



Combining SAFe Value Streams and TM Forum Models at Deutsche Telekom

MECHANISMS FOR OPTIMISING ORGANISATIONAL STRUCTURE
TO ENHANCE FLOW

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ABSTRACT

The organizational architecture model (eTOM) is integrated with the SAFe Value Stream and ART identification workshop. We explain how this works and how the problems of poor communication between different business and IT departments, unclear accountability and other impediments to business agility are reduced by this approach.

INTRODUCTION

In this paper we combine the concepts of value streams according to SAFe and a standard organizational architecture model (eTOM) with basics of the TM Forum's enterprise architecture – Open Digital Architecture (ODA) – model to propose an approach for organizational collaboration in Deutsche Telekom.

BACKGROUND

SAFE

SAFe is a set of organization and workflow patterns intended to guide enterprises in scaling lean and agile practices. Some of the key concepts are described here.

In SAFe, agile teams are grouped together in so-called ARTs, comprising typically 5 -12 agile teams. There are mechanisms for further scaling called large solutions. The ARTs align in a regular cadence of around 10 -12 weeks (called a Planning Interval) in a big room planning meeting called a PIP. Here the direction for the coming interval, the key requirements and dependencies are discussed and planned.

Value Streams represent the series of steps that an organization uses to implement Solutions that provide a continuous flow of value to a customer.

SAFe identifies two types of value stream, Operational Value Stream (OVS) and Development Value Stream (DVS)

Operational Value Stream (OVS) is the sequence of activities needed to deliver a product or service to a customer. Examples include manufacturing a product, fulfilling an order, admitting and treating a medical patient, providing a loan, or delivering a professional service.

A typical OVS is described from the perspective of a customer and may include steps such as receive information, order product, receive product, pay for product, use product etc. and is usually described similarly to what is shown in figure 1.

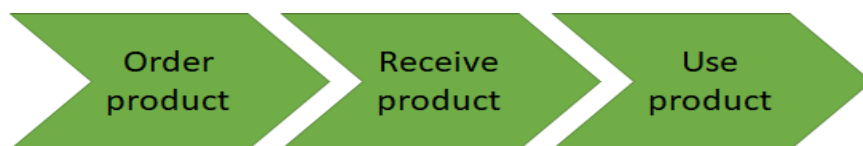


Figure 1: A typical extract from part of an Operational Value Stream (OVS)

For most of this document, we will limit our focus to the two value stream steps “Order product” and “Receive product”.

Development Value Stream (DVS) are the sequence of activities needed to convert a business hypothesis into a technology-enabled solution. Examples include designing a medical device or geophysical satellite, or developing and deploying a software application, SaaS system, or an e-commerce web site.

The DVSs provide, enhance and maintain the systems and services that enable the OVS. A DVS starts with an idea for an enhancement (e.g. introduction of a new product-line to a portfolio) and goes through the design, development, test, release and maintenance of that solution.



Figure 2: A typical example of a Development Value Stream (DVS)

Agile Release Train (ART). To quickly get from the generate idea phase through to release and maintenance of a product, cross-functional teams are created which have the competence to handle all phases of a DVS lifecycle. When the teams become too large for a single agile team, multiple teams are grouped into so-called “Agile Release Trains” or ARTs. The ART is a long-lived team of Agile teams, which, along with other stakeholders, incrementally develops, delivers, and – where applicable – operates one or more solutions in a value stream.

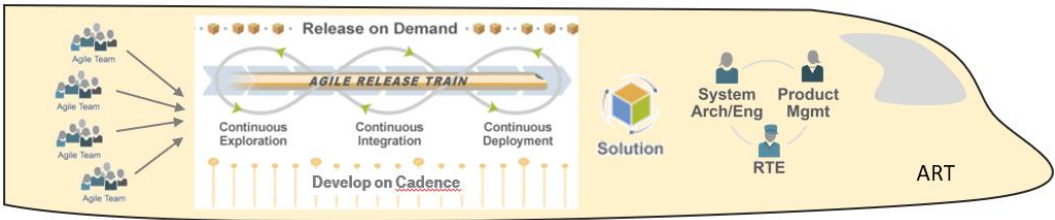


Figure 3: The SAFe Agile Release Train (ART)

There are various critical roles in the ART such as Business Owner (BO), Release Train Engineer (RTE) Product Manager (PM) etc. In SAFe, the PM for example is the person or group within an ART who is responsible for providing and maintaining the product or solution provided to the customers of that ART, be they internal or external customers. The PM may need to balance the needs of multiple customers to enable the most value for those customers and ultimately the organization.

For more details on SAFe, see <https://www.scaledagileframework.com/>

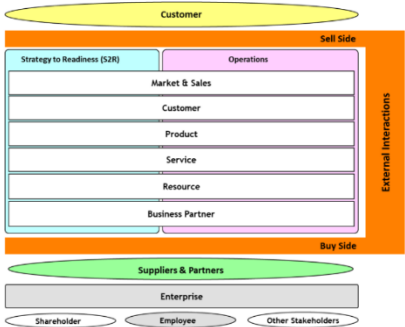
TELEMANAGEMENT FORUM

TM Forum is an alliance of over 850 IT and communications service providers (CSPs) and their suppliers striving to digitally transform and thrive in the digital era. They do this by defining open processes, frameworks and models enabling CSPs and suppliers to rapidly transform their business operations, IT systems and ecosystems.

Domains

The TM Forum segregates all their frameworks, models and components into so called domains. These domains give an indication about possible line organizational responsibilities of functions and processes. The domains which are used in all Frameworks are:

- Market & Sales
- Customer
- Product
- Service



- Resource
- Business Partner
- Enterprise

Figure 4: TM Forum Domains

In addition to these domains, there are the common, integration and cross domains. These are listed in other frameworks such as the application or functional frameworks. Each of the domains shall be able to independently act with its own processes, inventories and IT to be able to improve their services along the lifecycle.

For more details of the TM Forum model, please check here.

<https://www.tmforum.org/resources/reference/gb991-tm-forums-core-concepts-and-principles-v22-0-0/>

eTOM

The Business Process Framework eTOM (enhanced Telecom Operations Map), defined by the TM Forum is a comprehensive, industry-agreed, multi-layered view of the key business functions required to run an efficient and agile digital enterprise.

eTOM categorizes all the business activities that a service provider could use in a structured manner that allows these to be addressed at various levels of detail. The processes are defined in a matrix, grouped horizontally by domains (e.g. marketing domain) and vertically by context (e.g. strategy management) as shown in the figure below.

