



Action Week Roundup

Vancouver
25th–29th September 2017

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Action Week in Vancouver

- In addition to key workstreams for the Framework & Open API, Agile Business & IT, Customer Centricity and Internet of Everything programs, at Action Week we launched two key new initiatives
 1. TM Forum's Open Digital-Business Enablement System (ODES) and the Path to a Knowledge Defined Network (KDN). The aim of ODES is to create an industry-agreed, single architecture that will deliver all the capabilities previously siloed in independent BSS and OSS. By removing the barriers between these siloed systems ODES will deliver the flexibility and lower cost base needed to embrace new opportunities. This will deliver a truly digital customer experience and support the requirements of future, agile, real-time, service provider infrastructures based on SDN and NFV and the cloud native infrastructure of 5G.
 2. TM Forum AI-Centric Architecture Vision. The digital ecosystem is beginning to embrace AI and Machine Learning to improve and enable the creation of flexible networks that can adjust services based on customer needs. The first session at Action Week described the opportunities that AI/Machine Learning represents for our marketplace and introduced fundamental concepts and terminology to level-set participants for the working week ahead.
- Monday morning started with keynote speeches which set the scene for the week
 - The opening keynote speech was given by Nik Willetts, CEO, TM Forum, welcoming all to the week ahead and setting the context and latest "state-of-the-nation" for Digital Transformation.
 - This was followed by a keynote by Ibrahim Gedeon, Chief Technology Officer, TELUS, entitled, "Disruption by Design" in which he shared his thoughts on how the future of business and innovation not only require focus and control, but are also reliant on our ability to collaborate across industries.
 - There was then a keynote presentation by Arpit Joshipura, GM, Networking & Orchestration, Linux Foundation, entitled "ONAP: The Network Automation Platform Driving Open Source & Standards Harmonization". This addressed the issue that 5G, IOT & cloud are major drivers and disruptors that mandate network automation. Open source networking, enabled by Linux Foundation is providing an end-to-end view on carrier solutions and working to harmonize open source and standards. For more detail, please see this TM Forum Inform article: <https://inform.tmforum.org/digital-transformation-and-maturity/2017/09/action-week-onap-tm-forum-collaborate-advance-automation/>.

Open Digital Enablement System (ODES)

At Action Week in Vancouver, we launched TM Forum's Open Digital Enablement System (ODES). Conceived and developed by its members, the aim of TM Forum's ODES is to create an industry-agreed, single architecture that will deliver all the capabilities previously siloed in independent BSS and OSS. It removes the barriers between the two to deliver the flexibility and lower cost base needed to embrace new opportunities, to deliver a truly digital customer experience and to support the requirements of future, agile, real-time, service provider infrastructures based on SDN and NFV.

Digital transformation is very much the phrase on everyone's lips. It is a challenge the industry knows it must face, but there is very little consensus on how it might be achieved. There are very few standards to refer to, and, as yet, precious few case studies of successful transformation projects. To enable quick but efficient transformation and take advantage of the tantalising rewards on offer, TM Forum members are working hard to develop a set of common tools and standards.

In advance of Action Week, the TM Forum Future Architecture Strategy Discussion Paper was distributed, which builds on the consensus view from workshops held with CSP Members over the previous few months. To download and read the paper, see [here](#).

ODES is a data-centric architecture and is designed to connect to future Artificial Intelligence (AI) systems, enabling the Path to a Knowledge Defined Network (KDN). In the sessions at Action Week, we explained the concept of the KDN with its closed loop automation and how this will become an absolute requirement for the future to enable the benefits of SDN and NFV to be fully realized.

We solicited feedback from members about the proposed overarching OSS/BSS architecture during a day-long workshop at Action Week on Tuesday. More than 60 TM Forum members, including executives from AT&T, BT, Globe Telecom (SingTel), Microsoft, Orange, Telefónica and Vodafone, as well as many consulting companies and suppliers, attended.

Overall, operators who participated in the workshops to develop ODES said OSS and BSS must be:

- standards-based, enabling a marketplace of commercial and open source innovation;
- unified in a single architecture;
- data-centric with a single data lake to enable automation and AI;
- platform-based and componentized for agility using TM Forum Open APIs;
- artificial intelligence (AI) capable and autonomous;
- real-time in order to respond to the expectations of customers; and
- ecosystem capable to allow easy interaction with partners.

For more detail, please see this TM Forum Inform article;

<https://inform.tmforum.org/future-oss-bss/2017/09/action-week-amazon-ossbss/>

TM Forum AI-Centric Architecture Vision

The digital ecosystem is beginning to embrace AI and Machine Learning (ML) to improve and enable the creation of flexible networks that can adjust services based on customer need. TM Forum's Open Digital-Business Enablement System (ODES) is a data centric architecture and is deigned to connect to future Artificial Intelligence (AI) systems.

At Action Week, the sessions explored the opportunities that AI / Machine Learning represent for our marketplace and introduced the fundamental concepts and terminology.

If you are not already a project member, you may join the Data Analytics project here:
www.tmforum.org/join-Data

In Release 17.5, AI will be explored in the Data Analytics project. Members wishing to get involved in the **DATA ANALYTICS** project may access the working area on the project Wiki, Confluence, here: <https://projects.tmforum.org/wiki/display/DATA/Work+In+Progress>

A general session for all attendees addressed "what is ODES and why do we need it" which is covered elsewhere in this report. The focus of the session was to explore AI questions and issues such as:

What is Machine Learning (ML)?

- We heard that ML explores algorithms that can learn from and make predictions on data. There are three main types of ML: Reinforcement ML where if you do an action leading to the desired state, you get a reward. Then there is Supervised ML: You tell the machine which outputs are correct and which are not. And then there is Unsupervised ML: This is where the machine learns by itself. The discussions went on to introduce deep learning and issues around anomaly detection and prediction.

What is the Impact of AI in the Digital Ecosystem? –

- The meeting discussed various use cases for 'AI' in the context of the telco and underlined that significant business benefit can be accrued through its use. The next steps are to:
 - 1) ensure clarity for the terms BI (Business Intelligence), AI (Artificial Intelligence), BDA (Big Data Analytics), ML (Machine Learning) and DL (Deep Learning)
 - 2) prioritise the use cases for 'AI' and including as an important input the existing BDA/CE use cases that may already suggest associated AI use benefits
 - 3) invite CSPs and Vendors to make use of pre-catalyst or collaboration project platforms to work through the solution space.

What are the hot Topics in Artificial Intelligence?

- Objectives: Facilitated discussion to explore what constitutes the hot topic areas in AI that are applicable to digital ecosystems. An example explored was around a catalyst: Enterprises and brands have leveraged the mobile and digital channel to connect with their end customers and prospects. Sponsoring data connectivity to end customers can increase end-user value and differentiation. This catalyst will identify new and implement existing TM Forum APIs to create a fabric of providers connecting to a broad set of enterprises delivering the blueprint that can push the sponsored data as complete market offerings.

