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TOSCA Defined Control Loop Lifecycle Management Demo

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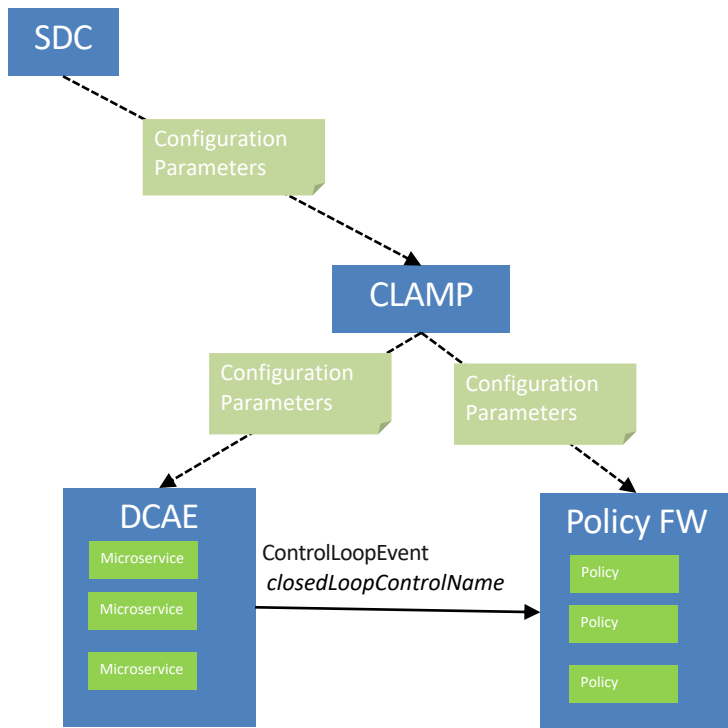


