



OLF NETWORKING

LFN Developer & Testing Forum

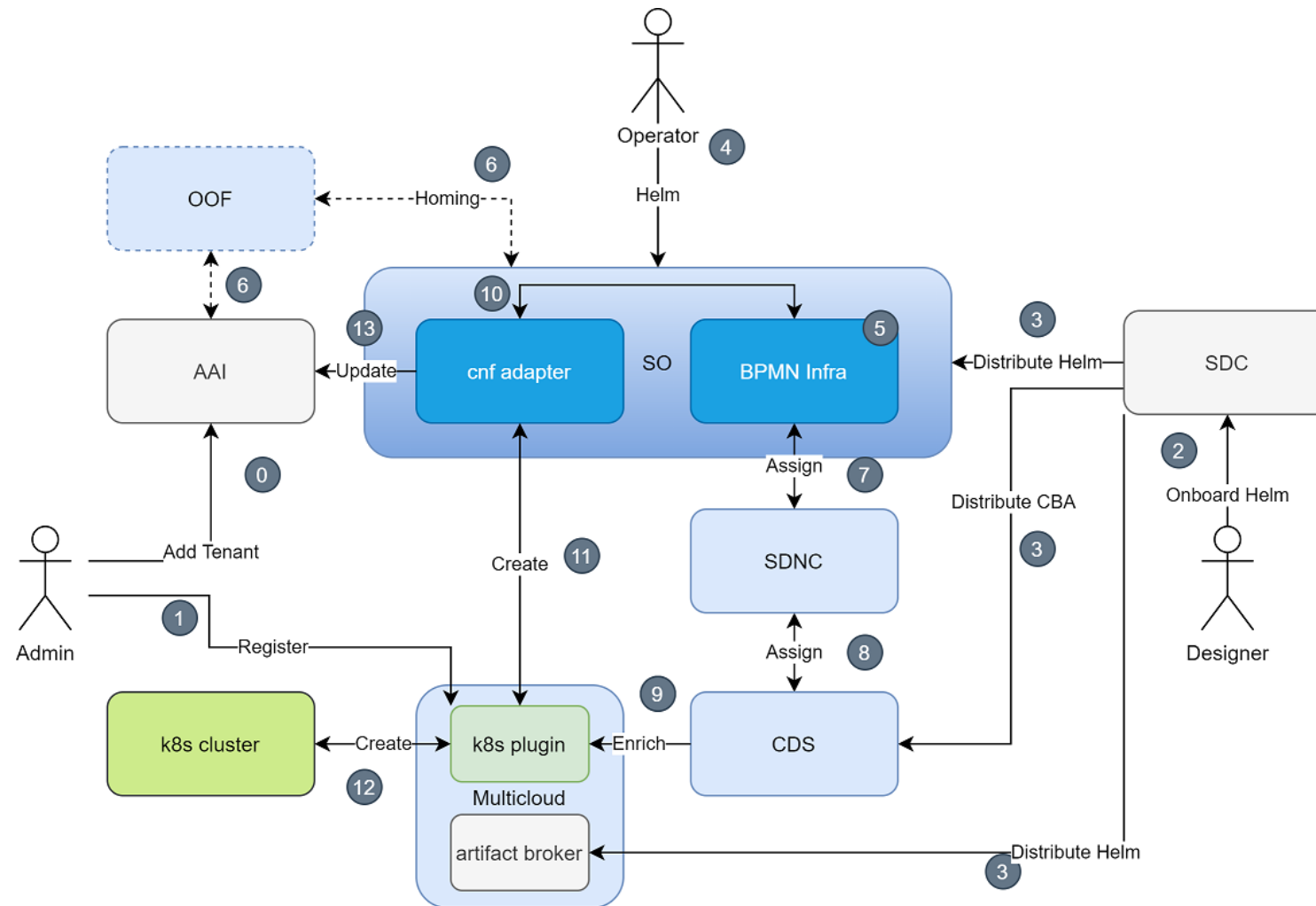
Complete Life-cycle of CNF Orchestration

Kohn Updates & CNFO Upgrade Demo

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18.11.2022

CNF Orchestration LCM Options



- Helm Onboarding [SDC]
- Day 0/1 Customization [CDS/MC]
- Instantiation [SO/MC]
- Day 2 Configuration [CDS/MC]
- State Synchronization [SO/AAI/MC]
- Healthcheck [SO/CDS/MC]
- Upgrade [SO/CDS/MC]
- Multi-cluster deployment [SO/MC]
- VNF/PNF Integration [ALL]
- E2E Service Automation [SDK]

CNFO Scenarios

- **CNF Onboarding**
 - Helm package composition options
 - Combination with PNFs
- **CNF LCM**
 - Creation
 - Deletion
 - Migration
 - Scaling
 - CNF coordination
 - Build & Replace Upgrade
- **CNF Representation in AAI**

DTF June 2022 Porto



CNF Orchestration



NOKIA



Tech
Mahindra



SAMSUNG



A close-up photograph of golden wheat stalks, slightly out of focus, creating a warm, textured background. The lighting is soft and natural, highlighting the intricate details of the grain heads.

