
2. Screen and select profiles: check if existing partners fulfill the requirements
3. Build a service partner portfolio: how to build new relationship, dissolve or strengthen new ones
4. Work with partners: how to ensure collaboration and how to support partners
5. Orchestrate the channels: how to exercise the control needed.

In general, ideas like aligning incentives, defining responsibilities, distributing risk, exchanging information , and actively supporting a partner (training, planning, analytics…) are good ways to deal with partners.

For services, value is not created linearly in a value chain like for products, it's co-created in networks with customers and partners: gaining customer insight and service innovation often comes from outside the organization. It's essential to join forces , share competencies and resources to become more competitive, and identify new opportunities. Markets are in constant change and firms need to be ready to reconfigure and strengthen their value network in tandem with alignment with existing channel partners.

GO DOWNSTREAM: THE NEW PROFIT IMPERATIVE IN MANUFACTURING

Demand for products has stagnated in the past decades while the installed base of products has been expanding because of the accumulation of past purchases and the fact that product life spans are getting longer. Providing services is now more lucrative (e.g only 20% of auto-related expenses in a family go to buy a new car, the rest is for gas, insurance, repairs etc.) Most manufacturing companies have been struggling because of this, the few thriving are the ones moving downstream, toward the customer: instead of focusing only on manufacturing, they also provide services required to operate and maintain products. Downstream markets not only offer large new sources of revenue, they have higher margins and to require fewer assets. And because they tend to provide steady service-revenue streams, they're often countercyclical.

Historically, the manufacturing strategy has been based on:

1. vertical integration of supply and production activities to control costs and maintain predictability of raw materials and other inputs
2. disciplined research to create superior products
3. dominant market position to provide economies of scale.

These 3 things used to guarantee cost advantages, steady revenue growth and scale barriers to competition, but they aren't very useful when it comes to capturing value downstream, in a service-based economy.
The new manufacturing strategy should:

1. **Redefine the value chain:** the product sale is now an opportunity to offer provision of services and not the opposite. The manufacturer has to look at the value chain

through the customer's eyes, examining all the activities they perform using and maintaining a product from sale to disposal. Redefining the value chain also means redefining how profit is measured because a product's profitability does not determine the profitability of the services associated with it (e.g companies can make more money from Internet-access periodical fees than from one-time computer sales)

2. **Building customer allegiance:** in the past, superior products and scale provided barriers to competition. Now it's very hard to maintain a price-performance lead and scale can be easily replicated or circumvented through alliances or contracts. The sturdiest barrier to competition is now customer allegiance. To obtain their loyalty, delivering a great product is not enough, deliver a combination of services that minimizes the overall costs of owning and using the product.
3. **Rethinking vertical integration:** value has shifted toward the customer, so now distribution is where much of the profit can be found. Typically manufacturers are not involved with distribution, but the ascendance of big retailers (broad product selections, lower prices and better customer service than traditional stores) draws the customer's loyalty away from the manufacturer. Also resellers control a huge portion of the distribution and with this channel control they have power over the customers: they can cut a manufacturer's profit by selling their own cheaper version of the product and the manufacturer can't do anything without risking being cut off from the channel. Online shopping, allowing for easier comparison, also shifts the loyalty to the intermediary. So the manufacturer should have hands-on involvement with distribution and a willingness to risk channel conflict in the pursuit of advantage.

FOUR DOWNSTREAM BUSINESS MODELS

1. **EMBEDDED SERVICES**

New digital technologies allow for services to be built into a product. A "smart" product performs the services in place of the customer, saving them labor costs (e.g Airplane Information Management System (AIMS) integrated in the airplane automate the in-flight monitoring of engine and system performance reducing the need for expensive flight engineers)

2. **COMPREHENSIVE SERVICES**

Some services can't be built into the product, but they can still be offered by the manufacturer (e.g a locomotive manufacturer can also finance rail assets, run maintenance facilities, refurbish and resell locomotives etc.)

3. **INTEGRATED SOLUTIONS**

Combine products and services into a seamless offering that addresses a pressing customer need (e.g Nokia produces not only phones but also handsets, transmission equipment and switches for carriers and it offers them services to manage their networks, do maintenance etc.)

4. **DISTRIBUTION CONTROL**

Move forward in the value chain to gain control over lucrative distribution activities (e.g Coca Cola has independent bottling plants and distribution networks. It even deals with vending machines and convenience-store coolers)

WHO SHOULD GO DOWNSTREAM

It depends on:

- indicators such as the ratio of installed units to annual new-unit sales, the customer's usage costs over the product life cycle relative to the product's price, and the profitability of downstream activities relative to product margins.
- if a company's ability to differentiate products is declining, or if customers are gaining power through consolidation
- how much real influence can a company exert over customers and their transactions. If a company already deals with its own distribution it should go downstream, if it sells through a specific set of distributors it could "buy the channel", if it sells through a fragmented network of distributors it can work in partnership with them to capitalize on downstream opportunities, if the industry's channel is controlled by a big distributor, a downstream move is very hard to pull off, a possible solution could be bypassing the distributor via the Internet or other channels.