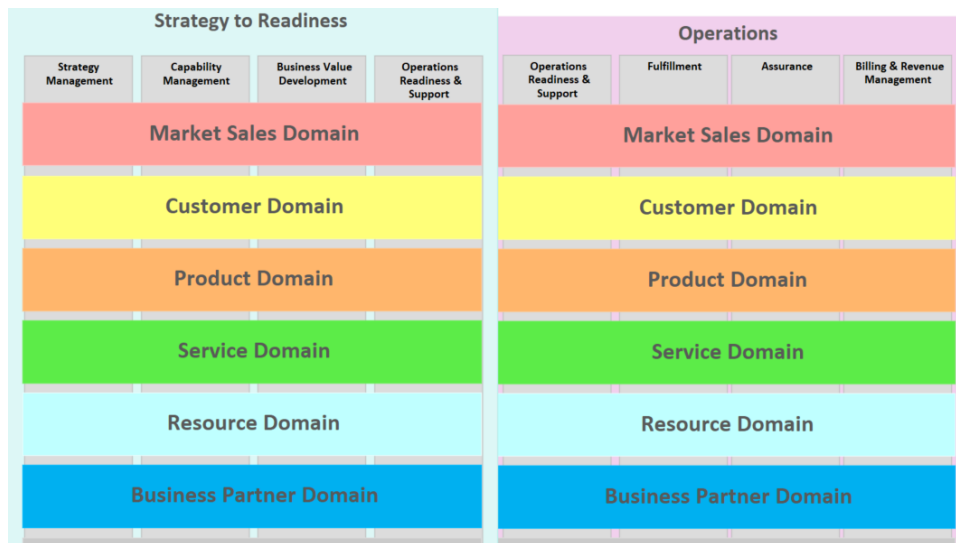


Figure 5: High level overview of the eTOM Model showing the horizontal domains extended with the vertical contexts

eTOM defines **Business Process Modules** (for the purpose of this document, shortened to **Modules**) organized to the domain/context matrix described in the previous section. Realizing and combining the appropriate Modules across the various domains creates **E2E Business Flows**.

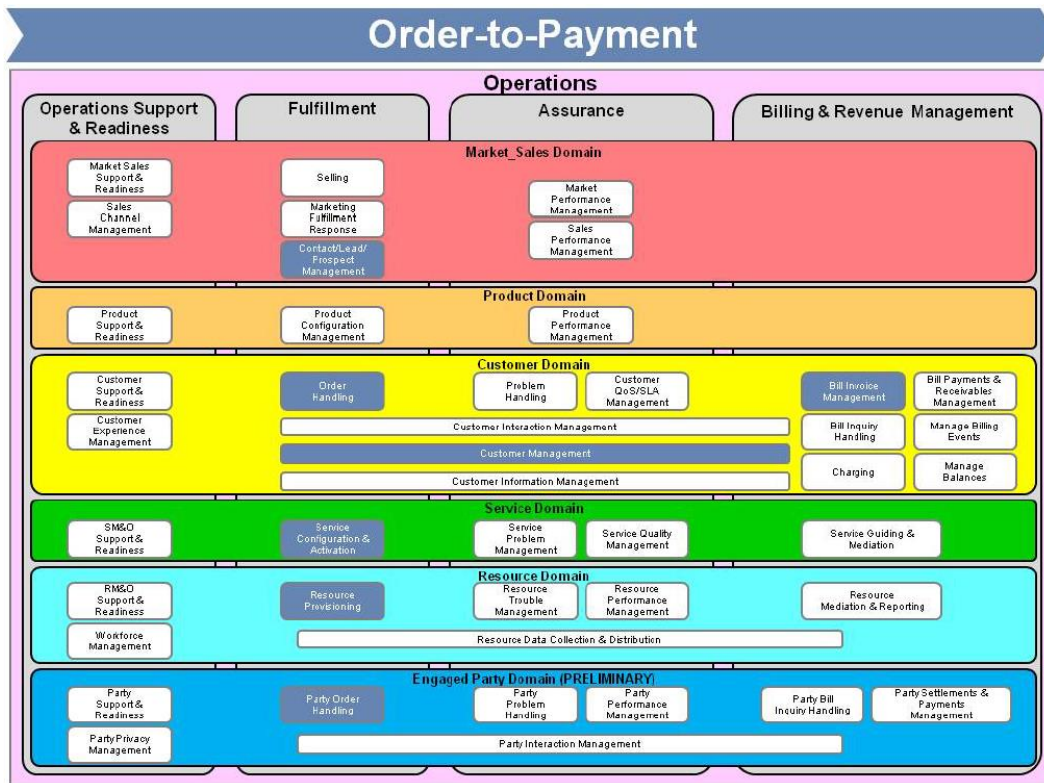


Figure 6: Example: E2E business flow Order-to-Payment - Extract of Modules on eTOM Level 2.

For more details on the E2E business flows, please check here.

<https://www.tmforum.org/resources/standard/gb921e-end-to-end-business-flows-v20-0/>

The defined Modules in eTOM are described from a business perspective and focus on the global business outcome (either directly or indirectly). They do not differentiate between value created with or without IT support. They are used to describe processual Services from a global perspective and can encompass knowledge, workforce and IT.

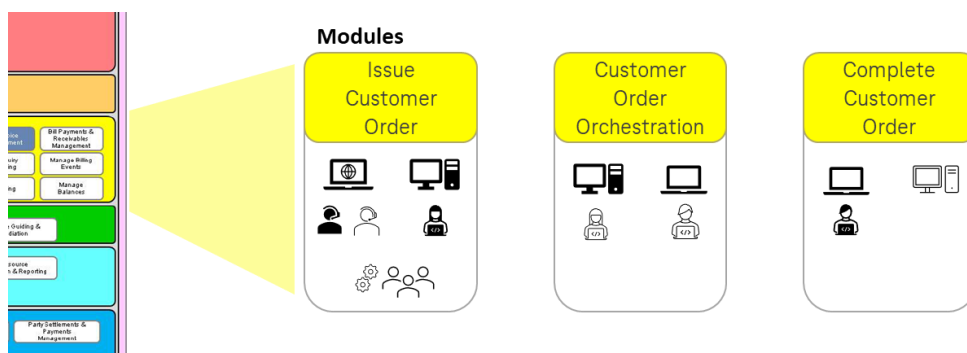


Figure 7: Three example Modules in the customer domain. Each contain both the business activities and the associated IT systems

TAM (Application Framework)

The Application Framework of TM Forum (TAM) describes IT capabilities which can be used to support the business processes directly with functions and workflows or indirectly by providing mechanisms to store and modify core data in inventories which are relevant for the business (for example customer details). These **Core Data Services** in most cases are required by multiple Modules used in various independent Operational Value Streams.

COMBINING THE SAFE VALUE STREAM AND TM FORUM MODELS

The SAFE model focuses on customer needs in the OVS and the corresponding development structures in the DVS on a generic level. The TM Forum models define the domains and Modules which enable us to create a concrete procedural development organizational structure tuned to specific business needs.

To maximize reusability of Modules while managing the complexity of the value streams we combine the SAFE value stream view with TM Forum's eTOM Framework. This is detailed in this section.

MAPPING OF ETOM MODULES TO OPERATIONAL VALUE STREAMS

Value stream steps can be realized by one or a combination of eTOM Modules. For example, the value step "Order Product" could be realized by the Modules "Issue Customer Order" and "Customer Order Orchestration", the step "Receive Product" by the steps "Customer Order Orchestration" and "Complete Customer Order". A single Module may also support multiple value steps (in this case "Customer Order Orchestration").