CNF

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Apache CNF Use Case with CNFO

Exemplary Use Cases

Apache

- Day 0/1/2 C(N)F
- Full automation in ONAP
- Standard K8S Cluster
- ONAP Istanbul+
- The most complete**

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Smoke Use Case

vFW CNF

- Day 0/1/2 CNF
- Full automation in ONAP + Postman
- Required KUD K8S Cluster
- ONAP Guilin+
- Used to validate CNFO
- The best documentation**

DTF June 2021 Video

Free5GC

- Day 0/1/2 CNF + PNF
- Full automation in ONAP
- Required Dedicated K8S Cluster
- ONAP Istanbul+
- CNF + PNF + Coordination**

DTF January 2022

CNFO Onboarding

```
{
  "name": "simpleCNF",
  "description": "",
  "data": [
    {
      "file": "CBA.zip",
      "type": "CONTROLLER_BLUEPRINT_ARCHIVE"
    },
    {
      "file": "helm_apache.tgz",
      "type": "HELM",
      "isBase": "true"
    }
  ]
}
```

VF_apache_k8s_demo... V1.0 CERTIFIED Upgrade Services Check Out

General
Deployment Artifact
Information Artifact
TOSCA Artifacts
Composition
Operation
Activity Log
Deployment
Properties Assignment
Attributes & Outputs
Req. & Capabilities

