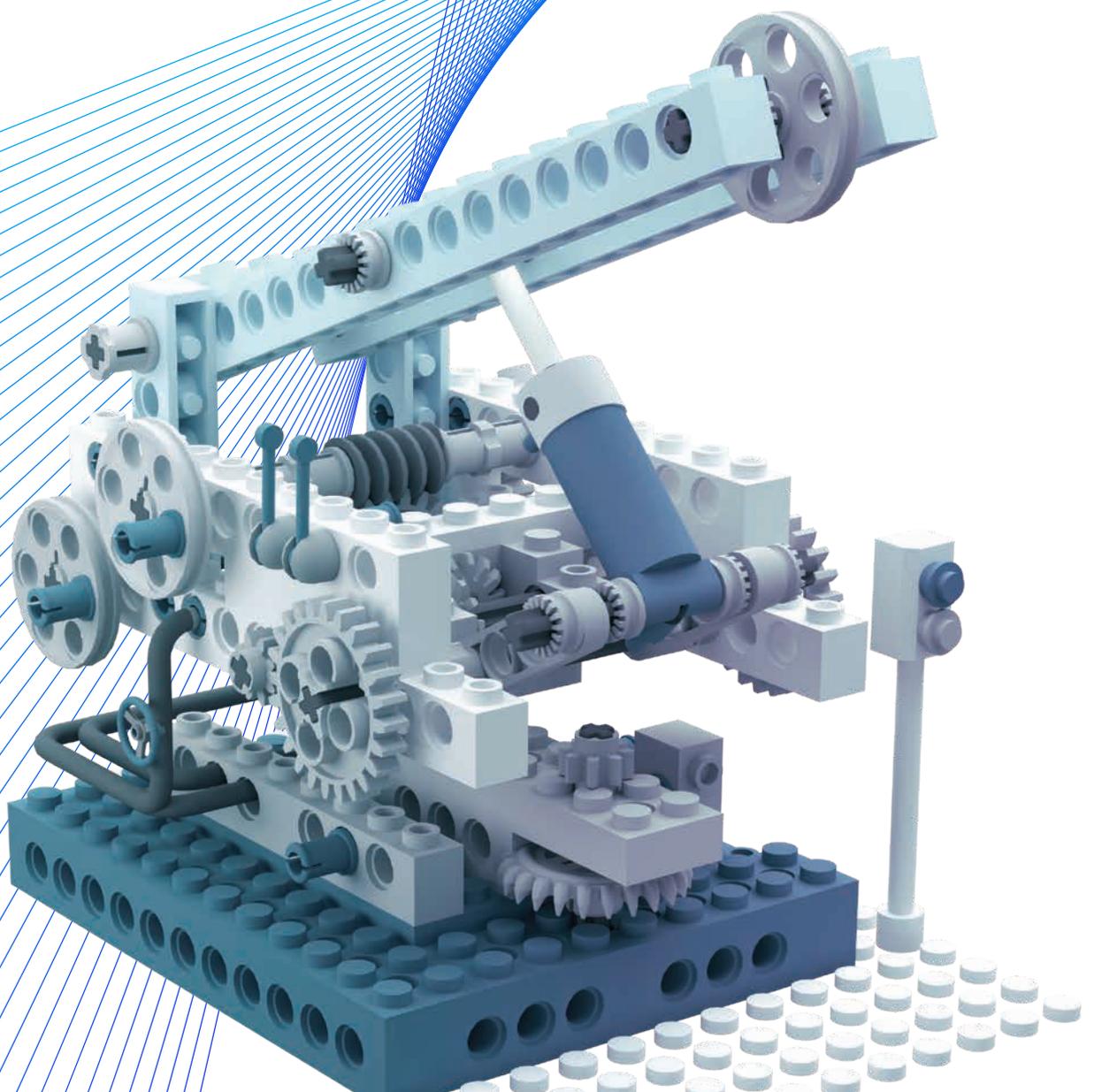# McKinsey & Company

Smart Platforms

Cracking the complexity challenge
of project industries

Content

Cracking the complexity challenge with smart platform strategies

Modular platform strategies – originally developed and used by high-volume automotive players – can drive value in complex, project-based industries as well.

Modularization excels in high-volume industries such as automotive, but does it offer tangible benefits for companies that tackle just a few, extremely complicated projects each year? The builders of steel plants, chemical plants, paper mills, wind parks, packaging lines or power plants fall into this category, completing a handful of highly specialized solutions every year that feature very specialized components. McKinsey & Company research affirms that, if done right, a modular platform strategy can deliver significant value quickly in these situations to fix the complexity challenge.

Dealing with four major challenges

In the reality of industries based on large projects, companies are typically faced with four key challenges:

Customization at low prices

Customers demand highly customized products, yet often decide primarily on price, which represents a challenge for both low-cost players and technology leaders.

Delays and cost overruns

Since every project is different, project delays, cost overruns, unstable technology, and quality issues often occur, primarily due to a lack of component reuse among projects.

Long payback time due to low volume

Portfolio investments do not pay off due to the absence of sufficient volume, little focus on a long-term perspective, and a lack of real innovation.

Flexibility between customer and supplier

Customers typically have requirements such as buildings and layouts, while component suppliers enforce their own standards. Project engineering companies end up as the flexible element in between, having to accommodate both.

In the absence of rigid product management systems, teams often develop new solutions based on prior projects. Consequently, each new project creates new variants on top of the last ones, making a well-structured product portfolio unachievable – and often includes costly customized "historical" features of previous customers, which the customer at hand does neither value nor pay for.

For these reasons, many project industry players find themselves stuck. The desire for customization drives costs, there is significant pressure to reduce spending, combined with firefighting to deal with delays and cost overruns, and long payback times for any investments into the portfolio – all this creates a vicious circle. Can modular platform strategies fix this complexity challenge, can companies monetize savings more quickly than usually, i.e., the typical three- to five-year time span?

20-30%

total direct cost saving potential

Overcoming skepticism

Many project industry leaders are skeptical of the benefits of platform strategies (Exhibit 1). For example, some argue that the approach is not possible due to high levels of customized complexity. However, experience shows that projects based on a modular architecture can apply up to 80 percent of standardized components.

Before companies can effectively manage large project complexity, they must understand what drives complexity in project industries. Examples include:

Customer specifications

Customer needs clearly drive variances in these organizations. In hydropower plants, for example, the height of the fall and the flow rate always remain given and are thus not up for discussion. However, this does not mean that projects must design everything completely from scratch. Discrete models of valves, parametric designs of rotors, and standard designs of lubrication systems can provide options that allow projects to react flexibly to customer wishes without reinventing the wheel.

A lack of complexity cost transparency

While material costs are often transparent, complexity-related costs typically remain murky. Consequently, engineers only have incentives to optimize material costs. In contrast, by optimizing complexity, they can attack total direct costs, including the effort needed to design additional variants for each new project or downstream costs in erection and commissioning. In many cases, it also positively effects indirect costs such as data administration.

Multiple engineering locations

Companies often have distributed engineering locations; a development caused by acquisitions and the consolidation of players, or by the existence of country-specific local departments. Such situations can lead to unnecessary complexity due to distributed project setups with several parallel designs for the same product.

Exhibit 1

Orthodoxies around standardization and modularization in project industries

No customer acceptance	Technically impossible	Major cultural challenge	Economically not worth it
"Customers do not accept standards – they require customized, cutting-edge technology"	"Standardization does not work because our projects are highly customized, complex, and need flexibility (e.g., more than 10,000 engineering hours)"	"Product standardization is contrary to our project- and engineering-driven culture (e.g., 3-year development time)"	"Potential benefits are low because repetition rate is low (e.g., only 2-3 projects p.a.)"

Reality

Using modular key components enables flexible reaction to customer needs – and makes implementing cutting-edge technology easier	Modular architecture allows customer-specific combination of standardized modules with up to 80% use of standardized components	Project business will always have a small share of customization	Main impact based on simplified engineering and robust machine concepts rather than from scale effects and volume bundling
Customers also appreciate short lead times, highly competitive costs, and a high quality level (tested concepts)	Different degrees of standardization from discrete modules to parametric design ensure flexibility	Nevertheless, it is indeed a cultural change combined with a change of business processes	20-30% cost savings and 30-50% delivery time reduction is possible/ achievable, even in project business

Benefiting from a smart platform strategy

With the smart platform strategy, players can address these challenges and achieve first substantial impact within three to five months. For example, they can capture a significant direct cost reduction by employing an optimized, market-driven design and a modular portfolio structure built on standardized components. This method can reduce engineering effort based on a high share of carry-over parts. Adopting a modular approach can cut project lead times by 30 to 50 percent by improving project quality, clarifying technical concepts, and boosting execution stability. It can also deliver shorter investment payback periods by making possible customized yet modularized solutions for customers via "repetitive" modules (Exhibit 2).
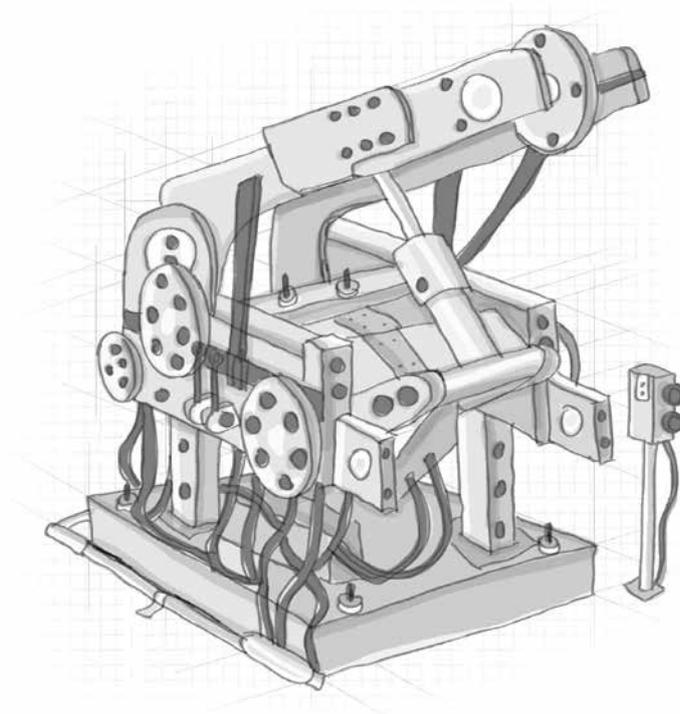
Companies can quickly experience the impact of a smart platform strategy and easily scale it up from a single module to the whole platform. Experience shows that it will not only deliver this immediate impact, but also enable a full set of further improvement initiatives. From product development, sales, purchasing, production, and transport through to erection — the paradigm shift from the opportunistic partial reuse of existing parts to the integrated planning of product platforms sets the foundation of structured improvements along the product hierarchy.