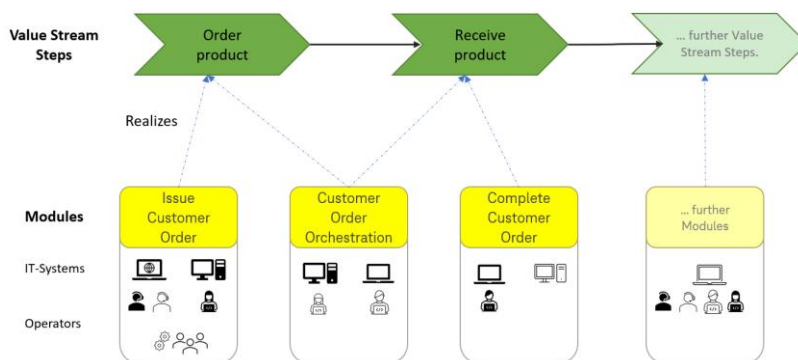


Figure 8: Example mapping between Value Stream steps and eTOM Modules

OPERATIONAL VALUE-STREAM NETWORKS (OVN)

In practice, the behavior and interactions of the enterprise with the customer cannot be described in a straight series of simple Operational Value Stream steps as described in section SAFE. For example, a customer may not always receive advertising, or use customer service; different types and segments of customers may use different steps of a value stream or use them in different sequences, different products may require different flavors of the same value stream step etc. For example, some products may be pre- or post-pay (does the billing and payment before or after receipt of the product), some customers may be pre- or post-pay, some products may need to be preconfigured, others may not etc.

A more realistic description is an operational value "network" (OVN) as shown in Figure 9: The way the customer interacts with the OVN is highly dependent upon their specific requirements, needs and the nature of the product they are ordering. The OVN can represent all the different flavors of the value stream steps.

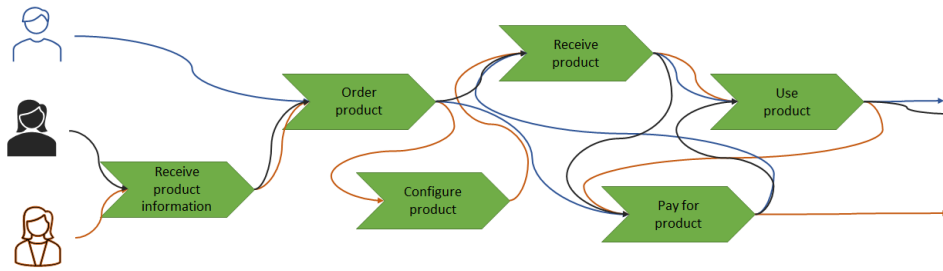


Figure 9: The operational value steps are used in a different order and a different way based on factors such as customer, product etc.

Each value step of the OVN must handle multiple different variants (based on market product etc) and weigh the importance of each. Here an ownership of the steps is required, realized in Deutsche Telekom by the role of the **Value Stream Lead**. A Value Stream Lead usually is responsible for multiples value stream steps and since we are looking at the Operational Value Stream this role is a business-related role.

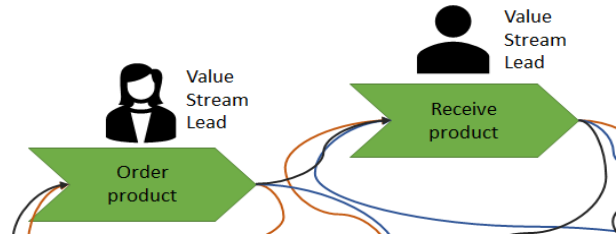


Figure 10: Each value step or group of steps has a Value Stream Lead

MODULE GROUPS

Some Modules have a high logical cohesion to other neighboring Modules. For example, the three Modules “Issue Customer Order”, “Customer Order Orchestration” and “Complete Customer Order” are usually all needed to fulfill specific customer needs. This logical business cohesion often correlates to development dependencies. This means that when a new functionality is required in “Issue Customer Order”, we can also expect development impacts in the other two Modules as well. We term these sets of interdependent Modules “**Module Groups**”.

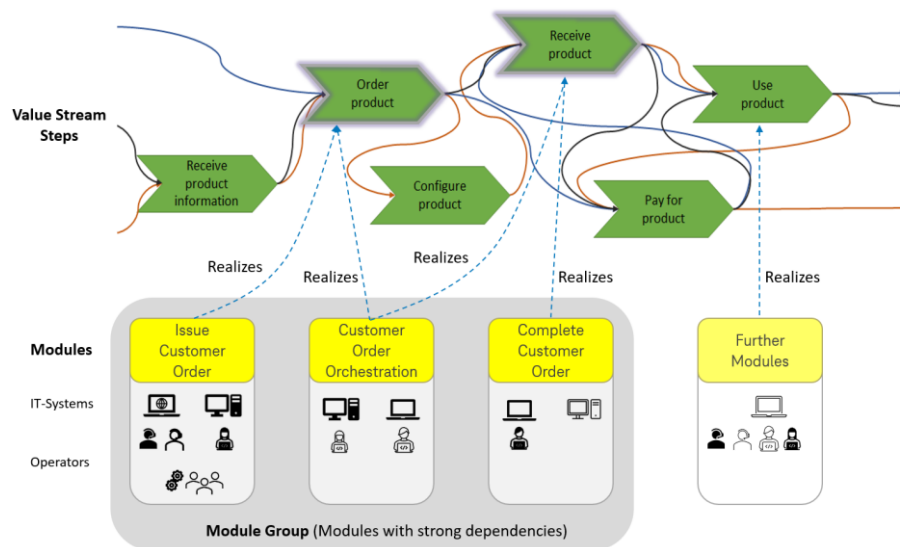


Figure 11: Example of a Module Group (groups of Modules which logically belong together)

MODULE VARIANTS AND MODULE CLUSTERS

A Module may be implemented in multiple variants. For example, “Issue Customer Order” could be implemented as part of a monolithic solution (e.g. the plain yellow one) as a microservice (e.g. the cross-hatched version) or be implemented differently for different markets or products such as fixed and mobile telephony. We term these different variants of the same Module a **Module Cluster**.

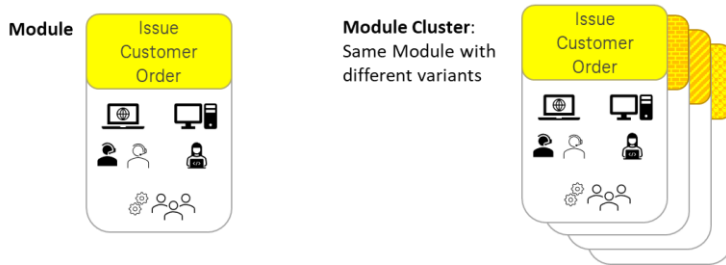


Figure 12: A Module Cluster. Four variants of the same Module implemented using different technologies or in different ways

To optimize efficiency and consistency across the variants, a governance is required which we term Module Cluster Ownership embodied by the role **Module Cluster Owner**.

