CONCEPTUALIZING AND DESIGNING AN ACTIVE CATALOG SOLUTION FOR A CSP

Communication service providers (CSPs) are undertaking innovative initiatives to simplify their business architecture and reduce overall cost. The product catalog performs an important role in transforming the enterprise landscape to improve operational efficiencies. The catalog is no longer perceived to be just another static solution component in the Telecom Application Map - it has evolved to take an 'active' part in the order lifecycle, enabling leaner selling and ordering business processes. It has led to a catalog-driven business processes strategy and the concept of an active / dynamic product catalog in business and IT architecture.

Our white paper aims at conceptualizing and designing an active product catalog solution, leveraging out-of-the-box capabilities of the Sigma Catalog for a CSP.

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CSPs are undertaking transformation initiatives to simplify their business processes and increase operational efficiencies by gravitating towards an enterprise catalog-driven strategy. The key drivers for such initiatives are:

- Assure feasibility of the order at creation time, avoiding costly exception handling at fulfilment time

- Simplify the existing complex fulfilment environment of system dependencies and hard coded systems which make changes difficult

- Reduce average handling time for order capture and service delivery

- Improve the usability of selling applications – reduce the number of clicks and provide real-time access to accurate product data

- Improve time-to-market for product launches

- Reduce manual effort for capturing and executing customer orders

- Improve order quality and reduce order fallout

These drivers are why an enterprise catalog is an integral part of the end-to-end ordering architecture and order lifecycle. The active catalog-driven approach can overcome fulfilment challenges by leveraging data centralized in the catalog to drive ordering flows, reducing the dependency on local reference data in selling and order management systems.

What is an 'active' catalog?

Providing an 'active' catalog is an interpretation and usage of an 'enterprise' catalog. An enterprise catalog contains the required product and ordering constructs which can be leveraged to drive various business processes across quoting, ordering, provisioning, service activation, product and service inventory management, customer communication management, rating and billing. The key difference between an enterprise catalog and the traditional in-app catalogs of systems supporting these processes is the scope of data managed and related. An enterprise catalog contains fully enriched structures across Product, Service and Resource, encompassing all layers of abstraction for the Commercial, Functional, Technical, Physical and Virtual dimensions of the product.

In an active catalog-enabled business architecture, the enterprise catalog is actually referenced during runtime for each of these critical path applications, to assist in the product selection, customer product configuration, validation, quote creation, order creation, order decomposition, order orchestration, service delivery and charging processes. Since this data is centrally sourced from an enterprise catalog, the ordering and fulfilment processes are simplified and connected as the order is created and flows through the different systems, thereby accelerating time-to-market and service delivery.

Enabling the 'active' role that the enterprise catalog has in the runtime quote-to-cash processes is a robust set of APIs (application program interfaces) that allow the catalog to interact with external systems, either as transactional interfaces for real-time interactions or as offline synchronization updates for systems that must rely on internalized versions of the catalog. With the key constructs and inputs to drive business processes defined in the enterprise catalog, it enables product-

agnostic order management design, and primarily results in removing the need for retaining product definitions, product-related data or tables in selling and order management systems. It also facilitates a lean selling and ordering architecture across the value chain which can remain unaffected by business as usual changes as part of the product lifecycle management process.

Some of the features of an active catalog solution include:

- Enterprise catalog with comprehensive specification management for all levels of Product, Service and Resource abstraction to cover Commercial, Functional, Technical, Physical and Virtual dimensions of the product

- Online interaction between the enterprise catalog with selling and ordering management systems

- Customer order validation and enrichment occurring with support from the catalog at run-time

- Order management leveraging the catalog constructs at runtime to drive various order management orchestration plans and activities

- Online retrieval of product information from the catalog driving configuration, pricing and quoting functionalities, and processes (which can be extended to support multiple channel experiences)

- Selling rules being sourced from the enterprise catalog and executed at run time as part of the API layer

Key elements of the solution

The key elements required to build an active catalog solution framework are:

I. Product and service data modelling framework: It is the foundation block of the 'active' catalog solution. This framework defines the meta model in the Product, Service, and Resource domains. The Information Framework (SID) information model from TM Forum

Frameworx and the Sigma Modelling Methodology can be leveraged as an accelerator or starting point to establish the logical data model. It would be defined and designed in the enterprise catalog system (for example, in Sigma Catalog using the Workbench configuration tool).