More and more organizations recognize the potential of modular platforms to streamline and optimize the project industry. Companies that begin this journey to create technical concepts that reflect these principles have a certain risk to run into a few major hurdles. First, many have trouble developing a technical modular concept suitable to their specific industry and needs. Second, having built the technical concept, companies sometimes struggle to implement smart platforms in their projects. Finally, organizations need to anchor the new way of working in the organization to guarantee it has sustainable impact beyond the initial push.

Exhibit 2
Smart platform strategy compared to typical situation in project industries

From fully customized solutions …

Starting point is the copy of an old reference machine

High number of options without clear customer benefit

Missing defined interfaces lead to high engineering effort

Firefighting to solve issues on customer sites

High uncertainty in project scope at contract signing

… to customized, yet modularized smart platforms

New offers are configured using ready-to-use building blocks

Projects tailored to customer needs with higher margins

Engineering focuses on innovation, rather than reinventing existing solutions

Efficient and stable processes based on proven modules

Basic design 100% clear at contract signing

The smart platform approach thus encompasses three crucial dimensions creating a competitive modular product portfolio, implementing it in current customer projects, and anchoring modularization in the organization (Exhibit 3).

Create a competitive modular product portfolio

Developing a competitive, modular platform based portfolio involves three elements that only unfold their potential when combined. First, modularize the product portfolio, which requires introducing clear product hierarchies and defining interfaces ensuring modules can be flexibly combined. Second, increase the use of standardized parts and components across products to achieve scale effects. Finally, use Design-to-Value methods to ensure modular systems and standardized parts are designed to be as competitive as possible.

Implement modular product portfolio live in current customer projects

Use an agile approach to implement optimization measures immediately in real sales projects both as a proof of concept and to create immediate impact. This will likely involve an in-depth analysis conducted together with project sales managers. At the same time, collect feedback from these project managers and use it to further optimize the smart platform portfolio.

Anchor smart platforms in the organization

To ensure lasting success, anchor the new modular architecture within the organization. This typically means embedding guidelines of the overall smart platform story to spur a culture change within the company. Furthermore, use clearly defined processes and responsibilities to describe how to handle and maintain

the improved portfolio – possibly in concert with organizational changes including capability building. Finally, create a set of defined key performance indicators (KPIs) as a basis for performance management.

To initiate the smart platform strategy, organizations first need to establish a baseline. How many variants of each component do we have in our portfolio? What is our most cost-effective solution? What drives the number of our solutions? Where do we see the highest potential to establish a modular system and where do we have to retain high flexibility? Various aids exist that can help here, including Portfolio X-Ray, a proprietary McKinsey & Company tool that cleans up direct cost spending by merging, categorizing, structuring, and enriching large amounts of product data. The tool identifies technical and commercial enablers for standardization and complexity reduction throughout the

Exhibit 3
Smart platform strategy based on three crucial dimensions

1. Modular, competitive portfolio

Standardization ... to optimize usage of identical parts

Modularization ... to create a modular system

Design-to-value ... to ensure cost-effective design

Continuous exchange between concept and live application in orders

2. Live implementation

Implement rapidly in running projects and new orders for
- Immediate impact
- Early proof of concept
- Improvement ideas for smart platform system

3. Organizational anchoring

Organizational structure	Processes	IT systems	Performance management	Mindsets and capabilities

entire product portfolio. Combining advanced analytics, text recognition, and machine learning, the software suite drastically increases the speed and scale of transparency in support of modularization.

Moreover, modularization supports the digitization of the entire organization. It can help companies handle the complexity of offering spare parts on an online platform while each customer has 100 percent customized solutions. In addition, modularization shows how to develop predictive maintenance logic across the vast variety levels inherent in customized individual projects.

Smart platform strategies not only work in industries with high volumes and standardized products, they can also deliver astonishing results in highly complex project industries. Understanding customer needs as well as what drives complexity in the product portfolio and within the organization provides a foundation for making portfolio and design decisions. The trade-offs thus made will lead to a real competitive advantage, for example, by reducing costs and lead times and freeing up capacity to focus on value-generating solutions.

"For us, a modular portfolio is the foundation for digital innovations like talking machines – this is simply not feasible if every project has a unique design."

Head of R&D

01

Laying the foundations with a modular, competitive portfolio

The very first step in making smart platform strategies work is to develop a modular, competitive portfolio, which requires an integrated approach combining modularization, standardization, and Design-to-Value.

How do modular systems in project engineering companies work, and which methodology should they choose to drive platform strategies? Which elements need come together to arrive at a truly competitive portfolio driven by customer needs?

McKinsey & Company outlines practical lessons and best practices based on the experience from various project engineering companies.

Hitting the portfolio target

The goal of the platform strategy approach is to minimize the time and resources needed to offer, develop, and deliver a product with a customized front end but standardized back end. First and foremost, smart platforms involve a whole new way of working in sales and engineering.

Configuring, not designing

By using configurations consisting of predefined building blocks for presentations, layouts, specifications, and commercial calculations, sales staff can quickly respond to customer inquiries. Doing so also ensures transparency regarding how special requests will influence price and lead time. High cost transparency enables sales people to negotiate more effectively while making sure they do not sell anything at prices below the target margin, and do not offer over-specified products that cannot compete regarding price. Since the configuration follows previously defined and cross-functionally aligned rules to link customer requirements to component variants, the basic design is 100 percent clear at contract signing (Exhibit 4).
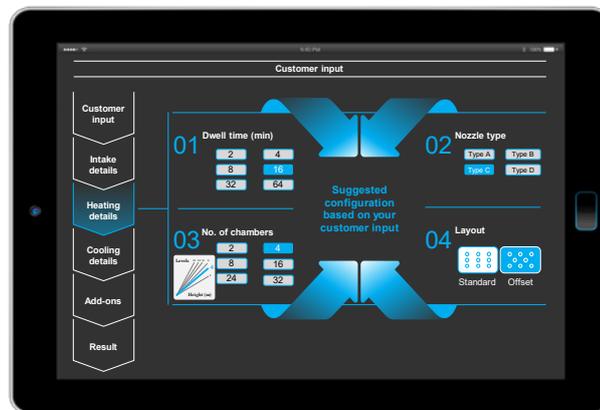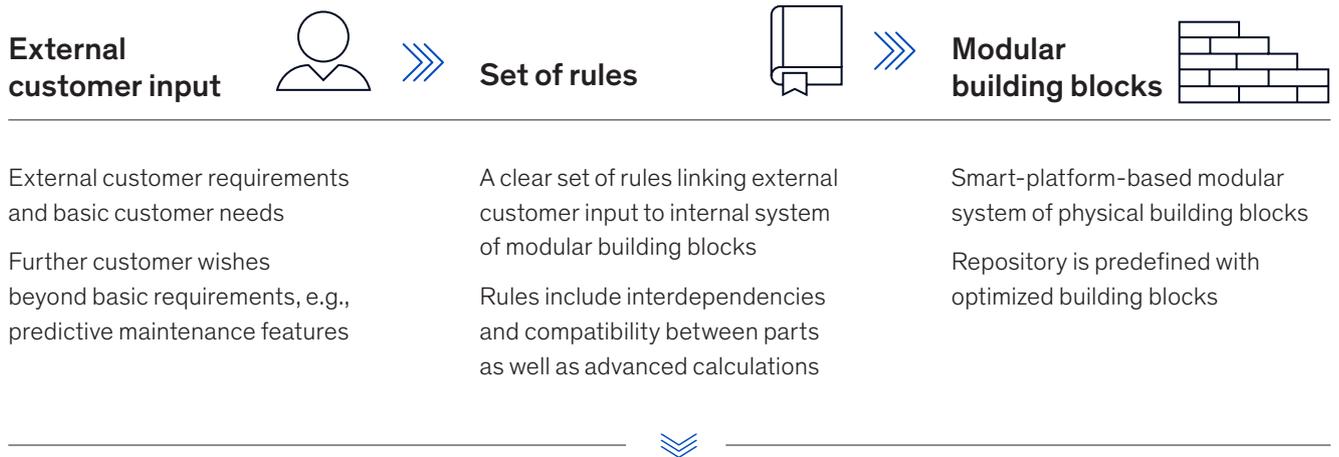
Proven modules instead of new designs

Engineers can take clearly defined, field-proven modules off the shelf, combining them flexibly in a master layout. Due to clearly defined interfaces, companies can purchase or manufacture these modules already while engineering works on other areas that require customization – or focus their efforts on project-neutral optimizations and innovations.

Benefits for project engineering companies and their customer alike

Smart platforms do not only provide benefits internally – customers will benefit greatly as well. Customers benefit from more reliable products based on field-proven modules. The cost transparency regarding add-ons and other features can enable them to adapt their specifications to tailor equipment costs according to their needs – and enable them to buy upgrades later. Beyond that, they benefit from predictable, stable processes and shorter, more reliable deadlines due to ready-to-use solutions. They also need to store fewer spare parts on-site if they can use the same component in several different machines. Furthermore, they will need less staff training when the principles and key modules are the same across products. And, since their equipment is based on widely used standards, they have a better chance to sell it as the opportunity arises.