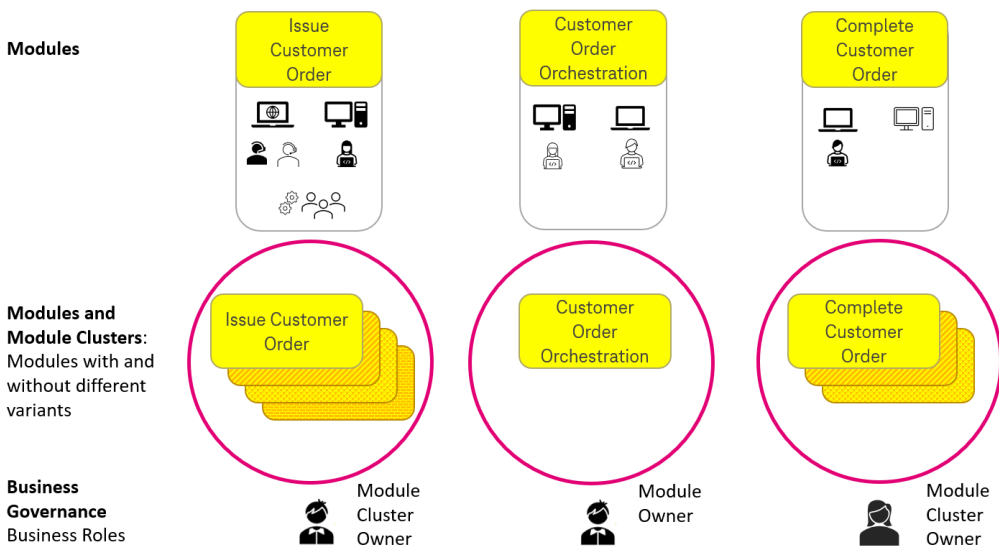


Figure 13: A Module Cluster Owner responsible for all variants of the same Module.

Module Groups can also be implemented as variants; for example, a Module Group (such as Issue Customer Order, Customer Order Orchestration and Complete Customer Order) could be implemented as a single monolithic system, while another may be implemented as a set of microservices, whereby a third variant may historically have been implemented for a specific product or customer segment (e.g. mobile or B2B) etc. This is indicated by the different hatching in the figure below.

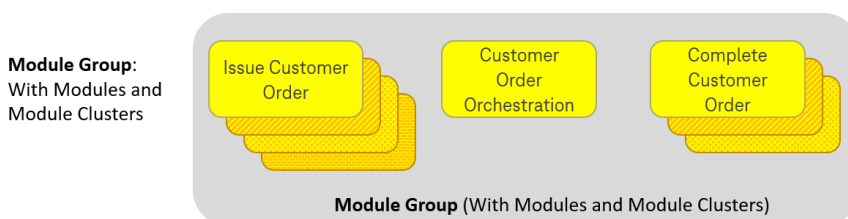


Figure 14: Multiple Module Group variants (Customer Order Orchestration consolidated into a single Module)

So far, we have focused on the business view. Each Module contains all people and systems needed to fulfil the service provided by the Module. Thus, we have a precise definition of business function and a container to describe its realization. This is a powerful tool for transparent communication and organisation.

DEDUCTION OF DEVELOPMENT STRUCTURES LIKE ARTS AND LARGE SOLUTIONS

Since **Module Groups** identify Modules with high interdependencies (which translates to high collaboration needs within the Module Group as part of the OVN) we experience a corresponding dependency pattern in the development of new functionality. Thus, the Module Groups give us key pointers to possible Development Value Stream structures. For example, an entire Module Group may be realized by a single ART or large solution as shown.

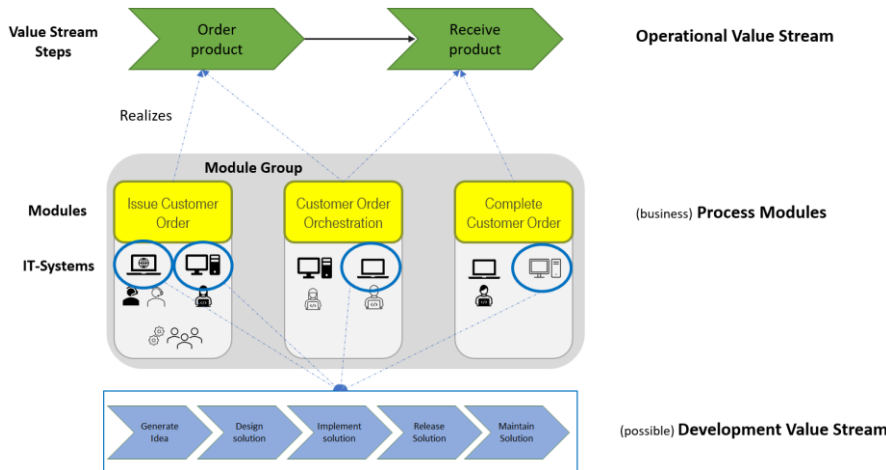


Figure 15: A single Development Value Stream realizes the entire IT landscape for a Module Group

To make this more concrete, here are some examples:

- A complete Module Group is developed within a single ART (or large solution). This enables the changes in the different dependent Modules to be aligned and synchronized giving us high agility.
- If a Module Group consists of Module Clusters, there might be several ARTs each developing one flavor of the Module Group and, if appropriate, a Large Solution providing architectural governance and coordination between them. This is shown in Figure 16
- Another possible structure is shown in Figure 17 where one ART develops all flavours of a Module Cluster.

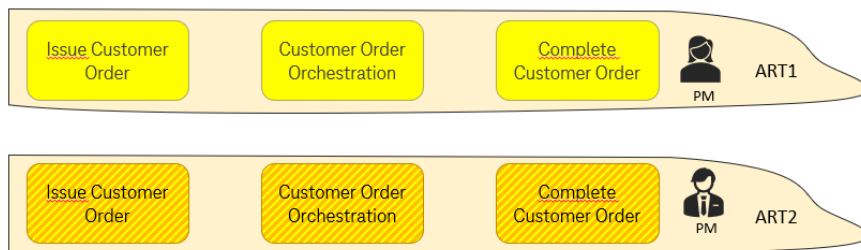


Figure 16: Two ARTs each developing the IT Solutions of a complete Module Group each in a different variant. If appropriate, within a Large Solution

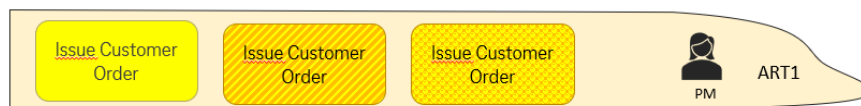


Figure 17: A single ART providing the IT Solutions for different variants of a Module (a Module Cluster)

Along with the Module Clusters and Module Groups, all previous ingredients for deciding ART structures (such as the existing IT landscape, current organization and the architectural runway), can be considered.

Combined, these inputs provide us with the information needed for setting up and evolving effective organizational structures for development (ARTs, large solutions etc.)

The **enterprise architect** plays a key role in identifying and defining business and IT architectures supporting business and development flow, an essential input for determining the organizational structures (ARTs). They need both an understanding of the business requirements as well as the current and desired IT landscape.

If, for example, there is a clear architectural preference for a specific Module Cluster variant, it may make sense to organize the ARTs according to Module Clusters which accelerate the consolidation within the Module Cluster but increases the synchronization effort within a Module Group.

