

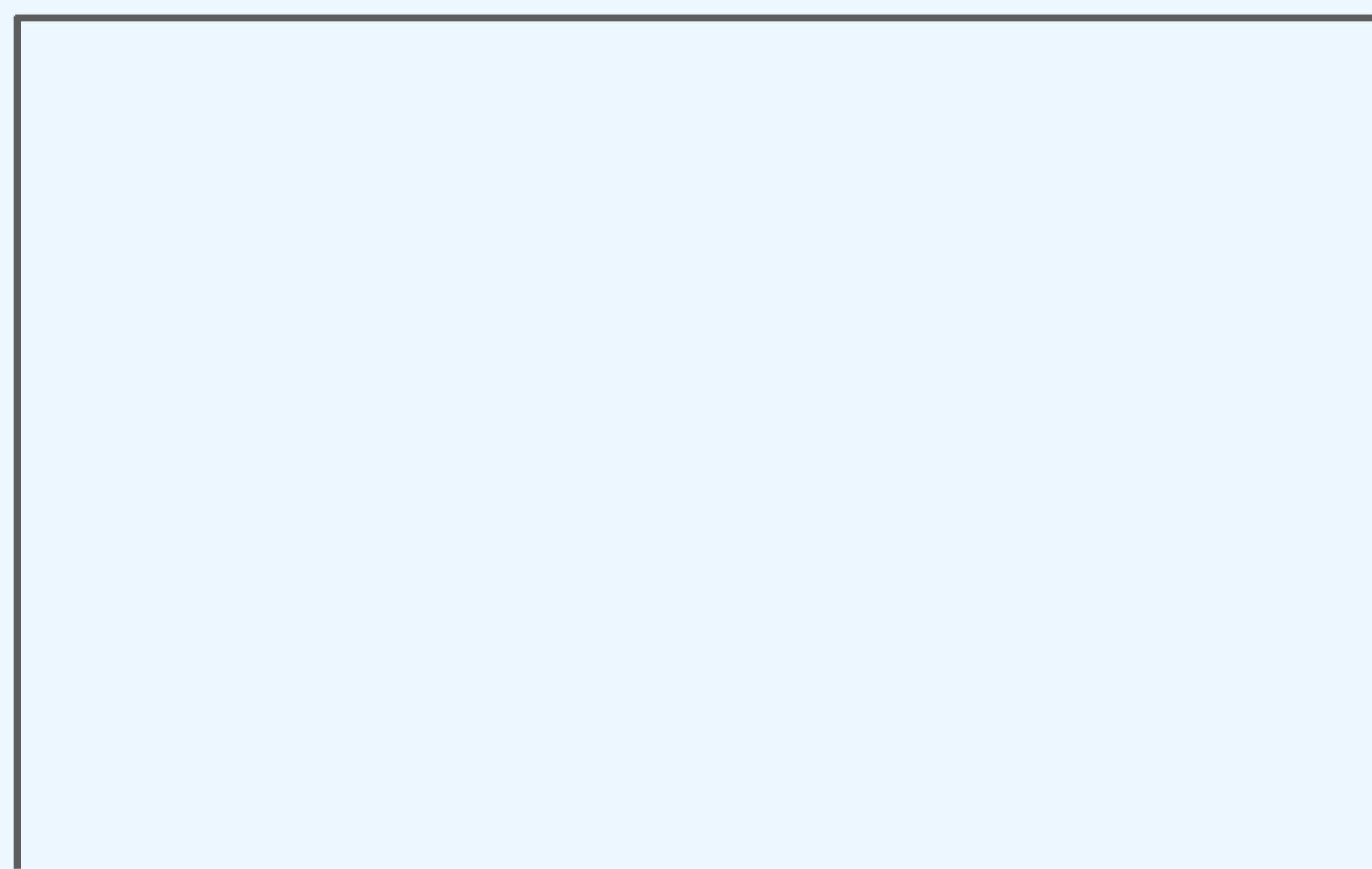
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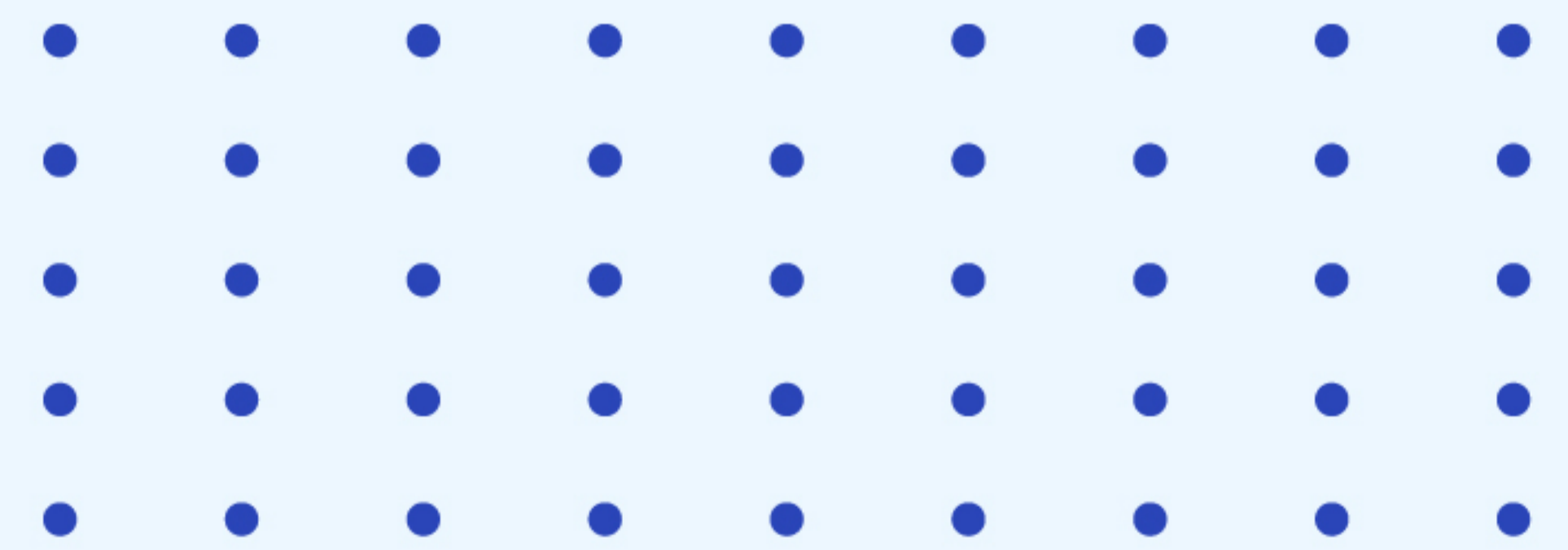
# DNext Integration Approaches

Business Case

Sample Integration with Salesforce CPQ,  
ServiceNow ITSM



Dec 2023



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# 1. Executive Summary

## 1.1. About DNext

DNext (the Next) is the Cloud-Native Customer Engagement, Order Orchestration and Catalog/Inventory Management Platform by DNext that comprises suite of related Lego-stye modules conforming to the specific needs of customers. DNext enables transformation from the present mode of application silo-based BSS/OSS systems to the Next future mode of platform-based execution; aligned to TMFORUM's (ODA) Open Digital Architecture (Ref. [3]), which offers an industry-agreed blueprint and common terminology providing pragmatic transformation paths from monolithic, legacy software solutions, towards scalable, cloud-based platforms that can be orchestrated with artificial intelligence-driven analytics.

