

Support xNF Software Upgrade in association to schema updates

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Requirement

- **Executive Summary** - A schema update in relation to a xNF software upgrades is a routine for network upgrade to support new xNF features, improve efficiency or increase xNF capacity on the field, and to eliminate bugs. This use case provides to ONAP an advantage in orchestrating and managing the Life Cycle of a Network Services in-line with business and service objectives.
- **Business Impact** - Deployment and orchestration of new services over CNFs, VNFs and PNFs in a model and software 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 service and network function Life Cycle Management
- **Funding/Financial Impacts** - Reduction in operations expense from using industry standard Interfaces.
- **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.*

E2E PNF Software Upgrade in Frankfurt Release

❑ PNF in-place software upgrade procedure on a single PNF instance without schema update

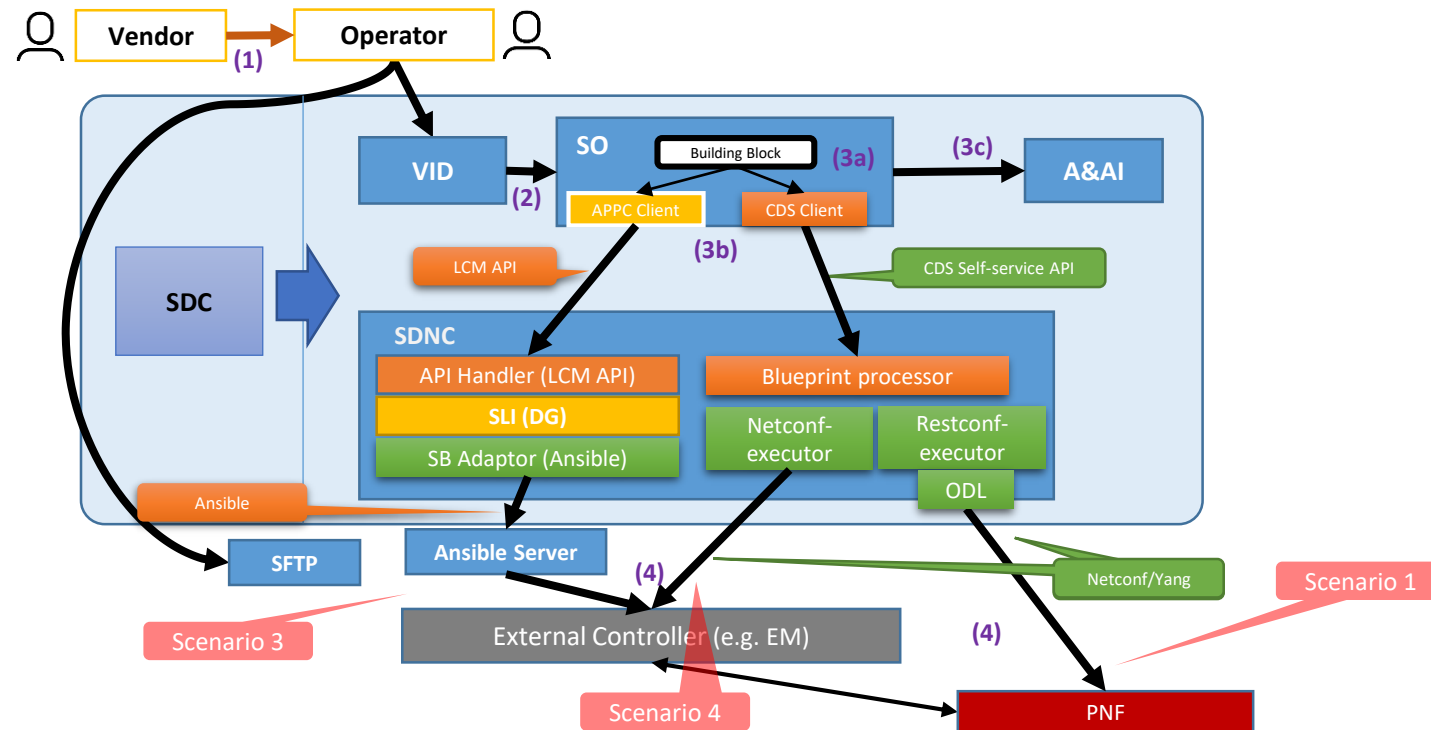
- Scenario 1: [Using direct Netconf/Yang interface with PNF](#)
- Scenario 3: [Using Ansible protocol with EM](#)
- Scenario 4: [Using Netconf/Yang interface with EM](#)