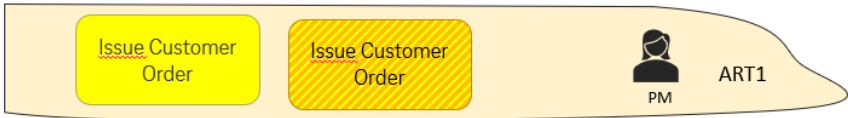


Figure 18: Combine Module variants within a single ART to accelerate retirement

Another example is when there are few if any business dependencies between Modules (here the Modules “Customer Order Orchestration” and “Customer Retention Strategy & Planning” are used), but both Modules need to use and develop on the same IT-System. If the Modules are both handled by the same ART, there will be competing and potentially unsynchronized business drivers towards that ART, if the Modules are handled by separate ARTs as shown in Figure 19, increased technical alignment is necessary. A potential solution is to split the system or replace by distinct microservices.

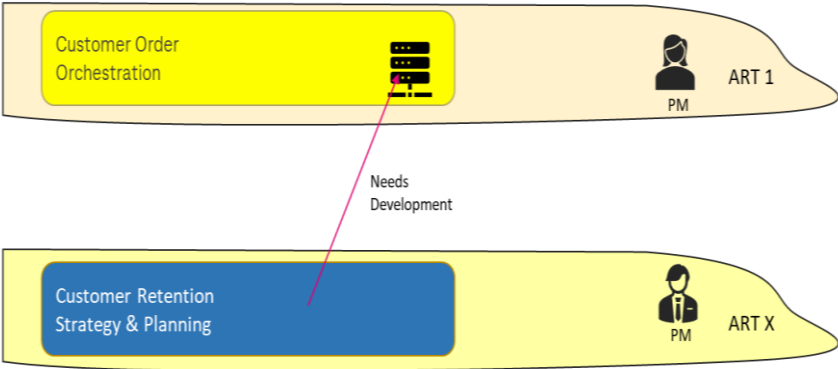


Figure 19: Independent Modules (from a business perspective) using the same IT system

ROLES

Value Stream Lead (VSL)

The Value Stream Lead is responsible for a single or a group of value steps of the operational value network. This is a business function which owns the value stream steps from the business perspective of the OVN, ensures that the different customer needs are supported in an optimal way based on the available resources and determines the business value of competing IT-requirements.

The Value Stream Lead is not responsible for technology choices in the supporting IT systems.

Module Owner (MO)

A Module Owner is responsible for a specific Module to work as needed in the OVN. Hence the Module Owner is responsible for establishing the right processes, the availability of the needed operators and IT-System functionality. The Module Owner is also responsible for requesting and prioritizing appropriate changes in the supporting IT systems as needed.

Module Cluster Owner (MCO)

If a specific Module has variants (Module Cluster) the Module Cluster Owner is responsible for all the variants of the Module Cluster. This includes people working in the operational value networks on a day-to-day basis as well as the IT functionality in all variants of the Module.

In larger Module Clusters, variants may have individual Module Owners. In this case, the Module Owner is typically responsible for the people working in this variant but needs to be aligned with the other Module variants in this cluster.

Enterprise Architect (EA)

There needs to be a function with a global overview of all relevant Modules and their dependencies with each other. The enterprise architect owns this responsibility and has governance of Module variants.

The enterprise architect takes care of the global Module catalogue and defines the lifecycle of Module types (from genesis to retirement).

EXAMPLES

In this section we provide some practical examples of using the mechanisms we have shown.

EXAMPLE 1: INDEPENDENT MARKET SEGMENTS, MOBILE AND FIXED NETWORK

In the first example, we have strong and independent mobile and fixed network markets each with a clear differentiated profile. Strong convergence across the business lines is not expected soon. The organization has recently insourced a customer order completion process for a part of the fixed market segment

For simplicity, we focus on the two value stages “Order Product” and “Receive Product”, each with a Value Stream Lead.

What this means for the evaluation of Module dependencies

- Business dependencies are stronger along Module Groups than along Module Clusters. I.e. one version each of the Modules “Order Product” and “Receive Product” exist in each of the markets and they are dependent upon one another in their respective markets. Explained in another way, when a business change is required for the Module “Order Product” in the mobile market, we can also expect a business change for the Module “Receive Product” in the mobile market. In this example we don’t expect major dependencies between the respective “Order Product” variants between the different markets.

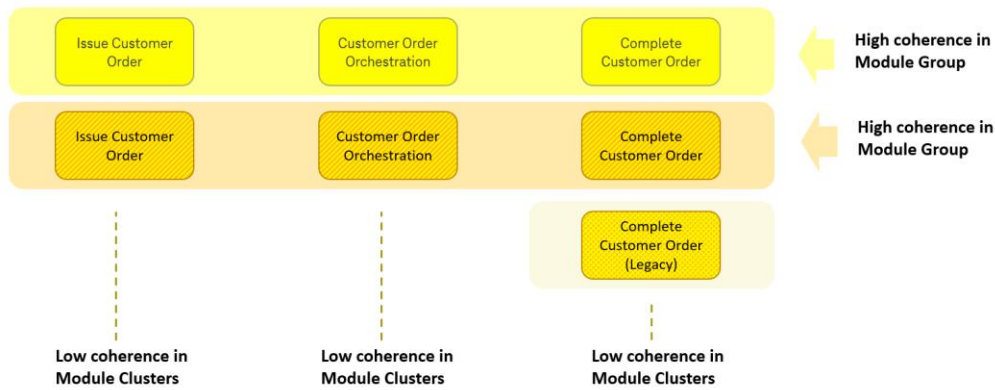


Figure 20: Coherence across groups is stronger than across variants

- Nevertheless, Module Cluster Owners (MCO) need to maintain both a Module Group view (provisioning of day-to-day services to the customer in an OVS) as well a cluster view (optimizing resource usage across the different variants).
- The insourced solution is realized by a further variant of the “Complete Customer Order” Module.

What this means from the enterprise architecture perspective

- The enterprise architect must derive the architectural vision for the Module Clusters and groups and guide the Module Cluster Owners in creating a strategy which addresses both the operational needs as well as the technical evolution of the solutions.
- The enterprise architect could for example decide that it makes no sense to use a standard generic technical solution for the different variants of a Module and thus make no recommendations to combine variants.
- The architect may additionally recommend retirement of legacy systems. E.g. for the newly insourced solution.

Development Value Stream View

- Business strategy, architecture vision and the current technical and organizational situation drive the identification of Development Value Streams.
 - Business input – expected business evolution, strategy and upcoming requirements are provided by the VSL, MCO, product/solution managers and epics owners.
 - Architecture Vision – expected technical evolutions impacting multiple Modules is provided by the EA
 - Current situation limitations and strengths, risks etc are provided by further stakeholders such as those mentioned above, business owners, system architects etc.
- In the example, the synergy potential across Module Groups is considered low and as a result, the Development Value Streams reflect separate Module Groups. I.e. there is one Development Value Stream for mobile and one for fixed network.

ART Structure

- ART structure is defined along the Development Value Streams reflecting the need to optimize for the individual segments.

- Acceleration of legacy retirement is achieved through combining the legacy solution with the future desired solution in the same ART. This can be seen in Figure 21.