*In this context, DNext product suite is positioned to play a vital role within the Digital Transformation strategies of the next generation Communication Service Provider (aka Telecom Service Operator) with its industry standards-compliant, cloud-native, and ready to scale Lego-style components, with each component exposing TM-FORUM open APIs resulting in a model-driven modular set of capabilities ready to be orchestrated and integrated in line with the business processes of the service operator.*

## 1.2. About this White Paper

Considering the digital transformation journey of Communication Service Providers (aka operators), from maintaining monolithic, legacy software solutions, towards managing nimble, cloud-based Lego capabilities that can be orchestrated using AI, most operators have already invested in various functional domains of the end-to-end business stack such as CPQ (aka Order Capture) or IT Service Management.

In this context, this White Paper introduces a high-level architectural framework that demonstrates how the integration of the DNext Product with Salesforce CPQ and ServiceNow ITSM is achieved assuming:

- Sales Force CPQ is deployed and responsible for:
  - ✦ Sales catalog, pricing, availability/eligibility/compatibility
  - ✦ Managing Sales Journey (aka Order Capture)
- DNext Core Commerce Suite is deployed and responsible for:
  - ✦ Product Catalog/Specification Management; holding only business dependency/bundling rules from fulfillment perspective.
  - ✦ Product Inventory Management (optional)
  - ✦ Business Product Fulfillment/Orchestration Configuration and Execution
- DNext Production Suite is deployed and responsible for:
  - ✦ Service/Resource Catalog/Specification Management
  - ✦ Service/Resource Inventory Management
  - ✦ Service/Resource Fulfillment/Orchestration Configuration and Execution
- ServiceNow is deployed and responsible for:
  - ✦ ITSM-IT Service Management (tracking/managing incidents, problems, or cases)



## 2. Introduction

### 2.1. About Importance of Integration

In today's ultra-fast-paced and ever changing business world, an organization's ability to operate efficiently, innovate, and adapt in a rapidly changing technological landscape is directly related to the ability of its business/operational systems that are easy to integrate; fostering a more connected and collaborative environment that can drive business growth and success by bringing in not only business agility, but also scalability, interoperability and efficiency.

Thus, integration capabilities of products, including technology, engineering, and business, system integration aspects play a critical role in enabling a complex, yet agile business platforms to operate seamlessly.

### 2.2 Challenges & Gains

System integration: specifically integrating software applications within an organization's IT infrastructure, can be challenging due to the potential complexities involved in integrating disparate technologies and ensuring they work seamlessly together. When implemented correctly integration will lead to the following results and benefits:

- Efficiency and Productivity
- Interoperability; seamless information exchange
- Data Accuracy and Consistency
- Business Scalability, Flexibility and Agility
- System Scalability and Performance
- Innovation and Collaboration
- Reduced Vendor Lock-In
- Industry Regulations Compliance and Security
- Cost Savings



## 2.3. DNext as an Integration-Ready Product Suite

For a vendor product suite to be easily integrated with other platforms within the BSS/OSS ecosystem of the operator, it should possess certain prerequisites that facilitate seamless communication, data exchange and collaboration. DNext, with its architecture and technology stack supports the following characteristics that make it possible for quick, efficient, yet cost effective integration:

- **Open Standards and Open APIs:** DNext is compliant with TMFORUM ODA (Open Digital Architecture) that fosters Lego-style loosely coupled, cloud-native and independently deployable components (aka Microservices) where each component exposes its functionality via industry standard TMFORUM Open APIs
- **Support for Web Services:** DNext modules expose TMFORUM Open APIs via highly scalable restful web services via open TMFORUM (TMF630) rest API guidelines
- **Standard and Open Data Interchange Formats:** DNext modules expose TMFORUM Open APIs via highly scalable restful web services and utilize JSON data format.
- **Modularity and Componentization:** DNext follows TMFORUM ODA and Open API guidelines resulting in highly modular, Lego-style independently deployable separate components. This allows different components to interact as needed without impacting the entire application suite.
- **Authentication and Authorization:** Secure integration requires seamless compliance to authentication and authorization protocols. All DNext components support out of the box role based Access control via OAuth2/OpenID Connect
- **Scalability and Performance:** An application should be able to handle increased loads and maintain good performance levels even when integrated with other systems that may generate additional traffic. DNext components are cloud-native that support dynamic horizontal scalability.
- **Error Handling, Logging and Monitoring:** Effective error handling, correlatable log collection/indexing and performance monitoring of distributed system components of integrated systems is the key to help diagnose and troubleshoot integration issues, improving the reliability of the integrated solution. All DNext components support conventional correlatable log systems and provide out-of-the-box support for monitoring of individual software modules regarding average/min/max transactions, latencies.
- **Event-Driven Architecture:** An event-driven approach allows more scalable, and more loosely coupled asynchronous integration patterns, with registering notification listeners on interested events and reacting to notified events. All DNext back-end modules, support TMFORUM Open API standard event hub/notification patterns and also publish critical changes to industry de facto standard Kafka Event Processing platform
- **Comprehensive Documentation:** Clear and thorough documentation of each module's functionalities, APIs, data structures, and integration methods is crucial for developers who are integrating the application. DNext provides a very comprehensive API documentation.
- **Change Management and Versioning:** A structured approach to managing changes and versioning ensures that updates and changes to the application do not disrupt existing integrations. In this regard, and due to following TMFORUM Open APIs, DNext modules expose their functionality in a backward compatible and API versioning supported fashion.



### 3. Integration Overview

The following diagram depicts a very high level DNext Conceptual Integration map.

