Activities toward TM Forum Frameworx 17.0 and TM Forum Live! 2017 Report

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Abstract

TM Forum is the global industry association related to telecom business operations. It specifies standard business processes, information models, applications (function deployment), and interfaces for achieving digital services in a reference model called Frameworx. The NTT Group conducts surveys and gathers information on putting TM Forum specifications to practical use. It also proposes requirements necessary to provide B2B2X (business-to-business-to-X) services and to manage end-to-end processes including virtualized environments and reflects those requirements in TM Forum documents. This article provides an overview of TM Forum and introduces the activities of the NTT Group at TM Forum including those at TM Forum Live! 2017.

Keywords: TM Forum, Frameworx, Catalyst

1. Introduction

TM Forum [1] is a non-profit industry association founded as the Open Source Initiative/Network Management (OSI/NM) Forum in 1988. The organization presently has more than 850 member companies and brings together more than 90,000 engineers and technicians to study industry standards in the field of operations and to promote interoperability. Specifically, TM Forum biannually releases a revised edition of documents called Frameworx that compiles business processes, information models, applications (function deployment), and interfaces as standards related to business operations. Furthermore, TM Forum specifies Business Metrics compiling key performance indicators and key quality indicators in the field of operations and Open Application Programming Interfaces (Open APIs) to enable collaboration between operators and other industries in the ecosystem as documents related to Frameworx. The most current release is Frameworx 17.0, with Frameworx 17.5 scheduled for release in December 2017.

In the past, the projects making up Frameworx dominated discussions, but in more recent years, related projects have come to be actively studied to support telecom operators and partners in other industries faced with the challenges of digital transformation. The results of discussions on those projects will be reflected in Frameworx.

TM Forum is also hosting proof of concept projects called Catalyst projects developed by telecom operators and software vendors. The purpose of Catalyst projects is to demonstrate that certain models and specifications formulated by TM Forum can be practically applied in real-world environments.

2. Overview of TM Forum projects

This section presents brief descriptions of the key TM Forum projects underway.

2.1 Work on Frameworx

Frameworx projects have been carried out focusing on the different areas below.

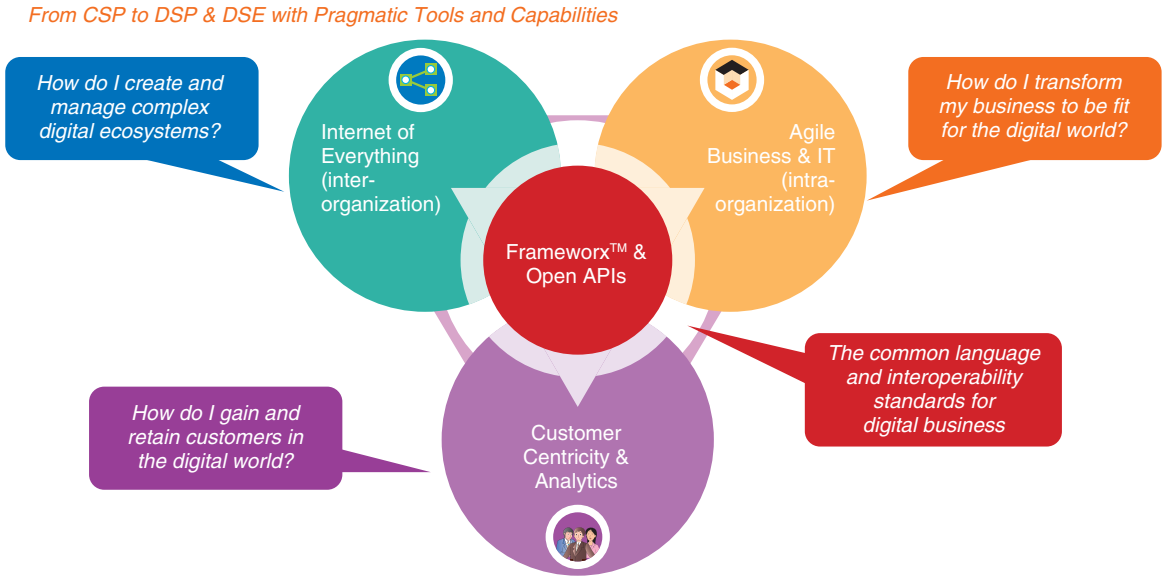


Fig. 1. Frameworx and related projects.