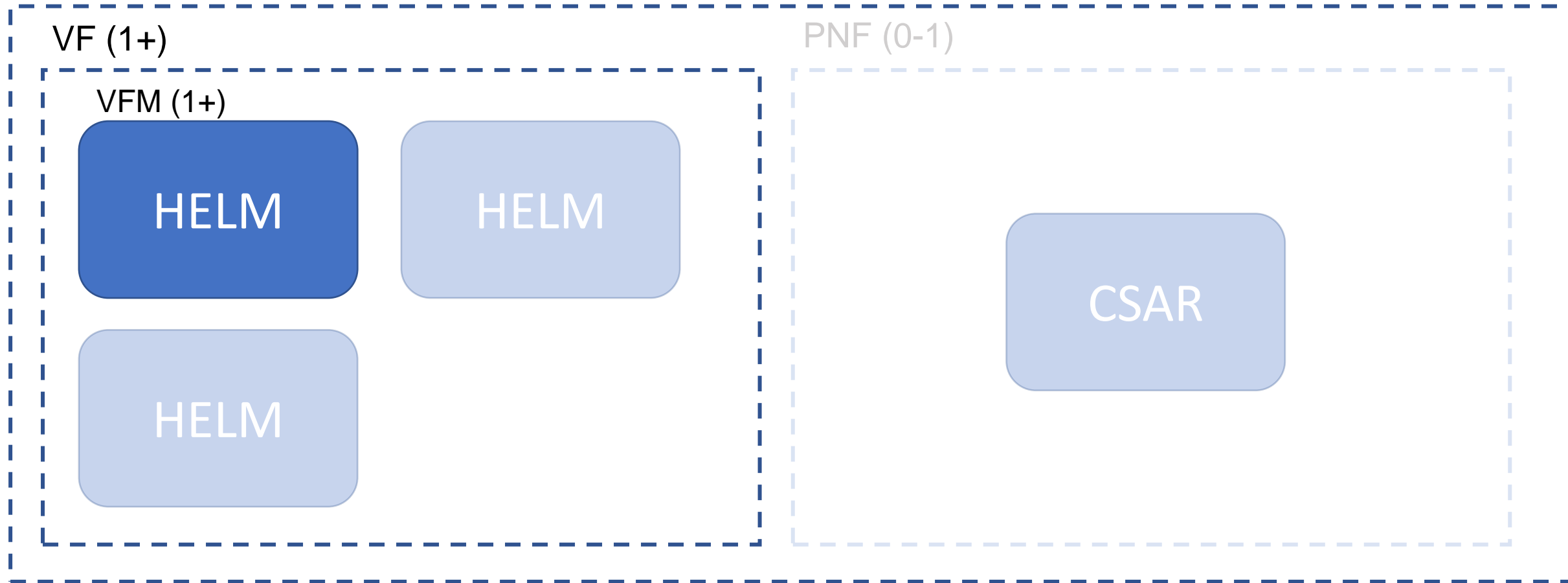
Deployment Artifact

Name	Filename	Type	Version	UUID	
VF License	vf-license-model.xml	VF_LICENSE	1	c91b7193-648c-42f7-8290-45	↓
base_template_dummy_ignor	base_template_dummy_ignor	HEAT	1	93d2a206-7ec6-41b7-92bb-d	↓
VF HEAT ENV	base_template_dummy_ignor	HEAT_ENV	1	e8f04e4b-069f-4159-9032-01	↓
Vendor License	vendor-license-model.xml	VENDOR_LICENSE	1	b0c5616a-b20a-414f-b5b6-87	↓
CBA	CBA.zip	CONTROLLER_B	1	065d2de4-ea29-4215-a936-c8	↓
helm_apache	helm_apache.tgz	HELM	1	f4134c48-43f4-420f-a00c-514	↓

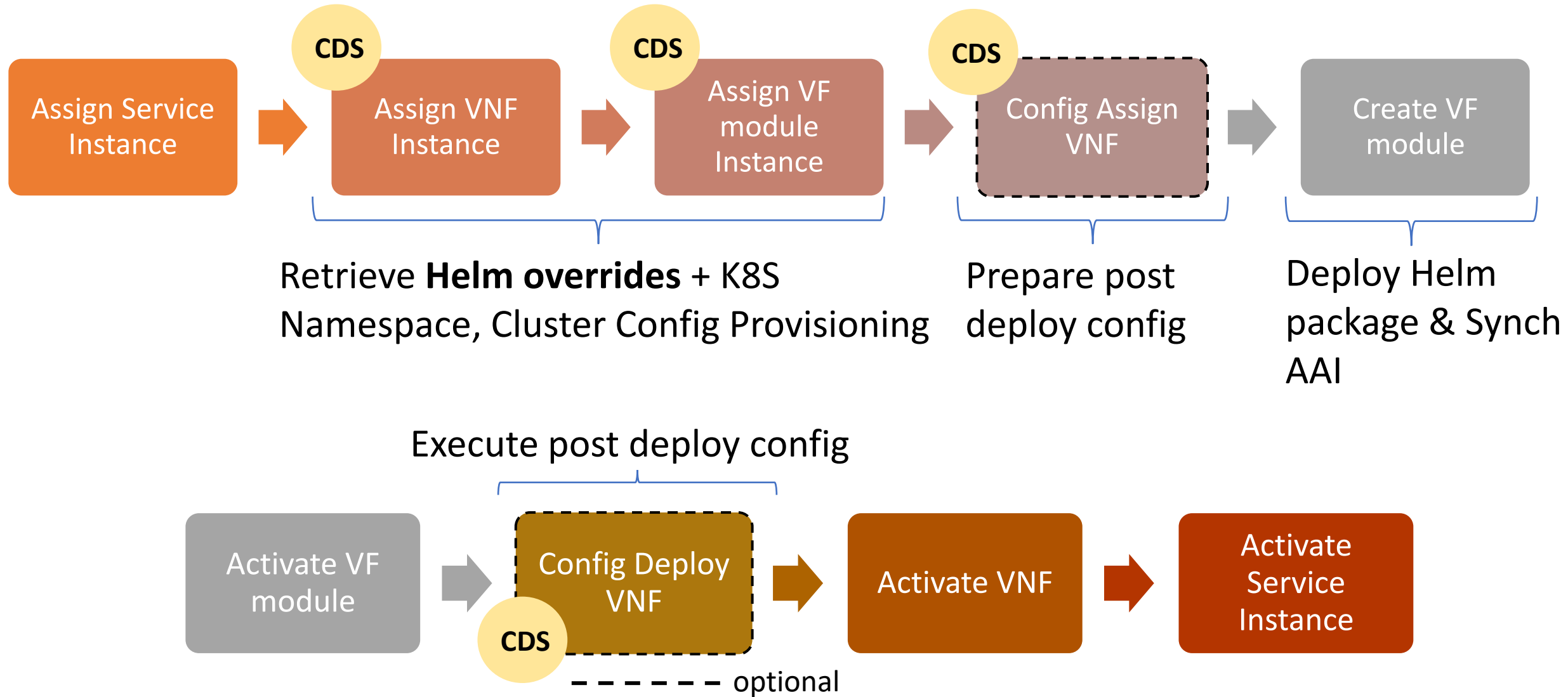
- Standard Simple VSP Package (ZIP)
- **CBA is crucial and mandatory for CNFO**
- In the future may be replaced with ASD