TM Forum ONAP Birds-of-a-Feather Group

A TM Forum Open Community of "TM Forum ONAP User Group" was created to provide a forum where any topic that is of interest to both the ONAP and TM Forum communities can be openly discussed, such as:

- TM Forum assets that can be used within ONAP;
- Enhancement of TM Forum assets to support ONAP scenarios;
- Joint development between TM Forum and ONAP communities.

This session also provided an update of the collaborative work thus far and solicited new inputs.

The discussions started with an introduction and exploration of what collaborative approach should be taken:

- Working methods, rules of engagement and collaboration space
- Read out of some TM Forum analysis on ONAP
- Consider what questions need to be addressed
- What would success look like for the collaboration?
- Where is the low hanging fruit for coordination of TM Forum ONAP efforts?

The meeting broke out into discussion groups and fed back to the whole group.

There were then presentations given by TM Forum members who are using/contributing to ONAP; Orange, China Mobile, Huawei, Microsoft followed by an open discussion.

It was agreed to create a TM Forum white paper to document the TM Forum members' views. It will cover points such as:

- Why should TM Forum and ONAP cooperate?
- Reducing duplication of effort within ONAP and TM Forum.
- Consistency across architecture, APIs, data standards, metrics terminologies.
- Supporting new technologies such as AI/ML BDA.
- Interoperability and frictionless Integration at the correct boundaries.
- Hybrid management between ONAP and non ONAP solutions.

Open APIs

TM Forum Open APIs provide the critical enablers to build an ecosystem or marketplace for partner onboarding, monitoring and management of digital services across business boundaries, including revenue sharing, monetization and settlement.

If you are not already a project member, you may join the API project here:

www.tmforum.org/join-API

Members wishing to get involved in the **API** project may access the working area on the project Wiki, Confluence, here:

<https://projects.tmforum.org/wiki/display/AP/Work+In+Progress>

See the meeting notes from Action Week, Vancouver and working calls here:

<https://projects.tmforum.org/wiki/display/AP/Meeting+notes>

OPEN HACK

The TM Forum Enterprise {open}:hack series continued at our Action Week event, where for developers and new comers there was an Open Hack held on Monday & Tuesday. The range of applications the teams came up with show the flexibility and rapid development that Open APIs offer. The hack featured a smart city challenge focused on how new telecom services can help to power and drive cities forward.

This was an opportunity to learn and build new innovative services, APIs and plugins with a group of like-minded and talented individuals from diverse countries and companies. Leveraging a common underlying platform, the hackers created new potential products and services underpinned by Open APIs, built to service the needs of massive cities.

ENTERPRISE {OPEN}:HACK OBJECTIVES

- Accelerate industry deployment of TM Forum Open APIs, metamodels and architecture across the industry
- Validate existing APIs and provide feedback for future iterations to technical collaboration teams
- Create IoT and Smart City solutions leveraging the Forum Open APIs
- Accelerate the incubation of new digital business opportunities in the areas of IoT and Smart City
- Create extensions to Forum Open APIs to be shared with industry

So, how did all those ingredients turn out? A lot of cities tout their records on environmental sustainability, but their evidence is largely anecdotal – they don't have the data to prove it. The winners of the TM Forum {open}:hack , YVR SmartBin, are hoping to change that with an internet of things (IoT) platform to collect sensor data from waste bins.

Vancouver, British Columbia, is made up of many neighborhoods and districts that have condominiums and apartment buildings with resident and tenant associations. "We wanted to figure out: is there a way for us to get waste management data to see how efficiently we are recycling on a district level? Could we engage citizens in a pragmatic way?" says YVR SmartBin team member Nagib Tharani.

The YVR SmartBin platform uses intelligent asset tags and augments them with sensor data to calculate waste-bin utilization. When citizens see that a bin is overflowing and needs to be emptied, they can scan a QR code on the bin, which opens a browser and lets the citizen request garbage pick-up. Sensor data generates intelligent insights into waste management metrics, such as ratios of trash to compost to recycled material. Eventually, the data could be used to incentivize citizens to reduce waste.

The YVR SmartBin team used the MangOH platform, the IBM Bluemix platform including the IBM Node-RED tool, TM Forum's Inventory Management and Trouble Ticket APIs, and APIs from Telus for communications and geo-platform coordination. They also used the City of Vancouver's open data. For more detail, please see this TM Forum Inform article;

<https://inform.tmforum.org/open-apis/2017/09/action-week-open-hack-winner-cleans-vancouver/>

Summary of API Sessions at Action Week:

API Design Guidelines and MicroServices:

Objective: Learn and contribute to our next generation of Open API Design Guidelines for enabling MicroService Patterns (for example Cloud Event based Integrations)

- A very well attended meeting with some interesting and useful input from the members.

Open Source VNF and Open APIs:

Complementarities: Learn and contribute to the development of open source platforms with TMF Open API Architecture (joint with ZOOM)

- A very well attended meeting with some good discussion around the move to developing APIs in an open source environment. Further discussion on the management of APIs and DevOps will be needed.

RI/CTK and the Open API Lab:

Objective: Learn and contribute to a new Open API lab where live reference implementations and CTKs are exposed

- A very good presentation and demonstration of the use of the Reference Implementation toolkit from the member from Huawei. There is still some work to be done to complete the toolkit and it is hoped that there will be a take up of this by the members.

Learn and participate in the TM Forum Open API to SID mapping activity (joint with Fx/SID).

- It was an informative and well-presented meeting it was good opportunity for additional members, who had not been involved in SID mapping, being exposed to the concepts. This was a perfect introduction for new member contributors to this mapping project.

API Design Guidelines and Hypermedia:

Objective: Discover of our new Hypermedia design guidelines and participate to the development of the next generation of Hypermedia based Onboarding APIs (joint with ZOOM)

- It was another well attended meeting and there was some good discussion on the new guidelines. It was agreed that the guidelines be moved into Team Review status.

Other sessions included:

- *Digital Service Management API: Contribute to the development of a new Digital Service Management API.*
- *TM Forum Open APIs & DPRA / DSRA: Progress alignment of APIs to key capabilities and platforms of the DSRA & DPRA (joint with DPRA / DSRA).*
- *API Security, Federated Identity and Access Control focus: Learn and contribute to this important set of specifications for securing APIs and Federate access control using open standards.*
- *API Platform for enabling Virtual Networks and SDN: Work on defining the components for enabling the ZOOM HIP API Platform (joint with ZOOM).*

Data Analytics

Telcos struggle today to easily identify, extract and analyse meaningful data from the massive cache they own. TM Forum's Data Analytics Program is working to help organizations make the best use out of business intelligence and data analytics tools in the enterprise-wide activities of revenue management and customer experience management. The focus of the work is on bridging the gap between 'raw' Data Analytics technology and the specific business needs of your company.