Exhibit 4

Configuration connecting customer input to modular building blocks

External customer input

External customer requirements and basic customer needs

Further customer wishes beyond basic requirements, e.g., predictive maintenance features

Set of rules

A clear set of rules linking external customer input to internal system of modular building blocks

Rules include interdependencies and compatibility between parts as well as advanced calculations

Modular building blocks

Smart-platform-based modular system of physical building blocks

Repository is predefined with optimized building blocks

Products are configured, not individually designed for each new project

Creating a competitive portfolio

To create such a competitive portfolio based on a smart platform strategy, project engineering companies need to combine three elements that, like the three pieces of a puzzle, only unfold their true potential in conjunction: modularization, standardization, and Design-to-Value (Exhibit 5).

Modularization

Without modularization, there is no reuse, meaning that all efforts are not worthwhile. A modular platform is a set of interfaces, parts, components, modules, and subsystems that form a common structure from which a stream of derivative projects can be efficiently developed and produced. It comprises a common core that allows for controlled interchangeable adaptation. Specifically, this applies not only to mechanical parts, but electronics and software modules as well.

The goal is to create a customer-focused modular system that links customer input to modular building blocks, cross-functionally aligned and supported by ready-to-use documents.

Companies need to assemble a library of defined modules from which they can select appropriate solutions based on customer requirements for each project. The modular system needs to be cross-functionally aligned to ensure all the building blocks can be flexibly combined. It furthermore has to be optimized according to the experience of all functions. Each module should consist of up-to-date, ready-to-use documents, including sales documents with finalized specifications and drawings, as well as a documentation for the execution phase, which can include three-dimensional designs with all relevant details, for example.

Companies should define the modules in ways that enable them to serve most of the target market segments (typically about 80 percent) with the optimal number of variants to reduce the cost of complexity and at the same time product cost. This means that the modules must have standard interfaces, while the product itself has a master layout that can combine the modules in different combinations. The modular system should not aspire to meet very rare special requirements if they make it more complex and expensive than economically reasonable.
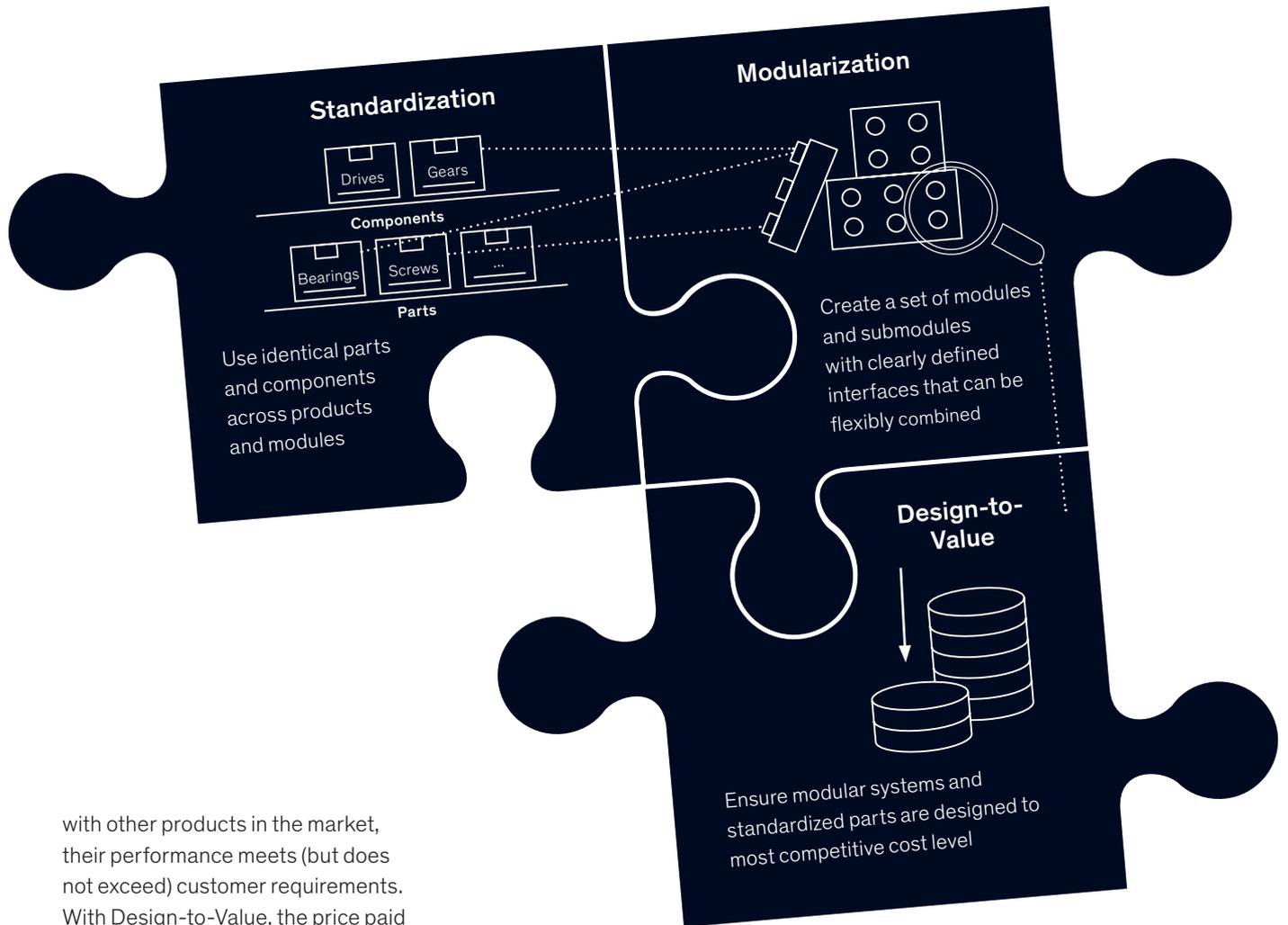
Standardization

Standardization enables companies to reuse identical parts and components. Each module should feature as many standard parts as possible – even across different products, product lines, and business units. It makes sense to define standard parts on a company level to minimize total cost (i.e., including efforts to source, store, and administrate different part numbers compared to their purchase price alone). Companies may have preferred suppliers in place that can deliver the standard parts at competitive prices. They should also consider using analytics tools such as Portfolio X-Ray by McKinsey to monitor and optimize the use of standard parts continuously as the portfolio evolves.

Design-to-Value

Methods from the Design-to-Value toolbox enable companies to optimize their products both technically and commercially, which becomes even more important since smart platform modules are continually reused. The product and its modules are competitive

Exhibit 5

Three pieces of a puzzle – modularization, standardization, Design-to-Value

Standardization

Drives Gears

Components

Bearings Screws ...

Parts

Use identical parts and components across products and modules

Modularization

Create a set of modules and submodules with clearly defined interfaces that can be flexibly combined

Design-to-Value

Ensure modular systems and standardized parts are designed to most competitive cost level

with other products in the market, their performance meets (but does not exceed) customer requirements. With Design-to-Value, the price paid to suppliers is close to the cost of the optimal manufacturing process, and the cost of products continually decreases due to a structured continuous improvement process. Companies can support work with analytics tools such as parametric should-costing (e.g., McKinsey Cleansheet Solution), digital benchmarking, and digital procurement.

In many cases, modularization is the first step to professionalizing areas beyond product development and engineering, such as purchasing and service. Consequently, modularization is the basis for increasing cost competitiveness in the entire organization.

Developing modular platforms systematically in seven steps

To create a competitive modularized portfolio in the project business, companies can follow these seven steps that have been field-proven and pressure-tested in various situations (Exhibit 6).

1. Module structure

Key question: how is the product portfolio structured into modules, submodules and components, what did they cost prior to the modularization effort?

The high-level structure of the module with submodules and clear boundaries as well as its interfaces with other modules are defined as a starting point. Beyond that, the total cost baseline for a module based on one or several completed projects needs to be determined serving as the basis for defining savings targets. Typically, this first step is prepared before the actual project start and cross-functionally aligned in the kickoff.

2. Existing variety

Key question: how many variants currently exist for the components of a module – prior to the modularization effort?

The second step involves creating an exhaustive, transparent picture of all currently offered variants, submodule by submodule. Thereby, defining the right level of granularity is key (e.g., the complete machine is too high-level or the valves might be too detailed). This ensures the complete portfolio is taken into consideration in the analysis – otherwise, it is very easy to "forget"

numerous variants. If these variants are not consciously included or excluded in the future system, there is a great danger of developing a modular system that is not in line with customer needs.

3. Variety drivers

Key question: what are the customer needs and how do they drive complexity – what share is internally induced?

To decrease complexity in the typically vast landscape of existing variants, the next step is to understand the market from a customer perspective by investigating customer needs and buying criteria as well as the respective trends involved. Companies should then derive customer requirements and translate them into product variety drivers. Especially in the project business, understanding and responding or reacting to customer needs is the key to success. As a result, companies should always link decisions to their impact on customers – and honestly challenge any internal variety drivers.

4. Future system

Key question: for every submodule, what is the optimal number of variants, and what are the most efficient step sizes to fulfill relevant customer requirements?

In a stable market environment, companies define the building blocks of the future modular system based on the existing variety list in conjunction with variety drivers. For every submodule, they eliminate obsolete variants, resulting in the minimum number of

variants necessary to fulfill relevant customer requirements. Companies can define variants not offered in the basic product, such as upgrades or add-ons, and offer them for additional charges. However, in a disruptive market environment, companies should not only focus on existing variety, but also include white spots in the market that they want to address.

5. Design-to-Value

Key question: how can companies position the platform at its cost optimum while meeting all relevant customer value requirements?

Methods from the Design-to-Value toolbox enable companies to optimize the modules from the future system both technically and commercially to ensure the modules that will be reused are designed to be as competitive as possible. This step needs to be carefully timed: if it takes place too early – before the future system is at least roughly in place – it becomes very difficult to optimize the high number of existing variants. If it is carried out too late, many decisions will already have been taken that prevent the Design-to-Value methods from unfolding their full potential.

6. Rules

Key question: how are customer input and requirements linked to the different variants of the modular system?

After having defined the variants (i.e., the building blocks) of the future modular system, companies need to establish rules that have a clear

logic for selecting variants based on customer input and the variety drivers. Organizations can implement these rules in a digital configurator where staff can easily configure modules and layouts based on customer input. Typically, rules are already partly established in the process of designing the future system – however, they need to be formally established for all variants. Rules, thereby, can be a simple direct link between a customer need and a component but they can be also complex calculations – but in both cases, they always lead to a clear link from customer input to the modular system.