II. Logical product model: The entity structures of different product types, for example, Internet, TV, Telephony, Triple play, MPLS-VPN, Carrier Ethernet, etc. These product models are created using the product service modeling framework and adhering to product modeling guidelines.

III. Enterprise catalog: Either a custom-built application or commercial off-the-shelf (COTS) package (such as Sigma Catalog).

IV. Catalog services: An online engine consisting of a series of fine-grained services, which can access the enterprise catalog, execute relevant rules, and can enable the quoting, ordering, fulfilment, and billing processes. For example, during the ordering processes, these services execute against the product, pricing, and rules data as part of real-time interaction with the ordering front end. Similarly, service decomposition can use product-to-service relationships and drive fulfilment processes across multiple systems. Some examples of catalog services are:

- Service decomposition: Decompose the customer order (from a CFS or Customer Facing Service level) into a technical order (the RFS or Resource Facing Service level), ready to drive fulfilment

- Tariff application / price calculation: Apply the correct rates and charges based on product, feature selection or contextual (customer or order-related) data

- Eligibility: Retrieve available entities based on customer, customer portfolio, catalog constraints or context (customer or order-related) data

- Upsell/Cross-sell: Get applicable promotions and present guided product selection opportunities

V. Catalog translation engine: Mapping is needed to transform the standardized enterprise catalog data model to target systems' application specific models. For example, if Sigma Catalog is the application, then mapping between Sigma entities to other BSS and OSS applications.

Designing the active catalog solution

In any catalog-driven environment, the enterprise catalog must support the definition of a set of known constructs. These constructs are then the key indicators that drive each systems' ability to interpret and act accordingly. Whether it's quoting, order management, provisioning or billing, these constructs are identifiable and understood as the central means of ensuring consistent behaviour and triggering support for various business processes. When utilized in an active catalog solution, these constructs then form the basis for executing (as part of a real-time process interaction) rules that support selling, fulfilment and validation.

In the case of Sigma Catalog and Sigma Catalog Services, when engaging in an active integration, these constructs are inputs to the logic of Catalog Services, providing a means for external systems to rely on the catalog for run-time execution support.

When the order management system receives a customer order with the commercial view at run-time, it's then able to request that Catalog Services decompose and enrich the order to include the technical view. This execution is driven by these constructs, allowing for the configuration of rules in the catalog to support order validation, decomposition and order enrichment, all leveraging the catalog as the source of truth.

Classification is an example of a Sigma construct. It is used to describe the eligibility or action to take against a particular business entity, whether it's a Product Offering, Product Specification, Customer-facing Service Specification, Resource-facing Service Specification or Resource Specification. Because these classifications are applied at a metadata or specification level for a business entity and not at the product instance level, the order management processes are typically not affected by product changes. The various classifications are instances of an out-of-the-box base class available in the Sigma Catalog. Some of the sample classifications which can be configured in the catalog are described below.

Customer order management
The classification construct is defined on business entities, for instance product offers (PO), product specifications (PS), CFS specifications (CFSS), physical resource specifications (PrS) and even price elements entities defining further action(s) to be taken by customer order management (COM) systems for the given entity. The classification is applied at the metadata or specification level.

Service and resource order management
The classification is defined on CFS specifications (CFSS) and resource specifications entities defining further action to be taken by provisioning systems on a given entity.

Billing order management
The classification is defined on product offer and related charges/price items to indicate if they need to be sent to billing and if yes, it further specifies the type of billing behaviour required.