If you are not already a project member, you may join the Data Analytics project here:
www.tmforum.org/join-Data

Members wishing to get involved in the **DATA ANALYTICS** project may access the working area on the project Wiki, Confluence, here:
<https://projects.tmforum.org/wiki/display/DATA/Work+In+Progress>

See the meeting notes from Action Week Vancouver and working calls here:
<https://projects.tmforum.org/wiki/display/DATA/Meeting+notes>

Summary of Data Analytics Sessions at Action Week:

Joint Cross Team Exploration Session on Analytics Big Data Repository (ABDR) for TM Forum members

- The Data Analytics team gave a high-level review of the work currently being done in the ABDR track within TM Forum. The session was a working session where members created real live entities service providers have been requesting. Working session was well designed and very productive. All work can be found in the notes. (see link above).

Other sessions included:

- *Newcomer's session on Revenue Assurance & Fraud Management – success so far, future work and how to get involved – Objectives: Orient team to Revenue/Fraud Management scope of workstream and Catalysts.*
- *Digital Analytics/Transformation - Objectives: Digital Transformation consists of Excellence Operations, Business Model, New Customer Venue. Session seeks to concentrate on "Excellence Operations" improving automatic process. Create new models for operations.*

Customer Centricity

Over the past several years work stream collaboration has resulted in a robust, reusable set of Customer Centricity assets and tools. Historically the Customer Centricity program has been focused on Customer Experience Management (CEM), Data Analytics and Metrics.

We continue to increase our focus on those deliverables which will accelerate CSP digital transformation, enhance Internet of Everything (IoE) services, and enable critical Trust processes.

If you are not already a project member, you may join the Customer Experience Management project here: www.tmforum.org/join-CEM

Members wishing to get involved in the **CUSTOMER CENTRICITY** project may access the working area on the project Wiki, Confluence, here:
<https://projects.tmforum.org/wiki/display/CEM/Work+In+Progress>

See the meeting notes from Action Week Vancouver and working calls here:
<https://projects.tmforum.org/wiki/display/CEM/Meeting+Notes>

Summary of Customer Centricity Sessions at Action Week:

CEM Use Cases and Implementation Guide - GB962D Customer Experience Management Implementation Guide Use Cases R17.5.

Objectives: Development of new CEM Use Cases; From team members (e.g. China Telecom, Oracle), from new catalysts (e.g. catalyst coordinators), jointly from X-team initiatives (e.g. Business Scenarios from IoT / monetization)

- CEM is currently working on a use case focused on the experience a mobile phone user could experience with the use of big data. The use case was introduced to members by China Telecom. Members talked about enhancements to the use case by discarding the data not needed and putting data in needed categories. The concept was well taken and there is an interest in discussing this beyond a use case and creating a catalyst.

Co-creation with Customer Centricity stream: A new chapter to the IoE Monetization white paper.

Objectives: Review and expand on TR271

- Members were introduced the Customer Experience track within TM Forum and the whitepaper on Monetizing and managing IoE services. The CEM and IoE tracks have come together to discuss the importance of having a CEM chapter in TR271 document: Monetizing Internet of Everything (IoE) for R17.5.
- It has been shown that customers are willing to pay more for services when components such as simplicity, quality of experience, exclusivity, rewards, trust, openness and security are offered by service providers. The two groups will continue to meet on a bi-weekly basis to add a section on CEM in the TR271 document.

Creating the Digital Trust conceptual model in conjunction with the Customer Centricity Omnichannel team

Objectives: Prioritizing, elaborating & planning next steps on the Digital Trust Roadmap of Challenges

- Nice session from the team, especially on the real-world examples, which everyone provided input and feedback. Gene Glaudel in particular did a great job with capturing the discussions in detail.
- The IoE and Customer Centricity (Omni Channel) track have been collaborating on the topic of trust. Trust is important to all as service providers and vendors move forward with digital transformation. Members were given a high-level description of the work done thus far and participated in hands on work by walking through trust scenarios. Pictures of the work done have been attached to the notes (see link above). The two groups will continue working together to update R17.5.

Digital Maturity Model

Many communication services providers, and other traditional service providers, are on a journey to transform themselves into “digital” businesses to take advantage of the opportunities provided by the latest technology and market conditions. As with any journey, some form of map or guide is essential to plan the route and to know how far you still have to go; and even when you have arrived. The TM Forum Digital Maturity Model project is following the successful pattern used in other TM Forum maturity models to provide just such a guide together with an online tool that helps organizations define their current level of digital maturity in terms of their existing digital capabilities and their aspirational target digital capability at some future point.

If you are not already a project member, you may join the Digital Maturity Model (DMM) project here: www.tmforum.org/join-DMM

Members wishing to get involved in the **DIGITAL MATURITY MODEL** project may access the working area on the project Wiki, Confluence, here:

<https://projects.tmforum.org/wiki/display/DMMP/Workshop+Materials>

See the meeting notes from Action Week, Vancouver and working calls here:

<https://projects.tmforum.org/wiki/display/DMMP/Meeting+Notes>

Summary of Digital Maturity Model (DMM) Sessions at Action Week:

Digital Maturity Model Phase 2 Project

Objectives: Opportunity for TM Forum members to have an overview of the tool and participate in helping to define the Phase 2 development of the TM Forum's Digital Maturity
Planned delivery of Phase 2 - February 2018

- Summary: After a level set of the DMM progress to date both from a product and pilot feedback perspective the meeting progressed to reviewing and prioritizing recent intelligence in what is making the implementation of current digital transformation efforts so difficult. These were identified as
 - 1) Lack of clear ambition and alignment across the organization
 - 2) Disproportionate focus on the customer i.e. not enough compared to other dimensions
 - 3) Underestimated cost of implementation
 - 4) Difficulty finding digital talent
 - 5) Clearly defining success and ensuring accountability.
- A number of potential solutions to these difficulties were proposed and the team concluded a prioritized set of enhancements to the DMM model, methodology and tool to bolster impact in these problem areas. This will be taken as input into the existing requirements set for further prioritization by the Core Project Team. The highest priority areas from this session were the need for Business Value Measure

KPIs and customizable surveys in the tool to allow Quick Gauge surveys and a unique question set for client organizations. A preview of the DMM Practitioner's Training event was provided and received a rating between Good and Excellent with further improvement points noted for implementation.