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Overview and Progress

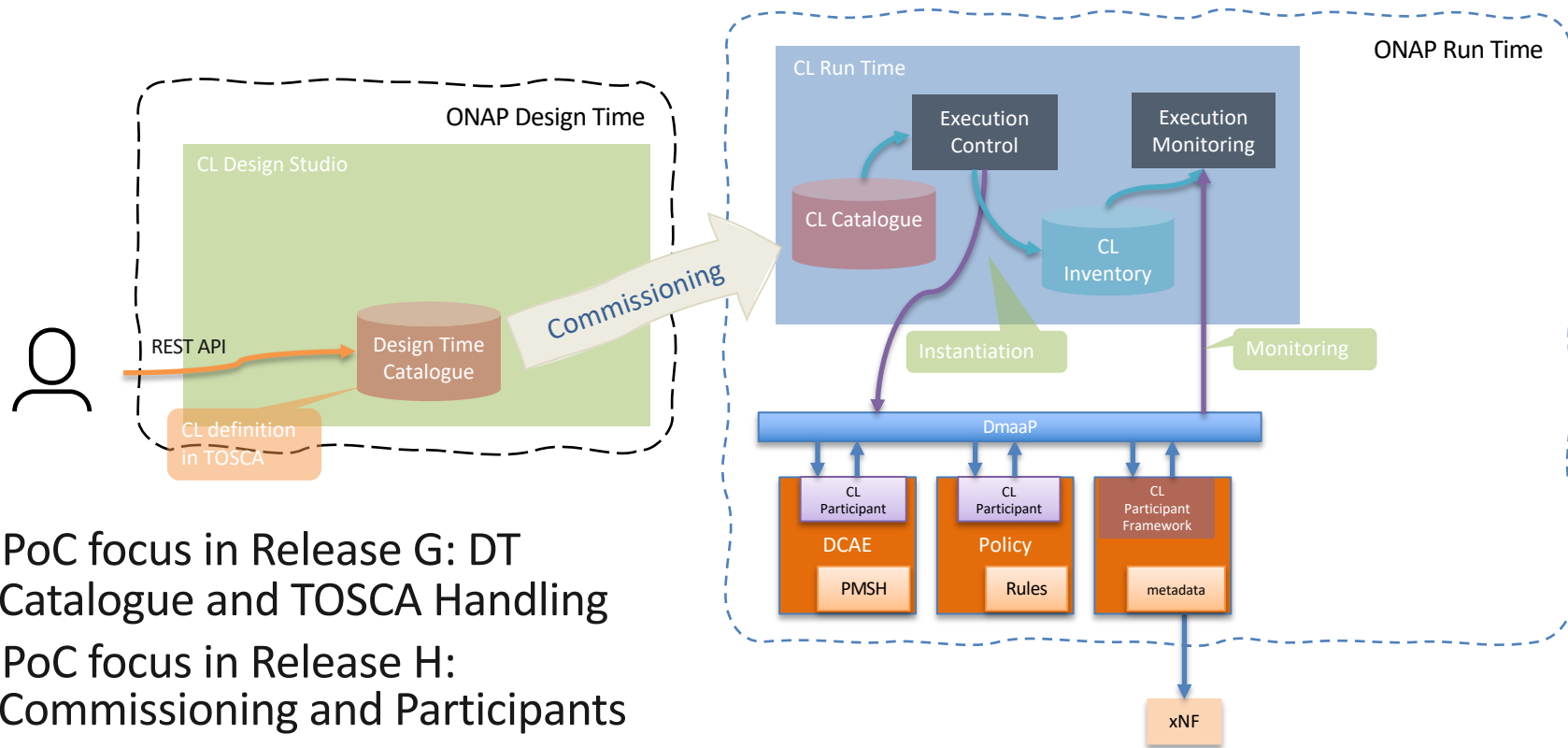
Background



- ONAP architecture is inspired by Control Loop and Autonomic Management research
- ONAP generalizes design time and run time Control Loop support
- Microservice definitions deployed beforehand
- Policy Types and rule sets separately deployed beforehand
- CLAMP configures the parameters and starts control loop microservices and creates policies for control loops

- Goals
 - Demonstrate Control loops themselves can be defined and deployed using TOSCA
 - Use a design time catalogue for Control Loops for a complete storage of all the artifacts from different DT systems
 - Introduce the Control Loop “Participant” concept to allow any component to partake in a control loop
 - propose a Control Loop Run Time API to provide more abstract LCM
- Participating Companies
 - Ericsson
 - AT&T
 - Bell Canada

CL Architecture in PoC (Rel G/H)



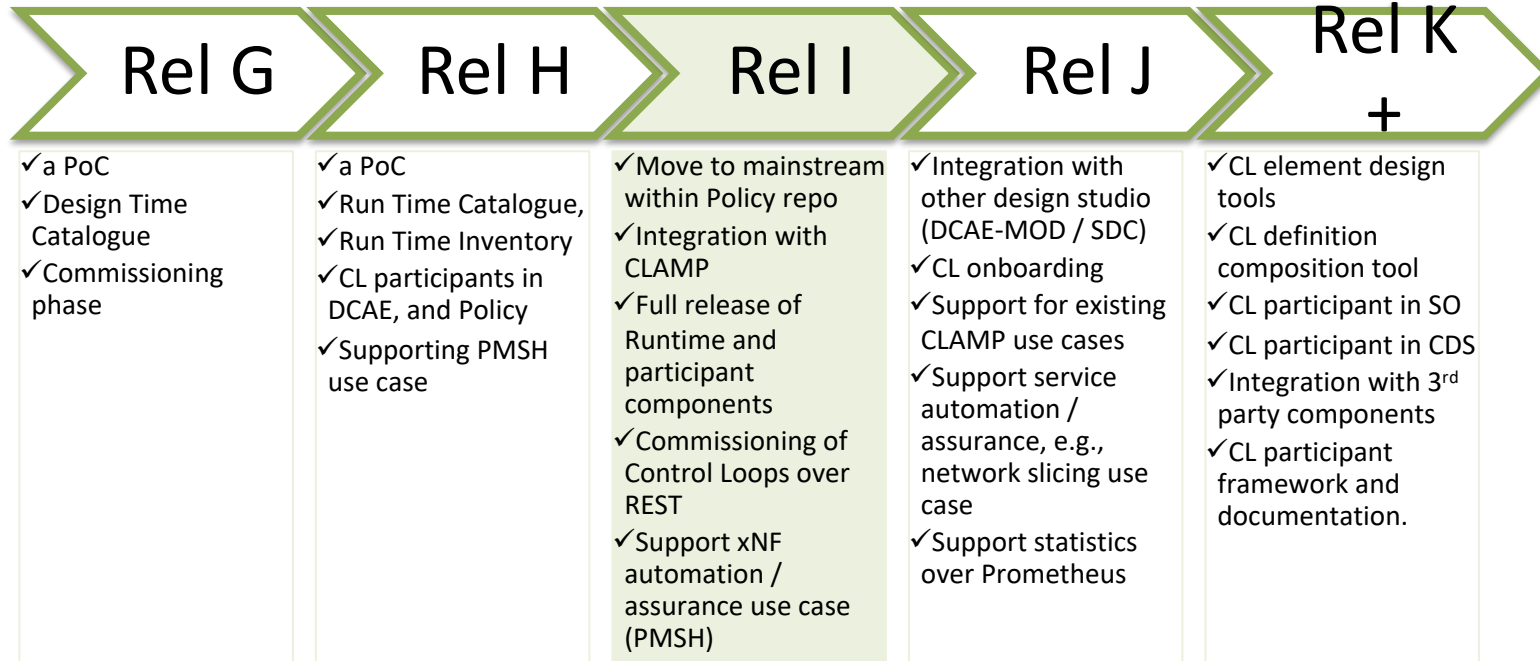
- PoC focus in Release G: DT Catalogue and TOSCA Handling
- PoC focus in Release H: Commissioning and Participants