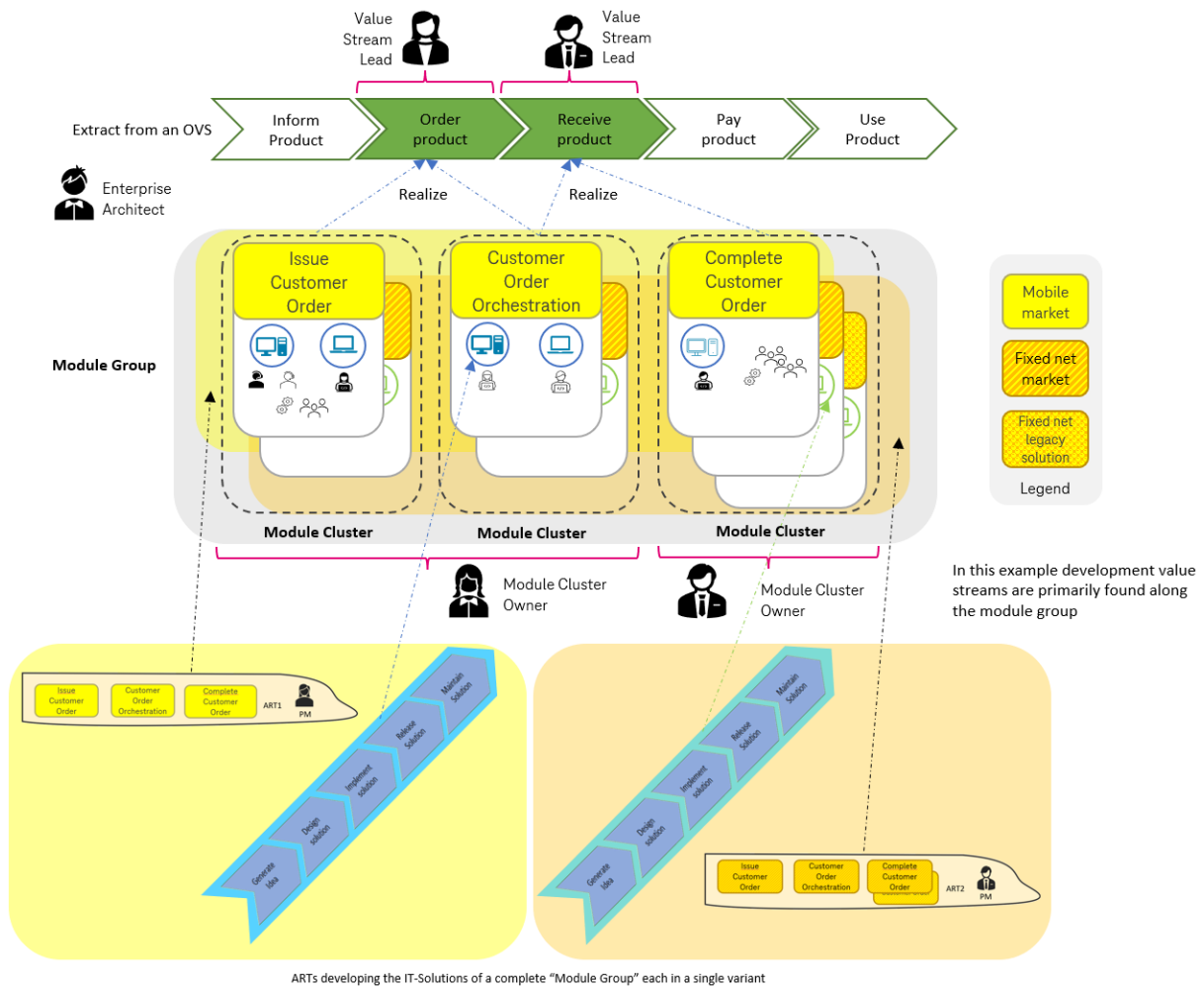


Figure 21: Two Value Stream stages mapped through eTOM to ARTs

EXAMPLE 2 – A NEW PRODUCT LINE

Use Case: A product owner defines a new product-line which should be ordered and received by customers.

- The product owner discusses with the Value Stream Leads for the necessary value steps (in our simplified case "Order Product" and "Receive Product"), and agreement is reached on priority. The Value Stream Leads identify the Modules which need to be adapted to support the new product line (in our case "Issue Customer Order", "Customer Order Orchestration" and "Complete Customer Order")

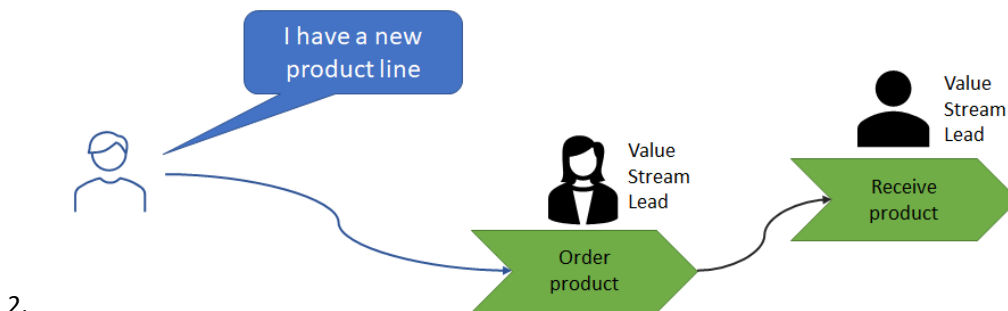


Figure 22: Product Owner discusses with Value Stream Leads concerning new functionality

3. Value Stream Leads align with the Module Cluster Owners of the three impacted Modules. Agreement is reached about implementation (and alignment) and a technology decision is made in accordance with enterprise architecture guidelines. (e.g. which variant should be implemented)

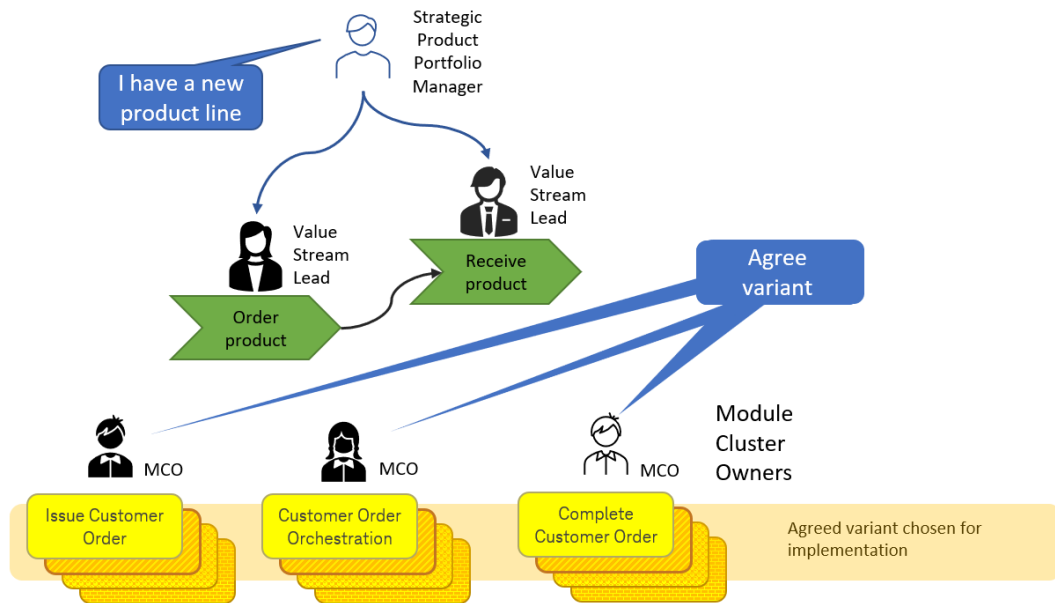


Figure 23: Value Stream Leads align with MCOs and decision is made regarding implementation approach

4. In larger Module Clusters, the MCOs may need to align with the Module Owners (they may also be the Module Owners themselves) at which point the requirements on the IT organization as well as the business organization are agreed.