Characteristics classification
 The classification defines the purpose, use, and assetization requirements for each of the characteristics for consuming systems. These are sample constructs and actual implementation can vary from one CSP

environment to another. However, the above constructs are based on the standard business process framework, e-TOM, and data modeling framework. The functional flow of the order in an active product catalog is shown below:

Figure 1: Functional diagram of active product catalog solution
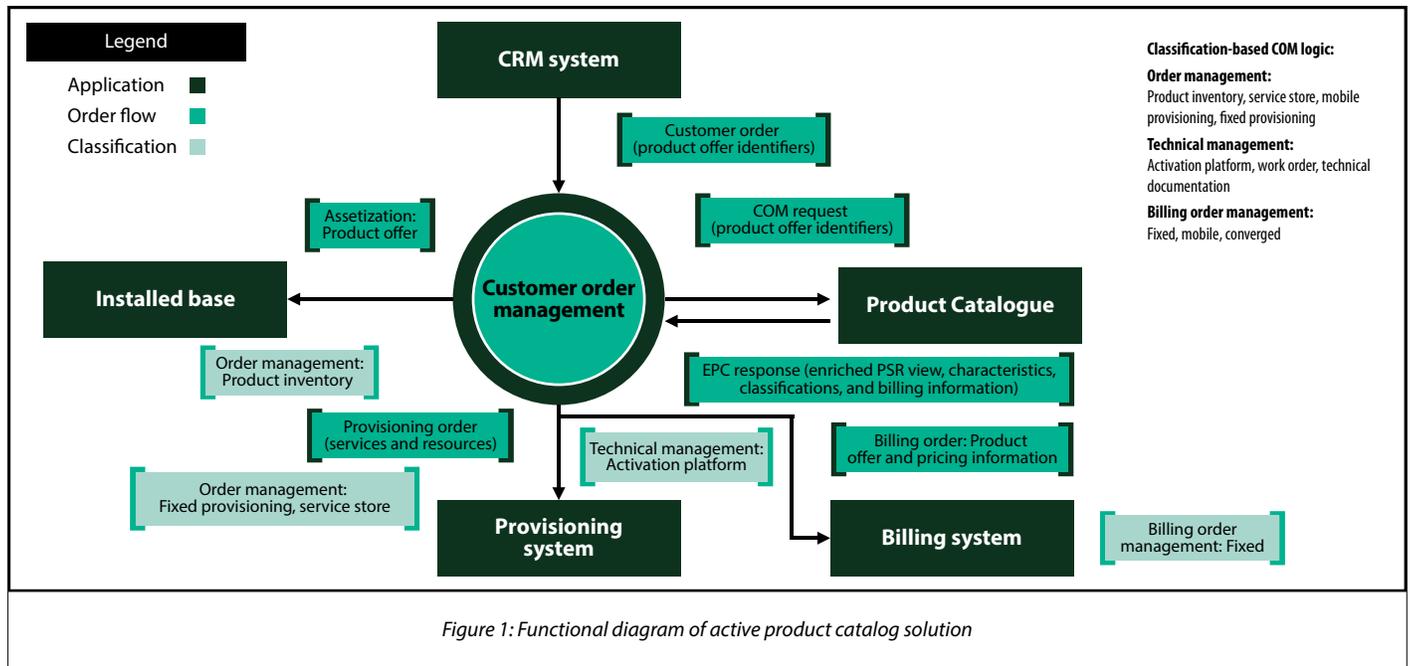
The sequence of events based on the above solution design is described below:

1. A customer order limited to commercial view with only the product offer and price identifiers sent to the order management system by the customer relationship management (CRM) system.

2. The order management system then sends the request for decomposition and enrichment to the enterprise catalog. This request includes only the product offer identifiers.