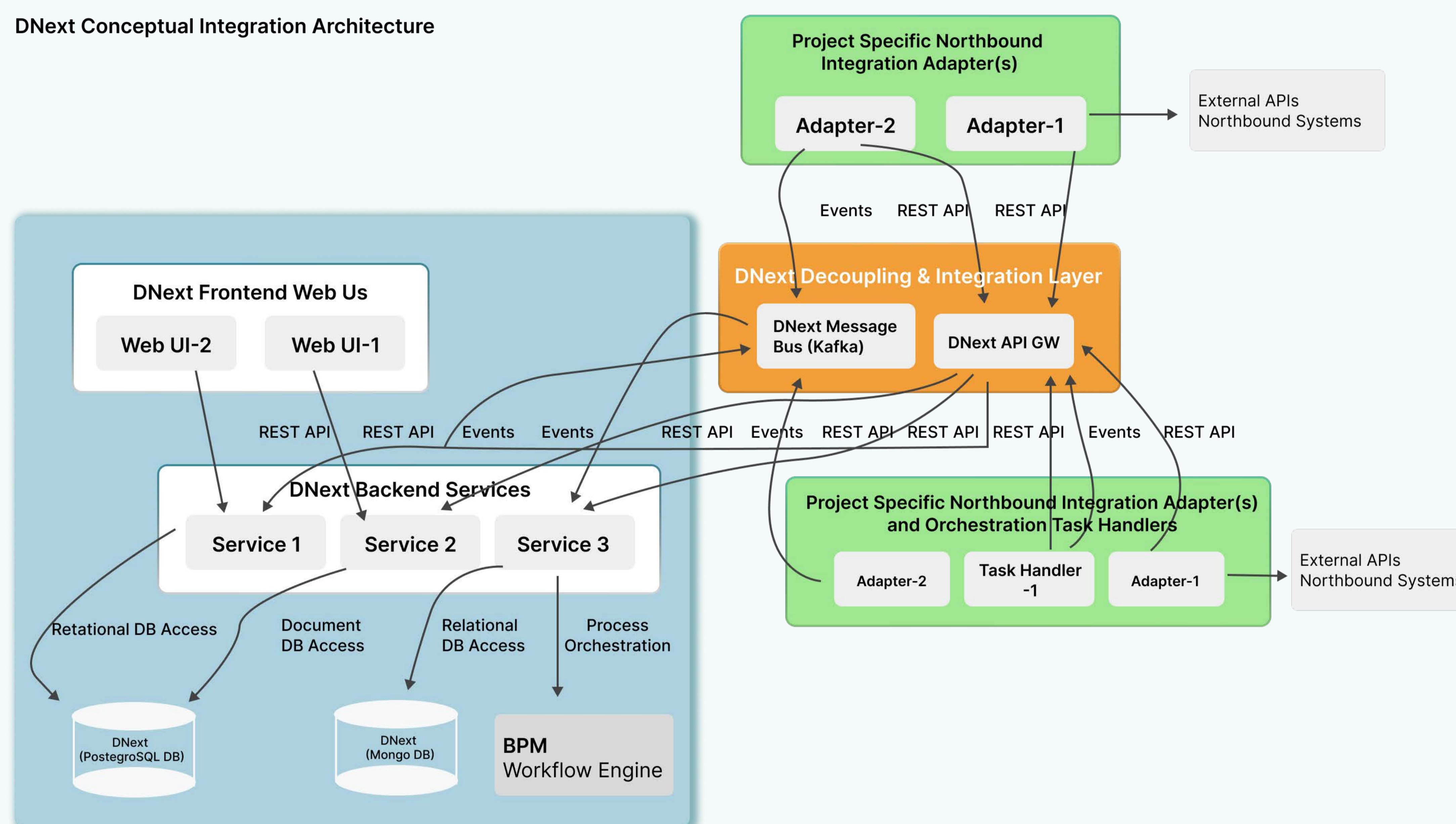


Figure 1: DNext Conceptual Integration Map

As can be seen on the above diagram, DNext provides independently deployable, easy to integrate modular web services with JSON based open interchange data formats, as well as the infrastructure allowing event driven async integration patterns. In a typical project:

- **Project Specific Northbound Integration Adapters** domain contain project specific integration logic that enable DNext Core Order Orchestration/Fulfillment to be integrated with an external CPQ/Order Capture/Market Place system.
- **Project Specific Southbound Integration Adapters** domain contain adapters that enable DNext Core Order Orchestration/Fulfillment and related tasks to be integrated with external ITSM/Case Management Systems or external operational apps, such as project specific 3PP resource/inventory management and/or logistics sub systems.
- **DNext Decoupling & Integration Layer** provides the backbone for:
  - ✦ **API Mgmt:** where all DNext Modules expose their functionalities as web services via conventional API GWs of operator's choice.
  - ✦ **Event Mgmt:** where DNext modules out-of-the-box support TMFORUM Open API compliant web service based async listener registration/event notification APIs
  - ✦ **Event Mgmt:** where DNext modules publish events on entities managed by DNext components to external Event Store/Processing Platform (Kafka) for the interested/subscribed external clients.



## 4. Business Case

Most large enterprises including Communication Service Providers (CSPs, aka Telecom Operators) naturally maintain, invest, and utilize different product offerings from multiple vendors. Especially, with the uptake of service oriented distributed systems blended with supplementary cloud-based software as service offerings, telecom operators do not transform their business stack as part of digitalization journey with a big bang approach.

Therefore, it becomes crucially vital for a product to be able to support, if not all, most of the characteristics that make it possible for an easy to integrate product. (Please refer to section 2.3 as such properties listed and provided for DNext)

The following diagram envisages such a business case where DNext is positioned mainly as the Orchestration/Fulfillment and Technical Inventory platform, leaving other parts of functionality to the 3PP external vendor applications, such as CPQ/Order Capture, Billing, ITSM/ Case Management etc.