Business Requirements: ONAP Rel I

- **Executive Summary:** CLAMP (Control Loop Automation Management Platform) functionalities, recently moved to Policy project, want to provide a Control Loop Lifecycle management architecture. A control Loop is a key concept for Automation and assurance Use Cases and remain a top priority for ONAP as an automation platform. This requirement wants to improve Control Loop LCM architecture focusing on an abstract CL management logic, providing a common CL Design time catalogue with a generic CL definition, isolating CL logic vs ONAP component logic and elaborate API to integrate with other design systems as well as 3PP component integration. PoCs have been progressed in ONAP Rel G and H in this area, CL LCM redesign has reached a relevant viable set of features and it is ready to be moved in Rel I to mainstream as part of the Policy framework.
- **Business Impact:** Deployment and orchestration of automation and control loop use cases across CNFs, VNFs and PNFs in a model driven way simplifies the network management. Enables operators and service providers to manage the Life Cycle of a Network Service. Assuring continuity of operation of services is crucial for production and carrier grade environments. The actualization or upgrades of software and in consequence required changes in the service model is a natural part of service instance life cycle. Without the support of ONAP service update with schema change, service life cycle management by ONAP can be very difficult which can impact the quality and continuity of services.
- **Business Markets:** All operators and service providers that are using ONAP for automation and assurance.
- **Funding/Financial Impacts:** CL LCM wants to reduce operational expense and its abstraction will provide an added value with multiple integration points.
- **Organization Mgmt, Sales Strategies:** *There is no additional organizational management or sales strategies for this requirement outside of a service providers "normal" ONAP deployment and its attendant organizational resources from a service provider.*

- The ONAP CLAMP project was subsumed into the the ONAP Policy Framework Project
- TOSCA Control Loop Life Cycle Management is released in the Policy Framework, mainly in policy/clamp but also used and added code in common Policy repos
- New components released
 - New TOSCA Control Loop Runtime component released
 - New Participant components for Kubernetes, HTTP, and Policy released
- Policy GUI updated
 - Supports commissioning of control loop definitions into the Control Loop Runtime
 - Supports creation and parameterization of new control loop instances
 - Supports management of the life cycle of control loop instances: Instantiation, state change, monitoring, and deletion
- Public Rest APIs available for all operations supported by the GUI

