MEF 3.0 Lifecycle Services Orchestration (LSO)

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MEF 3.0’s Global Services Framework
Accelerate innovation of agile, assured and orchestrated services.

**Orchestrated & Dynamic**
- Expanded CE
  - IP
  - Layer 1
  - SD-WAN
  - Security
  - Applications

**Agile**
- Cloud-based test & certification platform
- On-demand, user-initiated
- For both services & LSO APIs

**LSO APIs**
- Orchestration across multiple service providers
- Orchestration over multiple network technology domains
- Specifications and SDKs

**Community**
- MEF global membership
  - MEF 3.0 projects on MEFnet
  - LSO Hackathon
  - Software developer community
  - Open source projects & SDOs
  - Enterprise advisory council
  - Certified professionals
  - Events, seminars, webinars

**Expanded**
- For both services & LSO APIs

**Open**
A look into MEF 3.0 LSO APIs
Goal: Develop a model to automate, orchestrate and communicate subscriber intent.
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e.g.: Dynamic CE Service
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And do so across inter-organizational boundaries.

e.g.: Multi-Operator CE Service
Lifecycle Service Orchestration Reference Architecture (LSO-RA)
LSO APIs enable end-to-end service orchestration across networks & over technology domains.
The LSO Reference Architecture

CUS: Customer Application Coordinator
BUS: Business Applications
SOF: Service Orchestration Functionality
ICM: Infrastructure Control and Management
ECM: Element Control and Management
A new reference architecture: Lifecycle Service Orchestration (LSO) and its APIs

Defined in MEF 55: *The LSO Framework specification*

APIs are released as SDKs

Available in experimental or published states

Based on a 6 month sprint cycle
MEF’s LSO API work was initiated by a diverse and global group of service providers.

- Cantata
- Allegro
- Sonata
- Interlude
- Legato
- Presto
- Adagio
Now delivering on multiple LSO API SDK projects.

- **Cantata**: Portal-based Service Ordering (RI)
- **Allegro**: Elastic Service, Notifications – Performance, Service Status, Testing, Fault (RI)
- **Sonata**: Ordering-I Serviceability (R1, R1.1), Ordering-II Inventory, Trouble-ticketing (R2)
- **Interlude**: Elastic Service, Performance Reporting, Testing, Technical Fault Notification (R1)
- **Legato**: Service Catalog, Service Order, Service Inventory (R1)
- **Presto**: Network Resource Provisioning I (R1), Network Resource Provisioning II (R2)
- **Adagio**: Optical, Performance Mgmt. of MEF Services (R3)

**In Development**: Starting 2018

**Released**:
- **Portal-based Service Ordering**
- **Elastic Service, Notifications**
- **Ordering-I Serviceability**
- **Service Catalog, Service Order**
- **Network Resource Provisioning I**
- **Optical, Performance Mgmt. of MEF Services**

**In Planning**:
- SLA Reporting, Contracting, Catalog, Invoicing, Contact Mgmt., Implementation Feedback
The LSO Reference Architecture in depth.
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LSO RA - Cantata

Customer Domain

- Customer application coordinator
- CANTATA (CUS:BUS)
- ALLEGRO (CUS:SOF)
- PRESTO (SOF:ICM)
- ADAGIO (ICM:ECM)
- Element Control and Management
- Network Infrastructure

SP Domain

- Business Applications
- Service Orchestration Functionality
- Infrastructure Control and Management
- Network Infrastructure
- ENNI

Partner Domain

- Business Applications
- Service Orchestration Functionality
- Infrastructure Control and Management
- Network Infrastructure

LSO Cantata

- Product catalog
- Product feasibility
- Product ordering
- Acceptance testing info
- Billing and usage
- Trouble reports / status
- Product level quality
LSO RA - Legato

**Customer Domain**
- CANTATA (CUS:BUS)
- ALLEGRO (CUS:SOF)
- Business Applications (BUS:SOF)
- Service Orchestration Functionality (SOF:SOF)
- Infrastructure Control and Management (ICM:ECM)
- Element Control and Management (ICM:ECM)
- Network Infrastructure
- customer application coordinator

**SP Domain**
- Business Applications (BUS:SOF)
- Service Orchestration Functionality (SOF:SOF)
- Infrastructure Control and Management (ICM:ECM)
- Element Control and Management (ICM:ECM)
- Network Infrastructure

**Partner Domain**
- Business Applications (BUS:SOF)
- Service Orchestration Functionality (SOF:SOF)
- Infrastructure Control and Management (ICM:ECM)
- Element Control and Management (ICM:ECM)
- Network Infrastructure

**LSO Legato**
- Service feasibility
- Service configuration & activation
- Usage events & metrics
- Service performance & quality
- Service policy
LSO RA - Presto

Customer Domain

- CANTATA (CUS:BUS)
- ALLEGRO (CUS:SOF)

Business Applications

Service Orchestration Functionality

- PRESTO (SOF:ICM)
- ADAGIO (ICM:ECM)

Infrastructure Control and Management

Element Control and Management

Network Infrastructure

Partner Domain

- LEGATO (BUS:SOF)
- PRESTO (SOF:ICM)
- ADAGIO (ICM:ECM)