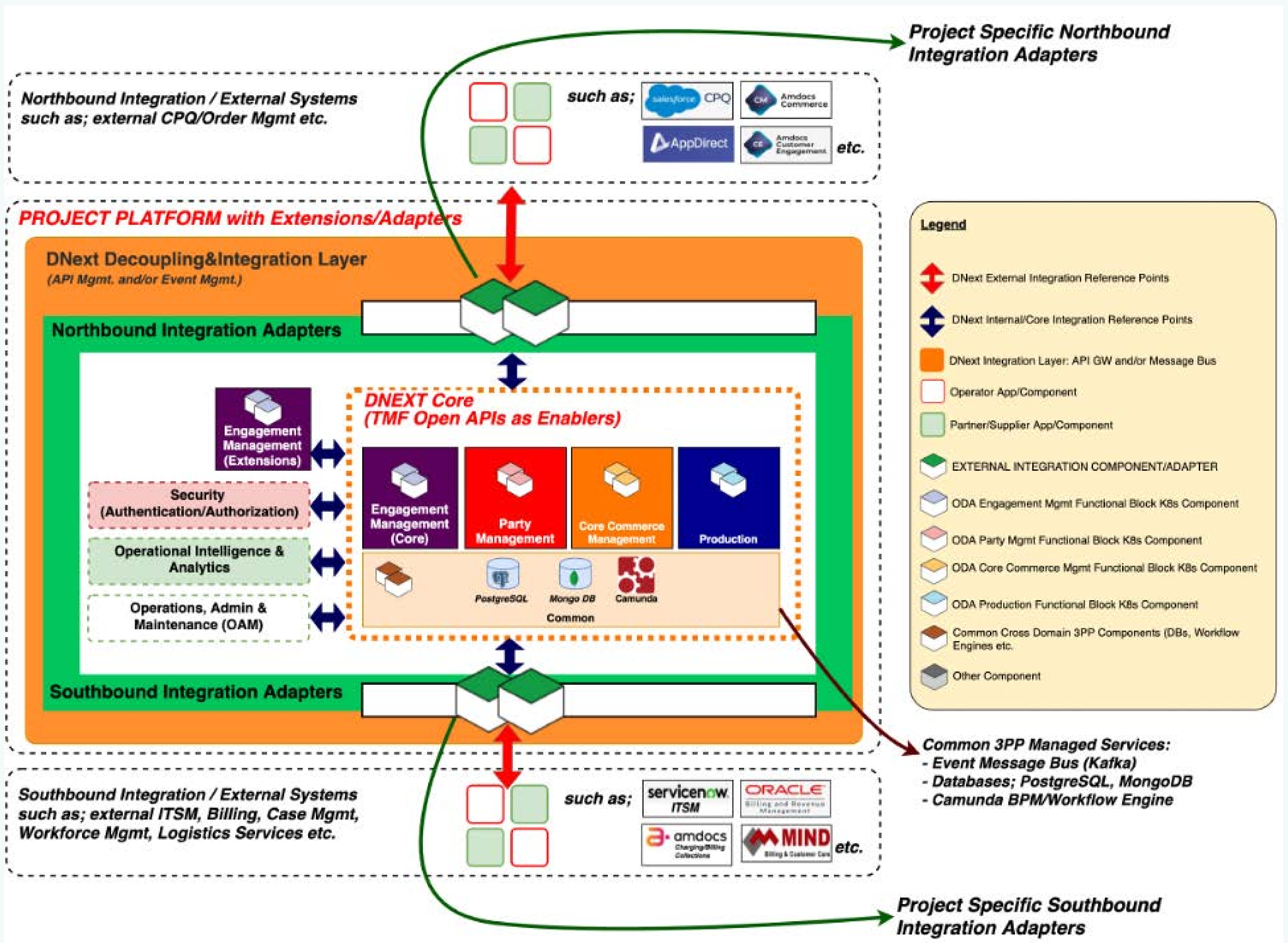


Figure 2: Business Case



## 5. Sample Integration Architecture

The following diagram depicts the high-level Integration Architecture and Approach for the specific Business Case where:

- DNext deployed as commercial/technical order orchestrator/fulfillment engine and inventory management subsystem.
- Salesforce CPQ is responsible for Order Capture
- ServiceNow ITSM is responsible for ITSM/Case Management

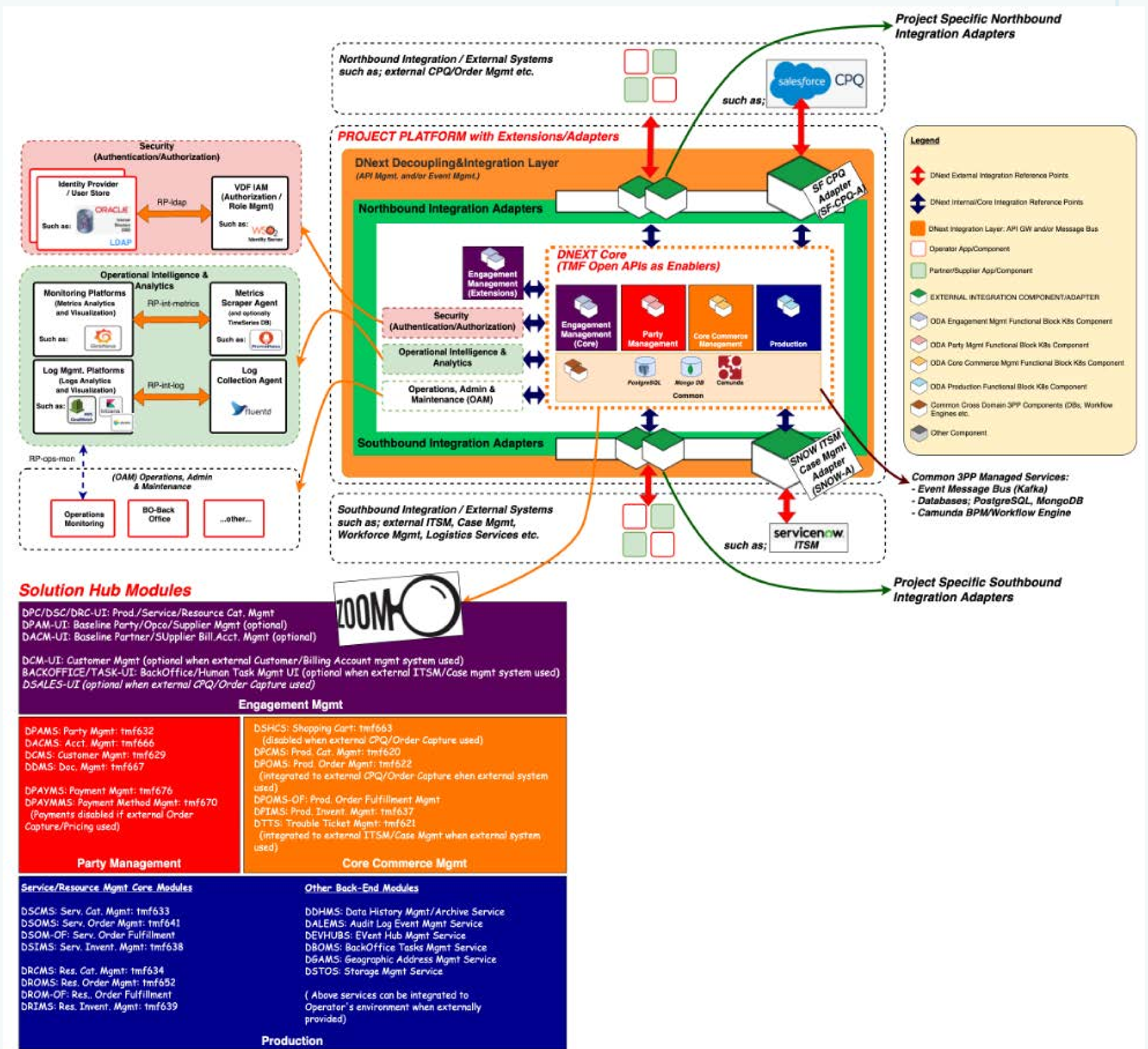


Figure 3: Sample Integration Architecture



The following sections provide the catalog of components that constitute the Sample Integration Architecture providing details on supported/exposed APIs and/or integration **Reference Points (RP)** starting from the outermost layer (higher level) and continuing with the DNext Core Modules grouped as per TMFORUM ODA functional blocks.

## Definition

**Reference Point (RP):** In this context RPs denote a systematic grouping/classification of related API(s) between any two components (as also used by [3GPP](#) Technical Documents).

Thus, a Reference Point, such as  $RP_{sf-cpq-a}$  denotes/describes one or more API(s) within the bounded context of Salesforce CPQ/Order Capture system DNext Order Management integration, allowing the external Salesforce system/client to have programmatic access to the capabilities provided by DNext platform and be able to exchange information.



## 6. Components, Integration Patterns and APIs

### 6.1. External Systems

This section provides the role and responsibility of the external systems integrated subject to Sample Integration scenario provided in Section 5.