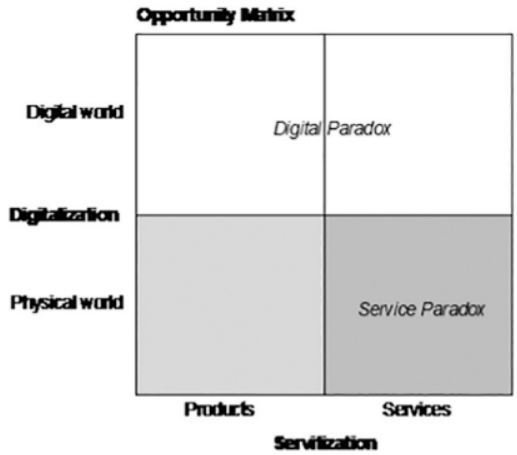
In general, going downstream is hard, requires a shifting in perspective and acquiring new skills and new people, but it is still important for manufacturers not to ignore the opportunities.

DIGITAL SERVITIZATION: CROSSING THE PERSPECTIVES OF DIGITIZATION AND SERVITIZATION

Digital servitization describes the convergence of servitization and digitalization.

- **Servitization**: instead of paying for products, customers increasingly want to receive only the value inherently offered by the product use, thus consuming it as a service. Consequently, companies have been focusing more on offering services than manufacturing products.
- **Digitalization**: adoption or increase in use of digital or computer technology. Not associated primarily with the adoption of some specific technology, but essentially built on their combination, in order to enable new ways of value creation in both consumer and industrial markets.

This convergence is opening up new growth opportunities for producers of industrial and consumer goods, illustrated by the matrix. Two paradoxes can prevent companies from achieving revenue growth through selling services and/or digital products. The **service paradox** suggests that companies invest in services, but may well not earn the expected returns. The **digital paradox** suggests that investment to procure and develop digital assets have rarely been paid off yet.



Companies should combine products, services and digital technologies to create digital solutions that more effectively address their customers' needs. Thus, the concept of hybrid/integrated offerings (products and services) should be extended toward digital offerings, and this also implies that research on servitization and digitalization should converge.

While cost improvements are certainly relevant, they will be quickly imitated by competitors, so the focus should be on revenue growth. Revenue growth means that product companies

really strengthen their position in the market and utilize digital servitization to advance the current offerings. These new and often hybrid offerings allow companies to better target customers' needs and consequently gain their loyalty.

Future research on digital servitization should focus on:

1. The use of precise models that capture hypotheses generated by theories. To generate them, it is necessary to establish quantitative measures of established constructs on digital servitization and to test them statistically. Less qualitative research, more variety of research methods.
2. Digital servitization leads to new and combined digital and service capabilities, which facilitate internal growth. Theory often ignores external growth. But product companies often acquire and partner with other companies specializing in digital technologies and the resulting external growth and capability development are often considered "anomalies". The current theoretical assumptions on internal growth, and the theoretical lenses and methodologies from the literature could be used to consider whether or not it may make economic sense to acquire specialized companies as a strategy for digital servitization.
3. The new competitive arena emerging around IoT platforms in B2B markets. Past research focused on the B2C context, where only a few companies dominate the ecosystem and tend to capture a disproportionate and expanding share of economic value. This is a result of the specific characteristics of B2C platforms. In order to remain competitive, product companies have begun to cooperate with infrastructure providers to build their own IoT platforms. But these providers are increasingly competing in the field of digital innovations and this can lead to new growth and differentiation potential. Future research should focus on how IoT platforms contribute in the move towards digital servitization, how the distinct characteristics of IoT platforms will influence the competitive landscape around these platforms, how various IoT platforms contribute in one specific value creation activity (horizontal perspective) and how IoT platforms upstream and downstream within the value chain (vertical perspective).

MANAGING THE TRANSITION FROM PRODUCTS TO SERVICES

Benefits of the transition from products to services for manufacturers:

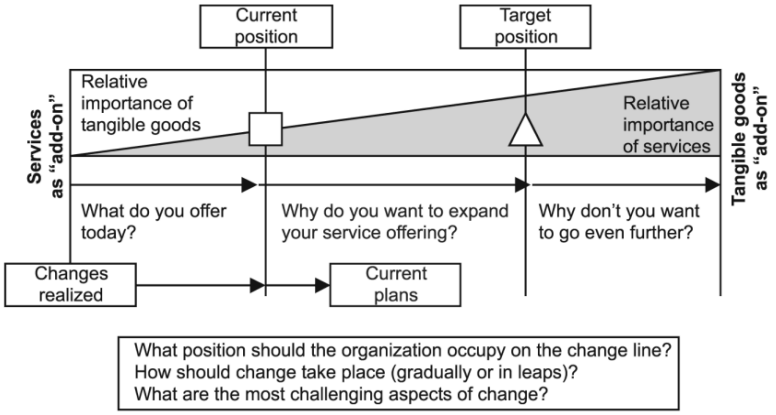
1. Services have higher margins than products and they provide a more stable source of revenue as they're resistant to economic cycles.
2. Customers are demanding more services.
3. Competitive advantage given by the fact that services are less visible and more labor dependent so they're also more difficult to imitate.

Despite these, not many companies have successfully transitioned from products to services. Reasons:

1. Companies might not believe in the economic potential of the service component for their product.
2. Even if they believe in the economic potential, they might still decide that providing services is beyond the scope of their competencies
3. They might try to enter the service market but fail in deploying a successful service strategy

In general, services require organizational principles, structures and processes different from manufacturing. Different business models (from transaction to relationship-based), capabilities, metrics and incentives.