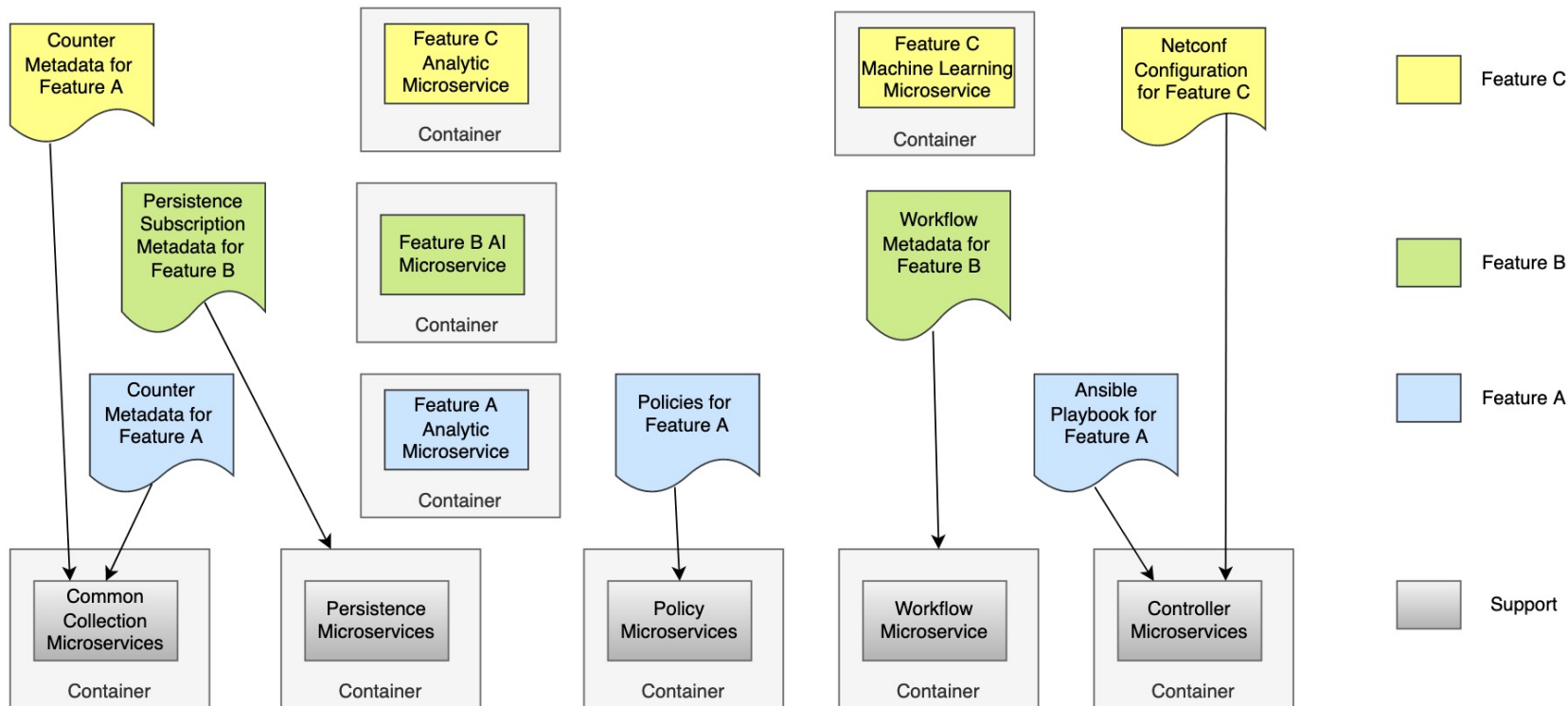
Roadmap



Highlights for Jakarta

- Support for Control Loop design
 - Onboarding of Control Loop Elements in SDC
 - Composition of Control Loops in SDC
 - Distribution and commissioning of Control Loops using the SDC
- Server Improvements
 - Spring Framework for Persistence
 - Better support for control loop updating
 - Statistics using Prometheus
- TCA Use case implementation
 - Support for Cloudify is being removed from DCAE in Jakarta
 - TCA based control loops planned to be implemented using TOSCA approach
- Proposal: Automation Composition Management
 - Proposed PoC in Jakarta
 - Generalization of the concept to include use cases beyond control loops
 - Use cases with arbitrary components working together to deliver a feature such as open loops or collections of features

Automation Composition Management



See the [Automation Composition Management Wiki Page](#)



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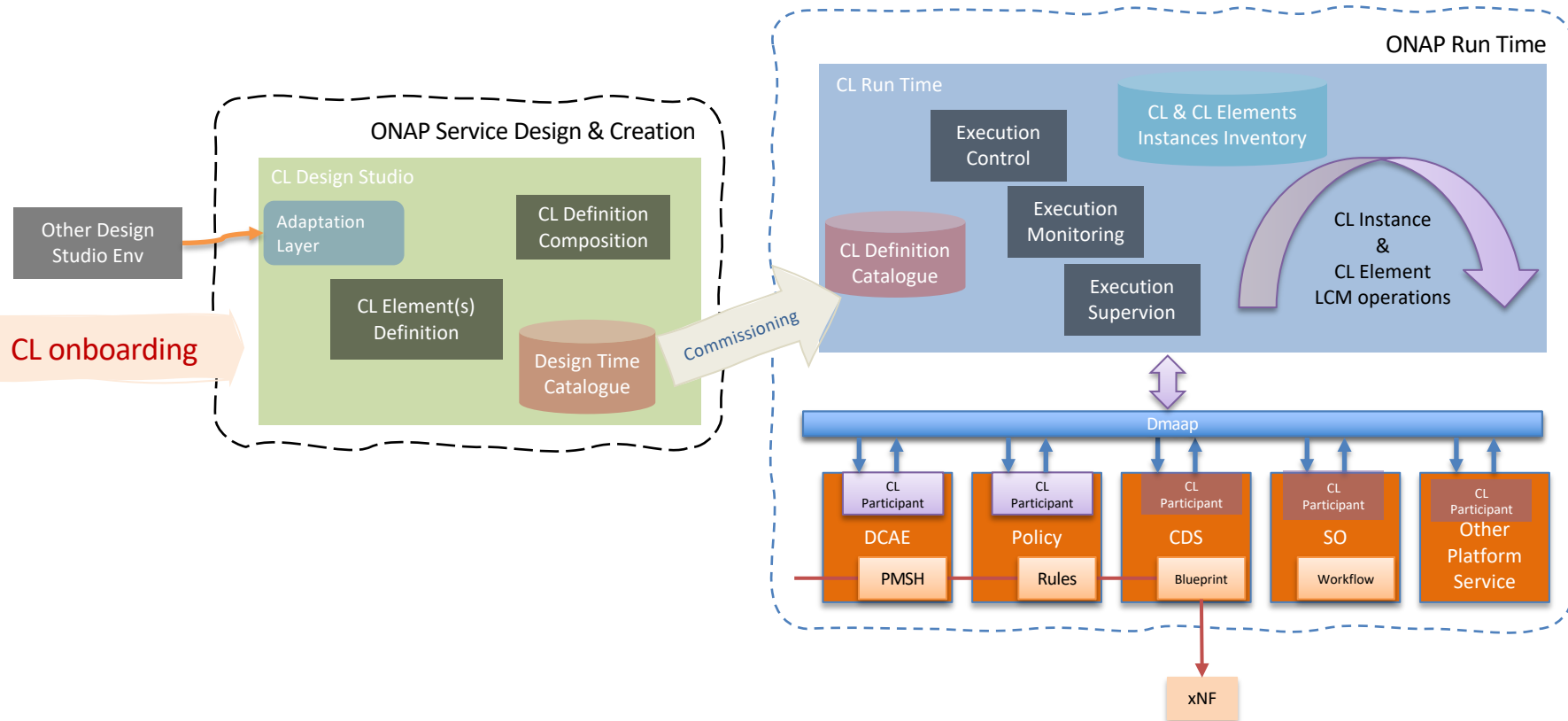
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Technical Description