#### 6.1.1. Northbound Integration / External Systems

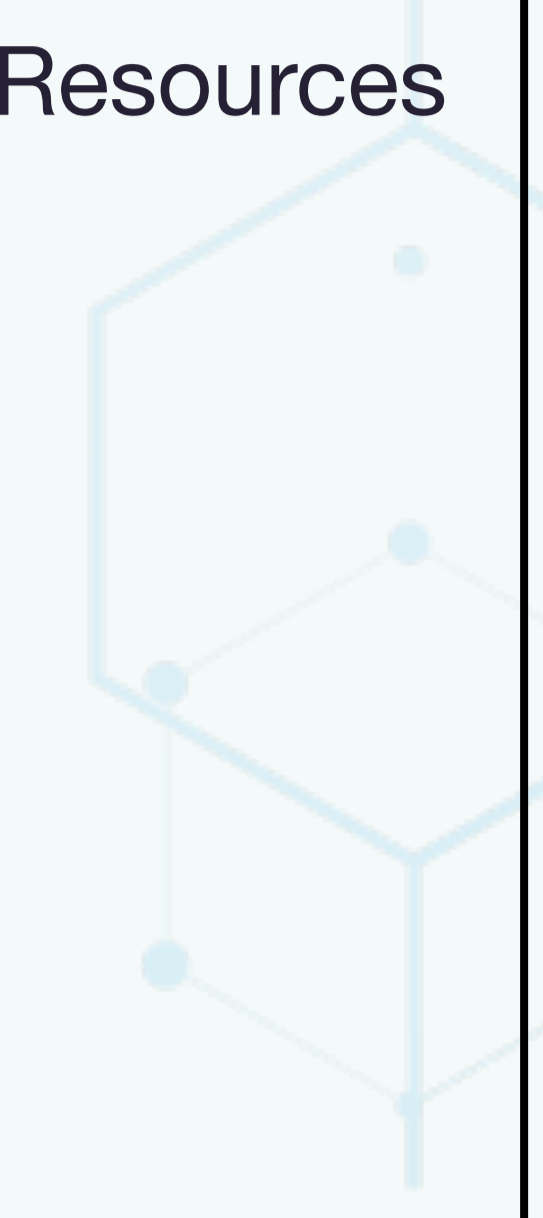
Component	Description	API Spec	Notes / Resources
<p>External CPQ/Order Capture Such as: SalesForce CPQ (aka Industries CPQ), AppDirect etc.</p>	<p>From an end-to-end solution perspective, External CPQ/Order Capture, such as Salesforce Industries CPQ provides marketplace capabilities managing the sales journey considering opportunity/quote/shopping cart including getting list of available sellable items, considering among others availability, eligibility and compatibility rules defined in the sales catalog.</p> <p>The output of External CPQ (depending on chosen technology) can be a proprietary quote, shopping cart or a confirmed order placed against DNext Order Management Subsystem.</p>	<p>Please refer to Documentation of chosen product, such as <a href="#">SalesForce CPQ Integration</a></p>	

#### 6.1.2. Southbound Integration / External Systems

Component	Description	API Spec	Notes / Resources
<p>External ITSM Service/Case/Issue Management Such as: ServiceNow ITSM</p>	<p>From an end-to-end solution perspective, External ITSM/Case/Issue Management, such as Salesforce Customer Service Management provides capabilities especially in service fulfillment and operations area. External ITSM, working in harmony with the Order/Service Management systems like DNext supplements the end-to-end journey when cases, issues or human tasks arise that need to be managed across different functions/departments of the operator to ensure service delivery.</p> <p>DNext Order Management Subsystem and associated activities, may be integrated and utilize the facilities provided by External ITSM for edge scenarios that may arise or for complex cases that involve service transitions that may require manual interventions.</p>	<p>Please refer to Documentation of chosen product. <a href="#">ServiceNow Integration Interfaces</a></p>	



## 6.2. DNext Decoupling and Integration Layer

Component	Description	API Spec	Notes / Resources
<p>(DEVHUBS) DNext Event Hub Service</p> <p>API Mgmt Such as: WSO2, APIGEE etc.</p>	<p><b>Event Hub Service API</b> Event Hub Service API provides centralized services for Topic, Event, Hub and Notification Management allowing external clients to register a callback URL and be notified (event details posted to registered callback URL) when a registered event occurs.</p> <p>Note that compliant to TMFORUM, each individual DNext component also provides event hub listener registration and notification callback o registered listeners.</p> <p><b>API Gateway</b> API Gateway accepts API calls from proprietary external systems/clients, proxy them to the appropriate DNext components. Within the DNext Architecture, API Gayeway Maybe utilized as needed for the following capabilities:</p> <ul style="list-style-type: none"> <li>• Flexible routing, composition, and protocol translation</li> <li>• Traffic throttling (API rate-limiting)</li> <li>• Provide external interfaces for clients for a secure API access layer with user/role-based security.</li> </ul>	<p>TMF688</p> <p>Please refer to Documentation of chosen product.</p>	
<p>Event Mgmt Such as: Kafka</p>	<p>Event Mgmt denotes a highly scaleable eventstore/messaging/streaming system.</p> <p>DNext utilizes Apache Kafka, an open-source, distributed event streaming platform for high-performance data pipelines, streaming analytics.</p> <p>In the context of DNext, DNext modules emit entity changes to configurable Kafka topics, such as Account Creation,Party Update, OrderStatusChanged etc. Thus, subscribed/interested external systems can be integrated to DNext in an asynchronous fashion.</p>	<p><a href="#">Kafka Documentation</a></p>	



### 6.2.1. API Management vs DNext Integration Modules: Roles and Functions

All DNext Integration Adapters exchange information and expose/access web services via the API GW. Thus, the split of what capability is to lie down within the boundary of API GW versus within DNext Integration Adapter is crucial to prevent bad integration practices. The following are the roles and functions that shall be handled within the API Gateway and NOT within the project specific custom DNext integration adapters:

- **API Routing and Aggregation:** API Gateway is responsible for incoming requests from/to external systems to/from DNext. Aggregation of multiple service calls into a single request to reduce the number of roundtrips and to improve performance is to be handled within the API GW and not hardcoded into DNext Integration Adapter(s).
- **External Load Balancing/Traffic Management/Rate Limiting:** The API Gateway will be distributing/distribute incoming requests to DNext across multiple instances of the same service to ensure even resource utilization and high availability. Whenever, throttling, rate limiting etc. required, such logic will not be implemented in DNext Integration Adapter(s)
- **Authentication and Authorization:** Different systems may be using different authentication policies. In such cases, API Gateway handles authentication and authorization alignment, ensuring that only authorized clients can access DNext specific services. It can enforce various access controls/grant types (client credentials, password, authorization code based etc.), verify user identities, and manage API keys or tokens.
- **Extended Security Requirements:** Whenever projects require extended security requirements to prevent DDoS (Distributed Denial of Service) attacks and SQL injection etc. implementation of such functionality is to be within the API GW.
- **Stateless Caching:** Stateless caching of data for performance is to be handled within the API to reduce the load on DNext services and improve response times for frequently requested data. DNext Integration Adapters are not polluted with such non-functional logic.
- **Logging and Monitoring:** API Gateways can log incoming requests and responses, providing valuable insights into usage patterns, errors, and performance issues. This data helps in debugging and monitoring.
- **Simple Data Transformation/Mapping:** An API Gateway can transform data formats between clients and backend services, ensuring that data is presented in the appropriate format for each party. In cases, where business logic agnostic technical transformation/data mapping required between an external system and DNext, API GW shall be used. However, if for the same interface, mapping/transformation of data varies for different business solutions, such business-related transformation and data mapping is handled within DNext Integration Adapters.
- **Version Management:** API Gateway will handle versioning of DNext Integration APIs exposed by DNext Integration Adapters, allowing clients to continue using older versions while new versions are developed and deployed.