Study on 11 German capital equipment manufacturers done through interviews based on the framework:



Durable products require services as they advance in through their life cycle and there's a cost of ownership beyond the purchase price.
A product's **INSTALLED BASE** is the total number of products currently under use.
While services are important for the sales function ("better services to sell more products"), it's important not to forget about **IB SERVICES**, that is the services required by an end-user to run the product effectively during its useful life. When defining services in relation to a product's IB note that:

1. services encompass all services required by the end-user to obtain a desired functionality, not just the ones bundled with the product
2. service suppliers are not restricted to product manufacturers
3. end-users are not restricted to be industrial firms

By integrating the value chain from product design to service provider, product manufacturers have the following advantages:

1. lower customer acquisition costs (manufacturers involved in sales have info on new equipment joining the IB)
2. lower knowledge acquisition cost (manufacturers know their products and their requirements over their life cycle)
3. lower capital requirements (manufacturers already possess technologies to fabricate spare parts or upgrades)

Challenges of entering the IB service market:

1. managing two tightly-coupled markets: increasing service quality and scope extends the product's useful life but reducing its replacement sales. Vice versa, increasing the product durability might reduce service revenues.
2. create a service network to support a geographically distributed IB

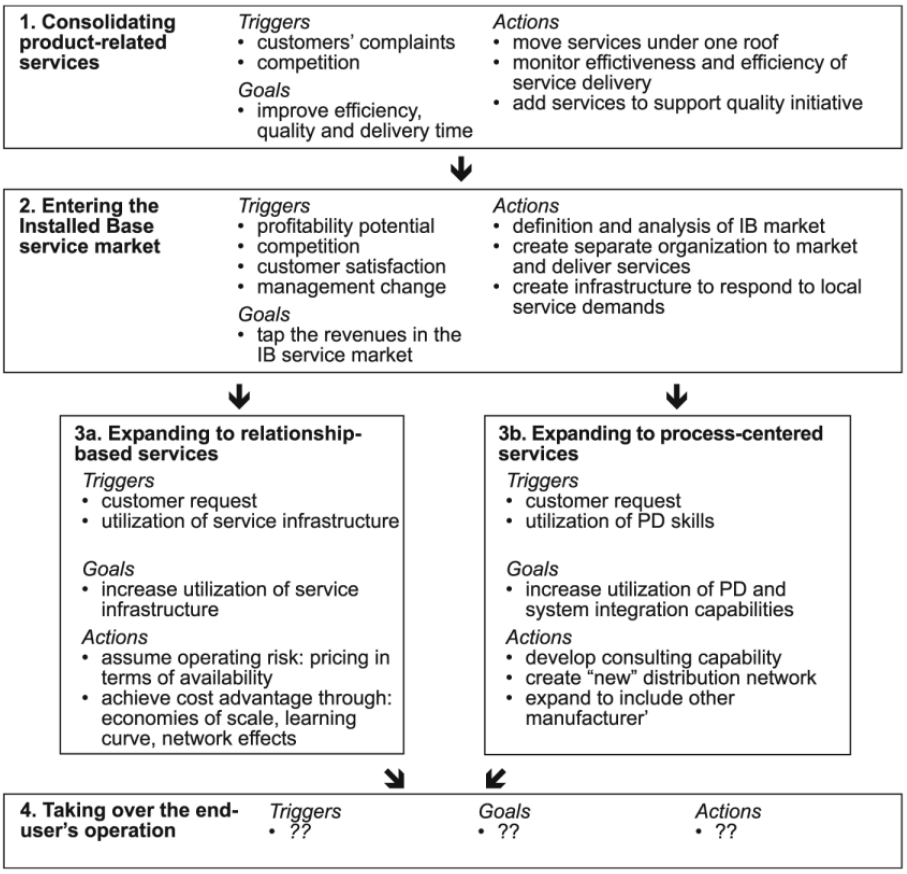
The study found:

1. A recurring pattern on the adoption of IB services in the nature of the service contracts and in their adoption sequence
2. The transition occurs in stages. During each stage the firm focuses on a set of issues and addresses them by developing new capabilities.

Stages:

1. **Consolidating product-related services**
    a. **Trigger**: firm provides services to sell and support the product but these services are fragmented and considered an unprofitable necessity to sell the product. Customers complain.
    b. **Goal**: improve quality, efficiency and delivery time
    c. **Actions**: move services under a single organizational unit and develop systems for monitoring efficiency and delivery. These systems allow the firm to see the services' contribution to the firm's operation and get a clear sense of direction through monitoring success/failure. The quality of services improves and the firm gets a reputation as a reliable service provider.
2. **Entering the IB service market**
    a. **Trigger**: Thanks to the monitoring system or to competition, the firm sees the profit potential related to the IB services market
    b. **Goal**: tap into this new market
    c. **Actions**: define and analyze the IB market. Since it's hard to establish a service culture in a product-based organization (services are just add-ons, we want to make durable products, not fix them etc...) it's useful to create a separate organization to market and deliver services. Monitor the success and use this to show the value of IB services to the rest of the organization. Create a global service infrastructure capable of responding locally to the requirements of the IB. Problems with this: initial investment requires a bit before generating revenue + need to develop the capability to diffuse knowledge across the network and to manage large organizations of service personnel + network has to make explicit decision about the degree of standardization of the service offer to balance between transferability of services across markets vs customization for individual end-users
3. **Expanding the IB service offering:** once the core functionality of the service organization has been set, the expansion of the service offering happens through 2 transformations
    a. **change the focus of customer interactions from transaction to relationship-based**. This changes the way the service is priced: from a markup for labor and parts every time a service is provided, to a fixed price covering all services over an agreed period (e.g maintenance contract). This reduces variability and unpredictability of demand over the installed capacity and allows a higher average of capacity utilization. To make this appealing to the end-user too, pricing must be done on the basis of equipment availability. This means that to make a profit the organization should assess failure risks for the equipment and this requires a new set of skills.
    b. **change the focus of the value proposition to the end-user from product efficacy to the product's efficiency and effectiveness within the end-user's proces**s. The product is not the center of the value proposition anymore, just part of it. The challenge here is to provide services for an IB over its complete life cycle, not only for installation or commissioning of new products (e.g as an add-on to boost product sales). Another challenge is to develop new networks to work with new distribution channels.

4. **Taking over the end-user's operations:** advancing in these two directions means for the organization to assume operating risks and take the entire responsibility of the end-user's process. The field of operational services is still uncharted territory.



EIGHT TYPES OF PRODUCT– SERVICE SYSTEM: EIGHT WAYS TO SUSTAINABILITY? EXPERIENCES FROM SUSPRONET

Product–service system (PSS): tangible products and intangible services designed and combined so that they jointly are capable of fulfilling specific customer needs. They were considered good for value creation and sustainability and promoted by SusProNet. There are three main categories of PSSs:

- **product-oriented services:** business model focused on products, with some extra services added. We can distinguish between:
    - **product-related services:** the provider sells both the product and the services needed during use(e.g maintenance, financing, supply of consumables).
    - **advice and consultancy:** the provider gives advice on how to use the product in the most efficient way (e.g organizational structure, logistics)
- **use-oriented services**: the product still plays a central role, not sold but made available in a different form. We can distinguish between:
    - **product lease**: provider owns the product and is also responsible for maintenance, repair and control. Customer pays a regular fee for unlimited and individual use of the product

    - **product renting or sharing:** product is owned by a provider, who is also responsible for maintenance, repair and control and the user pays for the use but doesn't have unlimited and individual access, others can use the product at other times.
    - **product pooling**: similar to product renting or sharing but with simultaneous use of the product.
- **result-oriented services:** client and provider agree on a result, and there is no predetermined product involved. We can distinguish between:
    - **activity management/outsourcing:** part of an activity of a company is outsourced to a third party (e.g catering, cleaning) according to performance indicators to control the quality.
    - **pay per service unit**: user doesn't buy the product, just its output according to the level of use (e.g pay-per-print formulas).
    - **functional result**: the provider agrees with the client the delivery of a result. The provider is generally free as to how to deliver the result (e.g companies who offer to deliver a specified 'pleasant climate' in offices rather than gas or cooling equipment)

FACTORS INFLUENCING ADDED VALUE CREATION AND CAPTURE IN PSSs

The ability to create and capture sustained added value is often seen as the key measure of success of business. **Economic Value Added** is computed by taking the spread between the return on capital and the cost of capital, and multiplying by the capital outstanding at the beginning of the year. There are 4 important elements that affect EVA:

1. **market value of the PSS**: it can be
    a. **tangible:** a customer estimates actual cost of product and won't pay more than that for equivalent PSS
    b. **intangible**: in affluent societies consumers can generally take basic needs for granted and fulfill higher needs such as love, esteem and self-realization through experiences with an intangible added value and pay more than would be justified on the basis of 'rational' calculation
2. **production costs of the PSS**: involves
    a. **traditional production costs** (e.g. time and costs): often mirror the tangible value: if the tangible value for the user is higher than the extra production cost for the provider or the cost deficit is compensated by the intangible value then the service should be offered
    b. **risk premium/uncertainty** related to the solution. Relevant specifically for result-oriented PSSs: by promising a result, the provider often faces difficulties in predicting and controlling risks, uncertainties and responsibilities that otherwise were the problem of the user.
3. **investment needs/capital needs for PSS production**: include
    a. **inherent capital base needed to produce the solution:** cost of the PSS providing systems
    b. **additional 'transition' investments needed to create the system that produces the solution**: based on the assumption that most companies are currently quite product oriented so they have to invest in infrastructures and relationships to be able to provide a PSS. These costs can be tangible or intangible and should be considered investments.
4. **ability to capture the value present in the value chain**: includes

a. **strategic position in the value network:** the PSS provider should be able to capture the value it creates so it needs to to create a quasi-monopoly by covering the essential parts of the delivery or production system.
b. **sustained low barriers for access to the service and a contribution to client loyalty:** often associated with use-oriented and result-oriented services because payment is usually per unit time or unit use and they offer better means of ensuring client loyalty than the mere purchasing of products.
c. **contribution to a comparatively high speed of innovation**: PSSs might contribute to better and faster innovation because of the need for maintaining low barriers to accessing the service, which also implies access to, and insight into, the needs of clients. Openness, predisposition to mutual learning and access to networks of other players to discuss strategy are key features of innovative firms. Since PSSs are so user oriented and require cooperation with other companies, they tend to be innovative.