(1) Business Process Framework (eTOM)

The enhanced Telecom Operations Map (eTOM) organizes the business processes of an information-communications service provider on a matrix based on phases along the time axis and management domains.

(2) Information Framework (SID)

The Shared Information/Data model (SID) systematizes the information managed and circulated in a system as an information model rather than a specific data model.

(3) Application Framework (TAM)

The Telecom Application Map (TAM) is a standard framework for organizing and mapping the functions in the operations support system/business support system (OSS/BSS) using relationships between eTOM and SID. Here, the focus in business processes is not only on tasks performed during operations known as FAB (fulfillment, assurance, and billing) but also on strategy (decision-making) and readiness (migration, procurement) from the viewpoints of agility and virtualization.

(4) Integration Framework

The Integration Framework has traditionally contained standards supporting integration and interoperability between applications defined in TAM. These standards are used widely today in the telecom industry, but recent industry trends are now driving the standardization of Digital Services Reference Architecture (DSRA) related to both support and management functions on platform services and APIs based on Representational State Transfer (REST) for achieving collaboration between operators.

2.2 Related projects

Three strategic programs were launched four years ago as a framework for studying the direction of Frameworx extensions (**Fig. 1**) [1]. These programs are based on trends in the telecom industry and are focused on providing business support for introducing virtualization, providing business-to-business-to-X (B2B2X) services, and improving customer value. These three strategic programs are summarized below.

(1) Agile Business & IT (information technology)

This program is centered on operations and security in a virtualized environment. In particular, the Zero-touch Orchestration, Operations and Management (ZOOM) project is focused on exploiting network functions virtualization (NFV) and software-defined networking (SDN) in the operation of virtual networks.

(2) Internet of Everything

This program concerns architecture for achieving

an open digital ecosystem and scenarios such as smart cities based on linked services as typified by IoT (Internet of Things).

(3) Customer Centricity & Analytics

This program explores customer experience management using customer-experience evaluation indices (Business Metrics) and the big data analytics to analyze those metrics.

TM Forum members consider the requirements established in these strategic programs to cross-sectionally discuss the standardization of REST-based APIs in the area of operations of API projects at the implementation level in collaboration with related industry organizations.

2.3 Catalyst projects

At TM Forum, Catalyst projects are organized to demonstrate the effectiveness of TM Forum standards and to refine them. These projects are focused on scenarios created by two or more service providers, including telecom carriers. Catalyst projects are aimed at testing the dynamics of scenarios that are given form by four or more software vendors using TM Forum standards. Catalyst projects are demonstrated at TM Forum events. Project members can receive comments and feedback on their projects there and can promote their reflection in Frameworx and implementation as standards.

Demonstrations of 32 Catalyst projects from the above strategic programs were presented at the TM Forum Live! 2017 conference (a conference featuring keynote speakers, general lectures, Frameworx presentations, Catalyst demonstrations, workshops, and corporate exhibits) [2] held in Nice, France, in May 2017. As a result of these demonstrations, the concerns in standardization activities shifted from reference models to implementation.

3. Activities toward Frameworx 17.0

Discussions were held within the various TM Forum projects on the establishment of Frameworx 17.0 released in September 2017. These efforts, including trends at TM Forum Live! 2017, are summarized in this section.

3.1 Standardization activities in NTT Group

The NTT Group recognizes the weight that TM Forum carries in commercializing OSS products and has therefore been working at TM Forum to reflect NTT Group requirements in TM Forum standards while promoting the improvement of environments (covering technology, deployment, and operation) that can utilize TM Forum-compliant products on the NTT Group side. These activities are centered on the treatment by the NTT laboratories and NTT COMWARE of the Internet of Everything and Agile Business & IT as NTT Group priority areas from the respective viewpoints of B2B2X business and end-to-end (E2E) management including virtualized environments.