ONAP modeling concept (SDC)

Service



SO CNF Instantiation (macro mode)



Automation for CNF Use Cases

<https://github.com/onap/demo/tree/master/tutorials/apacheCNF>

- Python ONAP-SDK Based
- Templates Folder
 - Build and Test CBA
 - Build onboarding package with make
- Automation Folder
 - Step-by-step README
 - Create K8S Region
 - Onboard Service
 - Instantiate Service
 - Delete Service
 - Scale Service
 - Upgrade (WIP)
 - Check Health of CNF

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Smoke Use Case

```
— README.txt
— automation
  — Pipfile
  — Pipfile.lock
  — README.md
  — __init__.py
  — artifacts
  — config.py
  — crds
  — create_cloud_regions.py
  — delete.py
  — healthcheck.py
  — instantiate.py
  — k8s_client.py
  — onap_settings.py
  — onboard.py
  — update_cba.py
  — update_connectivity_info.py
  — vsp
— templates
  — Makefile
  — README.txt
  — base_native
  — cba
  — cba-dd.json
  — cba-dev
  — cba2dd.py
  — helm
  — native_cnf_k8s_demo.zip
  — package_native
  — tools
```

CNF Day 0 – Helm Enrichment

```
"resource-assignment": {  
  "steps": {  
    "resource-assignment": {  
      "description": "Resource Assign Workflow",  
      "target": "resource-assignment",  
      "activities": [  
        {  
          "call_operation": "ResourceResolutionComponent.process"  
        }  
      ],  
      "on_success": [  
        "profile-upload"  
      ]  
    },  
    "profile-upload": {  
      "description": "Generate and upload K8s Profile",  
      "target": "k8s-profile-upload",  
      "activities": [  
        {  
          "call_operation": "K8sProfileUploadComponent.process"  
        }  
      ]  
    }  
  }  
},
```

CDS

Assign VNF
Instance

CDS

Assign VF
module
Instance

- Modifies Helm package from VSP
- K8s Profile Creation & Upload
 - Native mechanisms in CDS
 - Customizable by CBA
- Modification of Helm values
- Customization of labels
- Selection of k8s namespace
- Modification of Helm templates
- Provisioning of new Helm templates

CNF Day 2 – Config Preparation

```
"config-assign": {
  "steps": {
    "config-setup": {
      "description": "Gather necessary input for config template upload",
      "target": "config-setup-process",
      "activities": [
        {
          "call_operation": "ResourceResolutionComponent.process"
        }
      ],
      "on_success": [
        "config-template"
      ]
    },
    "config-template": {
      "description": "Generate and upload K8s config template",
      "target": "k8s-config-template",
      "activities": [
        {
          "call_operation": "K8sConfigTemplateComponent.process"
        }
      ]
    }
  }
},
```

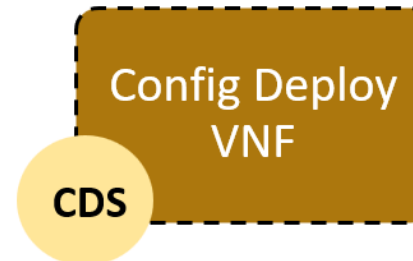
CDS

Config Assign
VNF

- Config Template (CFT)
 - Helm package
 - Build or modified by CDS
 - We can use VSP Helm as a template
- CFT preparation may be a part of Config-Assign in CDS
- Native mechanisms in CDS
 - Customizable by CBA
- Config Setup merges data
 - CBA
 - AAI i.e. vf-modules info
 - MDSAL – i.e. resolved Day 0
 - K8s – i.e. k8s resource status info
 - Kotlin, Python, REST
 - Complex JSON

CNF Day 2 – Config Creation

```
"config-deploy": {
  "steps": {
    "config-setup": {
      "description": "Gather necessary input for config init and status verification",
      "target": "config-setup-process",
      "activities": [
        {
          "call_operation": "ResourceResolutionComponent.process"
        }
      ],
      "on_success": [
        "config-apply"
      ],
      "on_failure": [
        "handle_error"
      ]
    },
    "config-apply": {
      "description": "Activate K8s config template",
      "target": "k8s-config-apply",
      "activities": [
        {
          "call_operation": "K8sConfigTemplateComponent.process"
        }
      ],
      "on_success": [
        "status-verification-script"
      ]
    }
  }
}
```



- Config Instance (CFI)
 - Instantiates CFT
 - Provides overrides for CFT
- CFI creation is part of Config-Deploy in CDS
 - Creates new k8s resources
 - Modifies k8s resources of existing CNF instance
- Native mechanisms in CDS
 - Customizable by CBA
- In vFW CNF Use Case followed by simple Status Check
 - Checks Pod Status until „Running”
 - Fails after 30 retries

A close-up, low-angle shot of a golden wheat field under bright, warm light. The wheat stalks are in sharp focus in the foreground, with a soft bokeh effect in the background. The overall color palette is warm, ranging from light yellow to deep orange.