Analysis of these key economic elements per type of PSS:

- **Product-related services and advice and consultancy** usually provide some tangible value for the user by a more efficient use of materials and human resources so there's some additional material and human resource costs for the provider. A product-oriented company usually has to make some investments in capital and organizational transitions. Lower client barriers, a higher client loyalty and, due to better client contacts, more innovation.
- **Product lease** has some tangible value for the user, since various costs and activities are shifted to the provider who also owns the product, so need for capital is high. Low client barriers due to low initial investment by the client. User loyalty might improve, but the user can still easily switch to other providers. No influence on innovation because leasing companies use other companies' products.
- **Product renting, sharing, pooling:** users have to put time and effort into getting access to the material artifact but they no longer need to buy the product. Low intangible value because it doesn't contribute to (self-)esteem, or offer 'priceless' experiences. Provider still owns the product so capital need is high but compensated by the shared use. Low client barrier due to low initial costs for new clients.
- **Activity management:** customer pays for personnel and material, provider has to make gains by organizing the outsourced tasks more efficiently with specialized knowledge. Good performance criteria must be defined to avoid discussion about the delivered result with the client (risk premium issue). Longer term contracts so loyalty is ensured. The specialization might lead to more innovation.
- **Pay per unit use**: clear tangible value for the user since various activities (maintenance, etc.) are outsourced to the provider. The providers' position in the value chain becomes better, direct access to clients = loyalty. The provider has to be able to predict the behavior of the user to calculate costs and include a risk premium. Provider owns the product so additional capital is needed. Low barriers for new clients, and good client contacts lead to innovation.
- **Functional result:** since the same function is offered, user could give it the same tangible value. Intangible value is another matter though, and cannot be judged without defining the specific system. The provider could try to provide a solution with much lower input of human resources and materials but it's risky. Capital costs could be low, but transition costs high. Highest degree of freedom with regard to innovation.

FACTORS INFLUENCING SUSTAINABILITY IN PSSs

Mechanisms leading to incremental/average impact reductions (10–20%):

- Incremental efficiency improvements (e.g. by better maintenance due to a maintenance contract in a product-related service) = more intensive use or prolonged life of capital goods, or less use of energy and consumables

Mechanisms leading to average to high impact reductions (up to 50%)

- Keep life cycle costs in mind when designing and provider taking responsibility for these costs (e.g. in the case of pay per service unit) = strong incentive for optimizing the use of energy and consumables, and recycling of product parts and materials where feasible.
- More intensive use or prolonged life of capital goods (e.g. in a product renting or sharing situation) than in a traditional product system, it can also stimulate a quicker replacement by newer, more efficient models.
- Considerably less use of energy and other auxiliary materials in the use phase, e.g. in a product pooling situation.
- Use of a considerably more efficient technology made possible by a higher economy of scale (e.g. washing machines in a laundry using gas heated water rather than the electricity heated water used at home).

Mechanisms potentially leading to very high impact reductions (up to 90%)

- Application of a radically different technological system with radically lower impacts (e.g. a functional result).

Effects of each type of PSS on sustainability:

- **Product-related service:** no changes in the technological system or how the user operates it, no strong incentive in terms of internalizing life cycle costs in the design process by the provider. Can lead to incremental efficiency improvements due to better maintenance, or take-back provisions but it's not sure.
- **Advice and consultancy**: the effects here are similar to those for product-related services. PSS providers might suggest all kinds of optimization for using the product, which can lead to incremental reductions in environmental impacts.
- **Product lease**: the provider now also takes responsibility for maintenance, repair and control, and this could lead to incremental efficiency improvements, the provider may perceive an incentive to prolong the product life and may design the product accordingly. In most cases, however, lease companies buy the products they lease and are not responsible for product design. Furthermore, the lease in general does not cover many costs in the use phase (e.g. fuel consumption in cars), so neither the lessee nor the product provider will perceive much incentive to do something about energy and consumable use in the use phase. The fact that the user no longer owns the product could even lead to negative effects, such as a careless use shortening its useful life span.
- **Product renting and sharing**: product renting and sharing implies that the same product is now more intensively used = high impact reductions. Users pay for each time they use the product and access is a little more complicated = use of the product in general will be somewhat discouraged = positive environmental effects.
- **Product pooling**: similar to renting and sharing, with one major difference, the same product is used at the same time by more users (e.g. car pooling) = even more

impact reductions, particularly if the lifecycle impacts are related to use of the product.

- **Activity management/outsourcing**: no radical changes in applied technology, organization etc. However, companies have to be more efficient than the company who outsourced the activity to stay in business = more efficient use of capital goods and materials but in many cases the efficiency gains are realized on personnel costs rather than material costs, which is less relevant for impact reduction.
- **Pay per unit use:** the provider is responsible for all life cycle costs = powerful incentive to design a long lasting or reusable product. In specific cases (e.g. pay per wash) the user will make a more conscious use of the service, though in other cases (e.g. copiers at work) this issue plays no role.
- **Functional result**: a result is promised and the provider can decide the necessary approach to deliver the result = provider will try to do so in the most cost effective way, which bears the promise of a search for radical innovations.