## 6.3. Northbound/Southbound Integration Adapters

### 6.3.1. Roles and Functions supported by all Integration Adapters

Please refer to section 6.2.1 for supplementary roles and functions that will be handled within API GW domain and be utilized by this Integration Adapter.

DNext Integration Adapters are the project specific integration modules that can be independently deployed providing the relevant integration capabilities for the related business scope. The following are the roles and functions that shall be handled by all DNext Integration Adapters:

- **Business Specific and/or Stateful Data Transformation/Mapping:** In cases, where business logic agnostic technical transformation/data mapping required between an external system and DNext, API GW shall be used. However, if for the same interface, mapping/transformation of data varies for different business solutions, such business-related transformation and data mapping is handled within DNext Integration Adapters.
- **Business Specific Logging and Monitoring:** Log incoming/outgoing integration requests and responses, with valuable insights into usage patterns, errors, and performance issues. The logs are correlatable with all other DNext components making it possible for easy operations and root cause analysis, debugging and monitoring purposes.
- **Business Analytics and Metrics:** All DNext Integration Modules will be generating analytics/metrics data that can be collected by conventional monitoring agents allowing analysis of related integration API usage, throughput, response times, and other metrics.

### 6.3.2. SF-CPQ-A: Sales Force CPQ Integration Adapter Approach

SF-CPQ-A enables placement of orders captured by Salesforce/CPQ onto DNext Order Management Subsystem.

SalesForce Industries CPQ can be integrated to other external order management systems, such as DNext. The preferred approach will be to utilize the REST API integration interfaces provided by Salesforce as required.

SalesForce CPQ can be configured how it interacts with external order management systems, like DNext. Salesforce Order Management Integration Layer exposes an interface that can accept notifications from external order management systems, like DNext. So, the following Salesforce API sets will be considered as part of integration:

- [Invoke the Order Management Integration Layer](#)

Invoke the Order Management Integration Layer through a REST API call.

- **Submit Order Notifications:**
  - [Submit Order Accepted](#)
  - [Submit Order Provisionally Accepted](#)
  - [Order Rejected](#)
- **Order-Level Notifications:**
  - [Order Accepted](#)
  - [Order Activated](#)
  - [Order In Progress](#)
  - [Order Queued](#)
  - [Order Rejected](#)



- Order Item-Level Notifications:
  - [OrderItem Accepted](#)
  - [OrderItem Activated](#)
  - [OrderItem Assetized](#)
  - [OrderItem In Progress](#)
  - [OrderItem Rejected](#)
- [Order Management Integration Layer Messages Initiated by CPQ](#)  
Messages initiated by Salesforce/CPQ to DNext
  - [Submit Order Request](#)
  - [Freeze Order Request](#)
  - [Unfreeze Order Request](#)

The following are additional integration capabilities supported by Salesforce, but are not assumed to be considered in the context of SF-CPQ-A

- [DataRaptor Setup for Order Management Integration Layer](#)  
Order Management Integration Layer requires the OrderBackSync and OrderItemBackSync DataRaptors to update order records.
- [Create Hooks for Odin Notification Handlers](#)  
Odin Notification Handler APIs provide an option to let you write custom pre and post-hooks for each API to implement custom logic.

### 6.3.3. SNOW-A: ServiceNow ITSM Adapter Approach

ServiceNow ITSM provides scalable REST APIs that allow integration and exchange of order/service/resource fulfillment activity information working in harmony with the Order/Service Management systems like DNext supplementing the end to end journey when cases, issues or human tasks arise that need to be managed across different functions/departments of the operator to ensure service delivery.

Referring to the ServiceNow [REST API Reference](#), some of the following API sets (including, but not limited to) that will be considered as part of integration:

- [Customer Central API](#)  
The Customer Central API provides endpoints to access customer information and configuration details.
- [Account API](#)  
The Account REST API enables you to retrieve and update Customer Service Management (CSM) account records.
- [Email API](#)  
The Email API provides endpoints that enable you to receive and send email messages using REST
- [Case API](#)  
The Case API provides endpoints that enable you to retrieve and update Customer Service Management (CSM) case records.



## 6.4. Security

Component	Description	API Spec	Notes / Resources
<p>IAM – Identity and Access Mgmt Such as: Keycloak, WSO2</p> <p>IDP/User Store Such as: Oracle IDP</p>	<p>Provides the infrastructure and services enabling authorization and role-based access management. DNext supports OAuth 2.0 / OpenID Connect authorization protocols.</p> <p>All DNext modules can be configured out-of-the-box with RBAC (Role Based Access Control)</p> <p>IAMs also provide out-of-the-box user management/authentication capabilities. However, in large enterprises, typically multiple IDPs are integrated to IAM, where IAM acts as the federated identity management system. Simply, integrated with IAM, IDP acts as the source of truth authenticating user identities.</p>	<p>Please refer to documentation of chosen product.</p> <p>Please refer to documentation of chosen product.</p>	

## 6.5. Operational Intelligence & Analytics

Component	Description	API Spec	Notes / Resources
<p>Log Collection Agent Such as: FluentD</p> <p>Log Mgmt. And Search System Such as: ElasticSearch, CloudWatch etc.</p>	<p>Fluentd is an open-source data collector for a unified logging layer. FluentD compliant to K8s deployments for collection of relevant LOG streams.</p> <p><i>FluentD is utilized as a Logging Agent as part of K8s based deployment.</i></p> <p>CloudWatch is a service by AWS and collects monitoring and operational data in the form of logs, metrics, and events and can also be used to analyze (Log Insights) and visualize it via configurable dashboards.</p> <p>CloudWatch comes with its internal data store/index engine as well as visualization front end.</p> <p>ElasticSearch is a distributed, free and open search and analytics engine/datastore for operational log management.</p>	<p><a href="#">FluentD Documentation</a></p> <p><a href="#">AWS CloudWatch Documentation</a></p> <p><a href="#">Elastic Stack Product Documentation</a></p>	



Component	Description	API Spec	Notes / Resources
<p>Metrics Scraper Agent Such as: Prometheus</p>	<p><i>Prometheus</i> is an open-source systems monitoring and alerting system originally built at SoundCloud. Typically it contains the following components</p> <ul style="list-style-type: none"> <li>• A data scraper that pulls metrics data over HTTP periodically at a configured interval.</li> <li>• A time-series database to store all the metrics data.</li> <li>• A simple user interface where you can visualize, query, and monitor all the metrics. Typically the User Interface capabilities of Prometheus are NOT used and may be delegated to a dedicated tool (such as Grafana) for Monitoring Platform purposes (Please refer to next Component below)</li> </ul>	<p><a href="#">Prometheus Documentation</a></p>	
<p>Monitoring Platforms (Metrics Analytics and Visualization) Such as: Grafana, Kibana, AWS CloudWatch etc.</p>	<p><i>Grafana</i> is a multi-platform open source analytics and interactive visualization web application. It provides charts, graphs, and alerts for the web when connected to supported data sources.</p> <p>Grafana may also be used for both Log Mgmt and Monitoring purposes as it allows to bring data from various data sources like Elasticsearch, Prometheus, Graphite, InfluxDB etc, and visualize them.</p> <p>Kibana is an free and open frontend web UI application that sits on top of the Elasticsearch, providing search and data visualization capabilities for log data indexed in Elasticsearch</p>	<p><a href="#">Grafana Documentation</a></p> <p><a href="#">AWS CloudWatch Documentation</a></p> <p><a href="#">Elastic Stack Product Documentation</a></p>	



## 6.6. DNext Core

This section provides an overview of critical TMFORUM Open API complaint DNext components as listed on Figure 3: Sample Integration Architecture. For a full list, please refer to DNext Reference documentation.