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CNFO - CNF Upgrade Options

CNF Upgrade Kohn Options

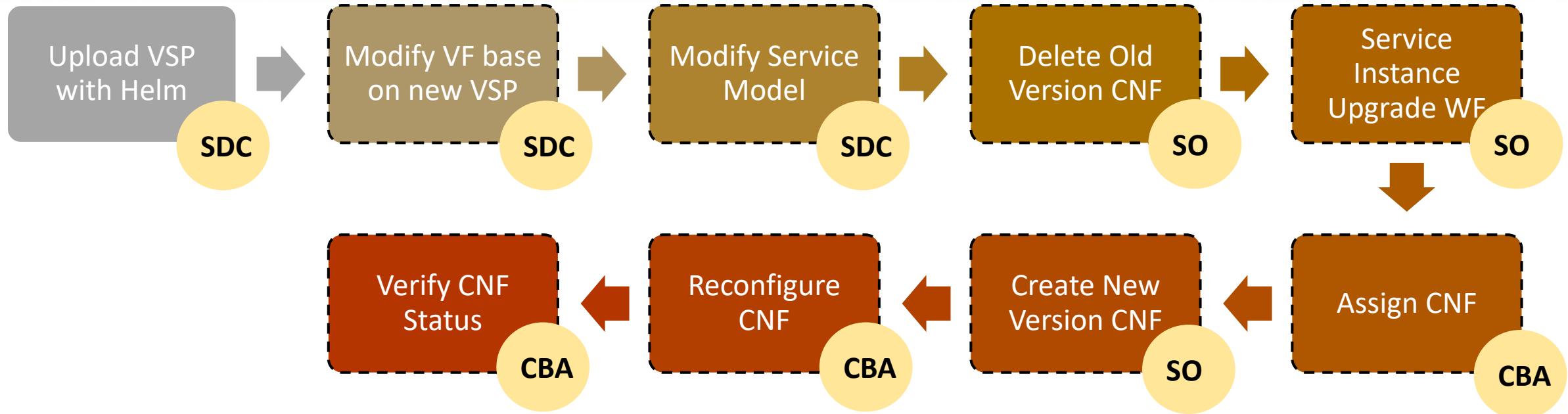
Build &
Replace



Upgrade

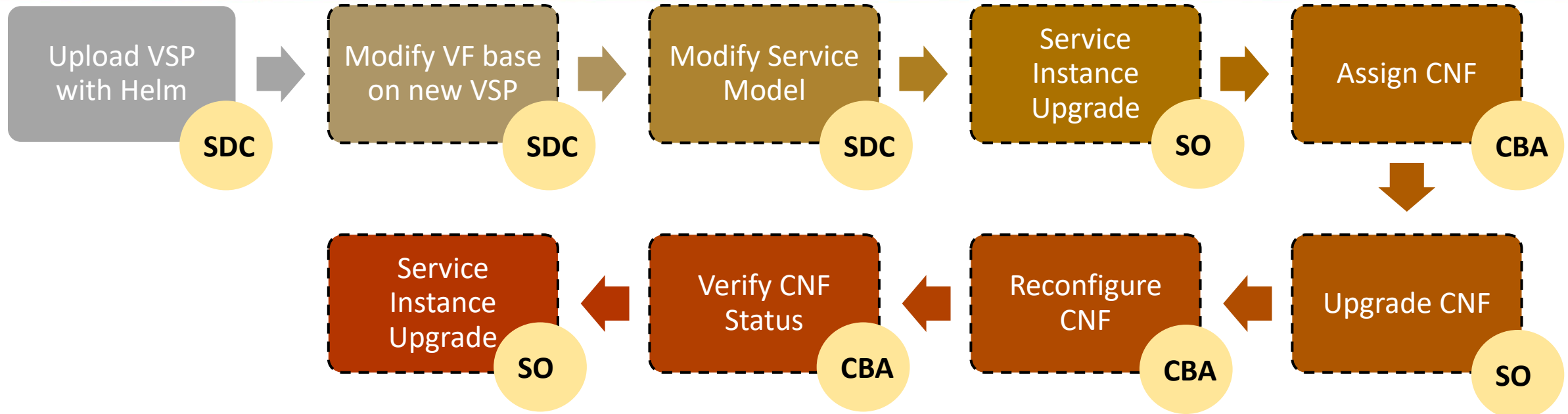


CNF Upgrade since Jakarta



- **Simple to execute**
- **We need to remove old version of the CNF firstly**
- Requires traffic migration/redundancy to not loose the traffic
- All required workflows present in SO (REQ-883)
 - `POST serviceInstances/$SERVICE_INSTANCE_ID/upgrade`
 - `POST serviceInstances/$SERVICE_INSTANCE_ID/vnfs`
 - `DELETE serviceInstances/$SERVICE_INSTANCE_ID/vnfs/$VNF_ID`

CNF Upgrade since Kohn



- **Little more complex to execute**
- **We upgrade CNF like helm upgrade does**
- In SDC we need to change model twice
- All required workflows present in SO (SO-3947)
 - [POST serviceInstances/\\$SERVICE_INSTANCE_ID/upgrade](#)
 - [POST serviceInstances/\\$SERVICE_INSTANCE_ID/vnfs/\\$VNF_ID/upgradeCnf](#)

A close-up photograph of golden wheat stalks, slightly out of focus, creating a warm, textured background. The lighting is soft and natural, highlighting the intricate details of the grain heads.

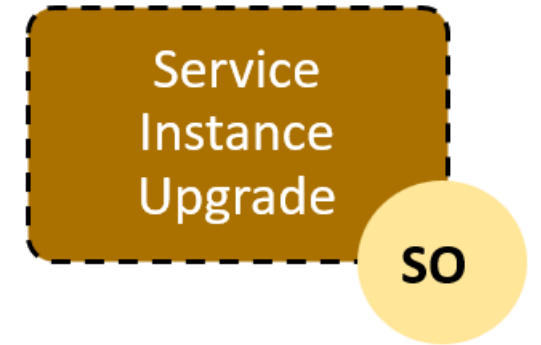
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CNFO - CNF (Helm) Upgrade

CNF Upgrade – Instance Upgrade

- Upgrade existing service instance to newer model in SDC and AAI. This functionality is available from Istanbul release