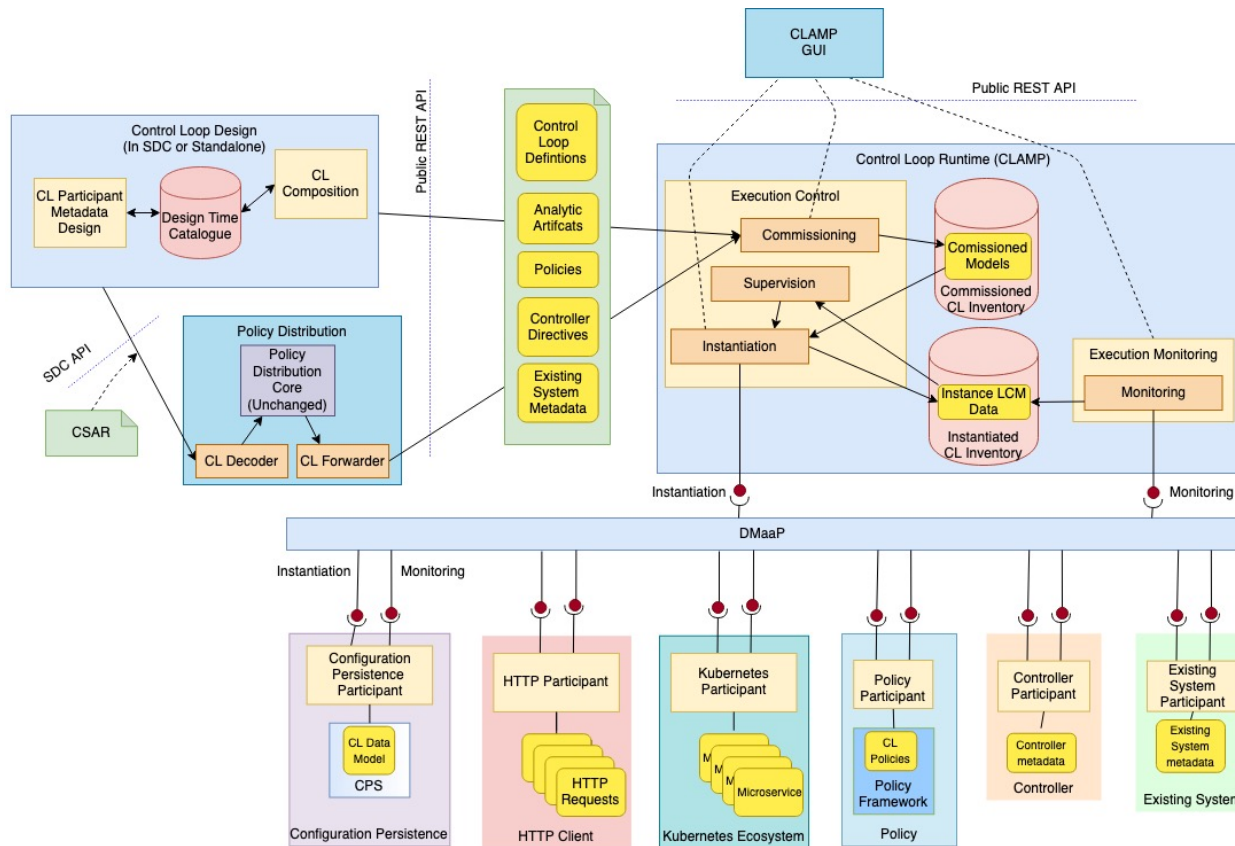
What is Supported?

- Managing the definition of Control Loops
- Managing Control Loop Commissioning and Decommissioning
- Managing the parametrization of Control Loops
- Managing the Control Loop life cycle
 - Instantiation
 - Status Monitoring
 - State Change