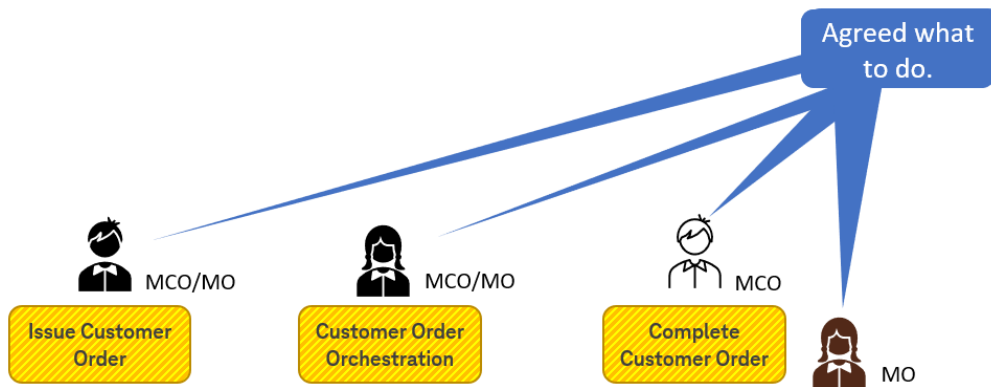


Figure 24: in larger Modules, further alignment with MOs may be necessary

5. The changes are implemented in the systems (we are assuming that all three Modules are impacted and need development work). The Module Owner remains ultimately responsible for the provision of the Module.
 - a. Scenario 1: All three Modules are realized in a single ART (or large solution)
 - i. This is the easiest case, where the requirement is passed to the product manager (or solution product manager in a large solution) who is responsible for implementation and maintenance of the solution within their ART or LS.



Figure 25: All Modules realized within one ART

- b. Scenario 2: the Modules are realized by different ARTs in different portfolios.
 - i. Here the Module Group coherence is not reflected in the organization of the ARTs and there is an increased coordination overhead.
 - ii. Alignment and agreement need to be reached between the associated product/solution managers and solution owners.
 - iii. Potentially additional E2E tests need to be planned across the ARTs (ideally identified as acceptance criteria in the epics/initiatives)

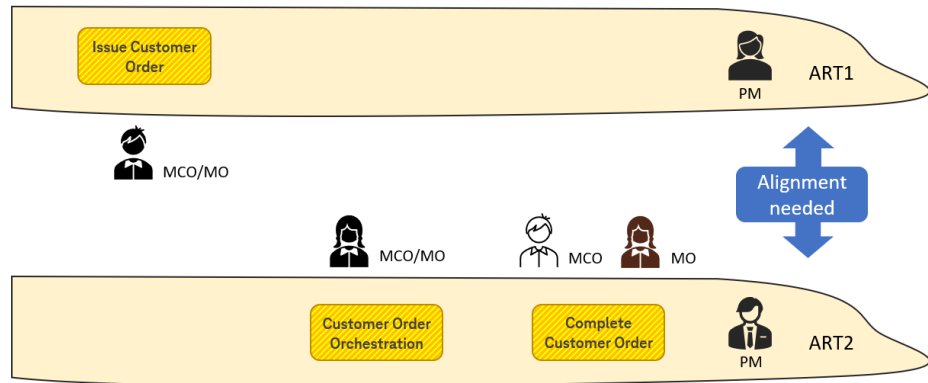


Figure 26: Modules are realized within different ARTs implying more alignment overhead

- iv. Here we also see a fracture in the Development Value Stream leading to increased organizational overhead. If this becomes a recurring pattern, the set-up of the ARTs should be reconsidered.

EXAMPLE 3 – ART DEFINITION OF CORE DATA SERVICES

As mentioned in the section introducing Telemangement Forum, besides the Business Process Modules, there are pure IT functions such as Core Data Services which are required across different value streams and interact with multiple other Modules. For example, when a new customer signs a contract, various Modules are used during the process and their details are added to a database (through a Core Data Service). These details can then later be retrieved by various other Modules to provide relevant services to that customer such as network availability, or billing.

These **Core Data Services** are handled differently to Modules because they contain non-transient (or non-transactional) state which can be used and changed by multiple Modules. To maintain data integrity, the use of these Core Data Services is forced. We are, in effect, forcing a dependency into and across Operational Value Streams and into Development Value Streams (e.g. when a new tariff is made available for use, it needs to be added to rating and billing core data).

The standardized model provided by TAM defines Core Data Services and thus also here gives us a structure with which we can manage these dependencies.

In defining ARTs, for example, we would not typically place the Core Data Service close to a Module-providing ART – since this would create dependencies to other ARTs – but group the Core Data Services in their own platform-like ARTs.

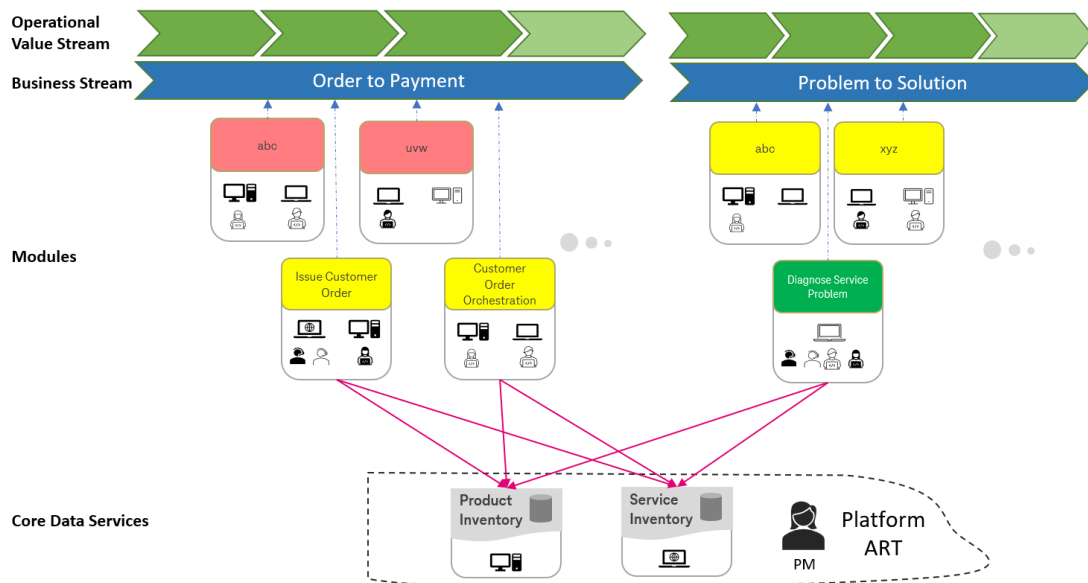


Figure 27: Modules are realized within different ARTs implying more alignment overhead

As with Modules, Core Data Services may also exist in different flavors and groupings.