- Quarter 1: The meeting considered the remaining compelling need for organizations to redouble their efforts in progressing their digital transformation goals. A level-set of the DMM progress to date was undertaken both from a product and pilot feedback perspective and concluded there is still a great deal of further support CSPs could have to help them in their journey. A set of questions were posed to the team to help uncover further considerations for improvement in the DMM model, methodology and tool and these captured:
 - Are there additional dimensions or sub-dimensions that need to be considered?
 - Are there sub-dimensions that should be rolled up as stand-alone dimensions based on the level of impact / importance or breath of components within?
 - What are your organization's key priorities / focus areas?
 - What are you observing in your competitors' strategies?
 - Which additional components (e.g. success measures, pre-requisites before using the model, etc.) should be considered to supplement the digital maturity model framework?
- Quarter 2: A number of potential solutions to these difficulties were proposed (items 1-4 were covered in Q2 with item 5, KPIs, in Q3) and the team concluded a prioritized set of DMM model, methodology and tool enhancements to bolster impact in these problem areas. This will be taken as input into the existing requirements set for further prioritization by the Core Project Team.
- Quarters 3 & 4: The meeting reviewed why the measurement of digital transformation success and ensuring accountability is difficult. Three potential 'KPI' areas were identified for improving the DMM model and tool:
 1. a set of business value metrics that would help monitor impact on cost reduction, revenue enhancement and customer satisfaction when improving the maturity of DMM dimensions and sub-dimensions
 2. a set of performance KPIs, mainly sourced from the TM Forum's Metrics database that would help organizations rate their level of maturity via quantitative-based metrics associated with the digital criteria
 3. whether there were new metrics suggested by the DMM model itself.

Two approaches to undertaking the work were identified: a) running asynchronously so 1) then 2) then 3 or b) by choosing a sub dimension and testing value of doing 1), 2) & 3) together to test value of strengthened approach. This will be taken as input into the existing requirements set for further prioritization by the Core Project Team.

Frameworkx

The Frameworkx project is continuing to evolve the core frameworks to support both the latest technology, such as virtualised network functionality, but also the latest business processes, such as DevOps approaches.

If you are not already a project member, you may join the Frameworkx project here:

www.tmforum.org/join-Fx

Members wishing to get involved in the **FRAMEWORKX** project may access the working area on the project Wiki, Confluence, here:

<https://projects.tmforum.org/wiki/display/FP/Current>

See working call meeting notes here:

<https://projects.tmforum.org/wiki/display/FP/Meeting+notes>

Summary of Frameworkx Sessions at Action Week - The week had a focus on meetings with other project teams from across the strategic programs.

Discussion on Requirements for Intent-based Directives (Joint with ZOOM)

- The team discussed the need to consider two possible kinds of policies; Predefined "static" policies created by the CSP and more "dynamic" policies created by the customer. Several action points were agreed to clarify or enhance the proposed approach.

Aligning Digital Trust with Frameworkx:

Objectives: Update Frameworkx team on latest Digital Trust TR270 R17.5 as it relates to Frameworkx. Obtain new questions and feedback from the Frameworkx team as it relates to Digital Trust TR270 R17.5. Identify next steps to prepare for incorporation of Digital Trust concepts into Frameworkx in R18.0

- Had a productive meeting of Frameworkx and Trust Group.
 - We have reviewed the Definition of Roles and terminology and how described in TR270.
 - Validated it in a Trust conceptual model.
 - We have considered whether we have to add Trust Management? Is it an extension to Assurance Management? Might be that Trust is an aspect of Risk Management
 - Agreed to have a meeting with the Information Framework team to consider modelling options.

Frameworkx DSRA/DPRA Joint meeting:

Objectives: Validating the current DPRA/DSRA documents against other Frameworkx Assets

- Frameworkx had a productive meeting with the DSRA - We have reviewed two contributions to Frameworkx and have agreed to further develop them and complete in this release cycle.
 - KDDI- additions to API management

- Analysis of changes needed to the SIP side of the Business Process Framework.

Developing a terminology document for all the frameworks:

Objective: To develop a comprehensive reference of terms used within the Framework suite, combining current and previous material. Joint with ZOOM & Framework projects

- An interesting, informative and productive session that clarified the requirements and established clear goals for the development of an improved dictionary of terms
 - Agreed to work on a Centralized Dictionary / Glossary
 - Sources will include Framework Terms (SID, existing docs) and Auxiliary terms (other SDOs, general terms)
 - Goal is that all docs will refer to the repository
 - Plan is to present the benefit of mapping and present the mapping rules, then discuss contents.

SID / API joint meeting

- The principles and interest in this work were presented. Different process related points were discussed (e.g. what if a new API is proposed by a Catalyst project? where to document the mapping information? how to maintain it?). It was suggested to have a first quick round of mapping at the concept level when a new API is created (to identify the key concepts and give examples). It will give indications to the SID team of directions to consider (e.g. Shipping Tracking API). Stephen Harrop will take the proposed actions in the API governance team.

SID-Service-Resource Relationships and Associated Modelling Issues:

Objective: The goal was to clarify the relationship between Resource Functions (RF) and Resource Facing Service (RFS) using a detailed example. As part of the contribution it was proposed to generalise the concept of Resource Function to Functions that would be applicable at all SID layers (Joint with ZOOM)

- Through the discussion it became evident that, in addition to some new concepts, some concepts in SID are not well understood by the community.
- The SID team will provide clarifications on the difference between; Resource Facing Service and Resource; Function and Features; Resource Functions and Functions.

SID-Modelling of Resource Slices and 5G. Joint with ZOOM

- Session very well attended (24 people). The standardization landscape regarding 5G slicing was presented – it is very rich. The key question to the team is how to map NGMN slice entities to TM Forum / SID. The team will work on a proposal, starting from a draft contribution which was presented.

SID / Catalogue Management joint meeting

- The goal was to make a check point on open actions originated by the Catalogue Management team having an impact on SID. Good and clear session allowing to distinguish between actions already known from new ones identified. A process was agreed to fill the charter pipe line (no new actions taken by SID before R18.0).

Internet of Everything

The Internet of Everything (IoE) makes networked connections more relevant by turning information into actions. This has resulted in predictions of new revenue in the trillions of dollars and the availability of billions of additional connected devices. TM Forum's Internet of Everything Program has produced an IoE Roadmap of Challenges which is focused on designing, developing, and implementing collaborative solutions to address these challenges.

If you are not already a project member, you may join the Internet of Everything project here: www.tmforum.org/join-ODP

Members wishing to get involved in the **INTERNET OF EVERYTHING** project may access the project Wiki, Confluence, here:
<https://projects.tmforum.org/wiki/display/ODEP/Internet+of+Everything+%28IOE%29+Project+Home>

See the meeting notes from Action Week, Vancouver here:
<https://projects.tmforum.org/wiki/display/ODEP/2017+TAW+Vancouver+Meeting+Notes>

The Internet of Everything Sessions have focused on B2B2X & Monetization & Trust at Action Week:

IoE Monetization, Management & Trust; Platform – The keys to unlocking IoE success. How to align trust across a complex digital ecosystem of partners and manage sharing risk and reward in a \$20+ trillion economy – Collaboration across functions and departments has never been more vital than in today's and tomorrow's digital business scenarios.

