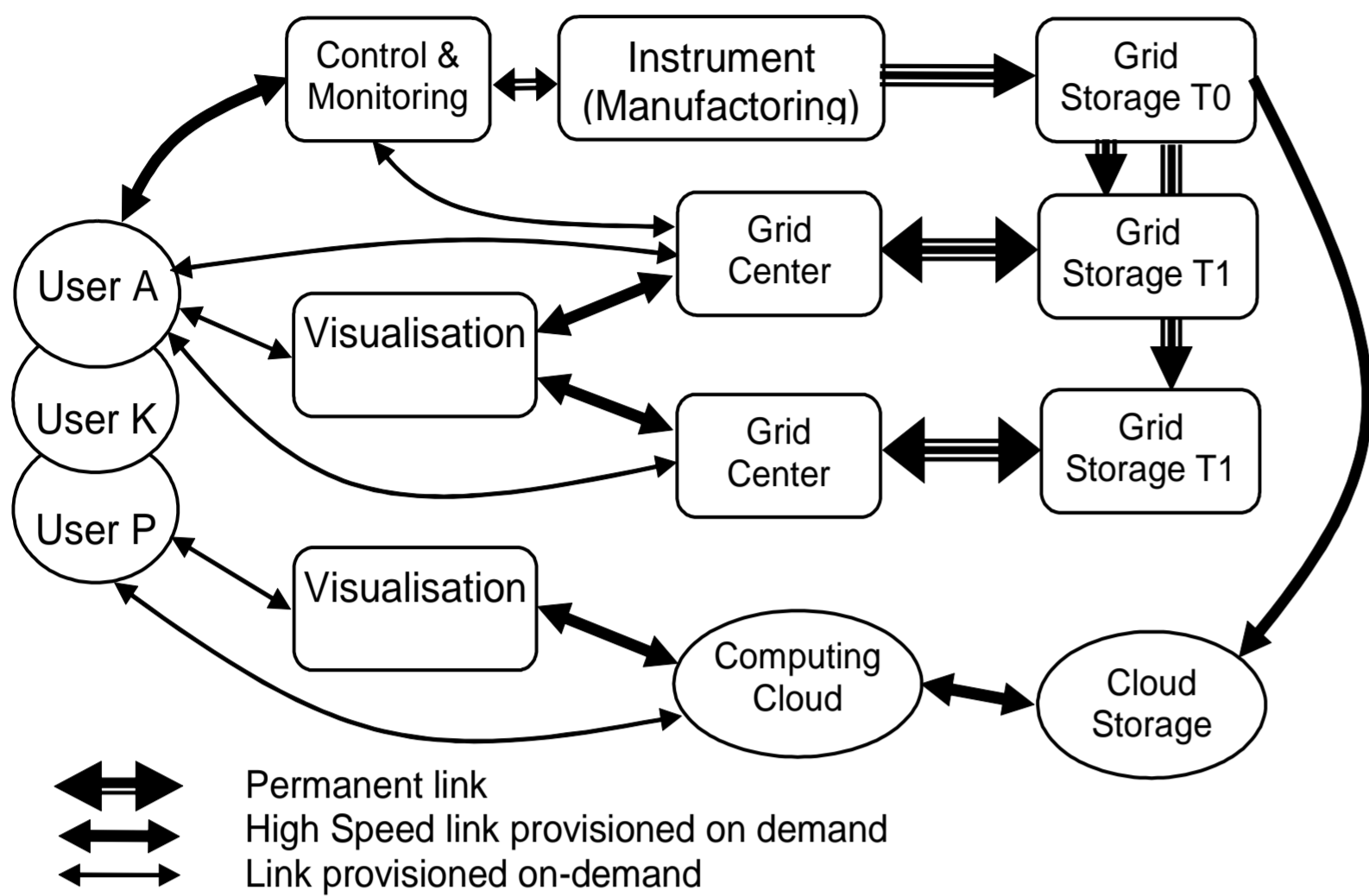


# Composable Services Architecture (CSA) for Dynamically Configurable Virtualised Infrastructure Services Provisioning

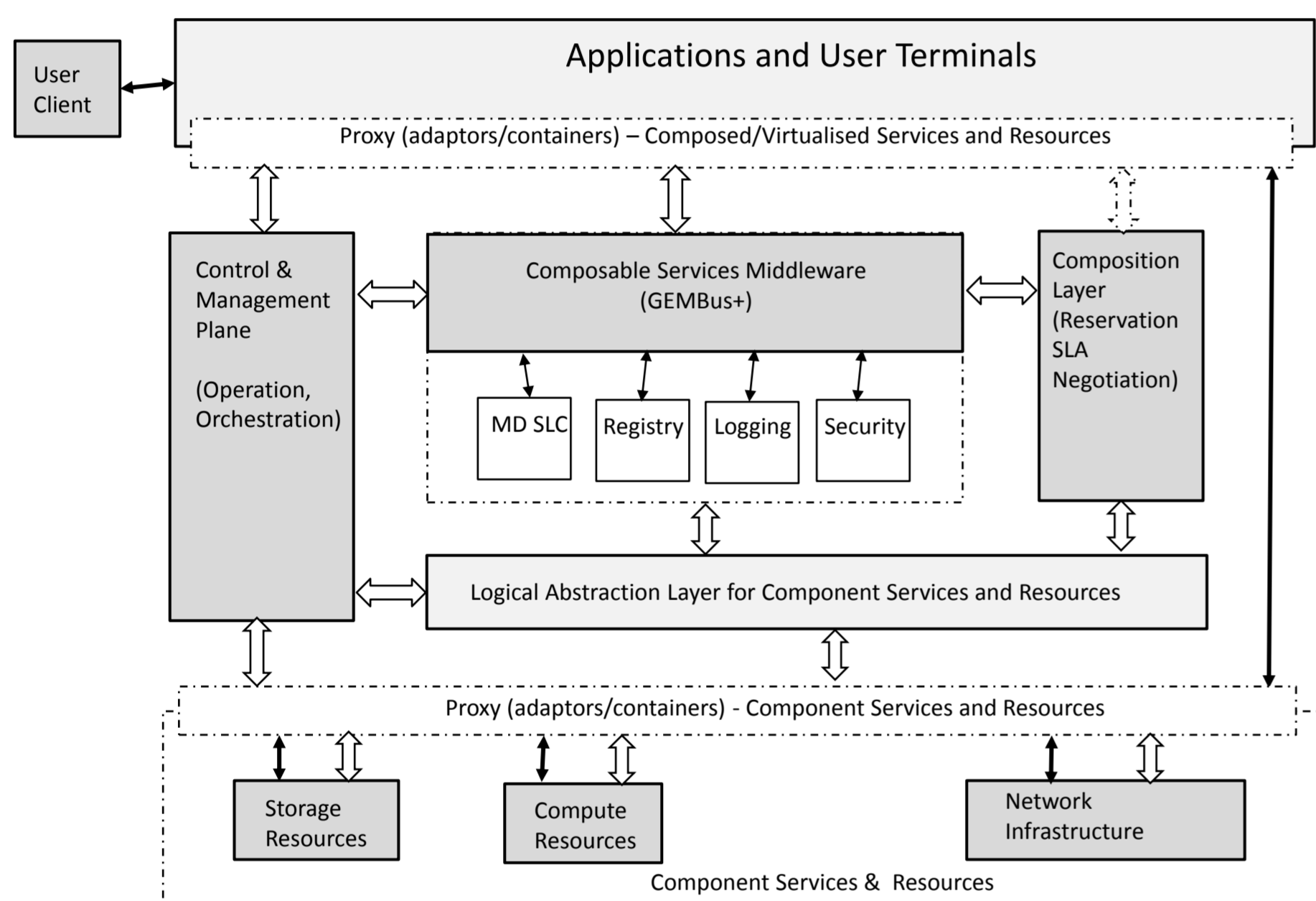
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## Use case: Provisioning Multi-domain Collaborative Environment On-Demand



Components of the typical e-Science infrastructure involving multi-domain and multi-tier Grid and Cloud resources and network infrastructure.