7. Interfaces and master layout

Key question: how can we ensure that modules or submodules within the module fit together, independent of customer needs or design changes?

Defining the critical interfaces between modules ensures that variants of "neighbors" are compatible with each other and add-ons can be flexibly used. This, in turn, allows independent work focused on the development of different modules, submodules, and items.

The master layout allows the flexible exchange of any of the building blocks and is used as the starting point for every project – different master layouts may exist for different product lines. Predefined master layouts also ensure that overarching topics, such as safety concepts and piping concepts, do not have to be reinvented for every project.
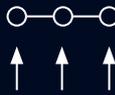
Exhibit 6
Systematic process to a competitive portfolio

1. Module structure

Define high-level module structure with submodules and associated cost baseline

2. Existing variety

Detail module structure and assess all internal variants that are currently part of the offering (often based on past projects)

3. Variety drivers

Identify external customer input and requirements that drive existing internal variety

4. Future system

Define optimized, modular building blocks of the future smart platform offering while removing overlaps and niche variants with low take rates

5. Design-to-Value

Optimize the future system of modular building blocks maximizing value along customer needs as well as minimizing costs with both technical and commercial levers

6. Rules

Define a clear set of rules linking external customer input to internal system of modular building blocks including advanced calculations

7. Interfaces and master layout

Define key interfaces and design master layouts that allow to exchange building blocks flexibly

Ensuring success in creating competitive portfolios based on smart platforms

Experience suggests that several factors are crucial in making the process of creating modular, smart platforms a success.

Work in waves and prioritize modules based on expected financial impact

To design a competitive portfolio with limited resources, launch the rollout in consecutive waves, starting with prioritized high-impact modules.

Take decisions based on financial rationale

All decisions within the project should reflect facts and financial quantification. Companies need to adopt an 80/20 mindset in early project phases, permitting some level of inaccuracy and iterations. It is not important to quantify everything to the last percentage point, but to generate a rough sizing to prioritize and make decisions regarding the allocation of resources.
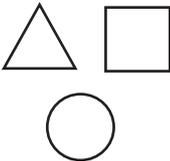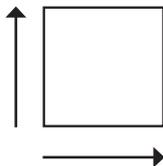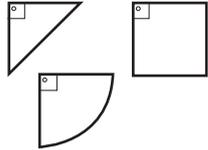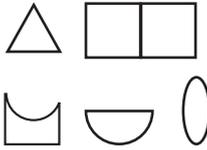
Practitioners must differentiate complexity

They must reduce internal complexity as far as possible, while external complexity should address customer needs (but only if doing so increases value).

Complexity reduction represents a grey area

In between full customization and focus on a single variant, several options allow projects to find the optimal complexity levels for the given situation (Exhibit 7).

Exhibit 7
Degrees of standardization between identical and customized design

Standardization degree				
Identical design	**Discrete variants**	**Parametric design**	**Standard concepts**	**Customized design**
Identical module for all clients	Module chosen from a set of 2 or more possibilities	Module scaled by 1 or more parameters	Customized module, but with standard concepts	Module designed according to client specifications

Examples				
Integration between frame and sides by attachment fitted on both sides	2-tape solutions for the roof – either sandwich or corrugated bodywork on trusses	Make the width of the frame varying, depending on the width of the central profile and 2 sides	Design guide of the front guide framework – e.g., straight tube struts, simple prototypes	Specific pavilion crossbar depending on interface with the door opening, door mechanism, tape

Define only the concept, carry out detail engineering later with the first customer project

Define the concept, principles, and guidelines of the modular system in this phase and make sure the platforms cross-functionally aligned. The detail design should be done alongside the next order, which minimizes up-front engineering costs.

Use a field-and-forum approach

To apply the methodology in practice and to ensure the effective use of resources, a field-and-forum approach is suitable. In weekly workshops (forums), the team applies the respective steps of the methodology in practice; team members receive task assignments and the overall team agrees on the next steps. In between the weekly workshops (fieldwork), the team splits up and works separately on clearly defined and assigned tasks.

Rigorous tracking and clear governance

A rigorous indicator tracking system should accompany the methodology, along with clearly defined governance policies with assigned roles and competences, and a defined meeting cascade and decision processes.

Involve the organization

This is not a pure engineering effort – developing effective modular platforms requires the input of multiple functions, especially sales, procurement, manufacturing, product controlling, etc. All of them have a very active role from the very beginning.

Project companies can overcome many complexity-driven challenges by developing smart product platforms. The industry's customer-centered focus makes it possible to create a broad portfolio of platform-based solutions. Developing smart platforms with benefits for the entire organization in mind (not just engineering) is essential for setting off on the right track. Creating a competitive portfolio requires the three elements modularization, standardization, and Design-to-Value, that only unfold their potential when combined. And while cracking the complexity challenge is certainly difficult, following a systematic seven-step process has proven to make smart platform strategies successful.

"For us, a modular portfolio is the foundation for digital innovations like talking machines – this is simply not feasible if every project has a unique design."

CEO

02

Accelerating smart platform payback with live implementation

Rapidly implementing smart platform strategies in real projects ensures they can be quickly monetized while serving as an early proof of concept.

Even with the best technical concepts and a competitive portfolio on paper, many companies struggle to implement smart platforms in their projects. How can they achieve impact within months, even if a typical project takes years? And how do smart platforms affect the process from offer to order and pricing? McKinsey & Company research shows several key aspects required to cut this "Gordian knot."

Overcoming typical slow payback pitfalls

Attempts to implement a smart platform strategy can get bogged down in several ways. For example, implementation typically only starts when the entire modular platform is ready, which can take years. And with few success stories available to "prove" that the approach works, momentum can easily stall. What's more, a lack of feedback loops involving the sales department and the market itself can make it extremely difficult to improve concepts iteratively.

Consequently, companies often fall back on theoretically optimized "ivory tower" solutions that fail to meet market needs and thus do not result in the desired impact. In addition, the inability to achieve tangible results at an early stage could cause companies to lose confidence in the process of designing a modular, smart platform.

Implementing live at an early stage of the development process

Rapid, live implementation is crucial in project industries at an early stage of the process of developing smart platforms – more so than in most other sectors. It focuses on three specific goals (Exhibit 8):

Immediate impact

Achieve immediate effects on the profit and loss statement (P&L) despite a typical project duration of two to three years.

Proof of concept

Demonstrate that the smart platform approach drives real, tangible impact, and not only from a technical point of view: early success stories can play a major role in change management by boosting confidence in the entire organization.

Improvement ideas

Collect feedback from sales project managers to optimize the smart platforms, thus ensuring optimization in terms of market needs.

Depending on the status of ongoing projects and offers, companies might elect to use different methods. For all new projects, companies should systematically make smart platforms available from the very start of the offer phase. For projects and offers in the sales phase prior to contract signing, cross-functional reviews can bring as many platform elements as possible into these projects. For example, by meeting in a focused, one-day format, cross-project teams can have an immediate impact through quick wins

as well as by generating additional cost saving ideas.

For running projects in the execution phase after the contract signing, project conventions are an effective format for reviewing the concept end-to-end. Project conventions typically focus not only on technical topics, but also on process aspects, for example, to ensure on-time deliveries. They use a one-week format structured into several deep dives. One key element is the daily presentation of ideas to management, which makes immediate decisions on implementation.
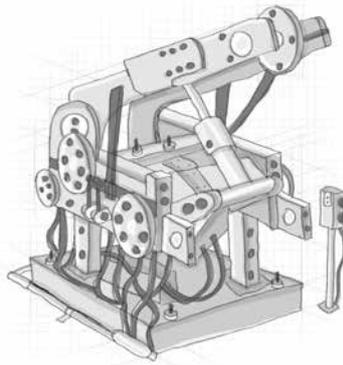
While live implementation is key at an early stage even if smart platforms are not fully integrated into the organization just yet, there are three more actions required to implement smart platforms effectively:

1. Creating a lean modular sales portfolio

2. Establishing intelligent pricing

3. Driving a modular execution process

Exhibit 8
Live implementation rapidly in customer projects

Fully customized based on references

New offers are customized based on a copy of an old reference machine

Live implementation in running projects

Review projects for opportunities to implement measures early

- Immediate P&L impact already during project phase
- Early proof of concept to create buy-in from the organization
- Improvement ideas for smart platforms identified during implementation

Smart platforms fully implemented

New offers are configured predominantly using modular smart platforms

1. Creating a lean modular sales portfolio

Achieving an effective modular portfolio for sales requires adhering strictly to modular principles, defining a clear, unique selling proposition, and using lean scoping to maximize margins.

Adhering strictly to modular principles

Modularity is a key element of smart platforms; particularly in the process of developing smart platforms, it is crucial to strictly adhere to modular principles. Companies should set targets so that customer projects use at least 80 percent modules. Furthermore, they should base budget offers entirely on existing modular building blocks that significantly reduce time (e.g., by under a week) and effort.