CONCLUSION

Overall the simple thinking that PSS development will automatically result in an environmental/economic win–win situation also seems to be a myth. Some of the contradictions:

- The easiest PSSs for companies to introduce can lead at best to some incremental environmental improvements.
- Some PSSs, such as product lease, can lead to less responsible user behavior and hence an increase of environmental impacts.
- Product renting, sharing and pooling in principle can lead to high environmental gains but this category in particular probably has a considerably lower market value than the competing product, due to both tangible and intangible user sacrifices.
- The most promising PSS in environmental terms is the function-oriented PSS. However, this PSS particularly needs attention concerning operationalization. There will be plenty of cases where the ‘functional result’ cannot be operationalized in sufficiently concrete terms, where liabilities related to the promised result are too high, or where the provider simply has insufficient control if the result is to be reached. These issues can be prohibitive in putting a function-oriented PSS on the market (or otherwise only by demanding a high risk premium).

HOW SMART CONNECTED PRODUCTS ARE TRANSFORMING COMPANIES

All smart, connected products share three core elements:

- **physical components** (mechanical and electrical parts)
- **smart components** (sensors, microprocessors, data storage…)
- **connectivity components** (ports, antennae, protocols, and networks that enable communication)

Smart, connected products require a whole supporting technology infrastructure for data exchange between the product and the user, to integrate data from business systems, and for data storage and analytics. This infrastructure allows for:

- a product to monitor and report on their own condition and environment = previously unavailable insights into their performance and use.

- users can control some product operations thanks to remote-access options and customize the function, performance, and interface of products to operate them in hazardous or hard-to-reach environments
- monitoring data + remote-control capability create new opportunities for optimization.
- monitoring data + remote control + optimization algorithms = autonomy, products can learn, adapt to the environment and to user preferences, service themselves, and operate on their own.

Reshaping the manufacturing company

In the past, data was generated primarily by internal operations and through transactions across the value chain (sales, interaction with suppliers etc.) and integrated with information from surveys, research, and other external sources to get insights about customers, demand, and costs, but much less about the functioning of products. Now the product itself can be a source of data. This new product data is valuable by itself, yet its value increases exponentially when it is integrated with other data and the ability to unlock the full value of data creates competitive advantage, so the management, governance, analysis, and security of that data is developing into a major new business function. While individual sensor readings are valuable, companies often can unearth powerful insights by identifying patterns in thousands of readings from many products over time. But the data from smart, connected products and related internal and external data are often unstructured and conventional approaches to data aggregation and analysis are ill-suited to managing a wide variety of data formats. The solution: a “data lake,” a repository in which disparate data streams can be stored in their native formats and then studied with a set of new data analytics tools (descriptive, diagnostic, predictive, and prescriptive). It can also help to use a digital twin, a 3-D virtual-reality replica of a physical product which allows the company to visualize the status and condition of a remote product and can also provide new insights into how products can be better designed, manufactured, operated, and serviced.

Transforming the value chain

Smart, connected products require a fundamental rethinking of design: product development shifts from largely mechanical engineering to true interdisciplinary systems engineering. Smart, connected products also call for different product **DESIGN** principles:

- **Low-cost variability**. In conventional products, variability is costly because it requires variation in physical parts. But the software in smart, connected products makes variability far cheaper. Meeting customer needs for variability through software, not hardware, is a critical new design discipline. Variability is needed not only across customer segments but also across geographies. Software also makes it easier to localize products for different countries and languages. However, emerging local regulations for data standards are introducing new country and regional differences and require duplication of data storage infrastructure or applications.
- **Evergreen design**. In the old model, the design of a product remained the same until a new improved generation came out. Smart, connected products can be continually upgraded via software, often remotely, fine-tuned to meet new customer requirements or solve performance issues. Companies can release new features that are works-in-process, not finalized.
- **New user interfaces and augmented reality**. The digital user interface of a smart, connected product can be put into a tablet or smartphone application, enabling remote operation and even eliminating the need for controls in the product itself.Less

costly, easier to modify, greater operator mobility. Augmented reality applications can tap into the product cloud and generate a digital overlay of the product for monitoring, operating, and service information that makes supporting or servicing the product more efficient.

- **Ongoing quality management**. Testing that tries to replicate the conditions in which customers will use products has long been part of product development. Smart, connected products allow for continuous monitoring of real-world performance data, so that companies can identify and address design problems that testing failed to expose.
- **Connected service.** Product designs now need to incorporate additional instrumentation, data collection capability, and diagnostic software features that monitor product performance and warn service personnel of failures. And as software increases functionality, products can be designed to allow more remote service.
- **Support for new business model**s. Smart, connected products let companies switch from transactional selling to product-as-a-service models. When a product is delivered as a service, the responsibility for an associated cost of maintenance remains with the manufacturer, and that can alter several design parameters. Products delivered as services must also capture usage data so that customers are appropriately charged. This requires clear thinking about the type and location of sensors, what data will be gathered, and how often it should be analyzed.
- **System interoperability.** As products become components of broader systems, the opportunities for design optimization multiply. Through codesign, companies can simultaneously develop and enhance hardware and software across a family of products, including those of other companies.

MANUFACTURING. Smart, connected products create new production requirements and opportunities, manufacturing now goes beyond the production of the physical object, because a functioning smart, connected product requires a cloud-based system for operating it throughout its life.