Only the 1st part of the E2E solution

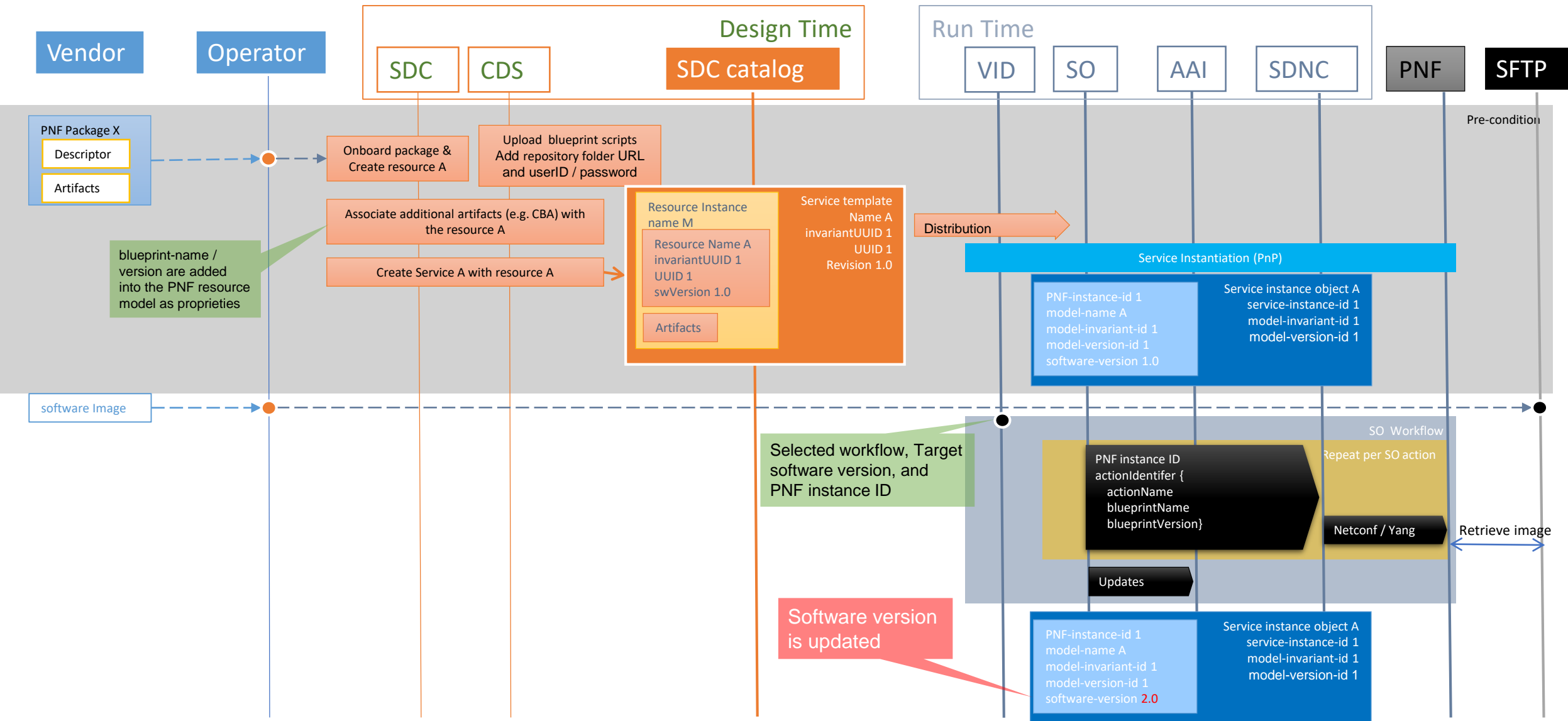
❑ Schema update is proposed as “scenario 2 [Enable service level LCM operations](#)”