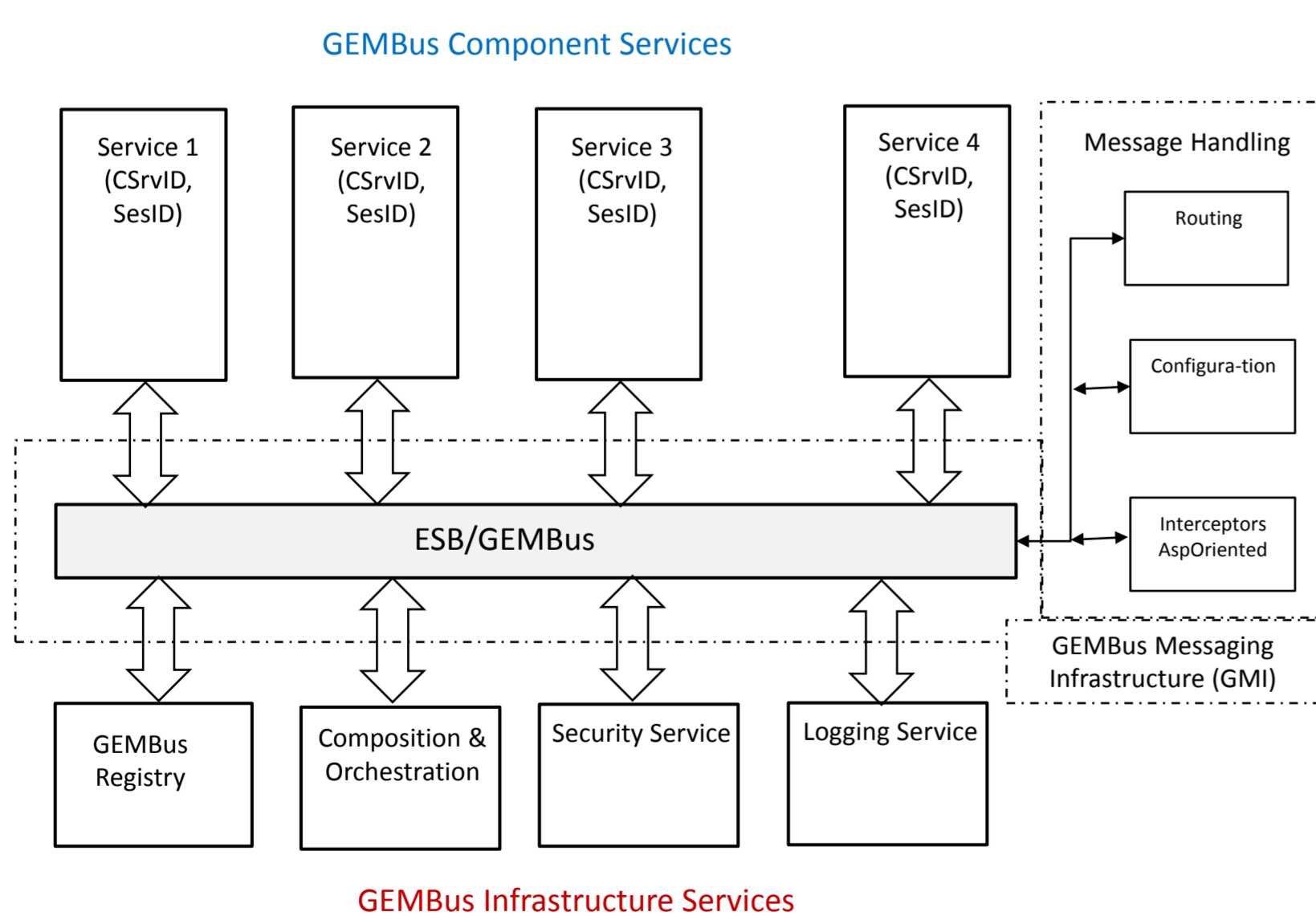
## Composable Services Architecture (CSA)