### 6.6.1. Engagement Management (Web-UIs)

Component	Description	Web-UI Type	Notes / Resources
(DPCMS-UI) Product Catalog Management Service UI	Provides Front End(s) for 360° management of Product Catalog items	Kernel	
DSCMS-UI) Service Catalog Management Service UI	Provides Front End(s) for 360° management of technical Service Catalog items	Kernel	
(DRCMS-UI) Resource Catalog Management Service UI	Provides Front End(s) for 360° management of technical Resource Catalog items	Kernel	
DPAMS-UI) Party Management Service UI	Allows users to search, add and manage Individual / Organization Parties.	Kernel	
(DACMS-UI) Account Management Service UI	Provides an environment to manage billing and settlement accounts, as well as financial accounts.	Kernel	
(DCRM-UI) Customer Relationship Management UI v1.1	Provides Front End(s) for 360° Customer and Account information management	Non-Kernel	<i>Not required as external CPQ in use</i>
DBOMS-UI) BackOffice UI	Provides Front End(s) for back-office management; order assessment, tracking and manipulation of submitted orders	Non-Kernel	<i>Optional as external ITSM in use</i>
(DSALES-UI) Sales Omni UI	Provides Front End(s) for 360° management of omni-channel Sales and Order Capture process until checkout and submission of the order	Non-Kernel	<i>Not required as external CPQ in use</i>
(DTTS-UI) Trouble Ticket Management Service UI	Provides Front End(s) for Trouble Ticket Management	Non-Kernel	<i>Not required as external ITSM in use</i>



## 6.6.2. Party Management

Component	Description	API Spec (Swagger)	Notes / Resources
(DPAMS) Party Management Service	<p><b>Party Management Service API</b></p> <p>The Party Management Service API provides a standardized mechanism for party management such as creation, update, retrieval, deletion. It also supports the notification/streaming of API-related events. Party can be an individual or an organization that has any kind of relationship with the enterprise. Party is created to record individual or organization information before the assignment of any role. For example, within the context of a split billing mechanism, Party API allows the creation of the individual or organization that will play the role of 3rd payer for a given offer and, then, allows consultation or update of his information.</p>	TMF632	
(DACMS) Account Management Service	<p><b>Account Management Service API</b></p> <p>Account API provides services for Party Account information management. It also supports the notification/streaming of API-related events.</p> <p>In this context Account is the abstract financial entity managed by this interface (so all implementations of Account as financial and partyAccount) are managed via this API.</p>		
(DPRMS) Party Role Management Service	<p><b>Party Role Management Service API</b></p> <p>The Party API provides a standardized mechanism for managing roles of party(ies) and/or assignment/unassignment of roles to/from party(ies). It also supports the notification/streaming of API-related events.</p>	TMF669	
(DCMS) Customer Management Service	<p><b>Customer Management Service API</b></p> <p>Provides services for Customer information management. It also supports the notification/streaming of API-related events.</p> <p>Customer is a Party with a special Party Role=Customer. Since Customer is such a ubiquitous and critical role, as per TMF Open APIs DNext also provides a dedicated API for it.</p>	TMF629	<i>Optional</i>
(DDMS) Document Management Service	<p><b>Document Management Service API</b></p> <p>Document Management Service API provides a consistent/standardized mechanism to create new documents, delete existing documents, retrieving information about uploaded documents. It also supports the notification/streaming of API-related events.</p> <p>Examples of Documents handled by the Document service include scanned passport details or other identification documents, Agreement documents, Customer Bill, etc</p>	TMF667	<i>Optional</i>
(DPAYMS) Payment Management Service	<p><b>Payment Management Service API</b></p> <p>Provides services for Payment Management</p>	TMF676	<i>Not required as pricing is handled by Salesforce</i>
Not required as pricing is handled by Salesforce	<p><b>Payment Method Management Service API</b></p> <p>Provides services for Payment Method Management</p>	TMF670	<i>Not required as pricing is handled by Salesforce</i>



### 6.6.3. Core Commerce Management

Component	Description	API Spec	Notes / Resources
(DSHCS) Shopping Cart Service	<p><b>Shopping Cart Service API</b></p> <p>The Shopping Cart Service API provides a standardized mechanism for the management of shopping carts. It also supports the notification/streaming of API-related events.</p> <p>The shopping Cart entity is used for the temporary selection and reservation of product offerings in e-commerce and retail purchase.</p> <p>A shopping cart supports the purchase of both tangible and intangible goods and services (e.g. handset, telecom network service). The charge includes the one-off fee such as the fee for the handset and the recurring fee such as the fee of a network service.</p> <p>Shopping Cart contains the list of cart items, a reference to a party or party role (e.g. customer) or contact medium in case of an unknown customer, In addition, the calculated total items price including promotions.</p>	TMF663	<p>Not required as external CPQ/Order Management in use</p>
(DPCMS) Product Catalog Management Service	<p><b>Product Catalog Management Service API</b></p> <p>Product Catalog Management Service API goal is to provide a catalogue of commercial products offerings. Product Catalog API provides a standardized solution for rapidly adding products offering and specifications to an existing Catalog.</p> <p>It brings the capability for Service Providers to directly feed partners systems with the technical description of the products they propose to them.</p>	TMF620	
(DPOMS) Product Ordering Management Service	<p><b>Product Ordering Service API</b></p> <p>The Product Ordering Service API provides a standardized mechanism for placing a product order with all of the necessary order parameters. The API consists of a simple set of operations that interact with CRM/Order Negotiation systems in a consistent manner. A product order is created based on a product offer that is defined in a catalog. The product offer identifies the product or set of products that are available to a customer and includes characteristics such as pricing, product options and market.</p> <p>Once Product Order is accepted, Product Ordering API triggers a catalog driven dynamic order fulfillment BPMN process (ant associated sub BPMN processes) managed by DPOM-OFS. The API covers a task-based resource to request Order Cancellation. It also supports the notification/streaming of API-related events.</p>	TMF622	
(DPOM-OFS) Product Order Fulfillment Service	<p><b>Product Order Fulfillment Service API (Internal)</b></p> <p>The Product Order Fulfillment Service API is an internal API endpoint, in which for a placed order via DPOMS, DPOM-OFS manages the entire lifecycle of configurable fulfillment workflow with all its subtasks.</p>	REST-API, Kafka	



Component	Description	API Spec	Notes / Resources
(DPIMS) Product Inventory Management Service	<p><b>Product Inventory Management Service API</b> The Product Inventory Management API provides a standardized mechanism for product inventory management such as for creation, update, and retrieval of the representation of a product in the inventory. It also supports the notification/streaming of API-related events.</p>	TMF637	
(DTTS) Trouble Ticket Service	<p><b>Trouble Ticket Service API</b> The Trouble Ticket Service API provides a standardized client interface to Trouble Ticket Management Systems for creating, tracking and managing trouble tickets as a result of an issue or problem identified by a customer or another system. It also supports the notification/streaming of API-related events.</p>	TMF621	

