A lightweight OSS/BSS architecture
Moving up the value chain in operations

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TNC 2015 TAC meeting, 15th June 2015
Profile

• Development and operations of national e-infrastructures for R&E

• Core partner in pan-EU e-Infrastructures: GÉANT, EGI, PRACE, EUDAT and global collaborations (CHAIN-REDS)

• **Delivery of an extensive portfolio of advanced ICT services to institutions and end-users**

• Technology-oriented community building & wide scale dissemination activities

• Consulting/infrastructure/service operations for the public sector
Portfolio

- **R&E backbone**
  - 10 → 100 Gbps capacities
  - Carrier L2
  - ROADM-capable L1
  - IPv6

- **High Performance Computing**
  - Grid Production Services
  - National HPC Infrastructure

- **Middleware**
  - Digital Certificate Services
  - AAI and federated AAI (eduGAIN)
  - eduGAIN and public sector AAI (STORK) interoperability (work in progress)

- **Security**
  - CSIRT/CERT services
  - Coordination of incident handling with national authorities

- **IaaS/Cloud computing**
  - VM and cloud services
    - Virtual Private Server service (ViMa)
    - ~okeanos cloud services
  - Storage services

- **Applications**
  - HD Video Conferencing (more than 15K meetings held)
  - Live Streaming (~27,000 subscribers)
  - e-Voting (ZEUS)
  - Adademic IDs

- **Public sector services**
The service era

- 1,000s -> 10,000s of end users
  - Direct access to individuals
  - Multiple levels of customer relations within institutions
- NOCs and service managers
- *-as-a-Service
  - VPN as a Service
  - Server as a Service
  - Firewall as a Service
  - Flow monitoring as a Service
  - ...
- Composite services/service bundling
- Rapid uptake of services
Operating infrastructures vs. services

- Maintenance window for resource Y is changing to...
- Elastic service X requests Y virtual servers
- Ticket X affects services Y, Z
- Quality performance data for resource X is required
- Resource X is generating event/alarm Y
- Service X is unreachable, which is the root cause?
Some (more of the) requirements

- Service portfolio management
- Order management
- Orchestration
- Composable services
- SLA management
- Re-usability of OSS capabilities
- User analysis and retention
- Reduce system integration efforts
- Targeted marketing
Legacy architecture

- Service A silo
  - Provisioning
  - Service CRM
  - Service-specific support systems
  - Self-service
  - Monitoring
- Service B silo
  - Stats
  - Self-service
  - Monitoring
  - Provisioning
- Service C silo
  - Self-service
  - Provisioning
  - Monitoring
- Service D silo
  - Self-service
  - SLA mgmt
  - Provisioning
  - Monitoring
  - Vendor management system/API

OSS ecosystem: infrastructure services
New architecture

OSS ecosystem: resource/infrastructure services

ECI Lightsoft

SPACE

Simplified TMF resource/infrastructure operations

Self-service Service A
Self-service Service B
Self-service Service C
Self-service Service D
CRM
Service Management

Simplified TMF service operations

Service Bus

Brokerage

Middleware

Vendor management system/ API

Provisioning A
Service-specific support systems

Provisioning C

Provisioning B

Resource inventory services

Resource monitoring services

Provisioning D

Middleware Service Bus

BSS layer

OSS layer
OSS layer

- Componentization
- Decoupling infrastructure from service operations
- Consolidation of common OSS functions
  - e.g. resource inventory services, server monitoring, network element monitoring
- Infrastructure/resource-facing services to deliver front-end services
OSS layer standardization

- **TMF- Frameworx compliant modelling**
  - Tele-management Forum’s *Shared Information/Data Model (SID)*
    - Used extensively by GRNET’s Service Bus and Middleware
    - Reduce integration costs by adopting standards-based information models
    - Starting with a mature framework
    - Speeding up time to production by using well-designed integration interfaces
    - Eliminating the need for data translation between systems

- **Enabling Multi-Technology Operations Systems Interface (MTOSI) as an interface between OSSs**
  - Using a single interface infrastructure
  - Applying the same patterns across multiple technologies
## What does SID look like for ticketing?