CSA incorporates the major principles of the Service Oriented Architecture (SOA) and supports SLM/SSLM services lifecycle management models

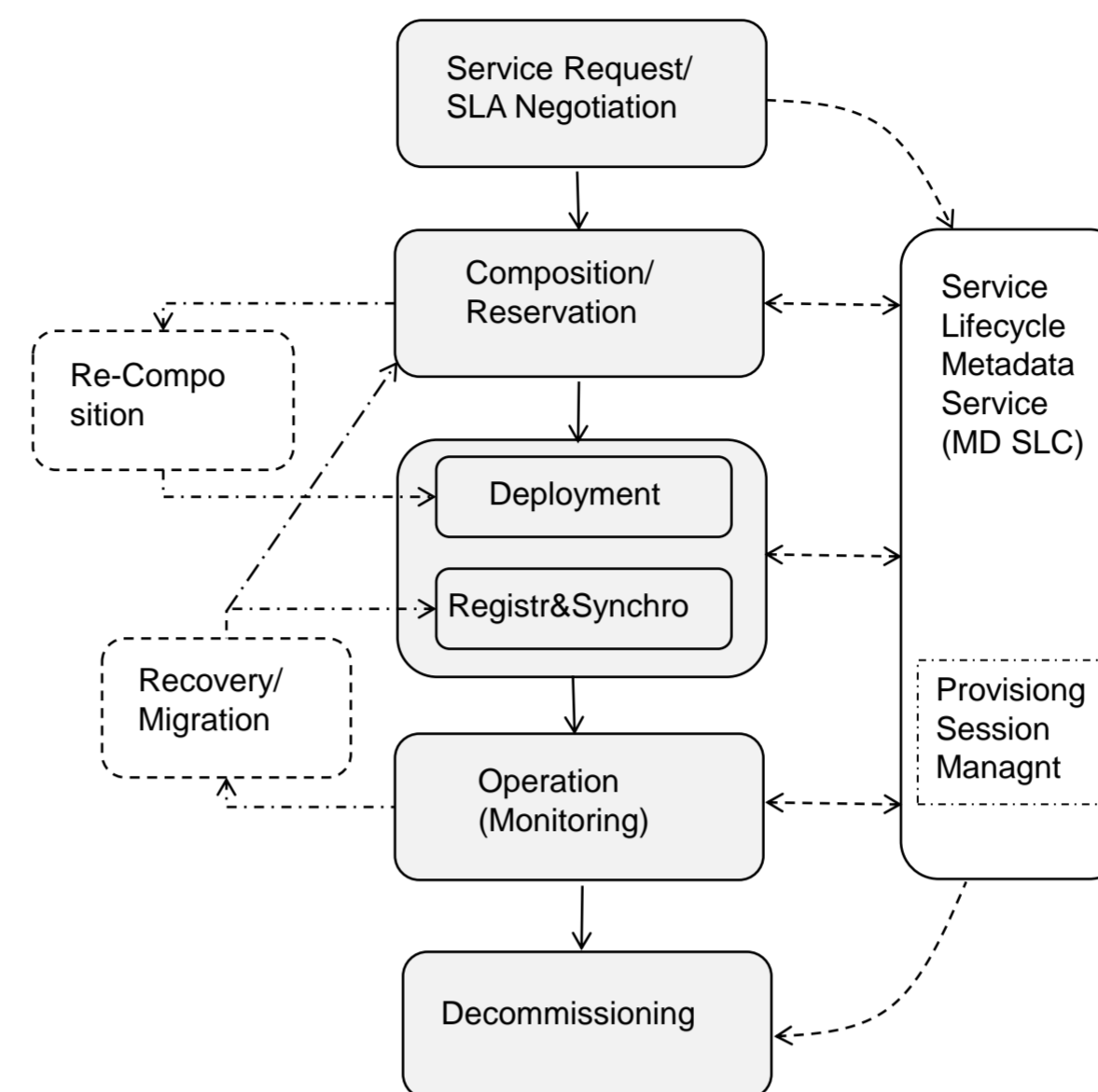
Logical Abstraction layer provides a basis for uniform component services presentation allowing federated cross-domain composite services operation.