- only “PNF software version onboarding” is committed

The 2nd part of the E2E solution



Update one PNF instance without schema update



Why schema update is needed

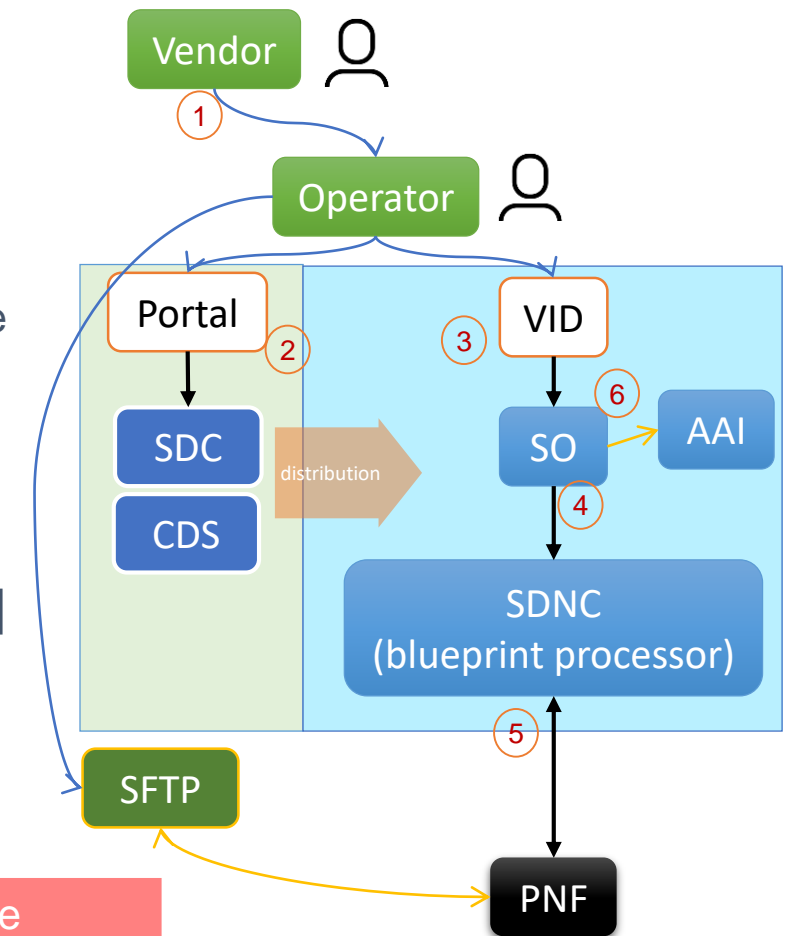
- Vendor delivers software image and the corresponding VNF / PNF package to the operator. The package includes a descriptor and its artifacts. The descriptor and artifacts describes the functions supported by the VNF / PNF.
- At design time, a resource template must be created based on the vendor provided onboarding package. Then a service template must be created which can include one or more resource template. Next, the service template is distributed to the run time.
 - Note1: ONAP does not distribute any resource template. It only distribute service template.*
 - Note2: ONAP does not support resource LCM management if it is not part of a service template.*
 - Note3: The information included in the resource template and the service template are named as schema in this study.*
- At run time, service instantiation procedure is executed. At end of this procedure , a VNF/PNF instance will be up and running, and a corresponding service management object instance is created in ONAP. The service management object instance is created based on the distributed service template.
- At any time after the service instantiation, a new software image may be delivered to the operator, which the software upgrade procedure may be triggered. However, with the current ONAP VNF/PNF in-place software upgrade procedure, only the software running in the instance is updated. The corresponding ONAP service / resource management object instances are unchanged, excepted software version.