The NTT Group expert committee on TM Forum consists of expert members from NTT Group operating companies, with a member of the NTT laboratories serving as head and NTT COMWARE as secretariat. This committee supports NTT Group participation in TM Forum projects, consolidates opinions with respect to TM Forum documents, and shares information on studies and trends at TM Forum.

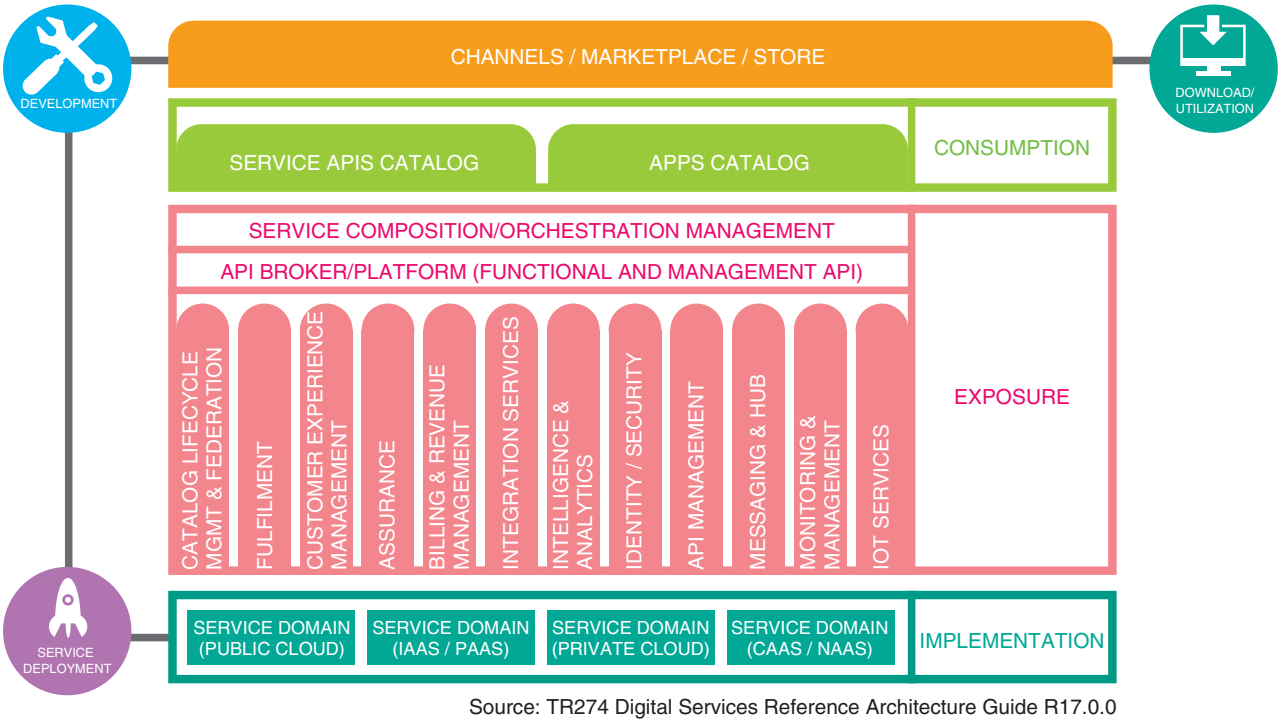
(1) APIs

Studies on REST-based API standardization called TM Forum Open APIs began three years ago at TM Forum as a result of anticipation of the shift in the carrier business model to B2B2X services. As the number of TM Forum members studying APIs increased, API requirements for OSS/BSS intermodule linking came to be reflected in standards in addition to inter-operator APIs. In addition, API standardization based on virtualization requirements has recently been gaining momentum in studies.