Objective: Align program initiatives and workstreams priorities and set stage for activities at Action Week

- IOE and Digital Business Program Alignment & Kick-off - An overview of IoE and Digital Business. Reviewing the action Week IoE and Digital Business Tracks including; Monetization, Management, Trust & Business Assurance, Digital TRUST – Fundamental Ecosystem Enabler, Business Assurance / Revenue Assurance, Fraud Management & Charging & Billing. Also innovation areas of Blockchain and Smart Contracts.
- High level Overview of IoE program as well review of the specific activities and work items to be addressed this week were presented.

Monetizing 5G and network slicing through IoE - Explore how to monetize 5G network slicing

- Concepts of 5G technologies presented and discussed; discussions of CSP options for utilizing Network slicing were defined. Use Cases presented and further explored but not completed. Additional discussions to continue and planned for TQ2.

Exploring and creating smart contract templates - Exploring Digital Twins concepts and applications in CSP Use Cases

- Interesting and informative topic presented that left the audience wanting to hear more. The applicability to ODES was discussed.

Blockchain: Blockchain: Hands-on Workshop utilizing the TM Forum Sandbox - Hands-on usage of Blockchain Sandbox

- General informational discussion on components of the Blockchain sandbox and the SLA use case. Future discussions this week to choosing the next use case for blockchain processing.

IoE Monetization white paper: enhancement & refinement - Review and expand on TR271

- A quick review of TR271 was done and high-level discussion of what updates should be considered. Next steps to do a more formal page by page review, review CEM contribution to overall document and look into incorporation of metrics.
- Review of the Connected Car scenario was further explored as means to identify any new monetization patterns/models introduced as a result of 5G. In addition, other activities were identified for refining the Monetization Paper for R17.5 deliverables.

How to manage IoE through business ecosystem partnerships – Utilizing CurateFx and assessing reusable patterns - Defining/assessing Catalyst ecosystem partnership using CurateFx

- A historical perspective on the deliverables of the workstream and as the source for CurateFx was presented. Kevin McCaffrey presented a review of high level CurateFx monetization models identifying that the activities and deliverables of the Business Scenario Ecosystem (aka B2B2X) workstream and their focus on monetization is the basis to drive updates to the models.

Explore/Innovate Smart Contract Templates - Explore the Smart Contract Templates for CSP Use Cases

- Interesting and informative topic presented that left the audience wanting to hear more.

Catalog Management Working Session - Mapping of Entity Catalog to the Product / Service / Resource Catalog

- Background materials were covered to bring meeting participants up to speed on purpose of Entity Catalog API. Mapping examples were covered. Discussion of ONAP implications and need to further cross team discussions between ZOOM for modelling and orchestration. Good discussion and next steps were defined.

Catalog Management /Frameworkx SID Working - Working Session to work Catalog and JIRA Issues (Joint with Frameworkx)

- Well organized discussion on JIRA Issues and topics impacting SID. All topics were covered and understanding of what issues were scheduled for R17.5; which could be added as stretch goals and which issues would need to be discussed and scheduled for R18.0. Great participation.

Joint session exploring the Digital Customer Relationship Manager led by the Customer Centricity team with input from IoE team members

- Session was designed to be an exploratory working session on a digital customer relationship management tool. Members discussed if this type of management tool would be beneficial to the service providers. A diagram was created during the session outlining the potential for such a management tool along with potential obstacles.

Creating the Digital Trust conceptual model in conjunction with the Customer Centricity Omnichannel team - Identify the opportunities Digital Trust offers in line with a Customer Centric Focus for digital service providers. To be added to TR270 - Digital Trust Roadmap of Challenges

- Nice session from the team, especially on the real-world examples, which everyone provided input and feedback. Great job of detailed capturing the discussions!

Focus on Blockchain and smart contract use cases from the service provider's perspective – Analysis of a set of Service Provider Use Cases for block chain and smart contract application.

- Very engaging presentations by Huawei and Netcracker on CSP use cases for Blockchain. Large audience and active participation. Next steps to have focused discussions and work through use cases as examples for white paper on Blockchain/Smart Contract principles.

Other sessions included:

- *A Joint Session with CEM: Monetizing 5G and network slicing through IoE - Explore how to monetize 5G network slicing. Plan short summary for newcomers to describe program and current work activities. Co-creation with Customer Centricity stream: A new chapter to the IoE Monetization white paper - Review and expand on TR271. – See the Summary of CUSTOMER CENTRICITY Sessions at Team Action Week.*

Revenue Assurance / Fraud Management

The TM Forum Revenue Assurance Program has an extensible framework that enables the deployment of effective Revenue Assurance processes across various activities, processes, systems and network technologies. This program embraces Revenue Assurance, Fraud Management, Charging and Billing, and Asset Management to underpin all the strategic programs.

If you are not already a project member, you may join the Revenue Management project here: www.tmforum.org/join-Revenue

Members wishing to get involved in the **REVENUE ASSURANCE / FRAUD MANAGEMENT** project may access the working area on the project Wiki, Confluence, here: <https://projects.tmforum.org/wiki/display/RM/Revenue+Management+Project+Home>

See the meeting notes from Action Week, Vancouver here: <https://projects.tmforum.org/wiki/display/RM/2017+TAW+Vancouver+Business+Assurance+Meetings>

Summary of Revenue Assurance REVENUE ASSURANCE / Fraud Management Sessions at Action Week:

Newcomers' session on Revenue Assurance & Fraud Management – success so far, future work and how to get involved - Orient team to Revenue/Fraud Management scope of workstream and Catalysts

- Newcomers to session: Telus, Capgemini was well received with objective of provide a description of the scope and success of Revenue Assurance and Fraud Management assets.

Revenue Assurance Working sessions: Business Assurance Project & Establishing the RA Maturity Model (RAMM) - Overview of the Business Assurance project & provide a “high level” explanation that will permit to capture what it means to be at a certain maturity level in RAMM 2

- Agreement on the need for a Business Assurance initiative and on the proposed model of the “open” working group. Next steps;
 - Address Steering Group to get buy-in from relevant teams in their company.
 - Individually invite specific people and/or organisations to join the initiative and target to get 20 relevant experts to AW Lisbon Feb 2018.
 - Develop a manifesto for the group and get approval from participating companies to addresses the impact of IoE on Revenue Assurance, Fraud Management, Cyber-Security, Privacy, and related management challenges
- Good discussion on the value and usage of newly introduced levels of interpretation as a summary for the maturity model score. Path forward for team review during workstream sessions, identify volunteers to review and then prepare for R18.0.