- **Smart factories**. The new capabilities of smart, connected machines are reshaping the operations of manufacturing plants themselves, where machines increasingly can be linked together in systems.
- **Simplified components**. The physical complexity of products often diminishes as functionality moves from mechanical parts to software. This shift eliminates physical components, along with the production steps needed to build and assemble them. As the physical complexity of products decreases, however, the quantity of sensors and software rises, introducing new parts and complexity.
- **Reconfigured assembly processes.** Manufacturing has evolved toward standardized platforms, with customization of individual products occurring later and later in the assembly process. This approach reaps economies of scale and lowers inventory. Smart, connected products go even further. Software in the product or in the cloud can be loaded or configured well after the product leaves the factory, by a field service technician or even by the customer. New apps can be added or touchscreen keyboards set up for different languages. Product design changes can be incorporated at the last minute, even after delivery.
- **Continuous product operations**. Until now, manufacturing has been a discrete process that ended once the product was shipped. Smart, connected products, however, cannot operate without a cloud-based technology stack. In effect, the stack

is a component of the product—one the manufacturer must operate and improve throughout the product's life. In this sense, manufacturing becomes a permanent process.

LOGISTICS. The earliest roots of smart, connected products were in logistics, which involve the movement of production inputs and outputs and the delivery of products. Today's smart connected products can be tracked continuously, we know not just the current location but also location history, condition (their temperature, say, or exposure to stresses), and surrounding environment.

MARKETING AND SALES. The ability to remain connected to the product and track how it's being used shifts the focus of a company's customer relationship from selling to maximizing the customer's value from the product over time. This opens up important new requirements and opportunities for marketing and sales.

- **New ways to segment and customize**. The data from smart, connected products provides a much sharper picture of product use, showing, for example, which features customers prefer. By comparing usage patterns, companies can do much finer customer segmentation—by industry, geography, organizational unit, and even more granular attributes. Marketers can tailor special offers or after-sale service packages, create features for certain segments, and develop more-sophisticated pricing strategies that better match price and value at the segment or even the individual customer level.
- **New customer relationships.** As the focus shifts to providing continual value to the customer, the product becomes a means of delivering that value, rather than the end itself. And because a manufacturer remains connected to customers via the product, it has a new basis for direct and ongoing dialogue with them.
- **New business models.** Having full transparency about how customers use products helps companies develop entirely new business models. Today many industrial companies are beginning to offer their products as services—a move that has major implications for sales and marketing. The goal of salespeople becomes customer success over time, instead of just making the sale. That involves creating "win-win" scenarios for the customer and the company.
- **A focus on systems, not discrete products.** As products become components of larger systems, the customer value proposition broadens. Product quality and features need to be supplemented by interoperability with related products. Sales and marketing teams will need broader knowledge to position their offerings as components of larger smart, connected systems. Partnerships will often be necessary to fill product gaps or connect products to leading platforms. Salespeople will need to be trained to sell with those partners, and incentives will need to accommodate more-complex revenue-sharing models.

AFTER-SALE SERVICE. For manufacturers of long-lived products, such as industrial equipment, after-sale service can represent significant revenues and profits—partly because traditional service delivery is inherently inefficient. Technicians often must inspect a product to identify the reason for a failure and the parts needed to correct it and then make a second trip to perform the repair. Smart, connected products improve service and efficiency and enable a fundamental shift from reactive service to preventive, proactive, and remote service:

- **One-stop service**. Because technicians can diagnose problems remotely, they can have the parts needed for repairs in their trucks the first time they arrive at the customer site. They can also have supporting information for executing the repairs. Only one visit is necessary, and success rates rise.
- **Remote service.** Smart, connected products make delivering service via connectivity increasingly feasible. In many cases products can be repaired by remote technicians in the same way that computers are now often fixed.
- **Preventive service**. Using predictive analytics, organizations can anticipate problems in smart, connected products and take action.
- **Augmented-reality-supported service.** The vast amounts of data that smart, connected products gather are creating new ways for service personnel to work individually, together, and with customers. One emerging approach utilizes the augmented reality overlays we described earlier. When these include information about a product's service needs and step-by-step repair instructions, service efficiency and effectiveness can increase dramatically.
- **New services.** The data, connectivity, and analytics available through smart, connected products are expanding the traditional role of the service function and creating new offerings. Indeed, the service organization has become a major source of business innovation in manufacturing, driving increased revenue and profit through new value-added services such as extended warranties and comparative benchmarking across a customer's equipment, fleet, or industry.

SECURITY. Smart, connected products are widely distributed, exposed, and hard to protect with physical measures. Because the products themselves often have limited processing power, they cannot support modern security hardware and software. Smart, connected products share some familiar vulnerabilities with IT in general (e.g DoS) but these products have major new points of vulnerability, and the impact of intrusions can be more severe. Hackers can take control of a product or tap into the sensitive data that moves between it, the manufacturer, and the customer. So a firm's ability to provide security is becoming a key source of value—and a potential differentiator. Customers with extraordinary security needs, such as the military and defense organizations, may demand special services. Security will affect multiple functions. Clearly the IT function will continue to play a central role in identifying and implementing best practices for data and network security. And the need to embed security in product design is crucial. Risk models must consider threats across all potential points of access: the device, the network to which it is connected, and the product cloud. New risk-mitigation techniques are emerging. Security can also be enhanced by giving customers or users the ability to control when data is transmitted to the cloud and what type of data the manufacturer can collect. Overall, knowledge and best practices for security in a smart, connected world are rapidly evolving. Data privacy and the fair exchange of value for data are also increasingly important to customers. Creating data policies and communicating them to customers is becoming a central concern of legal, marketing, sales and service, and other departments. In addition to addressing customers' privacy concerns, data policies must reflect ever-stricter government regulations and transparently define the type of data collected and how it will be used internally and by third parties.