The NTT Group, meanwhile, has been active in standardizing API requirements within the NTT Group with the aim of establishing common operations (one-stop operations) for the provision of services linking multiple operators [3]. During the time of TM Forum Live! 2017, the scope of API studies with regard to NTT requirements (resource pool management) was adjusted in discussions with knowledgeable individuals. The plan going forward is to continue working to reflect these requirements in standards.

(2) DSRA/DPRA

At TM Forum, discussions are underway on DSRA (**Fig. 2**) as an architecture for achieving collaboration among multiple services under the B2B2X model and on APIs for completing those links. At the NTT laboratories, we incorporated the authentication federation function necessary for collaboration between multiple services (service federation) into the business scenarios in DSRA Guide R17.0. Additionally, a preliminary survey was conducted at TM Forum Live! 2017 with the aim of generating proposals for more functions, and the importance of various functions was evaluated.



Source: TR274 Digital Services Reference Architecture Guide R17.0.0

CAAS: communication as a service
IAAS: infrastructure as a service
MGMT: management
NAAS: network as a service
PAAS: platform as a service

Fig. 2. DSRA.

Digital Platform Reference Architecture (DPRA), which is based on DSRA, was also explored as a reference architecture for functional requirements in environments requiring collaboration among multiple partners. This architecture envisions hybrid infrastructure management spanning multiple carriers consisting of fixed/mobile networks, legacy networks, and virtualized environments in which vendor/carrier proprietary elements are treated as black boxes and operability is achieved through TM Forum Open APIs. At TM Forum, the aim is to provide integrated operations in an environment having different network technologies.

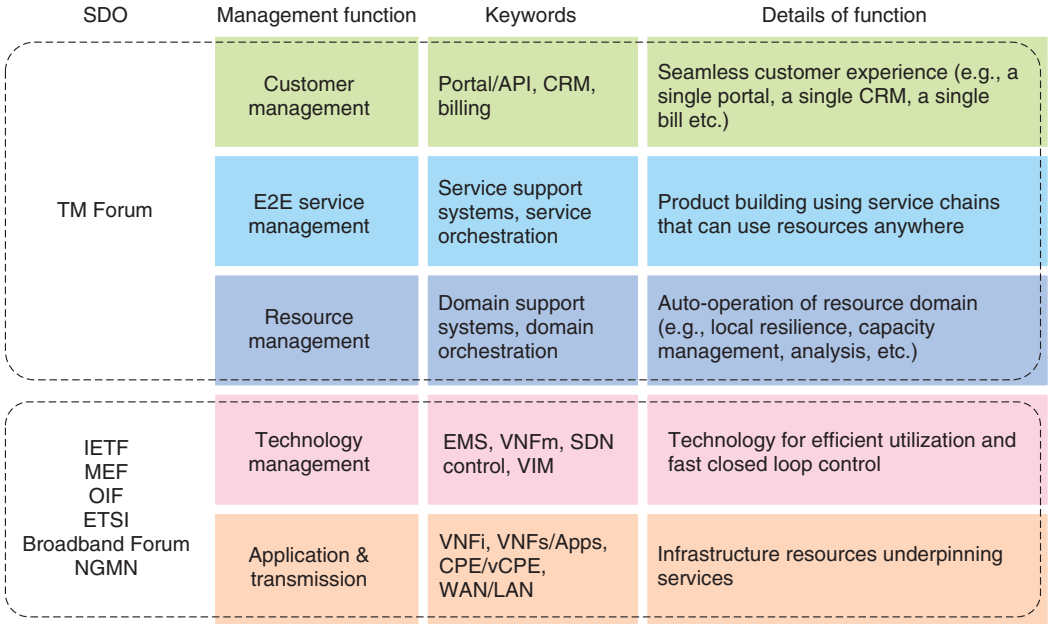
(3) ZOOM

One of the most enthusiastically discussed themes in virtualization-related studies is network slicing in fifth-generation mobile communications systems (5G). Network slicing refers to dividing up a network in a virtual manner so that individual networks can be provided in a more efficient manner tailored to service requirements. At TM Forum, attention is focused on how the business layer—the axis of studies—drives the provision and use of network slices between operators. A white paper was prepared by TM Forum on high-level requirements for network slicing based on the definition of slicing by Next Generation Mobile Networks (NGMN) and on TM Forum study assets accumulated to date such as those concerning common operations in a hybrid environment, a premise of network slicing. The NTT laboratories have made contributions to network slicing from the viewpoint of use cases based on the output from Catalyst projects.