Enforcing adherence can be facilitated by reversing the burden of proof: nonmodular offers follow a nonstandard request process that requires explicit management approval, including decisions on whether they should design the customized solution as part of the modular system in the future.
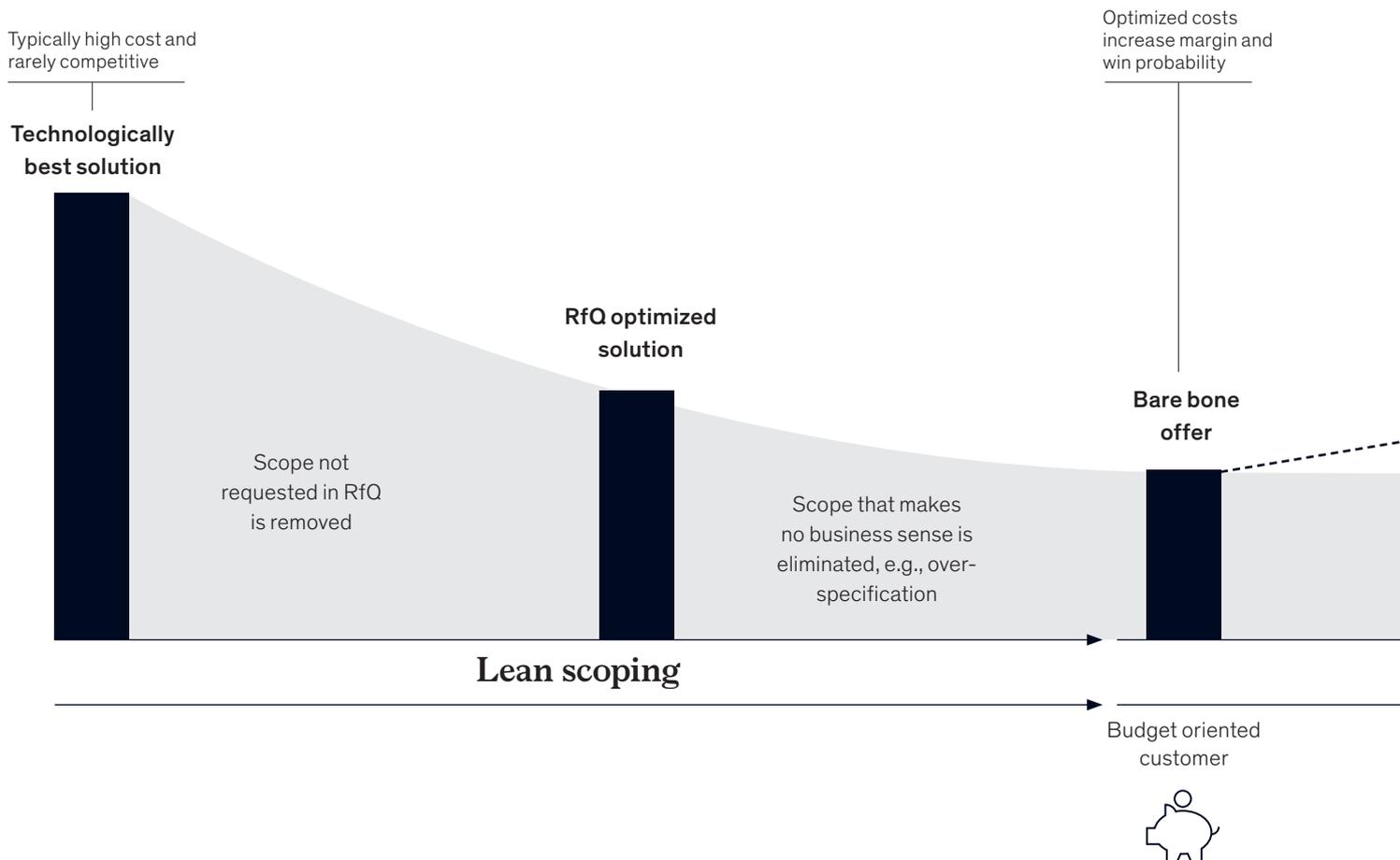
Defining a clear, unique selling proposition

Having a unique selling proposition will be key to communicate the value of the modular portfolio to customers. The modular system's value proposition must be transparent to customers based on unique, clearly documented selling points (USPs). Compared to projects developed from scratch, smart

platforms offer significant advantages as far as communicating USPs to customers. Companies must tailor a platform's customer strategy to target markets and channels depending on their specific needs, using the full breadth of the modular system.

Technology-oriented customers receive a solid fact base that features clearly articulated performance parameters of predefined building blocks as well as transparent cost implications on different potential choices. Medium-to low-budget customers can benefit from a cost-effective basic platform configuration, possibly opening new markets for them.

Exhibit 9

Lean scoping and intelligent, modular pricing to optimize margins during the offer process

Typically high cost and rarely competitive

Technologically best solution

RfQ optimized solution

Scope not requested in RfQ is removed

Optimized costs increase margin and win probability

Bare bone offer

Scope that makes no business sense is eliminated, e.g., over-specification

Lean scoping

Budget oriented customer

Likewise, outcome-oriented customers can select a basic bare bone configuration first and add other performance features depending on their needs (i.e., an upselling opportunity). In these situations, customer value becomes transparent by quantifying the modular offer's impact. For example, outcome-oriented clients especially like to understand how a specific add-on can increase net production time, so as to translate that impact into bottom-line profits.

Having unique selling points and a clear product positioning compared to the competition provides effective ways to justify prices and ensure the benefits of smart platforms are transparent to customers.

Using lean scoping to maximize margins

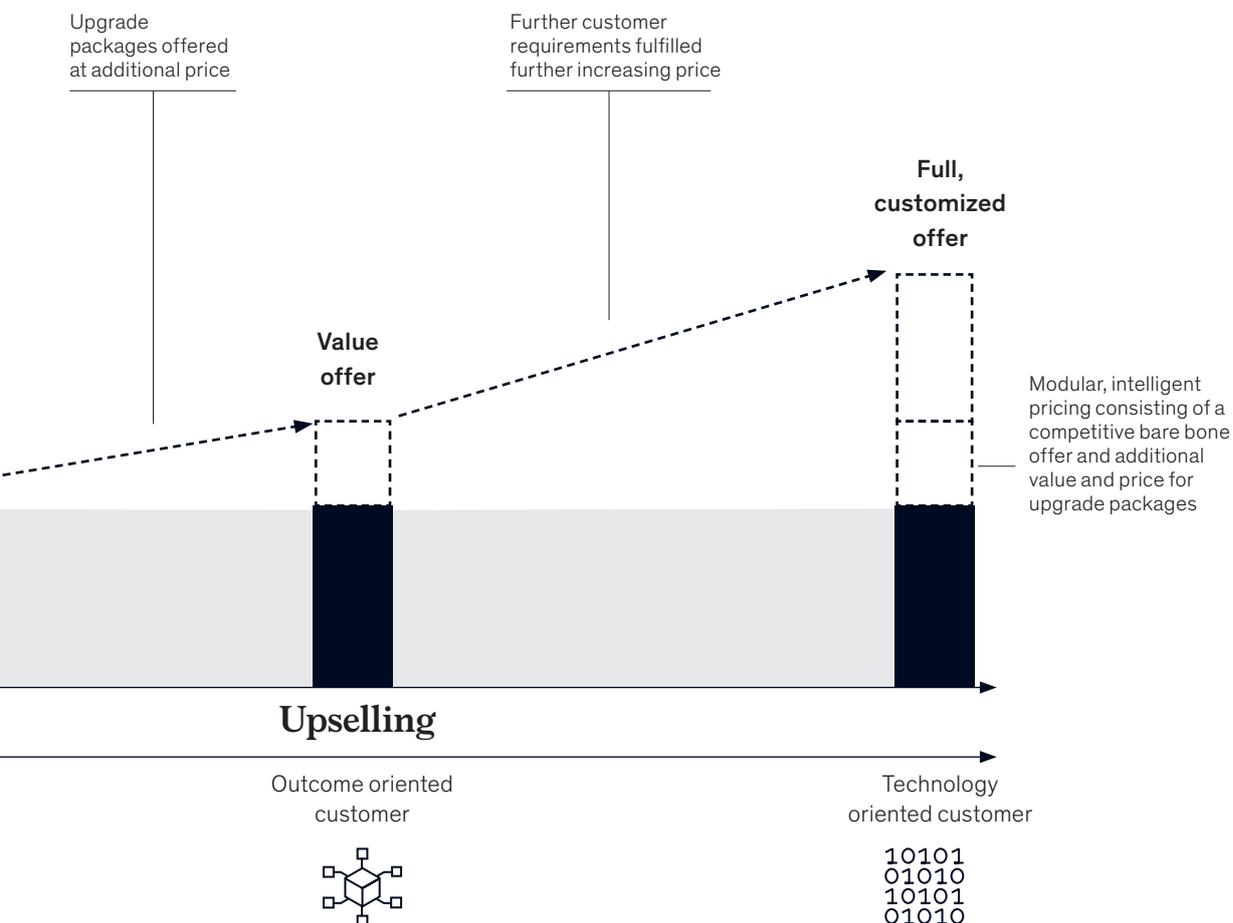Lean scoping offers significant opportunities for companies to achieve margin growth by optimizing project parameters before responding to a request for quotation (RfQ).

Over-scoping is a common pitfall in RfQs. In this case, the engineers of the project engineering company expand the scope until they arrive at a technologically optimal solution. Afterwards, all the potential changes and distinctive capabilities are priced, resulting in an uncompetitively high bid. Consequently, to win the RfQ, the company is often forced to offer major discounts, resulting in a high price but low margins.

Lean scoping optimizes the offer for the RfQ. It seeks to deliver the RfQ's minimum requirements, perhaps even breaching them, but without disqualification (Exhibit 9). The approach delivers a competitive bare bone price that should win the RfQ, while any upselling opportunities or subsequent scope changes are priced separately, resulting in both a competitive price and high margins. This way, lean scoping actively avoids loading the specifications with peak requirements, unnecessary features or cost-increasing step changes at the design limits.

Experience shows that lean scoping can provide 20 to 30 percent more gross profit compared to a fully scoped offer by focusing on the most valuable elements from the customer's perspective and simplifying the value story. It takes calculated risks to reduce the price and win the deal, and companies can use it as a last resort, increasing risk if no competitive offer is possible otherwise.

Upgrade packages offered at additional price

Further customer requirements fulfilled further increasing price

Full, customized offer

Value offer

Modular, intelligent pricing consisting of a competitive bare bone offer and additional value and price for upgrade packages

Upselling

Outcome oriented customer

Technology oriented customer

10101
01010
10101
01010

2. Establishing intelligent pricing

Intelligent pricing and markups translate the opportunities a modular structure offers based on a modular pricing structure combined with value pricing.

Developing a modular pricing structure

Add-ons help the project achieve full performance or take the form of enhancements, such as automation or digitization. This allows project engineering companies to address different customer segments according to their specific needs (Exhibit 9). One advantage of modules is that project engineering companies can precalculate prices. The extra price for options explicitly lays out all relevant cost drivers – not only for materials but also for erection, transport, and other expenses.