2017 Program Alignment for Business Assurance & Charging & Billing - Align 2017 Business Assurance where we are focusing on the new challenges posed by the advent of IoE and digital business with current billing and charging actions

Alignment of the 2017-2018 Plans were discussed for Business Assurance. It was agreed that additional clarity is needed prior to full agreement and alignment of the team.

DPRA / DSRA

If you are not already a project member, you may join the DSRA project here:

www.tmforum.org/join-DSRA

Members wishing to get involved in the **DPRA / DSRA** project may access the project Wiki, Confluence, here: <https://projects.tmforum.org/wiki/display/SES/DSRA>

See the meeting notes from Action Week, Vancouver & working meetings here:

<https://projects.tmforum.org/wiki/display/SES/DSRA+Meeting+Notes>

Summary of the DPRA / DSRA Sessions at Action Week:

Platform Architecture DSRA/DPRA Innovation and alignment with the City as a Platform - Test/Review the DPRA from a Smart City Platform Perspective as documented in TR272

- Good conversation and debate. Path forward to utilize CurateFx to describe DSRA business capabilities and further educate purpose and scope of the DSRA.

DPRA/DSRA and Framework - Joint Framework Session with DPRA/DSRA and NTT Contribution

- Good debate on role of DPRA and additional ways for validation and mapping to eTOM. Action suggested to look at the SIP from a platform perspective utilizing Catalogue Management processes.

Platform Architecture Discussions: Aligning DPRA and Policy - Validate the DPRA with Policy as documented in Hybrid Infrastructure Platform (HIP) Platform Policy & Security Strategy TR263D

- Good discussion and input. More work to be done for rigorous alignment with TR263D.

Other sessions included:

- *Platform Ecosystem Enabling Platform Business - Overview of the DSRA/DPRA and Setting the State of the Platform Work.*
- *DSRA/DPRA Cross Team with API: Digital Service Management API & Progress alignment of APIs to key capabilities and platforms of the DSRA & DPRA - Progress alignment of APIs to key capabilities and platforms of the DSRA & DPRA and presentation of a new Digital Service Management API.*
- *Platform Architecture Discussions: Collaboratively aligning concepts to enhance the DSRA/DPRA - Consolidate information compiled to Refine DPRA based on input from earlier Sessions.*
- *Modelling of Network Slices and 5G; Aligning DPRA with Dynamic Network Slicing (Infrastructure) - Joint discussion on Modelling of Network Slicing & 5G as well as Validate the DPRA Mapping Infrastructure to Framework utilizing IG1152. (Joint with ZOOM).*

Agile IT / ZOOM

Although different businesses are following different paths, for CSPs it is clear that deployment of virtualized and software defined network technology is well underway. CSPs must now start to maximize the benefits of this technology over and above simple substitution of existing functionality. For the ZOOM project (Zero-touch Orchestration, Operations and Management), this means a move from artefacts that enable transformation, to assets that can be used in the design and realization of systems, and enable the procurement, deployment and operation of them as part of a profitable business.

If you are not already a project member, you may join the ZOOM project here:

www.tmforum.org/join-Zoom

Members wishing to get involved in the **AGILE IT / ZOOM** project may access the working area on the project Wiki, Confluence, here:

<https://projects.tmforum.org/wiki/pages/viewpage.action?pageId=71741712>

See the meeting notes from Action Week, Vancouver here:

<https://projects.tmforum.org/wiki/display/ZOOM/Vancouver+TAW+2017+Meeting+Notes>

And working call meeting notes here:

<https://projects.tmforum.org/wiki/display/ZOOM/Meeting+notes>

Summary of AGILE IT / ZOOM Sessions at Action Week:

Management Platforms for External Architectures:

Objective: Discuss usage of TM Forum platform concepts (such as are stated in the DSRA and TR262) in relation to architectures external to the TM Forum (including consideration of ONAP, ETSI NFV and Network Slicing architectures). The output of this discussion may serve as input to the TMF070 series

- A useful introduction to the topic which will benefit from further discussion during the week. Agreement to develop jointly with DPRA team.

Requirements for Platform Management:

Objective: Possibly use input from the previous session, determine general requirements for platform management (related to TMF070 series and TR263 series). Topics include security, capacity management, actor / party management, naming / address and compatibility management

- This was a discussion session, designed to explore ideas around platform management, additional suggestions were made to add to the contribution. The DPRA attendees were comfortable we are still in alignment.

Newcomers Introduction to the ZOOM Project:

Objective: To welcome new comers to the ZOOM project and provide an overview of the project workstreams, topics and deliverables via the document roadmap. Align the team on

ZOOM AW Scope, Charter intent and Document Roadmap. Output: common goals and aims and understanding - especially about creating output that can be adopted &/or consumed in an impactful way. Reminder for participants to join the ZOOM Core Project Area

- A well-attended session with good interaction and excellent support from the ZOOM Team

Advanced Platforms (HIP and Beyond): –

Objective: This session covers additional platforms (beyond HIP) as defined in TMF070B. The session will cover various platform types (e.g. Customer Facing HIP), platform requirements and associated API, and scenarios

- An excellent session that made good progress and identified an important candidate work item for Release 18.0.

Developing a terminology document for all the frameworks:

Objective: To develop a comprehensive reference of terms used within the Framework suite, combining current and previous material. Joint with ZOOM & Framework projects.

- An interesting, informative and productive session that clarified the requirements and established clear goals for the development of an improved dictionary of terms.

Service-Resource Relationships and Associated Modelling Issues:

Objective: This session covered the relationship between the concepts of Service and Resource, and the implications on the SID and ZOOM work. There are also several detailed issues to be considered, i.e., modelling of Feature Groups and Features, and the Creation of Flows over a Topology (related to VNF FGs and Service Function Chains)

- Through the discussion it became evident that, in addition to some new concepts, some concepts in SID are not well understood by the community which creates some confusion.
- The SID team will iterate on clarification documents, in particular on the following topics:
 - Difference between Resource Facing Service and Resource
 - Difference between Function and Features
 - Difference between Resource Functions and Functions

Modelling of Resource Slices and 5G:

Objective: This session will cover modelling of the Resource Slicing requirements prepared by the ZOOM HIP stream. Compare with 3GPP work (service-based architecture, i.e., SLA-based). Templates for Resource Slices (with example). Review input from SID and TOSCA

- Session very well attended (24 people). The standardization landscape regarding 5G slicing was presented – it is very rich. The key question to the team is how to map NGMN slice entities to TM Forum / SID. The team will work on a proposal, starting from a draft contribution which was presented.