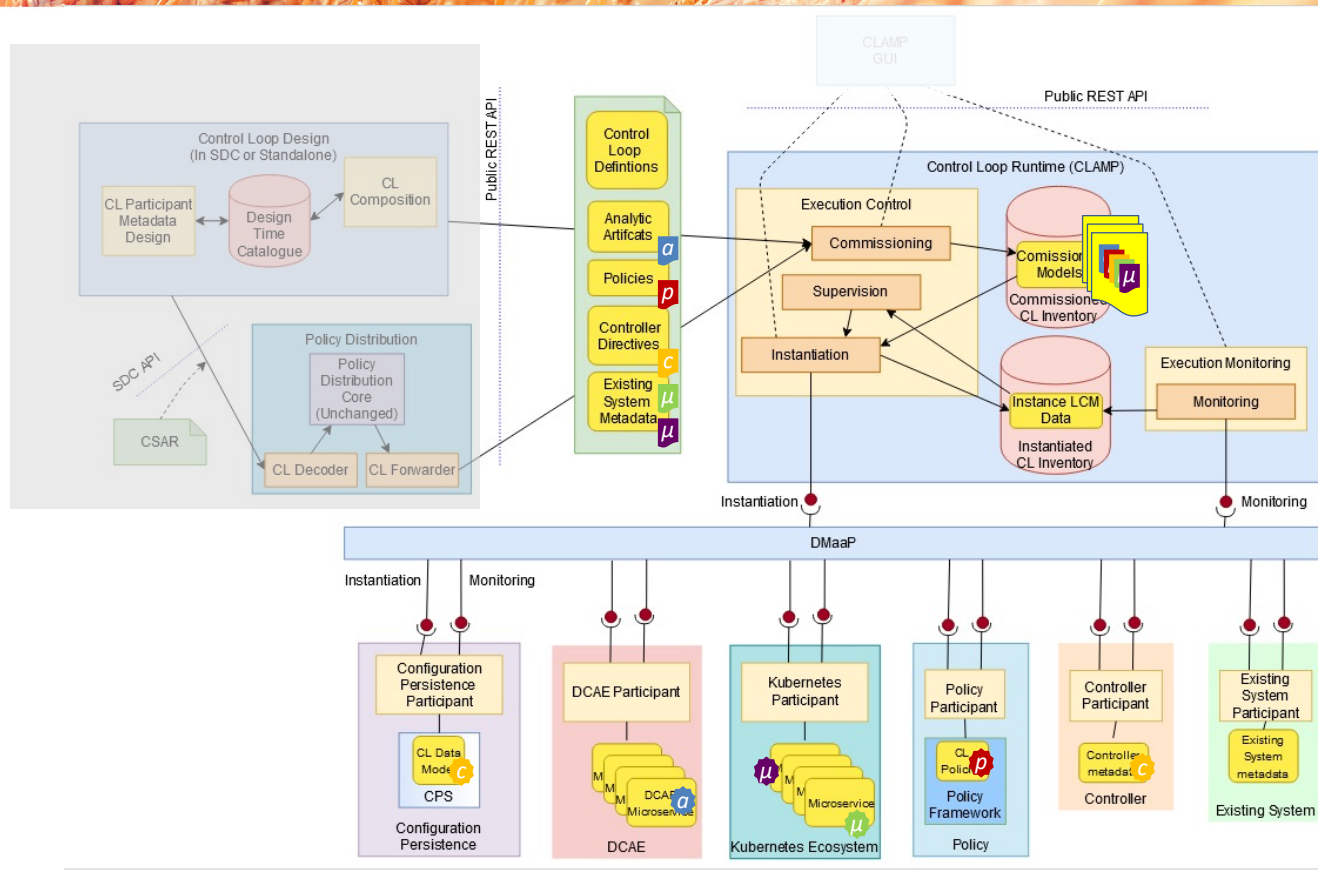
CL Target Architecture



Control Loop Target Architecture



ONAP App Management Architecture





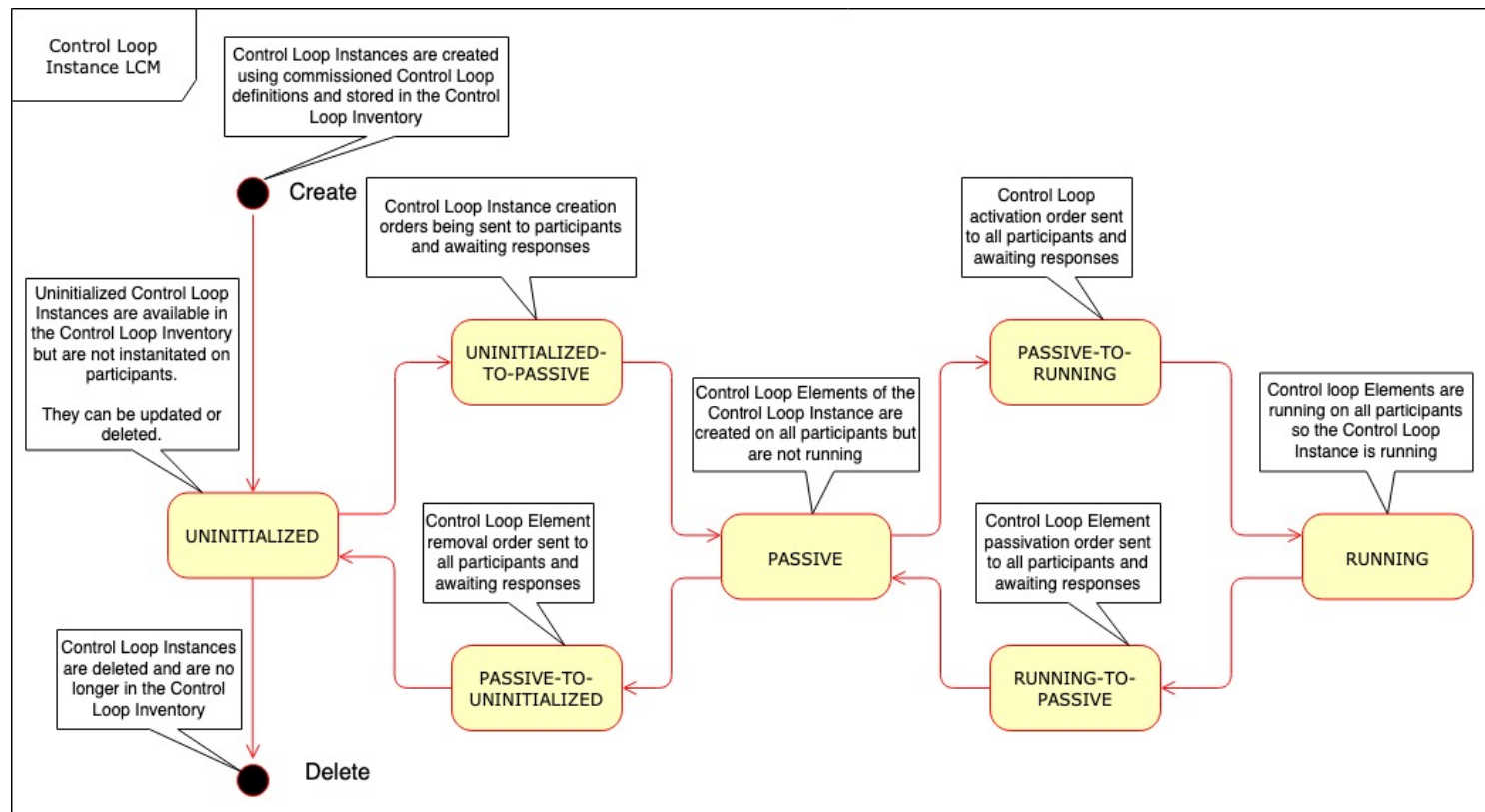
Terminology and Concepts