Smart platforms usually only offer customization or the inclusion of new developments under specific conditions, i.e., with top management approval for a new feature or the customer insisting and willingly paying for the additional complexity and risks. In such cases, the project engineering company prices to reflect high-risk provisions, and provides only limited performance guarantees. Companies can define some options as "strictly not offered" to exclude elements that,
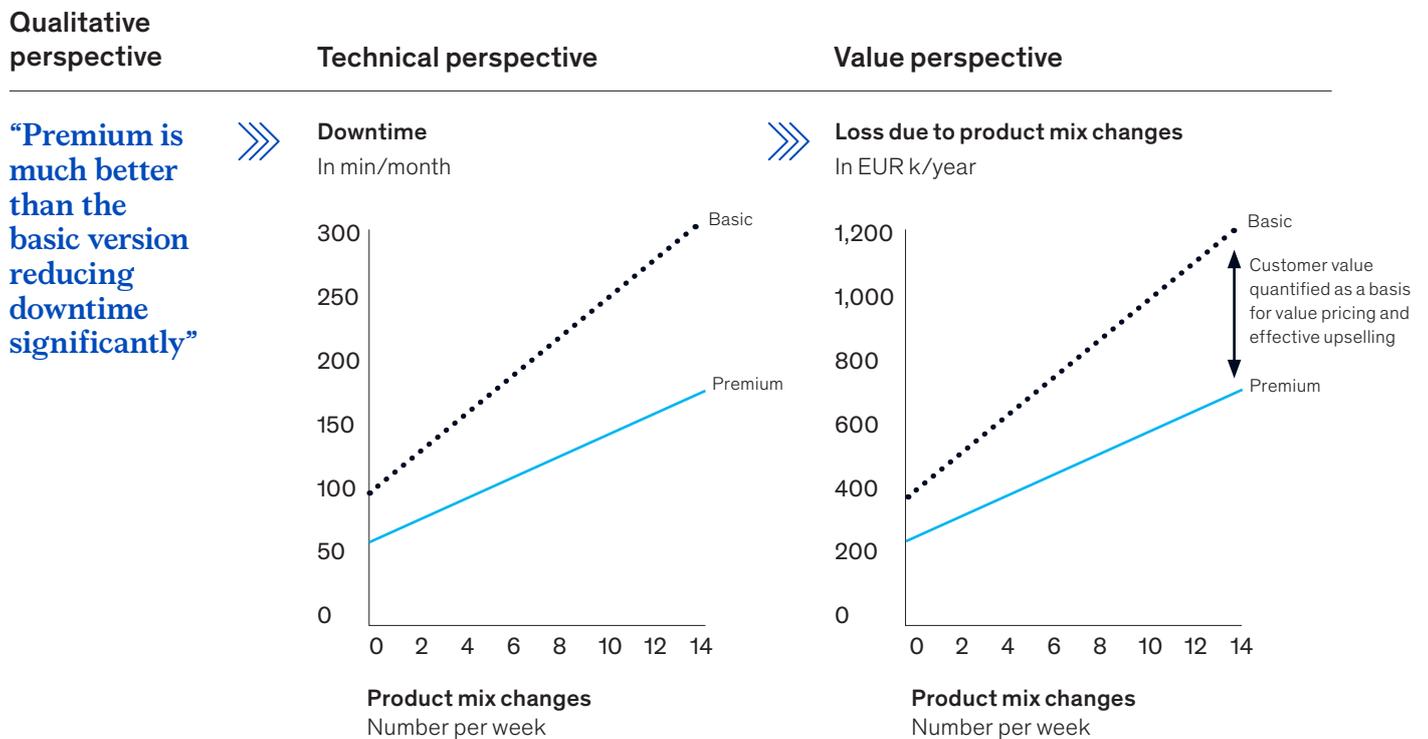
for example, might interfere with the modular platform strategy.

Companies should distribute their initial efforts at modularization over several projects to offer cost-competitive base prices from the beginning of negotiations, even if efforts to create modules are still underway.

Focusing on value pricing

Value pricing ensures companies price smart platforms to capture the maximum the customer is willing to pay, not just some random value derived from a simple cost-plus margin logic. Consequently, total direct costs (including complexity costs) represent

Exhibit 10
Value quantification as a basis for value pricing

Qualitative perspective

"Premium is much better than the basic version reducing downtime significantly"

Technical perspective

Downtime
In min/month

Basic

Premium

Product mix changes
Number per week

Value perspective

Loss due to product mix changes
In EUR k/year

Basic

Customer value quantified as a basis for value pricing and effective upselling

Premium

Product mix changes
Number per week

only the minimum price, while the actual asking price reflects the true customer value on offer (which also reflects competitor prices in the market).

Value pricing requires a quantitative perspective on customer value (Exhibit 10).

Moving from a purely qualitative perspective on features and differences between options to a technical quantification is the first step in creating a fact base. Essential, however, is to further quantify the business value from a customer's perspective behind the technical data to determine just the right price. Beyond pricing, quantifications are also very powerful in substantiating USPs as a fact-based way of customer communication.

One way to work with customers involves setting up a top deal team to challenge and support the sales team in defining these basic offers. Companies can provide upgrade packages based on the modular system that feature key customer benefits, such as options that can increase quality or reduce changeover times. Quantifying the value to the customer for each upgrade package allows makers to achieve appropriate pricing and pursue upselling opportunities more effectively. Value pricing becomes even more crucial with smart platforms since otherwise, there is a high danger of simply handing over all cost savings to customers when using traditional cost-plus pricing.

3. Driving a modular execution process

Executing the modular approach across all functions will make sure that the project engineering company infuses this way of working into the "DNA" of the entire organization. This approach also ensures the company reaps all the benefits smart platforms can provide. Usually, the primary focus is sales and engineering. Following sales and engineering, the other functions should also move toward smart platforms, adding initiatives beyond the platforms themselves, such as just-in-time delivery to the site. Such initiatives can reinforce and fully leverage a modular portfolio's strengths.

Sales

Sales should make sure that smart platforms are implemented from the very start in all projects. If companies do not sell projects based on the smart platform portfolio, they often find it difficult or impossible to change the nature of projects after signing the contract.

Engineering

Engineering reuses modular components, resulting in short lead times. It also creates additional neutral documentation alongside projects. It is important for a stable execution process to finish cross-functional alignment during smart platform development and before signing for each project – not to start from scratch in the engineering phase.

R&D

Research and development managers can use the freed-up resources to improve existing modules (based on feedback from all stakeholders mentioned above) and streamline the modular system to reduce non-value-adding variants and cover attractive new segments. Furthermore, they have to ensure that new technologies fit into the modular architecture, so that they can be easily applied.

Purchasing

On a component level, purchasing works mostly on replicating standard parts, and thus becomes more efficient in its processes. Sourcing can start directly at the time of contract signing, as drawings and specifications of most parts are available off the shelf, with frame contracts in place to reduce lead times and cost. Purchasing then ensures the holistic optimization of components, considering total direct costs and lead times (e.g., taking logistic costs and times into consideration).

Manufacturing

The manufacturing function will benefit from learning effects based on the repeated use of modular parts, with pretesting done as far as possible. Experience with repetitive parts allows to cut down on lead times and costs. In logistics, the repeated use of components and established suppliers can enable stable processes and just-in-time delivery to the plant site.

Assembly and commissioning

During the assembly of modules, standardized and proven interfaces will require less rework and troubleshooting on the construction site, since everything "fits together" well. Experienced staff can ensure a seamless project erection sequence based on the reuse of modules. This minimizes labor costs and cuts downtime and other plant level disruptions, which are typically very expensive. Firms can also accelerate commissioning via their experience with modules, using pretested components and avoiding creating solutions on the customer site (e.g., using modular, proven software).

Service

As the service personnel use standard modules, they are already familiar with the components due to work with other customers. This reduces the time spent per task and thus again eliminates labor costs and downtime. In addition, the lead times of service parts will increase due to lower levels of variety. The company feeds its experience and pain points back into the improvement of standard modules by R&D. Furthermore, service can exploit upselling potential based on predefined add-ons or upgrades and provide feedback regarding field experiences.

But how to achieve real savings within a customer project? Does the cost of my customer project increase by applying the modular architecture?

Modularization and standardization will reduce the costs of complexity along the entire value chain, either through scale effects or reduced investments per part number; a difference driven largely by the nature of a specific industry. For example, scale effects typically lead to a cost reduction of 4-7 percent every time the volume doubles in manufacturing or purchasing. Material cost reductions often take the form of volume rebates from existing suppliers and the use of a broader range of supplier choices.

4-7%

cost reduction potential in manufacturing and purchasing every time the volume doubles

Manufacturing sees cost benefits from moving to larger batch sizes that require less setup time, and enhanced overall equipment effectiveness. Interplant logistics improve with the use of better shipment routes and less complicated supply chains (e.g., the "supermarket" system instead of just in time). Companies can attack inventory bloat by enforcing less variability and faster shelf turnaround of inventoried items, and by keeping less safety stock on hand.

Organizations can also significantly reduce their investments per part number. For example, in R&D, they should work to reduce one-time investments per part number, while also focusing on recurring R&D efforts in areas such as quality, drawing updates, and serial administration. They can also strive to improve their Design-to-Value efforts. Other areas, from purchasing to tooling, can also benefit from the smart platform's ability to reduce both one-time and recurring costs. Beyond these areas, project engineering companies should also focus on testing certification, striving for more consistent reuse of proven solutions, easier homologation, and faster global deployment. Reducing or eliminating nonstandard cost via improved product quality and the reduction of penalties due to late deliveries, for example, can also generate solid savings.

Most project industry players can improve their performance by developing competitive portfolios based on smart platforms, but success will require systematic implementation. With that in mind, companies must implement lean scoping, intelligent pricing, and modular execution across all functions to achieve success. The live implementation of modular concepts in real sales projects and offers is crucial, particularly during the early project phase of smart platform development. Doing so will enable organizations to achieve immediate P&L impact and proof of concept. What's more, collecting feedback from sales project managers will help the company optimize the smart platforms.