3. The enterprise catalog then sends the response back to the order management system. The response contains the following:

   a. enriched product-service-resource (PSR) view for the product offers present in the request

   b. Product offer characteristics

   c. Billing information including pricing

   d. Various classifications which are defined in the catalog on product offers, product specifications, CFS specifications, physical resource specifications, and price elements. These classifications define further action to be taken by the order management system for the given entity

4. The following processes can take place in specific order or also in parallel. The sequence depends on the implementation in the particular CSP. The sequence mentioned below is only an example, mainly to describe how the classifications enriched by the catalog are used to drive business processes by the order management system.

   a. The provisioning order is sent to the provisioning systems. This is done for another particular value of customer order management classification defined in the catalog. Thus, generic logic in the order management system should include the CFSS in the provisioning order where Y value is enriched by the product catalog.

   b. The provisioning system further undertakes the necessary service and resource order management flows. These are done for the value 'Activation platform' of service and resource order management classification defined on the CFS in the catalog.

   c. A product offer is assetized in the installed base. This is done for a particular value of customer order management classification defined in the catalog. Thus, generic logic in the order management system assetizes an offer where X value is enriched by the product catalog.

   d. The billing order is sent to the billing system, which takes appropriate action based on the values received for the billing order management classification.

How the active catalog solution works

To illustrate the working of the active catalog solution, let us take the hypothetical case of Mr Scot Parmer. Scot is a potential customer for a communication service provider in Atlanta. He visits the CSP's store and places an order for a McAfee Internet Security product. The product consists of two subscription options – McAfee Mobile Internet Security and McAfee Fixed Internet Security component products. The following sequence of events take place:

Figure 2: Full product structure of McAfee Internet Security product in the catalog

Order intake and entry

1. Scot decides to buy the McAfee Fixed Internet Security subscription. The sales executive takes the order details and the customer order is submitted in the CRM system.

Order orchestration (Call to product catalog)

2. The customer order is sent to the order management system by the CRM system. The customer order includes only the identifiers of the McAfee Fixed Internet Security product offer.

3. The order management system then sends the request for decomposition and enrichment to the product catalog.

Decomposition and enrichment in the product catalog

4. The product catalog, as mentioned earlier, contains the complete product service- resource view for the offer received in input (in this case McAfee Fixed Internet Security).

5. The product catalog then sends the response back to the order
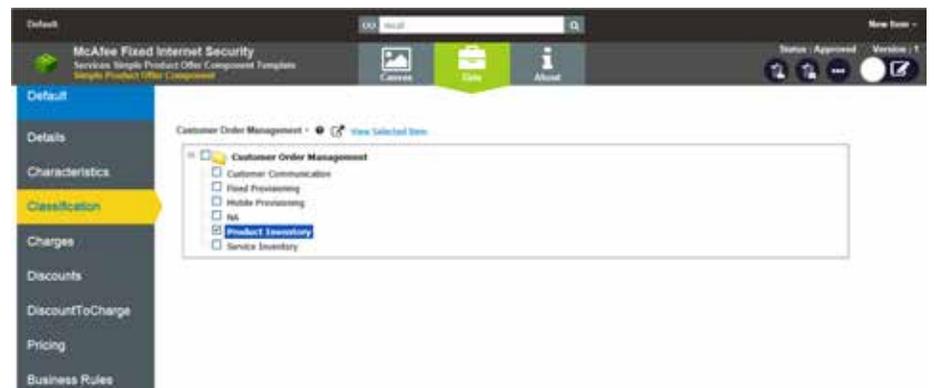
Figure 3: Customer order management classification defined on McAfee Fixed Internet Security product offer

management system. The response contains the following:

a. Enriched and only relevant product-service-resource (PSR) view for McAfee Fixed Internet Security (in this case PS_Internet Security, CFS Basic Security Settings, and CFS Fixed Internet Security)

  i. The CFS Mobile Security Spec is not invoked within the decomposition flow inside the catalog and so it is not selected. This is done by dynamic decomposition of entities at run time, unlike giving a static

view of all entities related to McAfee Internet security.

b. Various classifications that are defined in the catalog on McAfee Fixed Internet Security and CFS Fixed Internet Security. These classifications define further action to be taken by the order management system for the given entity. 'Product inventory' is the value defined for the McAfee Fixed Internet Security product offer in the catalog. CFS Fixed Internet Security has the following values defined for customer order management and service,

and resource order management classifications respectively – 'Fixed provisioning', 'Service inventory' and 'Activation platform'. Order fulfilment (handling of product catalog response by the order management system)