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Control Loop Life Cycle Management



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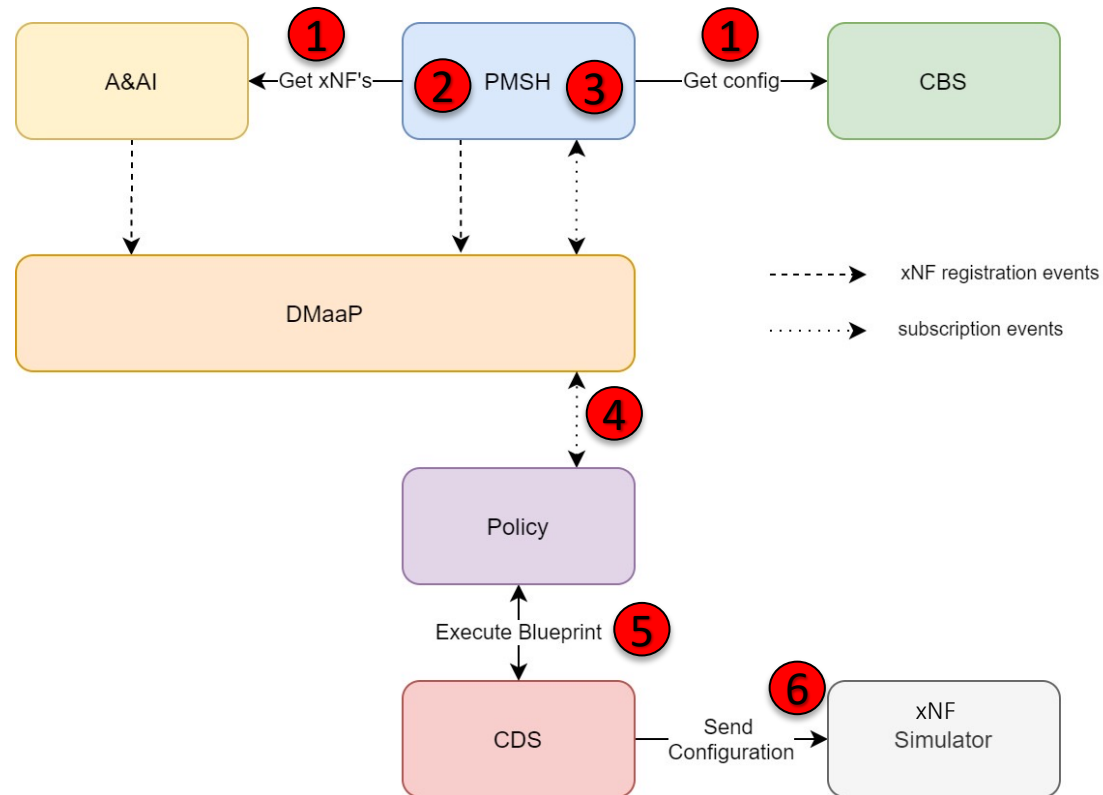
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Demonstration