In parallel with preparing this white paper, studies on API requirements toward operations in a hybrid environment are progressing with an eye to API standardization while aiming for consistency with related standards developing organizations (SDOs) (**Fig. 3**). There is now a move toward API standardization studies related to closed-loop, policy-based service and resource management, which is a topic focused on optimizing a hybrid environment. This movement will be a highlight of future discussions.

3.2 Catalyst activities in NTT Group

Of the 32 Catalyst projects presented at TM Forum



Source: TR262 Hybrid Network Management Platform Blueprint R17.0.0

Apps: applications
CPE: customer premises equipment
CRM: customer relationship management
EMS: element management system
ETSI: European Telecommunications Standards Institute
IETF: The Internet Engineering Task Force
LAN: local area network
OIF: The Optical Internetworking Forum
vCPE: virtual CPE
VIM: virtualized infrastructure manager
VNFi: virtual network function infrastructure
VNFm: virtual network functions manager
WAN: wide area network

Fig. 3. Achieving consistency with SDOs.

Live! 2017, the NTT Group participated in 4 of them, which are described below.

(1) Connected Citizen: Life in a Green, Clean, Smart City

This Catalyst led by Orange S.A. aims to commercialize a platform for smart cities. It has constructed a prototype platform based on use cases (building cities through citizen participation, transportation measures, healthcare) covering seven European cities. For implementation, NTT COMWARE contributed its FlexibleEntry [4] product as a user interface for local governments and an API to link with BearingPoint's Infonova R6 [5] business support system. (This project was evaluated as a TM Forum standardization activity and received a Catalyst award.)

(2) New Business Models with Mobile Sponsored Data

This Catalyst project focuses on the use of sponsored data to offer free communication services to mobile-device users. Such users would receive free services, which they would normally be charged for, through the delivery of ads or special messages sent by the service provider. At TM Forum Live! 2017, a demonstration of this project was conducted reflecting use cases involving collaboration among multiple carriers.

(3) 5G Service Operations - Leveraging Open Source Innovation

This Catalyst aims to provide 5G and existing network functions as a network-as-a-service to multiple industries by leveraging the benefits of open source. The demonstration focused on dynamically and automatically achieving business operations that satisfy carrier-grade assurance.

(4) Real Virtuality - Phase II

With a hybrid network spanning multiple digital service providers, this Catalyst aims to achieve E2E processing that includes both virtualized networks (NFV/SDN) and non-virtualized networks. The demonstration at TM Forum Live! 2017 featured high-function, self-managing operations based on the concept of policy control.

3.3 Global carrier trends

Nine themes including keynote presentations were covered at TM Forum Live! 2017. The following is a summary of the presentations on three themes that received particular attention.

(1) API Manifest

This keynote presentation reported on case studies in digital transformation in various companies and confirmed that positive developments were taking place both inside and outside the telecom industry. The TM Forum secretariat shared the news that the number of companies promoting TM Forum Open APIs as a means of achieving this digital transformation had increased from 9 to 28 (NTT Group is one of the original members).

(2) Future OSS

An example of digital transformation at various carriers was given in this keynote presentation, which announced a white paper on Future OSS from Orange and reported that discussions were progressing not only on the NFV/SDN network layer but also on the OSS/BSS layer including micro-services and APIs and that requirements of future OSS/BSS were starting to be specified. In particular, studies on APIs for virtual network environments and on network management automation based on the operational agility of NFV are progressing to the testing stage. To this end, leading carriers in Europe and the United States have been actively applying open source to virtual network management such as AT&T's Open Network Automation Platform (ONAP) and Telefonica's OSM, that is, Open Source MANO (Management and Orchestration).