Limitations with current in-place upgrade solution

- There can be a mismatch between the functions running in the VNF/PNF instance and the management instance schema stored in the ONAP, after upgrade.
- The mismatch includes not only the artifacts provided by the vendor, e.g. new CM Yang model, but also the artifacts provided at design time, e.g. CBA files from CDS.
- Then ONAP is not aware of any of new functions supported by the new software, including new PM counters, new CM Yang model, new Alarms, new CBA, new scripts, new Helm chat, etc.
- For the operator, it is difficult to make use of any new functions supported in the new software version.

Schema update procedure

1. A vendor shall provide
 - a new VNF/PNF package with updated artifacts, and
 - the new VNF/ PNF software image to the operator.
2. At receiving of the new package, the operator shall
 - onboard the new package and create a new resource template or update the existing resource template (PNF or VNF)
 - update the existing service template with the new or updated resource template
 - distribute the updated service template to run time.
3. At run time, the operator shall, based on the updated service template,
 - upgrade a service instance and its resource instances, and
 - update the AAI entry accordingly



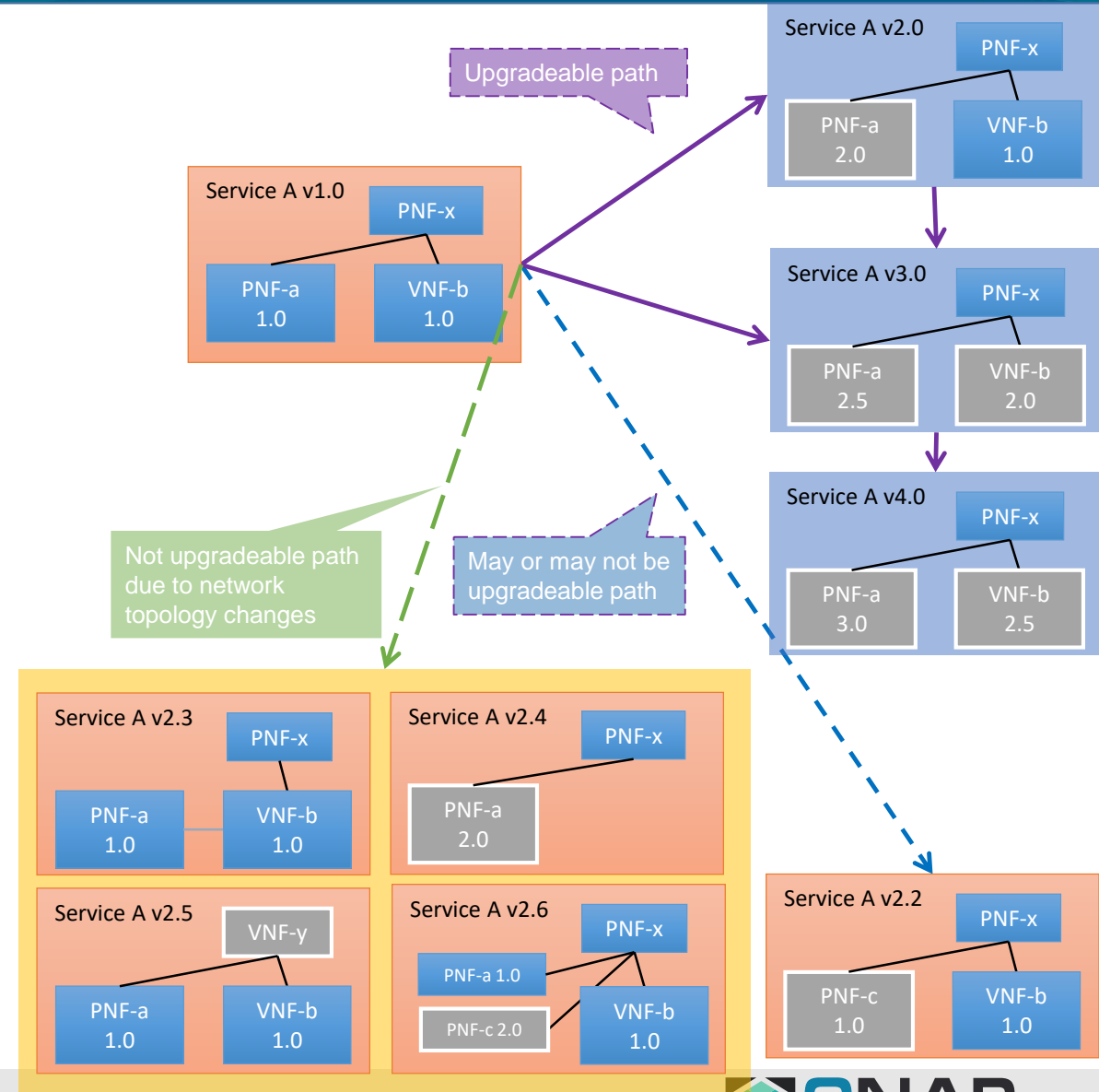
Schema upgrade must be handled at service level for both design time and run time