## GEMBus Infrastructure for Composable Services



GEMBus provides common dynamically configurable messaging infrastructure for Composable services communication  
 GEMBus is an ongoing development in the GN3 JRA3 Task 3 Composable Services activity

## Service Lifecycle Management (SLM) Model



### Main stages

**Service Request** (including SLA negotiation). Global Reservation ID (GRI) is generated as a provisioning session identifier.

**Planning** (including **Composition** and **Reservation**). May include SLA and access control policy enforcement.

**Deployment**. Component services configuration and initiation, including runtime binding to GRI.

**Operation** (including Monitoring). Main operational stage of the provisioned services.

**Decommissioning**. All sessions are terminated, data are cleaned up and session security context is recycled.

### Additional (sub-)stages

**Re-planning** (or Re-composition) that should allow incremental infrastructure changes..

**Recovery/Migration**. Can use MD-SLC for services re-synchronisation or re-composition.

## Security Services Lifecycle Management (SSLM) Model

SSLM includes additional stages to manage dynamic security associations and bind general provisioning session security context to virtualisation platform runtime environment

- **Security Service Request** that initiates creation of the dynamic security association and may use SLA security context.
- **Reservation Session Binding** with GRI (as part of Planning stage) that provides support for complex reservation process including required access control and policy enforcement.
- **Registration&Synchronisation** stage (as part Deployment stage) specifically targets possible scenarios with the provisioned services migration and recovery.

## Existing Frameworks for Services Virtualisation and On-Demand Provisioning

### TMF standardised frameworks, practices and procedures

- NGOSS – New Generation Operations System and Software (including eTOM)
- SDF – Service Delivery Framework defining provisioned services lifecycle and corresponding infrastructure
- SLAM – SLA Management

### ITU-T Next Generation Networks (NGN) Framework Y-seria standards

- ITU-T REC Y.2232 (01/2008) NGN convergence service model and scenario using Web Services
- ITU-T REC Y.2234 (09/2008) Open service environment capabilities for NGN

**OSGi Service Framework** that defines lower level component model for dynamically deployable managed Java based services that can be delivered and managed via network