Open Source VNF and Open APIs:

Complementarities: Learn and contribute to the development of open source platforms with TM Forum Open API Architecture. (Joint with API)

- A very well attended meeting with some good discussion around the move to developing APIs in an open source environment. Further discussion on the management of APIs and DevOps will be needed.

Operations Centre of the Future – impact on TAM in service platforms ecosystem (IG1130C):

Objectives: Review Operations Centre of the Future work with respect to Impact on Framework to continue work for R17.5 focusing on Resource Management

- Eight attendees at the meeting, several relevant questions, no objections concerning the description of resource domain management. Interests of NTT/KDDI/TELUS experts to attend at the regular meeting IG1130C on Thursday. Presentation of the suite " IG1130" /NFV/SDN impacts on TAM. Methodology/approach for identifications of the impacts on TAM example of the description of resource domain management.

Operations Centre of the Future - AI/ML impacts on Operations:

Objectives: to develop the Table of Contents for a document that will investigate and report impacts of Knowledge Management, and AI/ML on OCF Operations. Using material from TM Forum (CEM, BDA, AI workshop) Catalysts and elsewhere

- Presentation of KDDI contribution on AI, based on the lessons learned from the catalyst project "Smart BPM" presented at the TM Forum Live! in Nice (May 2017)
- Outputs: 1st of the draft of table of contents of AI / ML impacts on Operations. Decisions made concerning the deliverable "AI/ML impacts on Operations", actions list available.

VNF Onboarding Working Sessions:

Objectives: Joint ZOOM OLM Team and the Framework Team meeting to work on standardized terms, business objects and processes for procurement and onboarding automation. Key discussion areas including VF Package Type and License Management.

Output: contributions towards OLM team R17.5 deliverables

- Reviewed the thinking in contribution ZOOM-260 - Software Asset Management (SAM)
 - Discussion of the different levels of trust between suppliers and Service provider
 - License keys are sometimes used to convey configuration information.
 - Noted that a licence is a type of agreement
 - Noted that the VNF package may contain many references / pointers to artefacts e.g. key that may be changing dynamically
- Presentation of ZOOM-265 - VNF Licensing-LCM (Life Cycle Management) which is based on showing how Product Usage Rights (PUR)
 - Noted that SKU is sometime known as Manufacture Reference number/ product code. These are often in a schedule attached to a contract agreement between SP and supplier.

- Noted that in this example Orange create their own SKU distinct from the Suppliers SKU.
- Discussion about Product Usage Rights about whether when license changes whether the software image needs to be downloaded.

Other sessions included:

- *VNF Onboarding Working Sessions - Joint ZOOM OLM Team and the Metrics Team meeting to work on standardized metrics for procurement and onboarding automations. Output: contributions towards OLM team R17.5 deliverables.*
- *Mapping of Resource Function (RF) Spec and Associated Classes to TOSCA - While the UML model in the Information Framework is sufficient to express what is required, there is also a strong desire in the industry to make use of TOSCA. Thus, it is recommended to map the RF Spec model to TOSCA and vice versa. Outputs: plan and initial seed content for a requirements document that we can submit to OASIS.*
- *Intent-based, Policy-driven Management for Hybrid Infrastructures - This session will cover modelling issues concerning the management of hybrid infrastructure. Topics include the following: resource slicing (aka network slicing), intent-based directives and relationship to existing policy models, connectivity modelling (traffic descriptors, connectivity among deployment units, creating flows over a topology), notation for feature relationships), deployment scenarios, and resource state model.*
- *Assurance Management for Hybrid Infrastructures - Do an assurance scenario (going across levels such as Service and Resource). Cover issue concerning SLA / OLA / PM Thresholds. Prepare for meeting with API.*
- *Alignment of ZOOM and API activities - Mapping of APIs to new platforms defined in TMF070B. Relationship between Activation and Configuration, and Ordering. Possible Merger of Activation and Configuration APIs (TMF640 and TMF664), and perhaps a more general discussion about merging similar APIs across Resource, Service and maybe Product (as is being done for Catalogue). Resource state models. Notation for Expressing Feature Relationships. Streaming Capability.*
- *Operations Centre of the Future Joint Agile Delivery (IG1137B) - Explore, plan and develop work on Joint Agile delivery DEVOPS Development / Deployment + Service Assurance impacts for R17.5.*
- *Operations Centre of the Future - impacts on eTOM BPF in Service Platforms ecosystem (IG1145) - Analysis of Dynamic/Adaptive Processes and impacts on eTOM (IG1145).*

Catalysts

TM Forum's Catalyst Program explored the next steps for a new set of collaborative proof-of-concept projects at Action Week. The Forum received 18 Catalyst proposals, 11 of which were worked on this week. Each of the Catalysts focuses on challenges being addressed in the Forum's three strategic programs – Agile Business & IT, Customer Centricity, and Internet of Everything (IoE) – or specific challenges related to security and privacy, smart cities or application program interfaces.

If you are interested in joining a catalyst project, you may see a summary of planned projects and their requirements for additional members here:

<https://projects.tmforum.org/wiki/pages/viewpage.action?pageId=81746008>

Blade Runner - Unified Service Modelling to allow for Chaining and Configuration across different markets and business entities, using industry standards (TOSCA and YANG)

The modeling of cloud services using standard template languages and configuration (TOSCA and YANG) is nothing new. However, none of the telecommunication providers have managed to simplify their onboarding and chaining processes by fully utilizing the standards and understanding the relationship between them and the solutions involved to provide a service. The processes may be further polluted by some suppliers who may not follow the standards completely and may choose to push for alternatives, further confusing the industry. This attitude does not solve the problem of creating a vendor agnostic proposal for cloud services, creating a dependency on certain tools and methodologies. The problem gets much bigger when a telecommunication provider needs to quickly enable services across more than one operational market or functions within the same organization and across different orchestration and configuration systems.

Energy Saving as a Service - Make it easy and fast to transform building operations data to generate performance improvements that save money, enhance sustainability and drive employee productivity

Worldwide energy consumption is expected to grow 56 percent between 2010 and 2040. Commercial energy rates are increasing 3-5 percent annually. This solution offers a data driven and real-time proposition to manage the growing energy costs.

Enhanced customer experience through cognitive digital agents and robotic process automation integration - As an S/VP – Customer Experience of a CSP/DSP, I need to be able to improve the quality of service while making it easily accessible to my subscribers around the clock at a reduced OPEX. My customers must be able to place an order, schedule or modify appointments, upgrade or downgrade services, fix any trouble, etc. at their convenience at any given point in time. To do this I need to have customer service agents working around the clock, with easy access to valuable information to provide swift service to my customers and a seamlessly integrated application stack that can process the information without delays. To be successful, I have to leverage cognitive digital customer service agents integrated with robotic process automation for swiftly executing back office tasks, with no rework or errors, spanning across multiple applications including legacy, bespoke and COTS.