### 6.6.3. Production Management

Component	Description	API Spec	Notes / Resources
(DSCMS) Service Catalog Management Service	<p><b>Service Catalog Management Service API</b> The Service Catalog Management Service API allows the management of the entire lifecycle of the Service Catalog elements and the consultation of service catalog elements during several processes, such as service ordering process. It also supports the notification/streaming of API-related events.</p>	TMF633	
(DSOMS) Service Ordering Management Service	<p><b>Service Ordering Management Service API</b> A Service Ordering Management Service API provides a standard mechanism for placing a Service Order with all necessary order parameters. The API covers a task-based resource to request Order Cancellation. It also supports the notification/streaming of API-related events. A Service Order is created based on a Service Specification (made available in Service Catalog via Service Candidate entity).</p>	TMF641	
(DSOM-OFS) Service Order Fulfillment Service	<p><b>Service Order Fulfillment Service API (Internal)</b> The Service Order Fulfillment Service API is an internal API endpoint, in which for a placed order via DSOMS, DSOM-OFS manages the entire lifecycle of configurable fulfillment workflow with all its subtasks.</p>	REST-API, Kafka	
(DSIMS) Service Inventory Management Service	<p><b>Service Inventory Management Service API</b> The Service Inventory Management Service API provides a standardized mechanism for service inventory management such as creation, update, and retrieval of the representation of a service in the inventory. It also supports the notification/streaming of API-related events.</p>	TMF638	



Component	Description	API Spec	Notes / Resources
(DRCMS) Resource Catalog Management Service	<p>Resource Catalog Management Service API</p> <p>The Resource Catalog API allows the management of the entire lifecycle of the Resource Catalog elements and the consultation of resource catalog elements during several processes such as resource ordering process. It also supports the notification/streaming of API-related events.</p>	TMF634	
(DROMS) Resource Ordering Management Service	<p>Resource Ordering Management Service API</p> <p>A Resource Ordering Management API provides a standard mechanism for placing a Resource Order with all necessary order parameters. The API covers a task-based resource to request Order Cancellation. It also supports the notification/streaming of API-related events. A Resource Order is created based on a Resource Specification (made available in Resource Catalog via Resource Candidate entity).</p>	TMF652	
(DROM-OFS) Resource Order Fulfillment Service	<p>Resource Order Fulfillment Service API (Internal)</p> <p>The Resource Order Fulfillment Service API is an internal API endpoint, in which for a placed order via DROMS, DROM-OFS manages the entire lifecycle of configurable fulfillment workflow with all its subtasks.</p>	REST-API, Kafka	
(DRIMS) Resource Inventory Management Service	<p>Resource Inventory Management Service API</p> <p>The Resource Inventory Management Service API provides a standardized mechanism for resource inventory management such as creation, update and retrieval of the representation of a resource in the inventory. It also supports the notification/streaming of API-related events.</p>	TMF639	
(DDHMS) Data History Management Service	<p>Data History Management Service API</p> <p>Provides services for Data History Management</p>	Kernel Kafka	
(DALEMS) Audit Log Event Management Service	<p>Audit Log Event Handler Service API</p> <p>This Service API provides a standardized client interface for managing audit logs</p>	(DNext Internal) Kafka	
(DEVHUBS) DNext Event Hub Service	<p>Event Hub Service API</p> <p>Event Hub Service API provides centralized services for Topic, Event, Hub and Notification Management allowing external clients to register a callback URL and be notified (event details posted to registered callback URL) when a registered event occurs.</p> <p>Note that compliant to TMFORUM, each individual DNext component also provides event hub listener registration and notification callback o registered listeners.</p>		
(DBOMS) BackOffice Management Service	<p>BackOffice Management Service (internal)</p> <p>BackOffice Management Service provides task management for all tasks including personal tasks, and completed tasks.</p>	(DNext Internal) REST-API, Kafka	



Component	Description	API Spec	Notes / Resources
(DGAMS) Geographic Address Management Service	<p><b>Geographic Address Management Service API</b></p> <p>The Geographic Address Management Service API provides a standardized client interface to an Address management system. It allows looking for worldwide addresses. It can also be used to validate geographic address data, to be sure that it corresponds to a real geographic address. Finally, it can be used to look for a geographic address by: searching an area as a start (city, town ...), then zooming on the streets of this area, and finally listing all the street segments (numbers) in a street.</p>	TMF673	
(DSTOS) Storage Service	<p><b>Storage Service API</b></p> <p>This Service API provides a standardized client interface for virtualized storage services.</p>	(DNext Internal) REST-API	

## 7. Conclusion and Project References

As detailed in previous sections of the document, DNext (the Next) is the Cloud-Native Customer Engagement, Order Orchestration and Catalog/Inventory Management Platform by PiA that comprises suite of related Lego-stye modules conforming to the specific needs of customers.

For a vendor product suite to be easily integrated with other platforms within the BSS/OSS ecosystem of the operator, it should possess certain prerequisites that facilitate seamless communication, data exchange and collaboration. DNext, with its architecture and technology stack supports the following characteristics that make it possible for quick, efficient, yet cost effective integration:

- Open Standards and Open APIs
- Support for Web Services (TMFORUM Open APIs)
- Standard and Open Data Interchange Formats
- Modularity and Componentization
- Authentication and Authorization
- Scalability and Performance
- Error Handling, Logging and Monitoring
- Event-Driven Architecture
- Comprehensive Documentation
- Change Management and Versioning

DNext (available upon request) has many Telecom Operator Project references that are already in-production and with heavy system integration requirements fulfilled. Some of the 3PP systems successfully integrated with DNext in these projects are as the following:



- AppDirect: A Cloud based commerce/market place platform that can provide CPQ/Order Capture capabilities
- Amdocs: Billing&Charging
- MindCTI: Billing&Charging
- Oracle BRM: Billing
- SAP ERP: Inventory Management
- Mirakl: SaaS (software-as-a-service) solution chosen by leading enterprises worldwide to manage their third-party marketplace
- PEGA: Customer Value Management system
- Faveo HelpDesk and Ticketing: A Cloud based & Self Hosted award winning helpdesk ticketing system
- Datadog: A Cloud based observability and log management service for distributed and cloud native platforms
- AWS CloudWatch: Amazon Cloud based log collection, analysis and visualization service to streamline application maintenance.
- ElasticSearch/Kibana: A Cloud deployable distributed, RESTful search and analytics engine capable of addressing a growing number of data such as logs, events. When used with its data analysis/visualization dashboard Kibana
- Prometheus/Grafana: A Cloud deployable open-source monitoring system with a dimensional data model, flexible query language, efficient time series database used for real-time metric collection and tracking. When used with Grafana additional interactive analytics and data visualization dashboards can be utilized. Grafana may also be utilized instead of Kibana on ElasticSearch
- WSO2 and Keycloak: Identity Access Management
- APIGEE/WSO2: API Gateway