In the case of Core Data Services, enterprise architecture is the primary instance for governance.

OPERATIONALIZATION

In this section we provide details of operationalization of these concepts within Deutsche Telekom.

EXECUTION OF A VALUE STREAM ANALYSIS AND ART IDENTIFICATION WORKSHOP

To include the use of the standard model, the SAFe Value Stream Analysis Workshop has been -adapted. After the identification of the customer and description of the Operational Value Stream, the eTOM Modules needed to realize the OVS are identified and mapped to the OVS-Stages. Otherwise, the Workshop remains largely unchanged. The workshop process is adapted as shown in Figure 28 following.

Steps in the adapted SAFe Value-Stream and ART Identification Workshop

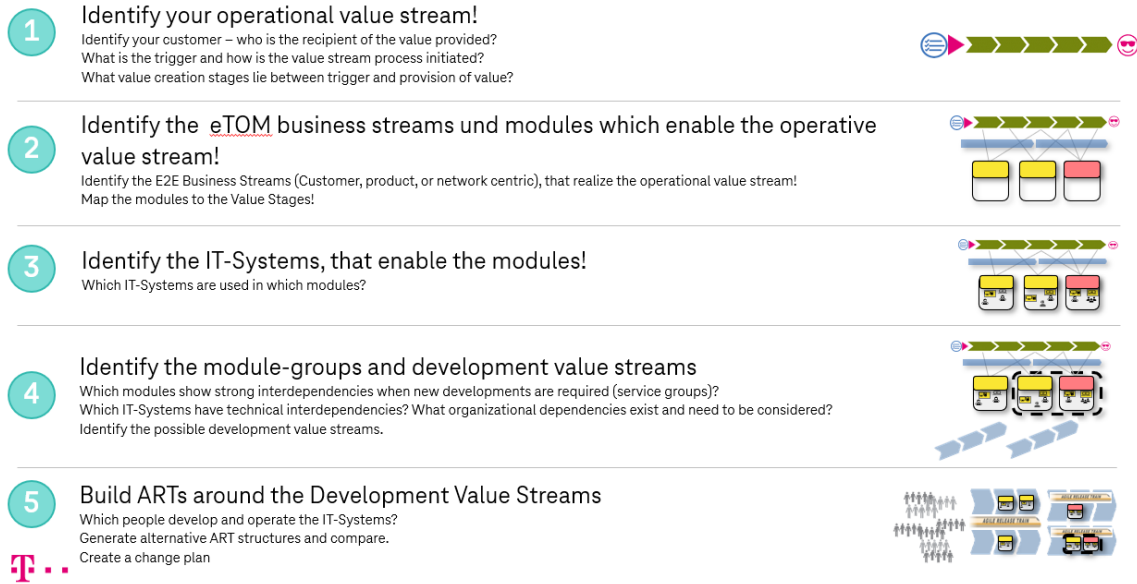


Figure 28: Value Stream and ART-Identification Workshop adapted to use a standard Business Process model such as eTOM

The workshop has been successfully run within Deutsche Telekom.

BUILDING A CUSTOMER ORIENTED SERVICE ARCHITECTURE USING THE ADAPTED VALUE STREAM IDENTIFICATION WORKSHOP

Over the past 3 to 4 years, we have successfully executed about 25 value stream workshops within Deutsche Telekom. From the point of view of the area in which the VSA was run, the results were satisfactory and enabled us to achieve a better end to end view of the streams providing value to the customer.

However, the results, while on an individual level good, did not provide a full picture of the services provided by the organization.



We had, in effect, identified pieces of puzzle, without determining how or even if the pieces fitted together. The results were a patchwork of services where we were not able to

determine duplicates, gaps and so on.

The adapted value stream analysis enables us to map the provided services to an overall model, identifying gaps and discrepancies while maintaining customer focus. Further, we have a common language between and across organizational units which avoids misunderstandings.



We have started to catalogue the results of further VSA workshops to create a full picture identifying gaps and overlaps.

ALIGNMENT OF BUSINESS AND IT GOVERNANCE TO THE MODEL

Governance both in business as well as in IT needs to follow the defined model so that the advantages listed below can be fully leveraged.

SUMMARY OF IDENTIFIED ADVANTAGES

We have identified following advantages of using the combination of SAFe and TMF Frameworks which are summarized in this section.

- TMF Frameworks provides a standard model and structure which enables us to systematically organize and describe the mapping between OVS/OVN and DVS in SAFe.
 - Business dependencies identified in eTOM (Module Groups) can be used to identify ARTs and highlight organizational discrepancies
 - We have a common language which facilitates communication between IT and business – a huge advantage for successful value stream analyses.
 - We can define relevant Core Data Services and analyze their dependencies to Modules which enables us to create independent and consistent Core Data Service.
 - The model has already helped us to highlight suboptimizations, multiple responsibilities, competing requirement sources and discrepancies in the ability of ARTs to support architectural enhancements.
- Business ownership and responsibility can be transparently described and assigned thus reducing friction and confusion - governance is further strengthened by using the roles **Value Stream Lead** and **Module** or **Module Cluster Owner** with clear definition of responsibilities
- The model can be used to highlight gaps in the support and governance of OVS and OVN stages.
- The model makes it possible to identify potential IT landscape enhancements and gives us a communication tool to support ensuing improvements such as splitting an IT system which supports Modules in different Module Groups or the other way round and consolidate Modules of a Module Cluster on the same IT system.
- The transparency and common understanding between IT and business enables us to more smoothly reach decisions concerning both organizational transformation evolution as well as value stream adaptation thus supporting SAFe principle 10 to organize and re-organize around the flow of value. Thus, we mitigate consequences of organizational suboptimizations such as the separation between IT and business.
- We expect to more easily be able to support decentralized decision making since teams will have the right information about business dependencies so that they can flexibly identify which Module Clusters or logical Module Groups are needed to support current business requirements.
- Moving towards an autonomous microservice architecture, the clarity of responsibility and governance should enable a much cleaner sourcing and offering of services from and to 3rd parties.

CONCLUSION

Especially in bigger companies where – more-or-less by default – portfolio and organizational structures are highly complex; it is vital to find ways to reduce unnecessary complexity and increase transparency to make systems controllable.

We believe that the combination of the SAFe Value Stream analysis approach with the eTOM model provides Deutsche Telekom with numerous benefits as described in the paragraph Summary of identified Advantages, and we are already seeing the first signs of this. It ultimately remains to be seen how beneficial the model will become and if it can be used as a blueprint within the organization.

TM-Forum's eTOM is the business process framework chosen by us for this investigation. There are many other frameworks with a strong footprint in other industries in which we believe the concept described here can be reused to provide similar benefit.

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