(3) Platform Economy

Detailed studies led by BT, Vodafone, and other firms on DPRA in relation to the linking of operator platforms as advocated by TM Forum are starting to take shape as application examples related to the Smart City concept that highlights collaboration between carriers and other industries. This trend was reflected in some of the Catalyst projects exhibited at TM Forum Live! 2017. Additionally, given that local governments have much in common with respect to the problems they face, collaborations and joint projects among local governments adopting Smart City ideas are now underway. TM Forum recommends that cities construct Smart City platforms based on a common architecture and establish mutual links via these platforms.

3.4 Global vendor trends

During the time of TM Forum Live! 2017, the NTT Group was engaging in technical discussions with global vendors and collecting information on product trends. We report here on NFV products and compliance with TM Forum standards.

(1) NFV products

There was an emphasis on service orchestration products that go beyond the integration of existing networks with virtual networks and enable linkage with a variety of digital services, that is, non-network functions. It was also revealed that a multivendor virtual network environment was becoming mainstream for operators, and the successful results of linking NFV products with the products of other companies drew interest.

Telecom operators are concerned with the increasing complexity of recovering from failures in a virtual environment that requires an awareness of the physical environment. Vendors are taking the stance that linking their products with service assurance products enables auto-healing, but no clear solution in cases of major physical failures caused by a natural disaster, for example, could be seen. The NTT Group will continue to keep an eye on standards-related technologies and product trends that take this into account.

(2) Compliance with TM Forum standards

We have confirmed that some vendors adopting TM Forum Open APIs use testing tools (conformance test kits) to check the conformance of API specifications and that they have products that expose TM Forum Open APIs. TM Forum standards have traditionally not required a level of conformance as strict as that of other standards, but against a background of interoperability with other companies' products in a multivendor era, they are moving in the direction of requiring strict conformance with API specifications, especially TM Forum Open APIs. Making it easy to reflect TM Forum standards in vendor products will make standardization activities all the more important.

4. Future outlook

As we work towards promoting virtualization and B2B2X services in the NTT Group, we are carrying out standardization efforts to achieve early reflection of our requirements for these priority areas in TM Forum programs. To this end, we are keeping a close watch on those areas at TM Forum in which lively discussions are being held. We will also continue to participate in Catalyst projects and assess the feasibility of those technical requirements.

The NTT Group can reference and use TM Forum standards when exposing functions as APIs and managing operations in a virtualized environment. Also, through the TM Forum expert committee within the NTT Group, we will continue to engage in activities beneficial to the use of TM Forum standards by the NTT Group by sharing information on technical studies and industry trends at TM Forum.

References

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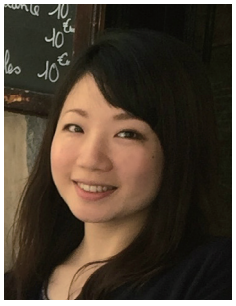

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He received a B.E. in information engineering and an M.S. and Ph.D. in information sciences from Tohoku University, Miyagi, in 2005, 2007, and 2010. From 2007 to 2010, he was a research fellow with the Japan Society for the Promotion of Science. After joining NTT Network Service Systems Laboratories in 2010, he was involved in research and development focused on exposing APIs from a call session control server. He is currently researching an API provision framework required for the B2B2X business model, while referencing TM Forum assets. Dr. Kashibuchi is a member of the Institute of Electrical and Electronics Engineers (IEEE) and the Institute of Electronics, Information and Communication Engineers (IEICE).

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He received a B.E. and M.E. from Tokyo Institute of Technology. He joined NTT in 1996. He has been working on the design, deployment, and management of platform based services. He also has experience in OSS/BSS optimization. He has been involved in TM Forum as a member of the API project since 2014 and received the "Outstanding Contributors Award" in September 2017.