Business Applications

Service Orchestration Functionality

Infrastructure Control and Management

Element Control and Management

Network Infrastructure

LSO Presto

Connectivity & network function feasibility
Configuration, activation & management of connectivity and logical network functions
Topology and routing
Performance and Fault
Connectivity policy
**LSO RA - Adagio**

**Customer Domain**
- CANTATA (CUS:BUS)
- ALLEGRO (CUS:SOF)

**SP Domain**
- Business Applications
- Service Orchestration Functionality
- Infrastructure Control and Management
- Element Control and Management
  - ADAGIO (ICM:ECM)

**Partner Domain**
- Business Applications
- Service Orchestration Functionality
- Infrastructure Control and Management
- Element Control and Management
  - ADAGIO (ICM:ECM)

**Management**
- Manage fabric or network functions on specific elements
- Element level configuration
- Element resource state
- Element fault and performance
- Element level policy

**Network Infrastructure**
- ENNI
LSO RA - Allegro

Customer Domain

- Customer application coordinator

SP Domain

- Business Applications
  - SONATA (BUS:BUS)
  - LEGATO (BUS:SOF)
- Service Orchestration Functionality
  - PRESTO (SOF:ICM)
- Infrastructure Control and Management
  - ADAGIO (ICM:ECM)
- Element Control and Management
  - LEGATO (BUS:SOF)
- Network Infrastructure
  - ENNI

Partner Domain

- Business Applications
- Service Orchestration Functionality
- Infrastructure Control and Management
  - PRESTO (SOF:ICM)
- ADAGIO (ICM:ECM)
- Element Control and Management
- Network Infrastructure

LSO Allegro

Dynamic service control
Service state info
Service performance & quality
Service related alerts
LSO RA - Interlude

**Customer Domain**
- Customer application coordinator

**SP Domain**
- Business Applications
- Service Orchestration Functionality
- Infrastructure Control and Management
- Element Control and Management
- Network Infrastructure

**Partner Domain**
- Business Applications
- Service Orchestration Functionality
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**LSO Interlude**
- Dynamic service control
- Service parameter configuration
- Service state info
- Service performance info
- Service problem alerts
Lifecycle Service Orchestration Committee Projects
Each LSO reference point spawns many projects. For example, the LSO Sonata projects and related releases.
LSO Sonata R1 was released in July 2017

Service Providers need to be able to...

Serviceability

1. Request Address Validation for a geographic location with Partner
2. Retrieve Sites at a given location from Partner
3. Request Serviceability (Product Offer Qualification) at a given location from Partner

Ordering (New Order)

1. Request a new Product order with Partner
2. Retrieve the Product order from Partner
For LSO Sonata R2

Service Providers need to be able to...

Ordering
1. Retrieve Product Inventory from Partner
2. Order for requesting Product Changes with Partner
3. Order for requesting Product Disconnections with Partner
4. Cancel the inflight Product order with Partner

Ticketing
1. Request creating Trouble Ticket with Partner
2. Request modifications or cancellation on the Trouble Ticket with Partner
3. Receive notification on the Trouble Ticket’s progress from Partner

Quote
1. Request for Quote for a Product from the Partner
Lifecycle Service Orchestration – Completed Work

• **Lifecycle**
  – MEF 50.1 (Service Lifecycle)
  – MEF 52 (CE Perform. Reporting Framework)
  – MEF 53 (CE Services Qualification Questionnaire)
  – MEF 54 (Ethernet Interconnect Point)
  – MEF 57 (Ethernet Ordering)

• **Orchestration**
  – MEF 55 (LSO Reference Architecture, Operational Threads, TOSCA templates)
  – MEF 59 Network Resource Model
  – MEF 60 Network Resource Provisioning

• **Services / Modeling**
  – MEF 58 Yang Modules for MEF services
Lifecycle Service Orchestration – Work in Progress

- **Lifecycle**
  - Commercial Affecting Attributes
  - MEF 57 enhancements (IPS, Access E-Line)
  - Presto SOAM and SAT

- **Orchestration**
  - MEF 55 (LSO Reference Architecture SOF, Security)
  - Access e-Line Service Control
  - MEF Network Slicing Architecture

- **Services / Modeling**
  - MEF Core Model
  - Policy Driven Orchestration
Open source & SDO collaboration supporting LSO
MEF consistently pursues collaboration with open source projects & other standards groups.

Multiple collaborations including:

- The Linux Foundation
- TM Forum
- ITU
- ONAP
- OPNFV
- Open Daylight
- Open APIs with LSO
- ATIS
- IETF
- ETSI
- Open Source MANO
- LSO APIs
- Broadband Forum
- IP service definitions
- Teleecom Infra Project
- OIF
- 3GPP
- CableLabs
- Network resource modeling
- G.8011
- Information & data models
- Ethernet ordering technical specification
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- **THE LINUX FOUNDATION**
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**tmforum**
Open APIs with LSO

**ITU**
Information models and G.8011

**ATIS**
Ethernet ordering technical specification

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