"The first time we presented our new concept to a customer, he was totally excited: a thought-out concept instead of starting with an old reference was very convincing."

Sales manager

03

Successfully anchoring smart platform strategies in the organization

To ensure lasting sustainable impact, smart platforms need to be integrated into the organization's day-to-day operations.

Anchoring smart platform strategies in daily work throughout the entire organization will help ensure sustainable impact. An adapted organizational structure with clear owners, efficient processes and IT systems, and an actively used performance management system with KPIs are as important as the right mindset and capabilities. McKinsey & Company research outlines the key elements required to achieve sustainable impact.

Weighing a five-pronged anchor

As most companies in project industries are engineering-driven, they do not always focus on the organizational aspects of initiatives. Nevertheless, at least five elements are crucial for effectively anchor smart platforms in the organization and in daily work:

1. Organizational structures support the application and further development of the smart platforms.

2. Processes ensure the application of smart platforms becomes completely embedded in daily work.

3. IT systems integrate smart platforms into all relevant workflows.

4. Performance management ensures progress and effectiveness of all efforts regarding smart platforms.

5. Mindsets and capabilities are a crucial element beyond formalized structures.

Exhibit 11:
Smart platform lead and module owners in action

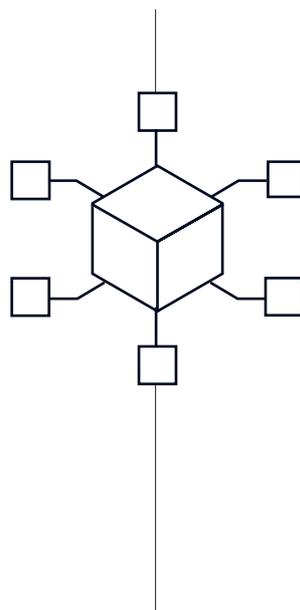**Neutral, project independent work to optimize the portfolio**

Smart modular platform

Project related work from offer to order and order to execution

Module owners optimize and maintain their modules

Smart platform lead drives smart platform strategy across the entire portfolio

Sales managers and engineers configure customized solutions using ready-to-use modules

1. Creating suitable organizational structures

Organizational structures that can sustainably drive smart platforms can take various shapes and forms – from strong product management departments to individual drivers in different functional areas. However, the key ingredient is usually clear ownership. One effective, field-proven setup consists of a single central smart platform lead working with several module owners for each application integrated into the organization (Exhibit 11).
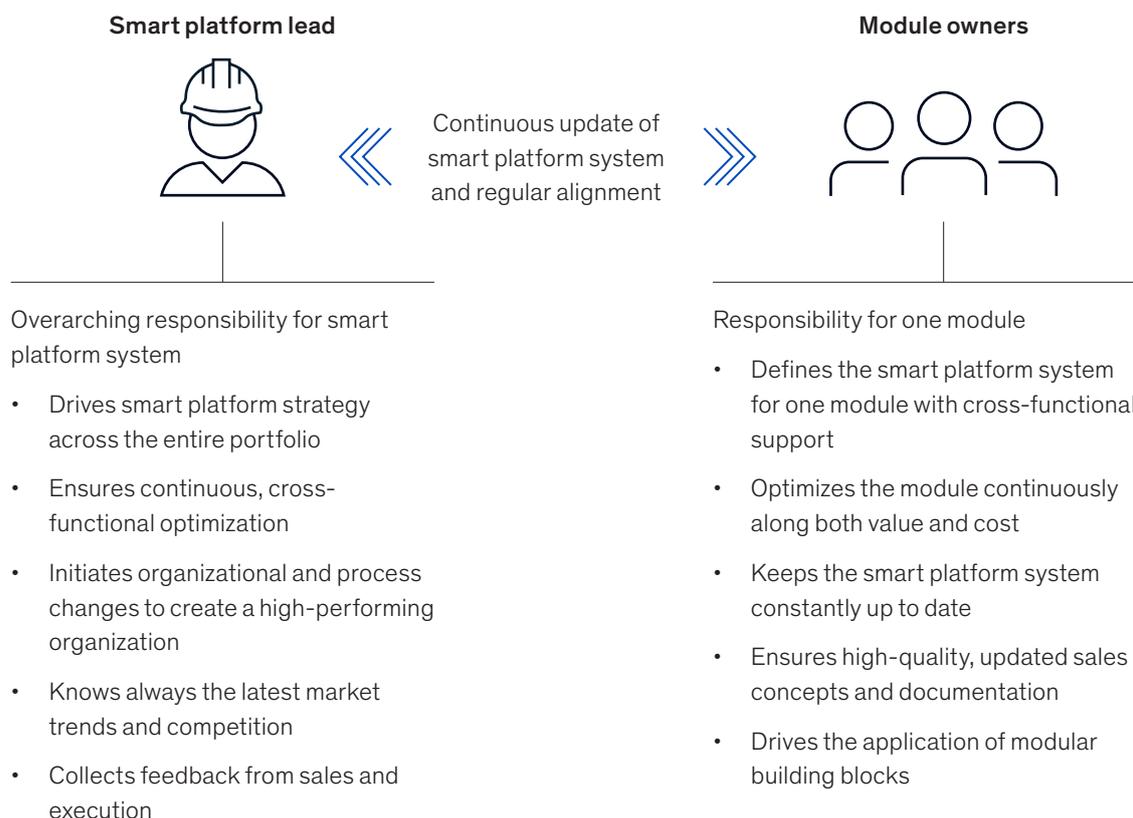
The smart platform lead takes overarching responsibility for the module, and thus serves as the central owner of smart platforms, focusing varying levels of dedicated capacity on this role (for example, more than 50 percent of his time in the short term, and perhaps 20 to 30 percent in the longer term). This attention is critical

to drive progress across all modules. Companies might consider integrating this role into the product management department. Typical responsibilities include driving the modularization of the entire portfolio, ensuring cross-functional optimization, and proposing process and organizational changes. These leaders also research market trends and the competitive landscape to understand the company's strengths and weaknesses, collect feedback from customers and module crews, and ultimately train the organization and new colleagues (Exhibit 12).

The company assigns one responsible owner per module, who drives progress for the respective module with some degree of dedicated capacity. Companies can also integrate these roles into the product management department, or simply distribute them across the

organization. Typical responsibilities include maintaining the modular system, optimizing it cross-functionally, particularly as far as shareable innovations go, and researching market trends and the competitive landscape. They also collect feedback and take the lead in driving the module's application in large projects. Companies do not have to appoint module owners right away, but in many cases, it is beneficial to name module project leaders with the prospect in mind of eventually making them module owners.

Exhibit 12

Responsibilities in organizational structures adapted to smart platforms

Smart platform lead

Continuous update of smart platform system and regular alignment

Module owners

Overarching responsibility for smart platform system

- Drives smart platform strategy across the entire portfolio
- Ensures continuous, cross-functional optimization
- Initiates organizational and process changes to create a high-performing organization
- Knows always the latest market trends and competition
- Collects feedback from sales and execution

Responsibility for one module

- Defines the smart platform system for one module with cross-functional support
- Optimizes the module continuously along both value and cost
- Keeps the smart platform system constantly up to date
- Ensures high-quality, updated sales concepts and documentation
- Drives the application of modular building blocks

2. Infusing processes end-to-end

Companies must adapt relevant processes to include smart platforms end-to-end from sales to execution, including project-independent processes, to ensure the modular system remains up to date.

Sales process

Players need to embed modularization in the sales process, from first sales contacts to deal signing. They should formalize this process using quality gates and IT systems, including regular KPI tracking and escalation paths.

As soon as a company decides to bid for a project, the applicability of smart platforms should be aligned in a very first, cross-functional quality gate to determine the use of the modular system, explain and defend deviations, and draft the offer strategy in line with the customer type. The key to success involves reversing the burden of proof: participants need to explain and defend any deviations from offering smart platforms, and have management approve them, not the other way around.

Top management should review the results from these initial quality gates on a frequent basis, e.g., biweekly to monthly, to ensure most projects are in line with the smart platform strategy. Overall, the organization systematically needs to track KPIs such as the percentage of module use in all quality gates to uncover deviations from the modular strategy at all stages of the process.

Execution processes

Companies should aspire to integrate modularization seamlessly, from deal signing to the end of order handling, formalized via quality gates and IT systems. Processes should include regular KPI tracking, predetermined escalation paths, and robust feedback loops, such as documenting and syndicating the lessons learned after commissioning.

Module maintenance processes

Project organizations need to set up module maintenance processes, including continuous improvement activities. Doing so will keep the modular system up to date by including a cross-functional release and feedback process. The company should keep neutral versions of sales documents up to date for three to five strategically selected high-runners based on the highest take rates. It should also create sales documents for nonprioritized products that are in line with those of up-to-date prioritized products (Exhibit 13).

In most project industries, companies should not worry about creating and keeping neutral versions of execution documents up to date, as this typically is neither practical nor worthwhile.
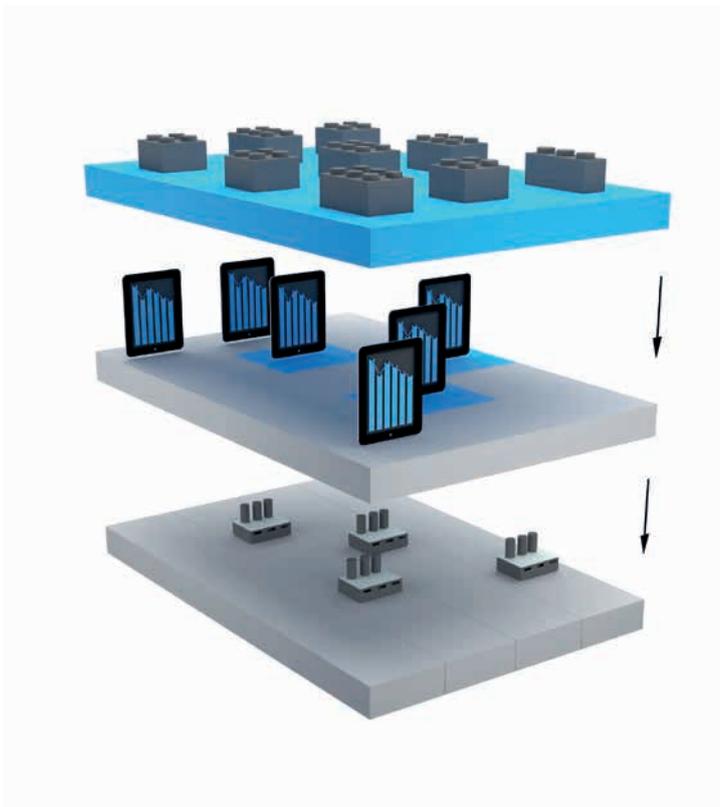
Portfolio review

Companies should regularly conduct higher-level reviews of the product portfolio, comparing it with customer segments and benchmarking it against competitors. During these reviews, participants challenge less profitable niche solutions, assess white spots in the market, and integrate new developments and innovations based on customer needs. Portfolio conferences are one way to formalize these reviews (Exhibit 14). A portfolio conference typically takes place annually for one to two days. The sales team, the smart platform lead, and the module owners review the entire portfolio, based on latest market trends and needs.