Then ONAP can make use of the new artifacts provided by the vendors, after schema update

Limited scope of service software upgrade path for R7

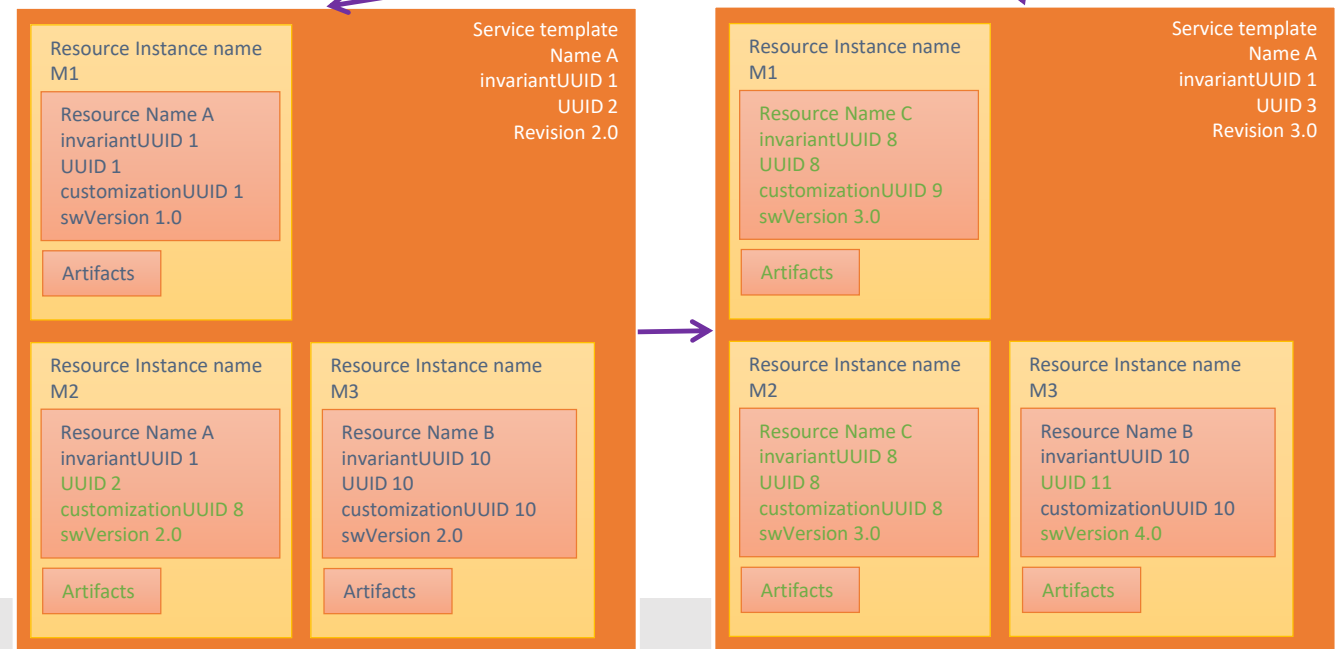
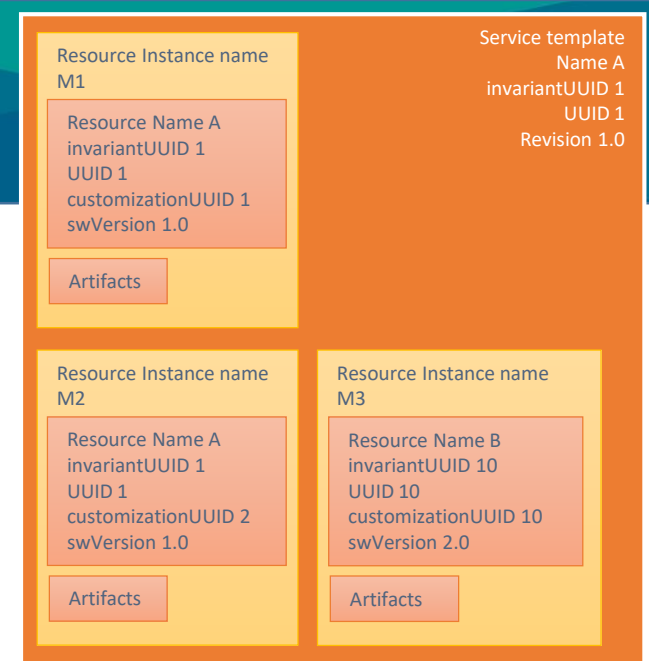
- ✓ In ONAP, one service template may contain more than one resource instance and the internal / external network topology.
- ✓ Updating a service template may have multiple scenarios.
- ✓ Ideally, upgrade path info and upgrade sequent info shall be passed from design time to run time. But how to validate a upgrade path can be very complicated. In this release it is up to run time validation.