6. The following processes take place after the response from the product catalog:

   a. The provisioning order for CFS Fixed Internet Security is sent to the provisioning systems. This is done for the values 'Fixed provisioning' and 'Service inventory' of the customer order management classification defined on the CFS in the catalog.

   b. The provisioning system further undertakes the necessary service and resource order management flows. These are done for the value 'Activation platform' of service and resource order management classification defined on the CFS in the catalog.
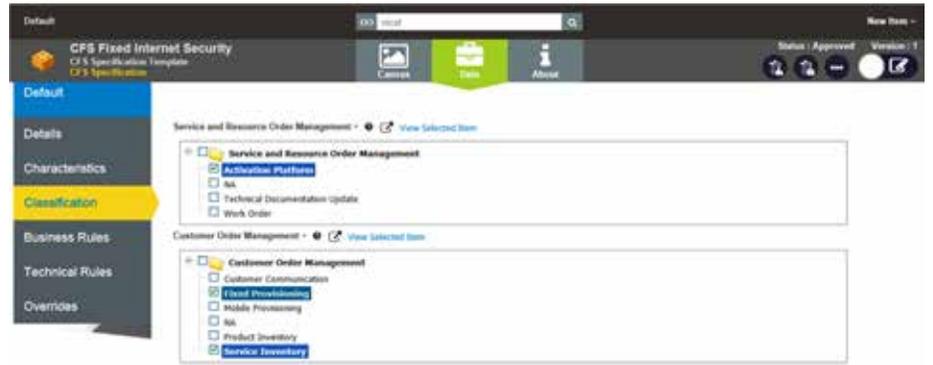
Figure 4: Customer order management and service and resource order management classifications defined on CFS Fixed Internet Security

   c. The McAfee Fixed Internet Security product offer is assetized (documented) in the installed base. This is done for the value 'Product inventory' of the customer order management classification defined on the offer in the catalog.

   d. The billing order containing enriched identifiers of associated prices for McAfee Fixed Internet Security is sent to the billing system for billing and invoice generation.

   e. Scot begins using the McAfee Fixed Internet Security product.

Benefits and challenges

Catalog-driven architecture realizes several benefits:

- Up to 25% increase in straight-through provisioning

- 60-80% reduction of average handling time for order capture

- 25-30% reduction of manual handling effort for capturing and executing customer orders

- Up to 80% improved time-to-market for product enhancements and launches (especially for bundled solutions based on existing concepts)

- Order fallouts reduced to nearly zero. However, these benefits entail certain challenges. The implementation of the active catalog solution is not yet pervasive in the telecommunications industry, and there are a few challenges:

- Performance: As part of the solution, the product catalog acts as an active part of the order execution cycle. So performance has to be of the best possible standard. Online interface with the order management system has to be well setup, as response from the catalog is expected within strict time restrictions in order to enable overall end-to-end order completion timelines.

- Added ownership: As the product catalog drives the business processes of ordering, fulfilment, and billing, it results in added ownership for the product catalog designers and reference data managers who have to develop the correct setup. An incorrect setup in the catalog might result in failures in the end-to-end order flow and execution. Therefore, proper governance, guidelines, and principles need to be established and followed strictly for the solution to function smoothly, end-to-end.

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Manish is a Principal Consultant in the energy, Communications and Services business unit at Infosys. He is a seasoned consultant and a management professional with an engineering background, and 12 years of experience in global organizations. His career path demonstrates increasingly challenging positions and accomplishments in Domain & Process Consulting and Advisory Services, Business Transformation, and Channel Sales and Marketing areas of the Information and Telecommunications industry. He has rich experience in Product Consulting, Product Portfolio Planning, New Product Launches, Product rationalization, Product Catalog Solution Implementation, and Product Lifecyle Management with multiple service providers.

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