<table>
<thead>
<tr>
<th>RFC6137 TTS field name</th>
<th>TMF SID NetworkTroubleTicket entity</th>
<th>Comments</th>
<th>Mandatory in RFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTNER_ID</td>
<td>Partner[i].Organization.PartyId Partner[i].InteractionRole=&quot;Owner&quot;</td>
<td>The unique ID of the TT source partner</td>
<td>Y</td>
</tr>
<tr>
<td>ORIGINAL_ID</td>
<td>EntityIdentifier.OriginalId</td>
<td>The TT ID that was assigned by the party</td>
<td>Y</td>
</tr>
<tr>
<td>TT_ID</td>
<td>EntityIdentifier.Id</td>
<td>The unique ID of the TT</td>
<td>Y</td>
</tr>
<tr>
<td>TT_TITLE</td>
<td>Title</td>
<td>The title of the TT</td>
<td>Y</td>
</tr>
<tr>
<td>TT_SHORT_DESCRIPTION</td>
<td>ShortDescription</td>
<td>The short description of the trouble</td>
<td>Y</td>
</tr>
<tr>
<td>TT_TYPE</td>
<td>TroubleTicketType</td>
<td>The type of the TT</td>
<td>Y</td>
</tr>
<tr>
<td>TT_STATUS</td>
<td>TroubleTicketState</td>
<td>The TT status</td>
<td>Y</td>
</tr>
<tr>
<td>TT_SOURCE</td>
<td>Source</td>
<td>The source of the ticket</td>
<td></td>
</tr>
<tr>
<td>TT_IMPACT_ASSESSMENT</td>
<td>ImpactAssessment</td>
<td>The impact of the incident/maintenance</td>
<td>Y</td>
</tr>
<tr>
<td>TT_OPEN_DATETIME</td>
<td>InteractionDate</td>
<td>Date and time when the TT was opened</td>
<td>Y</td>
</tr>
<tr>
<td>TT_CLOSE_DATETIME</td>
<td>InteractionDateComplete</td>
<td>Date and time when the TT was closed</td>
<td>Y</td>
</tr>
<tr>
<td>TT_LAST_UPDATE_TIME</td>
<td>LastUpdateDateTime</td>
<td>Last date and time when the TT was updated</td>
<td>Y</td>
</tr>
<tr>
<td>START_DATETIME</td>
<td>MaintenancePeriod.StartDateTime</td>
<td>Date and time that the incident/maintenance started</td>
<td>Y</td>
</tr>
<tr>
<td>END_DATETIME</td>
<td>MaintenancePeriod.EndDateTime</td>
<td>Date and time when the incident/maintenance ended</td>
<td>Y</td>
</tr>
<tr>
<td>LOCATION</td>
<td>TroubleTicketItem.Service.ServiceAccessPoint/GeographicAddress</td>
<td>The location (Point of Presence (POP) site, city, etc.) of the incident/maintenance</td>
<td></td>
</tr>
<tr>
<td>NETWORK_LINK_CIRCUIT</td>
<td>TroubleTicketItem.Service.EntityIdentifier.Id</td>
<td>Network line related to the incident</td>
<td></td>
</tr>
<tr>
<td>END_LINE_LOCATION_A</td>
<td>TroubleTicketItem.Service.ServiceAccessPoint/GeographicAddress</td>
<td>A-end of the link</td>
<td></td>
</tr>
<tr>
<td>END_LINE_LOCATION_B</td>
<td>TroubleTicketItem.Service.ServiceAccessPoint/GeographicAddress</td>
<td>B-end of the link</td>
<td></td>
</tr>
</tbody>
</table>
MTOSI: Business Scenarios Supported

• Resource Management & Operations between OSs
  – Resource Trouble Management: Communication of alarms
  – Managed Resource Inventory: Communication of inventory information
  – Resource Provisioning: Creating, modifying, and deleting network resources
  – Resource Performance Management: Resource performance monitoring and control (e.g. threshold crossing alerts)

• Service Management & Operations between OSs
  – Service Configuration & Activation interfaces
  – Manage Service Inventory, supporting bulk inventory retrieval (with filters) between

Source: https://www.tmforum.org/mtosi/
Service Bus

- Routing of messages between applications/systems
- Mediation services
- Support for complex Message Exchange Patterns (MEPs) and Enterprise Integration Patterns (EIPs)
- Data transformation
- Standardization
  - Unifies data encapsulation and transportation syntaxes under TMF notation
- Reliability: Fault tolerance, load balancing and high availability
- Stateless: Embedding the state of the message into the message itself
Service bus of choice

- Open source and free framework with vibrant community
- Few lines of code are needed to model a complex scenario or route
- Decomposes the original complexity into less complex (possibly concurrent) sub-routes
- Uses decoupling techniques and facilitates the potential replacement or refactoring
Middleware role

- Coordinates the business functions across provisioning, inventory, issue tracking support systems
  - Feasibility, fulfillment, monitoring orders
  - Orchestration of actions to fulfill
- Order data validation-enrichment
- Orchestration plan
  - Managing sequence and dependencies
- Invokes fulfillment systems
- Order state owner
  - Tracks order’s state and history
  - Make information available to other systems
Order handling

• Order items
  – Individual products, services, and offers to be fulfilled as part of an order
  – Create, Update, Delete

• Order item bundling
  – e.g. a group of Teleconferencing sessions to deliver a Teleconference service

• Dependencies

• Multiple instances
Middleware of choice

• Open-source, free business process framework
  – concept of a state machine
  – backed by Alfresco
• Lightweight database model and multi-database support
• Robust REST API
• Standard BPMN2.0
• Visual modeling
• Auto-versioning
Service management

Interactive Service Catalog
- Personalized catalog views
- Self-service, requests and incidents

Service Operations
- Business rules e.g. for escalation
- Incident-to-configuration-item correlation
- Event management

SLA definition and management
- Service and support level agreements
- User-driven verification

Service dependencies, bundling, chaining

Knowledge management

Service inventory – configuration management

Service-oriented reporting
Vidyo-based teleconf service
Resource to incident correlation
VPN Service: 10k ft view

VPN self-service portal

Service Management Platform (one-stop-shop)

CRM

Service SLA mgmt

User request

TMF-based VPN service order

TMF-based VPN resource order

VPN configuration generator

NETCONF-based configuration application

Set commands

Inventory

Configuration data

Monitoring data

VPN service monitoring

Middleware

Service Bus

BSS layer

OSS layer

AAI infrastructure

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- JUNOS SPACE
- BSS layer
- OSS layer
- User request
VPN service software stack

Junos PyEZ

python™

Flask

pytest

Slick

Play

CoffeeScript

JADE

Style

Gulp

AngularJS by Google

Middleware

Service Bus

Service Bus
In a nutshell

- Service (& SLA) management
- Order management
- Accounting
- CRM
- Reliable messaging
- Orchestration
- Composition
- Standardized interfaces
- Modularity
- Resource facing services

SP to SP business integration

Limitless business/operational requirements supported

SP to SP operational integration
Thank you!

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