- Trigger endpoint Url
[/onap/so/infra/serviceInstantiation/v7/serviceInstances/\\$SERVICE_INSTANCE_ID/upgrade](/onap/so/infra/serviceInstantiation/v7/serviceInstances/$SERVICE_INSTANCE_ID/upgrade)
- It will trigger below building block



id	COMPOSITE_ACTION	SEQ_NO	FLOW_NAME	FLOW_VERSION	NB_REQ_REF_LOOKUP_ID	SCOPE	ACTION
532	Service-Macro-Upgrade	1	ChangeModelServiceInstanceBB	1	100	NULL	NULL

- Service model in SDNC and AAI will get updated
- Payload will have only details of new service model version



CNF Upgrade – Assign CNF

```
"config-upgrade-assign": {
  "steps": {
    "config-setup": {
      "description": "Gather necessary input for profile upload",
      "target": "config-setup-process",
      "activities": [
        {
          "call_operation": "ResourceResolutionComponent.process"
        }
      ],
      "on_success": [
        "profile-upload"
      ]
    },
    "profile-upload": {
      "description": "Generate and upload K8s Profile before upgrade",
      "target": "k8s-profile-upgrade-upload",
      "activities": [
        {
          "call_operation": "ComponentScriptExecutor.process"
        }
      ]
    }
  }
},
```

Assign CNF

CBA

- Preparation steps before Upgrade
- May be exactly the same like for Day-0 step of CNF deployment
- We can update overrides, change namespace or do more complex actions
- We generate k8sprofiles and upload them