### Open Systems Integration Maturity Model (OSIMM)

- Defines 7 maturity levels and 7 dimensions

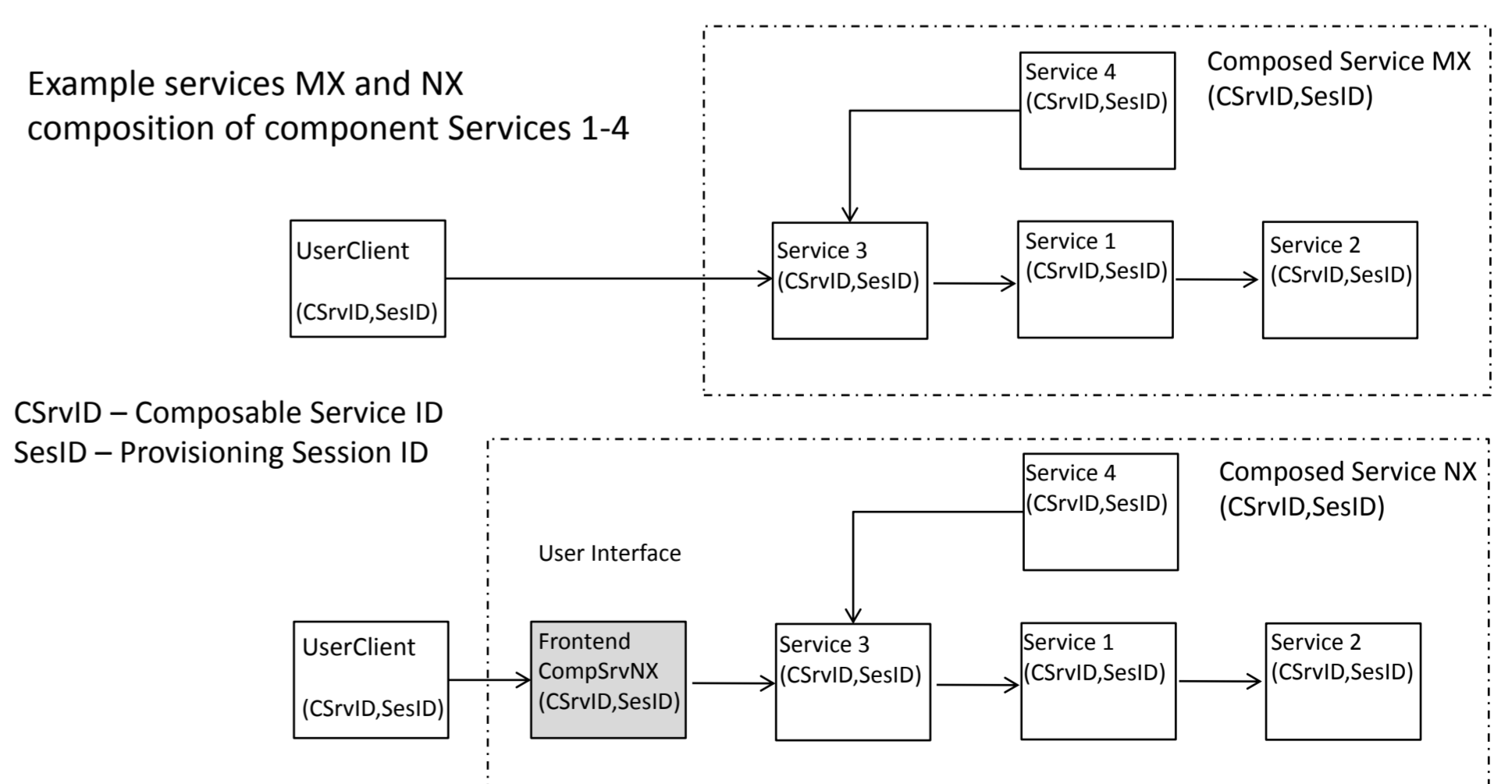
**Composable Services** are defined in compliance with OSIMM as highest maturity level “Dynamically re-configured virtualised services” however requiring corresponding infrastructure

## Implementation Suggestions

GEMBus is being developed as CSA middleware and provides a platform for dynamic /on-demand services provisioning and management

- Based on standard Enterprise Service Bus (ESB) implementations such as FUSE (primary), SwordFish, Apache ServiceMix and corresponding service management components
- Component services are created as OSGi services and deployed on the target GEMBus platform
- SLM/SSLM implemented using OSGi lower level lifecycle management mechanisms and higher level BPEL environment that can be also implemented using other higher level workflow management frameworks
- Security services are implemented using GEMBus Security Token Services (STS) and GAAA-Toolkit authorisation and security session management mechanisms that are integrated with composable services using Spring Security framework.

Example services MX and NX composition of component Services 1-4



## Contributing Projects

- GEANT3 JRA3 Task 3 – Composable services (GEMBus) - <http://www.geant.net/>
- GEYSERS – Generalised Architecture for Infrastructure services - <http://www.geysers.eu/>