To avoid the above complications, only limited scope of service software upgrade path is covered for R7 release.



Limitations

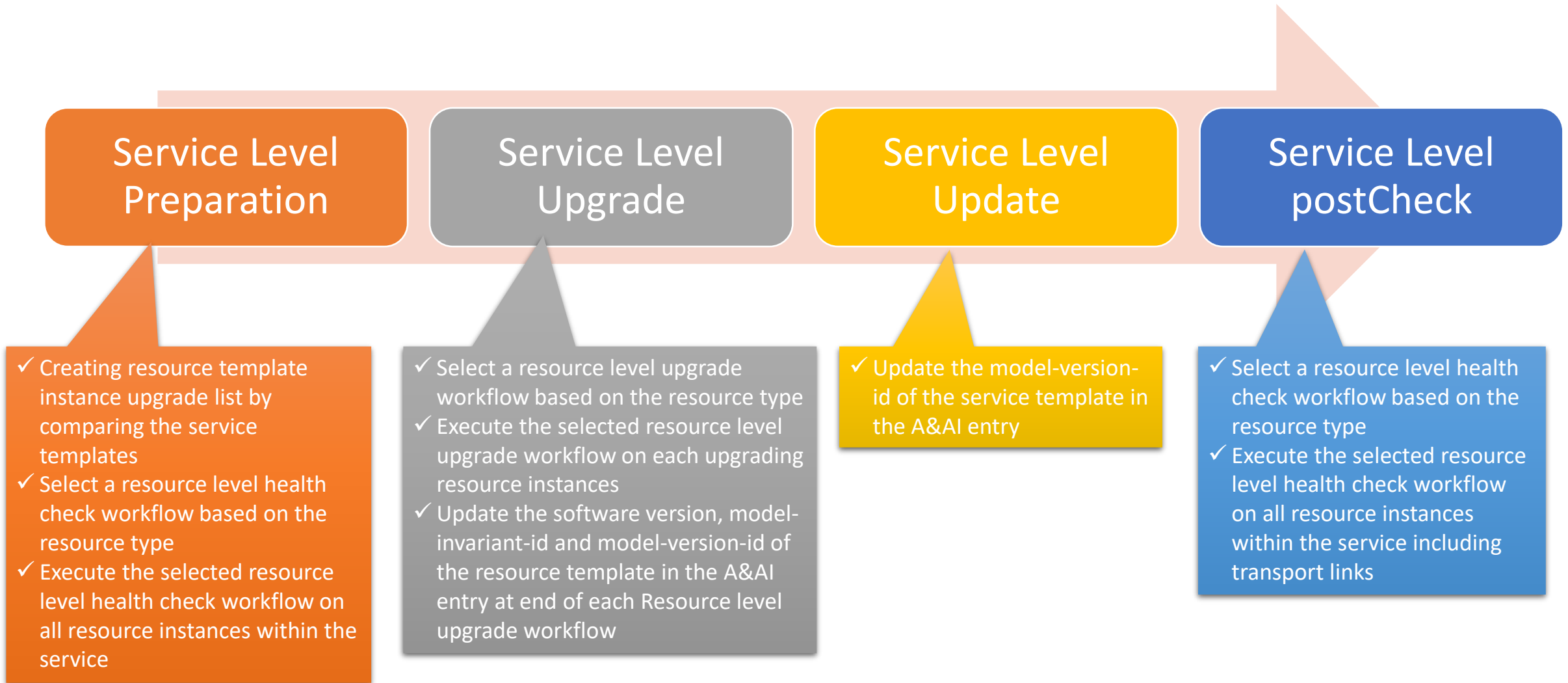
- The operator shall know the possible/feasible resource upgrade path based on vendor provided information.
- When operator updating a service template, the updated service template must be upgradable from any previous versions:
 - ❖ Within the service template, the resource instance name and network topology are unchanged.
 - ❖ The new resource template of a given resource instance (within the service template) must be upgradeable from any previous resource template versions.
- Note: This is to avoid adding possible upgrade paths info and upgrade sequent info into SDC model