Exhibit 13

Module maintenance approach in three levels of granularity

Smart, modular platform system of building blocks covers 100% of the offering on a high level

More granular sales documents are predefined and constantly updated for a few high-running variants only – rarer variants are derived from up-to-date high-runners (not outdated older projects)

Detailed execution documents are created based on the sales concept with existing execution documents used as a starting point – execution documents are not maintained

Exhibit 14

A 1- to 2-day portfolio conference facilitates the definition of a strategy for markets, customers, channels and portfolio

Market focus

Where do we want to attack?

Define customer segments and agree on how to address them

Define the overall strategy regarding markets in focus

Agree on forecast and overarching priorities for products

Monitor competition moves and focus

Portfolio focus

What do we need to succeed in these markets?

Review entire portfolio including changes, adaptions, discontinuations, etc.

Identify white spots in the portfolio

Systematically capture feedback from the markets

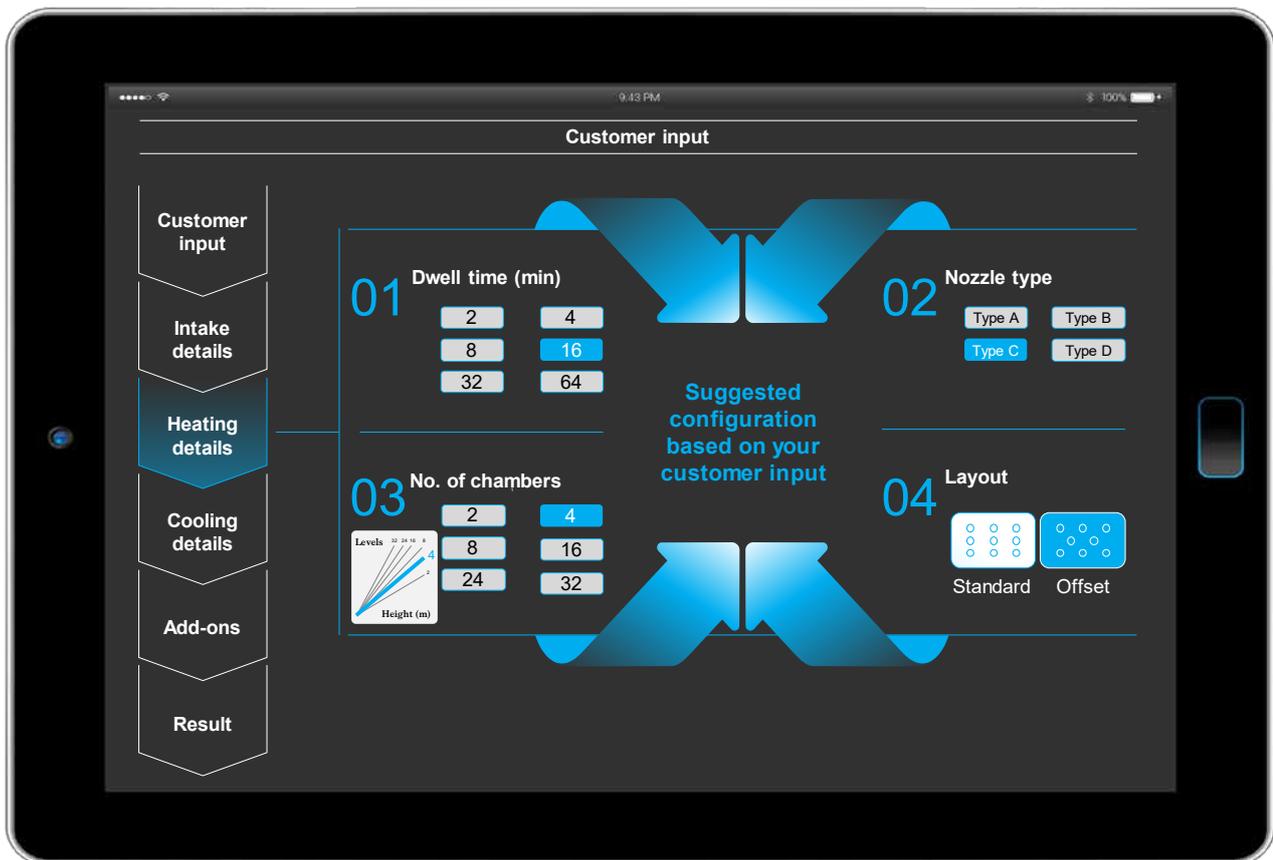Decide necessary changes to portfolio

3. Integrating via IT systems

IT systems often require some adjustments to manage workflows adapted to smart platforms – particularly configurators that ideally integrate into sales document creation systems. For example, companies provide offers using a guided configurator based on the smart platform library (Exhibit 15). The configurator links customer input to modular building blocks based on a clear set of rules. Typically, configurators are used by experienced sales staff and not intended for direct customer interaction, unlike in high-volume industries.

Companies create sales documents automatically by means of the configurator based on a central library, thus ensuring the consistency of

drawings, bills of materials, and other critical documentation. Organizations can use a variety of different "Configure Price Quote" software solutions available in the market to combine these workflows.

Beyond that, material master data management becomes more and more important, as component information is not only used for a single project but for multiple modular projects, spare part online Web shops, or digital twins. This is typically a significant hurdle for organizations that treated data as a necessary evil in the past.

Exhibit 15
Guided configurators for sales

4. Managing using performance management

Performance management provides a basis for systematic performance dialogs to ensure progress and impact, and to define necessary actions. A KPI dashboard creates a fact-based overview of the current situation. Ideally, KPIs span four areas: financial impact, competitive portfolio, implementation in projects, and anchoring in the organization. Combining leading and lagging KPIs allows the company to track historical performance reliably and to react at an early stage, for example, if progress begins to stall. Complementing quantitative KPIs with some qualitative indicators can help organizations grasp factors not easily put into numbers.

Companies should not use KPIs only as a reporting tool; they should also factor in performance dialogs that define actions to improve and optimize the current situation effectively. Performance dialogs should therefore definitely play a complementary role to regular KPI reporting.

"The biggest change for us was not the technical concept, but how we work together – a restructured, much more potent sales organization, an adapted execution process, much more emphasis on optimizing our products, and many more aspects of smart platforms reflected in our day-to-day work."

Smart platform lead

5. Ensuring the right mindsets and capabilities

An organization's collective mindset and capabilities are critical to success beyond formalized structures such as processes and IT systems. Elements of this approach include guidelines, mindsets, incentives, and capabilities.

Guidelines

Organizations should regularly and visibly communicate a clear modularization story and guidelines that are in line with the company's smart platform strategy. Several overarching guidelines make sense. For example, make sure the smart platforms include clearly defined building blocks and rules; they represent the foundation for success and are therefore untouchable. Always base offers on existing building blocks (both technical and documental), and get management approval for all deviations from these standards. Spend time on convincing customers of the benefits of the modular plants, and always base offers on a bare bone configuration while pricing additional features separately. Develop and maintain the module catalog cross-functionally, and update it regularly with the latest knowledge. Make documents for design and sales readily available, as they help simplify work.

Mindsets

Smart platforms should be on the top of the management agenda; an integral part of the organization's mindset. The organization should support mindset changes through strong communication campaigns, and hold module days for every completed module to promote the new setup in the organization. It should train the sales employees in using the modular system and ensure capabilities are in place.

Incentives

Companies should make sure there are incentives to drive modularization (monetary incentives as well as, e.g., "modularization medals"). Successful companies frequently apply a carrot-and-stick approach: they incentivize the use of the modular platform (e.g., lower project costs, preferred project with prioritized access to bottleneck resources) while punishing deviations from the smart platform approach (e.g., extra charge for offering customized solutions beyond the platform or for introducing an additional variant).

Capabilities

Successful firms ensure smart platforms are well-codified in documents (strategy, guidelines, rules, etc.), and that they regularly assess and train toward eliminating capability gaps. Beyond that, they use train-the-trainer concepts, and ensure they have successively infused knowledge throughout the organization, starting with just a few experienced people.

Companies tie all the above elements together to change mindsets and capabilities via communication. They should celebrate successes early, often, and explicitly. Structuring projects around pilot modules as "lighthouses", for example, can ensure first achievements that pave the way in the hearts and minds of the organization if communicated systematically. Even in fact-driven companies, communication needs to involve the organization emotionally and address potentially underlying factors, such as unspoken fears.

Sustainable impact requires companies to anchor smart platform strategies in daily work throughout the entire organization. However, it makes sense to tailor the anchored activities to each company's culture. While leveraging learnings from other companies is certainly helpful, there is no "one-size-fits-all" solution. Companies can employ some elements of anchoring, such as communication regarding mindsets and capabilities, at a very early stage. They should only implement new processes and responsibilities once they have established smart platforms for at least part of the portfolio. Otherwise, actions to anchor the system can deliver counterproductive results, as many may fail to see the value of smart platforms. Furthermore, it is worth keeping in mind that smart platforms are a fundamentally new approach for many companies in project industries and that it can take years to confirm their successful integration into the organization.

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