With the customers becoming more demanding, especially with the rise of the millennials, convenience, the speed of response/resolution, accuracy, quality and personalization of customer services have become more important than ever before.

Joint Agile Delivery - Phase III - Contribute processes, models, and API's to TM Forum to enable the development and delivery of world-class software that capitalizes on cross-organizational (cross-“value fabric”) synergies to dramatically improve TTM, quality, and cost.

With NFV standards still maturing and solutions coming from multiple parties (including the Service Provider), NFV Suppliers cannot test and certify their contribution in isolation. In addition, separation of software from hardware poses additional requirement and certification challenges. Collaboration is a solution but it is only possible if processes are standardized and the parties utilize a collaboration platform to enable joint activities.

Mobile Offloading & Bonding with Wi-Fi - Enable seamless experience in mobile and/or public wi-fi access. Fastweb is a MVNO with its own wi-fi network open to only its customers, Wi-Fi is offered “at home” and “on street”. Need to achieve; Offloading whenever possible and bonding mobile and wi-fi access in certain situations.

The focus of the catalyst is to offer to mobile customers the “best network experience”, whenever possible, shifting traffic to Wi-Fi or mobile network depending on available bandwidths and wireless quality mediated by traffic shaping policies and Traffic Throughputs and depending on Applications running on the phone. The Wi-Fi considered are all those that the mobile device may access without an “new obligatory authorization performed by captive portals”. The bonding will be set up to manage traffic shaping between Wi-Fi and mobile networks by a “policy engine router” that drives the short latency traffic to Wi-Fi and the long latency traffic to mobile network.

OASIS – Open APIs for a vibrant IoT EcoSystem - In search of an Oasis to create a vibrant and thriving IoT ecosystem powered by a set of standardized APIs to create a network effect that attracts both application developers and device manufacturers.

In order to fully maximize the potential of IoT, the ecosystem should be vibrant, and non-restrictive to players who could contribute to the value chain. Customers should not be limited to a set of IoT solutions available to them because of the restrictions brought about by non-interoperable devices, platforms, and applications. Defining the standards is the key to solving this and in fact, there are already a number of standardization initiatives across the landscape.

Offer Canvas: Dynamic Offer Creation with NFVs - Two of the key promises of Network Function Virtualization is Product Innovation and Reduced Time to Market (Agility). The TM Forum ZOOM project has defined the concept of the Hybrid Infrastructure Platform (HIP) that describes use cases and functionality to enable an OSS/BSS ecosystem to interact with NFV Infrastructure. This catalyst will explore how an implementation of the HIP supports use cases based on commercial requirements of a Product Manager in order to discover network capabilities, build those capabilities into commercial product offerings and bring them to market rapidly.

What makes this a significant problem to be solved? There has been a lot of work already done and in progress around network service and resource modeling.

Projects like Open ECOMP, Open-O, ETSI-NFV, etc. are focused on how do we model and orchestrate network and cloud services. However, not much work has been done to take this modeling approach up into the business stack to make sure we can take these services to the market in the form of products and offers faster. These projects assume integration with BSS systems, which is still highly manual and requires a lot of time and effort to introduce new offers or make changes to existing offers. Ideally, when a network or cloud service is available in the services Catalogue offer managers should be able to discover these network services, encapsulate them in commercial models to make them available as products and offers. All this is done without heavy integration and development effort by IT. The following is a high-level view of the proposed Catalyst problem space.

Unified Digital Infrastructure - Unified digital infrastructure management creates a common fabric for hyper scale data centers.

To realize the true potentials of cloud computing properties such as hyperscaling, we could no longer consider maintaining disparate cloud infrastructure to manage a network, IT, enterprise workloads in isolation resulting in higher TCO and business agility is impeded. Gone are the days where infrastructure would continue to be managed in organizational silos. Instead, we need to break the silos and unify all digital infrastructure and manage these uniformly to provide a common fabric within the organization.

Utilizing Artificial Intelligence, Machine Learning and Big Data Analytics for new opportunities in Revenue Assurance / Fraud Management - As a Digital Service Provider 'C' level executive in the digital era, I need to enable and support my company digital transformation process so I can ensure that our business goals in terms of customer satisfaction, market share and EBITDA are achieved. Current RA&FM technologies and operations are challenged by the new digital eco-system. In order to support the new business needs, I have to adopt new technologies that are based on AI, Machine Learning, and Big Data Analytics. I know that I am successful when the power and benefits of these innovative technologies are helping me to better detect and prevent revenue leakages and to ensure our customer's experience.

The key business driver is to adopt RA & FM to the highly demanding requirements of the business, by using the latest technologies to improve the tools and process.

The target audience is DSP's revenue assurance, fraud and risk managers, CIOs and CFOs, RA FM and big data analytics suppliers and consultants.

Interconnecting business with sponsored data - This catalyst will deliver a fabric for providers connecting a broad set of enterprises from different verticals into a mobile sponsored data offering. The catalyst delivers a blueprint that can bring together enterprise, brands, and CSP to offer complete sponsored data offerings to end users.

Enterprises and brands are in a continuous look for options to have their customer experience improved. Many of these brands have leveraged the mobile and digital channel to connect with their end customers and prospects. Sponsoring data connectivity to end customers increase end-user value and differentiation. But often enabling sponsored data services is one to one and provider specific non-standard integrations that are time-consuming. This catalyst will identify new and implement existing TM Forum APIs to create a fabric of providers connecting to a broad set of enterprises delivering the blueprint that can push the sponsored data as complete market offerings.

5G Service Operations – Real time service assurance – The team from the Nice 2017 catalyst met to discuss progress on a next phase for TM Forum Live 2018. Three directions have been identified based on enhancing the Nice 2017 use cases which are: to support URLL and MMTB workloads to meet defined customer SLA targets whilst optimizing the efficient use of the infrastructure. The three possibilities are:

1. Enhance Networking slice implementation by replacing simulated network by real NEP networks. Currently Huawei and Ericsson are candidates
2. Replace the interim APIs for Intent based closed control loop management by the recently published
 - a. TMF664 Resource Function Activation and Configuration API REST Specification R17.0.0
 - b. TMF639 Resource Inventory Management API REST Specification R17.0.0
 - c. TMF642 Alarm Management API REST Specification R17.0.0
 - d. TMF649 Performance Threshold API REST Specification R17.0.0
3. Add in AI Deep Neural Network (DNN) machine learning to handle the three-way optimization of SLAs for two workloads and asset utilization.

KDDI reported on the Smart BPMN project that they are doing which uses AI DNN for fault management and service assurance. This catalyst was demonstrated at Nice 2017 and will be shown at TM Forum Live Singapore 2017. It clearly could be combined with the 5 G Catalyst for TM Forum Live 2018.