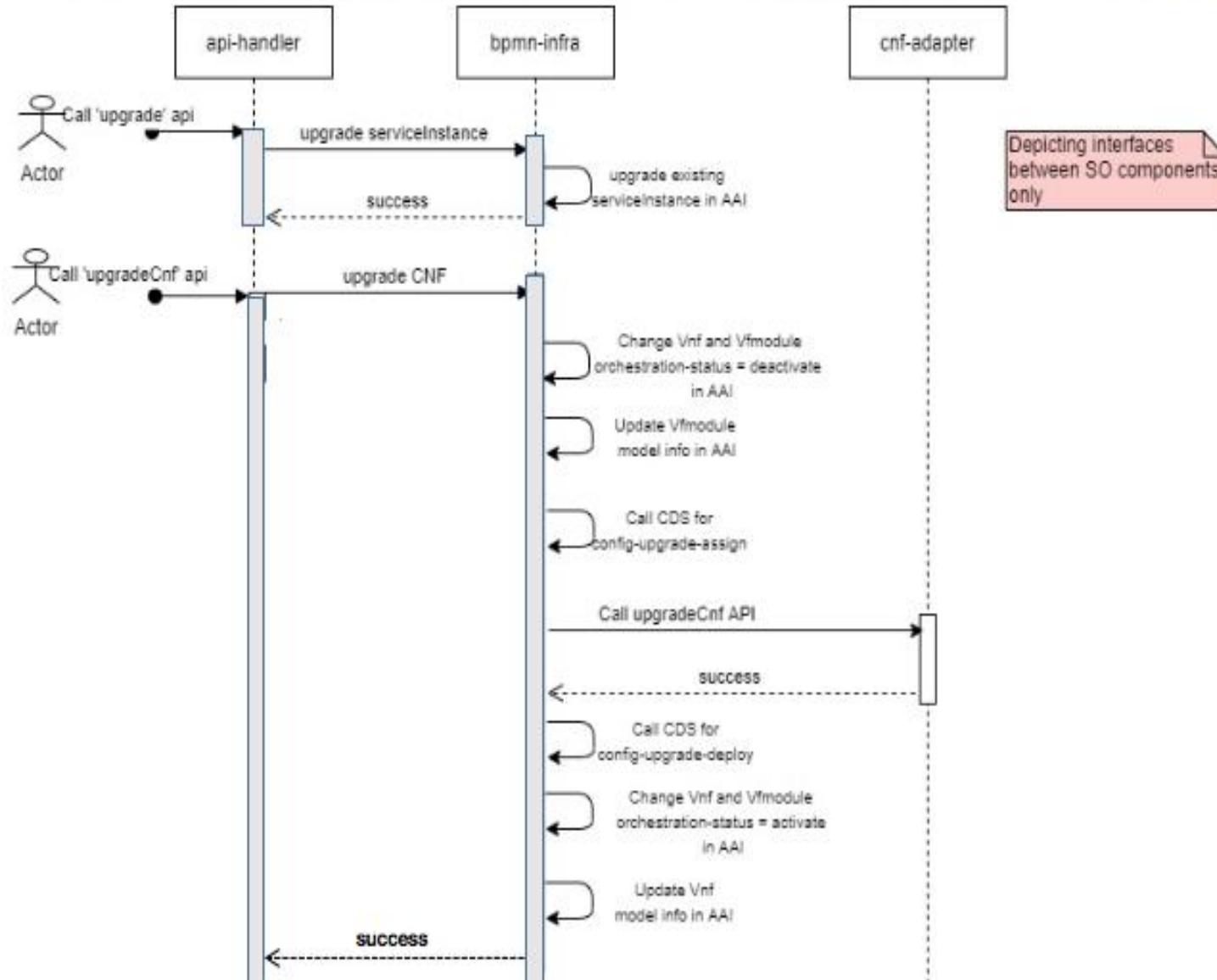
CNF Upgrade – SO Upgrade Workflow (1)

- New endpoint added to API-Handler
- POST
`/serviceInstances/{serviceInstanceId}/vnfs/{vnfInstanceId}/upgradeCnf`
- Payload the same as for VNF Create API
- We need to specify new VNF model details



SEQ_NO	FLOW_NAME	SCOPE	ACTION
1	AAICheckVnfInMaintBB		
2	AAISetVnfInMaintBB		
3	DeactivateVfModuleBB		
4	DeactivateVnfBB		
5	VfModuleUpgradeStatusBB		
6	ChangeModelVfModuleBB		
7	ControllerExecutionBB	vnf	config-upgrade-assign
8	UpgradeVfmoduleBB		
9	ControllerExecutionBB	vnf	config-upgrade-deploy
10	ActivateVfModuleBB		
11	ChangeModelVnfBB		
12	ActivateVnfBB		
13	AAIUnsetVnfInMaintBB		

CNF Upgrade – SO Upgrade Workflow (2)