HUMAN RESOURCES. A manufacturer of smart, connected products is a cross between a software company and a traditional product company. This mix demands new skills across the value chain, as well as new working styles and cultural norms.

- **New expertise**. The skills needed to design, sell, and service smart, connected products are in high demand but short supply. Shift from mechanical engineering to software engineering, from selling products to selling services, and from repairing products to managing product uptime, need for data analysts.
- **New cultures**. Manufacturing smart, connected products requires far more coordination across functions and involves integrating staff with varied work styles and from more-diverse backgrounds and cultures—which can be challenging.
- **New compensation models**. Manufacturers will also need new approaches to attracting and motivating talent. Perks like job flexibility, concierge services, sabbaticals, and free time to work on side projects of personal interest are the norm in high-tech firms.

Implications for Organizational Structure

While incorporating software, the cloud, and data analytics, manufacturing firms must continue to design, produce, and support complex physical products. Every organizational structure must combine two basic elements: differentiation and integration. Smart, connected products have a major impact on both differentiation and integration in manufacturing. In the classic structure, a manufacturing business is divided into functional autonomous units (R&D, manufacturing, logistics, sales…), integration happens largely through the business unit leadership team and through the design of formal processes for product development, supply chain management, order processing, and the like, in which multiple units have roles. With the emergence of smart, connected products, intense, ongoing coordination becomes necessary across multiple functions, including design, operations, sales, service, and IT. On top of this, manufacturers must keep producing and supporting conventional products. The continued coexistence of the new and the old will complicate organizational structures. Organizational structures are in rapid flux, and a number of important shifts are becoming evident:

- **Collaboration between IT and R&D**: IT hardware and software are now embedded in products and in the entire technology stack and only IT currently has the skills to support the software-based technologies so cooperation with R&D is needed for the development of smart, connected products. Some companies are embedding IT teams within R&D departments. Others are establishing cross-functional product design teams that include IT representation while maintaining separate reporting lines.
- **A unified data organization:** to get the most out of the new data resources, many companies are creating dedicated data groups that consolidate data collection, aggregation, and analytics, and are responsible for making data and insights available across all functions and business units.
- **Dev-ops**: The dev-ops unit is responsible for managing and optimizing the ongoing performance of connected products after they have left the factory. It brings together software-engineering experts from the traditional product-development organization with staff members from IT, manufacturing, and service who are responsible for product operation. Dev-ops organizes and leads teams that shorten product-release cycles, manage product updates and patches, and deliver new services and enhancements postsale. It oversees the frequent release of small, carefully tested batches of product changes into the shared cloud, ideally with no disruption to existing products and users in the field.

- **Customer success management:** new organizational unit responsible for managing the customer experience and ensuring that customers get the most from the product. Crucial with smart, connected products, especially to ensure renewals in product-as-a-service models. This unit performs roles that traditional sales and service organizations are not equipped for and don't have incentives to adopt: monitoring product use and performance data to gauge the value customers capture and identifying ways to increase it. Through the data it generates, a product can tell companies a lot about the customer experience: about product use and performance, customer preferences, and customer satisfaction.
- **Shared responsibility for security:** The data organization, along with IT, will normally be responsible for securing product data. The R&D and dev-ops teams will take the lead on reducing vulnerabilities in the physical product.

Making the Transition

The organizational transformation described will be evolutionary, not revolutionary, and old and new structures will often need to operate in parallel. Given the scope of the changes, and the scarcity of skills and experience in smart, connected products, many companies will need to pursue hybrid or transitional structures. We are seeing three models emerging:

- **STAND-ALONE BUSINESS UNIT**: a separate new unit, with profit-and-loss responsibility, is put in charge of supporting the company's smart, connected products strategy. The unit aggregates the talent and mobilizes the technology and assets needed to bring such new offerings to market, working with all affected business units.
- **CENTER OF EXCELLENCE**: a separate corporate unit houses key expertise on smart, connected products. It does not have profit-and-loss responsibility but is a cost center that business units can tap.
- **CROSS-BUSINESS-UNIT STEERING COMMITTEE**: a committee of thought leaders across the various business units, who champion opportunities, share expertise, and facilitate collaboration. Such committees usually lack formal decision-making authority, which can limit their ability to drive change.

The Broader Implications

Smart, connected products are dramatically changing opportunities for value creation in the economy and the effects are not confined to manufacturing, however, but are spreading to other industries, including services. Smart, connected products are a chance to improve economies and society: sustainability, bettering the human condition, helping with everyday's tasks, and consuming less. The exponential opportunities for innovation presented by smart, connected products, together with the huge expansion of data they create about almost everything, will be a net generator of economic growth. These new types of products will not reduce our needs or the number of people required to meet them. Instead, new industries, new services, and new roles will be created that can allow more people to meet their aspirations.