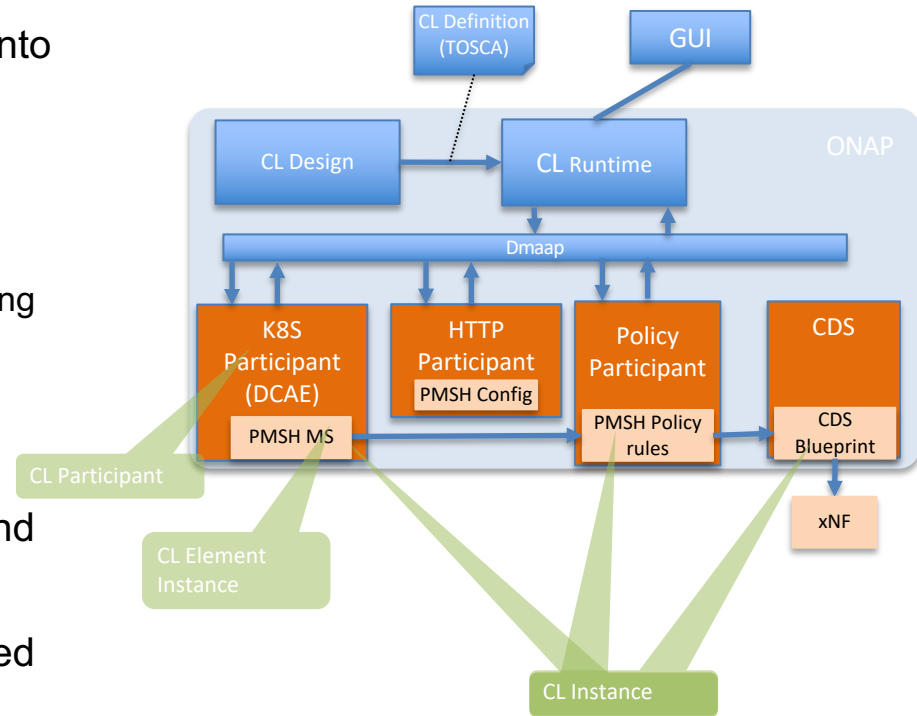
PMSH Control Loop

1. PMSH uses CBS for new xNFs or for config changes
2. If a change is detected, PMSH fetches xNF information from A&AI and triggers a control loop execution
3. PMSH prepares a subscription change
4. PMSH sends subscription change to Policy
5. Policy executes blueprint on CDS
6. CDS sends new configuration to xNF (Simulated in the demo)



LCM of PMSH Control Loop

1. Control Loop Definition is Commissioned into Runtime
2. Control Loop instance is created and parameterized
3. Control Loop Instance is instantiated by changing its state to Passive:
 - a. PMSH microservice is created in DCAE using the K8S Participant
 - b. PMSH microservice is configured using the HTTP Participant
 - c. PMSH Policy is deployed using the Policy Participant
4. Control Loop Instance is now in service and can be triggered and executed
5. Control loop instance is brought out of service by changing its state to Uninitialized
6. Control Loop instance is removed



[See the LFN Developer Event Minutes page for this session](#)

Available resources

- A recording of this entire session
- The session slides
- A recording of the demo

The background of the entire slide is a close-up, low-angle shot of golden wheat stalks. The stalks are in sharp focus in the foreground and gradually blur into a warm, golden bokeh in the background, creating a sense of depth and texture. The lighting is soft and warm, typical of late afternoon or early morning.

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Summary

Summary

- TOSCA defined Control Loop functionality is now released and is available in ONAP
- SDC support, support for more use cases, and improvements are coming in Jakarta
- Proposal to generalize the approach as “Automation Composition Management”
- Intention to create a PoC in ETSI ZSM to show the benefits of ONAP’s closed loop solution and compliance with ZSM specifications. See session on [TCC Generic Network Management](#) on Thursday
- Functionality is available for use in your Control Loop use case
- Full documentation is available in [the ONAP documentation here](#)
- Contact us anytime on the Policy Framework channels for more information



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Backup Slides

Scalability and Resilience

- The CLAMP runtime is stateless, state preserved in database.
- Participant communication is asynchronous and state handling is designed to be “eventually consistent”
- Participants cooperate with the CLAMP runtime, all updates to participants and state change requests are supervised
- More than one CLAMP runtime can be deployed and REST/supervision operations on Control Loop Instances can run in parallel
- Many participants of a particular type can exist, load balancing can be done by the CLAMP runtime and/or independently by participants