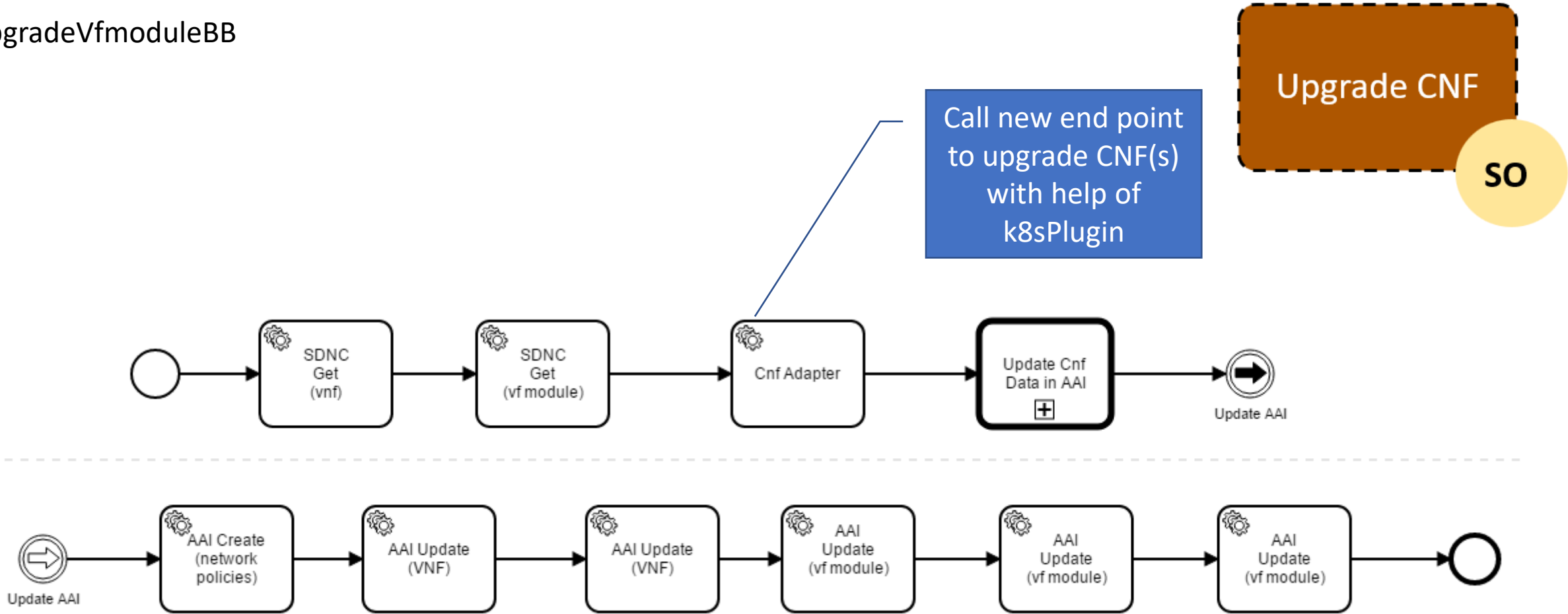


Upgrade CNF

SO

CNF Upgrade – SO Upgrade Workflow (3)

UpgradeVfmoduleBB



CNF Upgrade – Helm Upgrade

- Instance Upgrade Endpoint
 - **cnf-adapter:** `/api/cnf-adapter/v1/instance/<id>/upgrade`
 - **multicloud-k8s:** `/v1/instance/<id>/upgrade`
 - New resources created, existing upgraded, old removed
 - Upgrade, Migration, Reconfiguration
- Mimic of the implementation of helm hooks for upgrade operation
 - Support of pre/post upgrade hooks
 - Hooks can be created in order
 - Next one must wait for previous one to finish before continue.
 - Support hook upgrade policy



CNF Upgrade – Reconfigure CNF

```
"config-upgrade-deploy": {
  "steps": {
    "config-setup": {
      "description": "Gather necessary input for status verification",
      "target": "config-setup-process",
      "activities": [
        {
          "call_operation": "ResourceResolutionComponent.process"
        }
      ],
      "on_success": [
        "status-verification-script"
      ]
    },
    "status-verification-script": {
      "description": "Simple status verification script",
      "target": "simple-status-check",
      "activities": [
        {
          "call_operation": "ComponentScriptExecutor.process"
        }
      ]
    }
  }
},
}
```

Reconfigure
CNF

CBA

Verify CNF
Status

CBA

- Finalization steps after the upgrade
- May be exactly the same like for Day-1/2 steps of CNF deployment
- We check now only the status of CNF after the upgrade



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Next Steps

Future Steps – London++

- K8S Plugin: Bump of k8s API & Helm versions
- K8S Cluster Homing
 - Selection with CDS Support
 - Modification of Macro Flow to use request input or information from CDS
- CNF Upgrade – Rollback Scenarios
- Modification in ApacheCNF tutorial to include upgrade, migration and to add support for it in onap-sdk
- Utilization of ASD and new information hold there
- Integration with external k8s orchestrators



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