Service level upgrade workflow

- Design time
 - indicates which resource instance within a service template shall be upgraded
- Run time
 - Execute the service level upgrade workflow
 - Upgrade each resource instance based on the resource level upgrade workflow
 - After service level upgrade, all resource instances must be upgraded to the revision defined in the service template

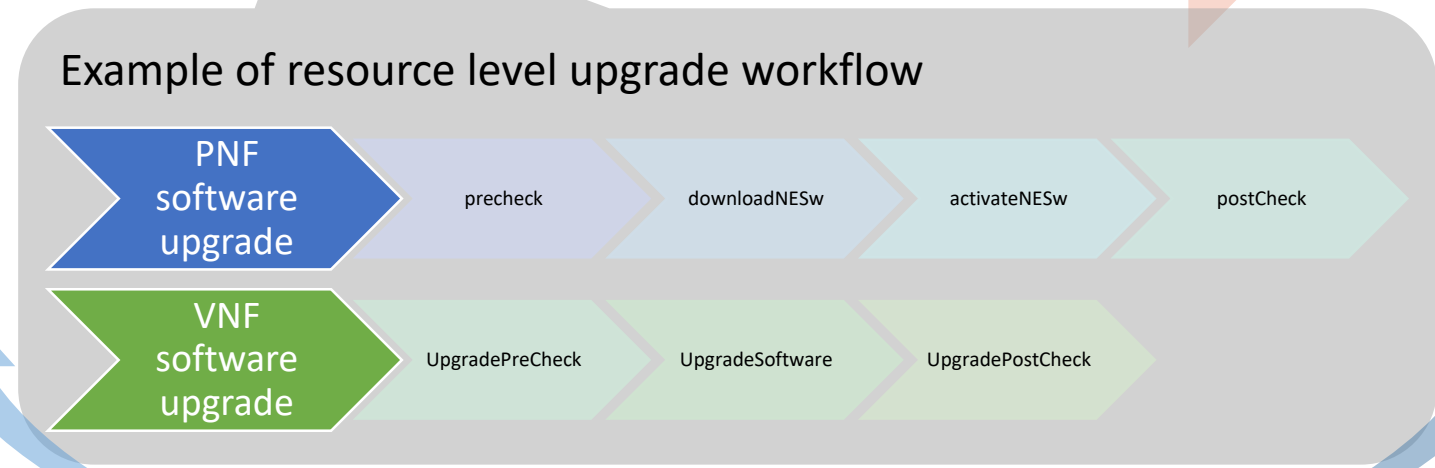
Service level workflow



Service level upgrade workflow



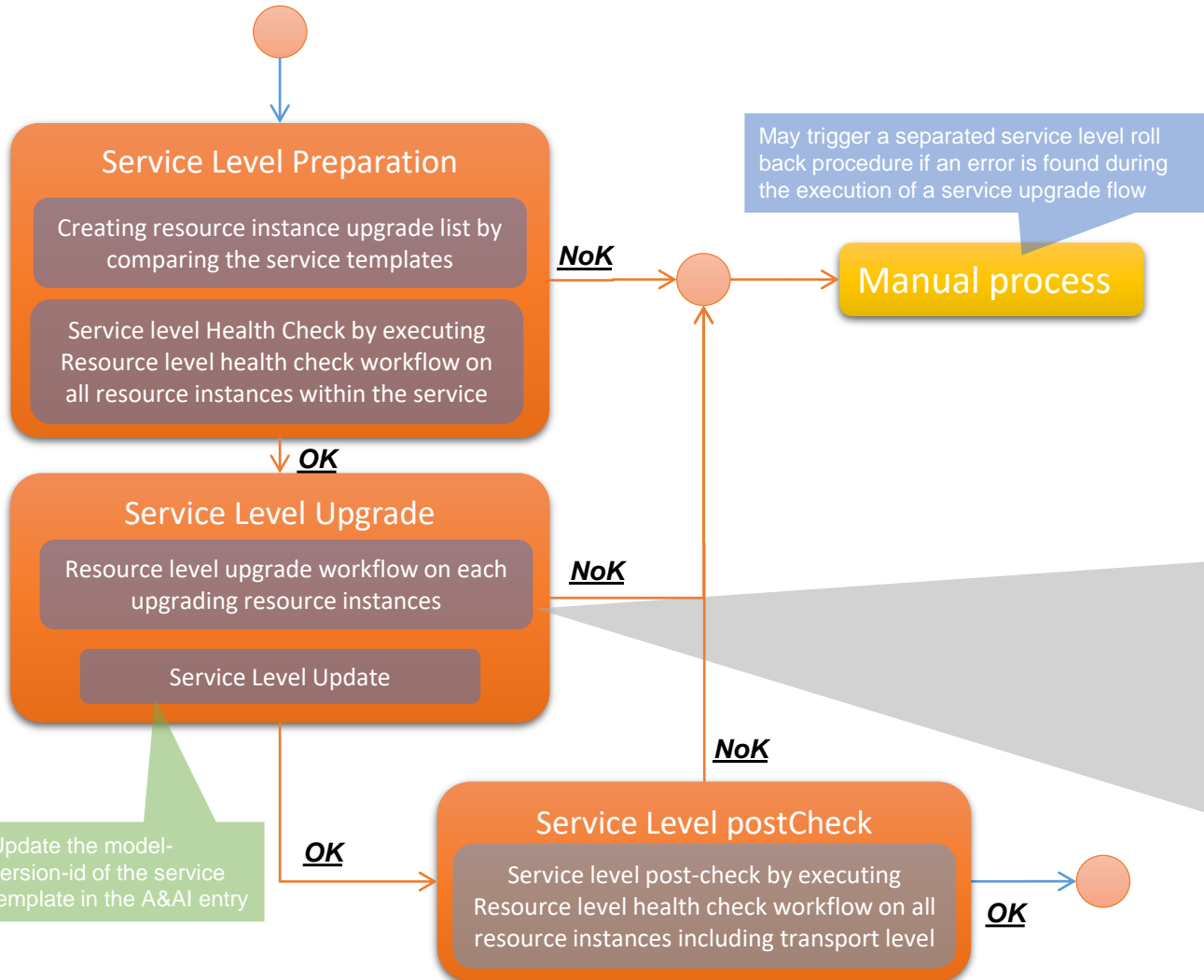
Note: the service level workflow is network function type independent. When upgrade one resource instance, the subsequent resource level upgrade workflow is selected based on the network function type.



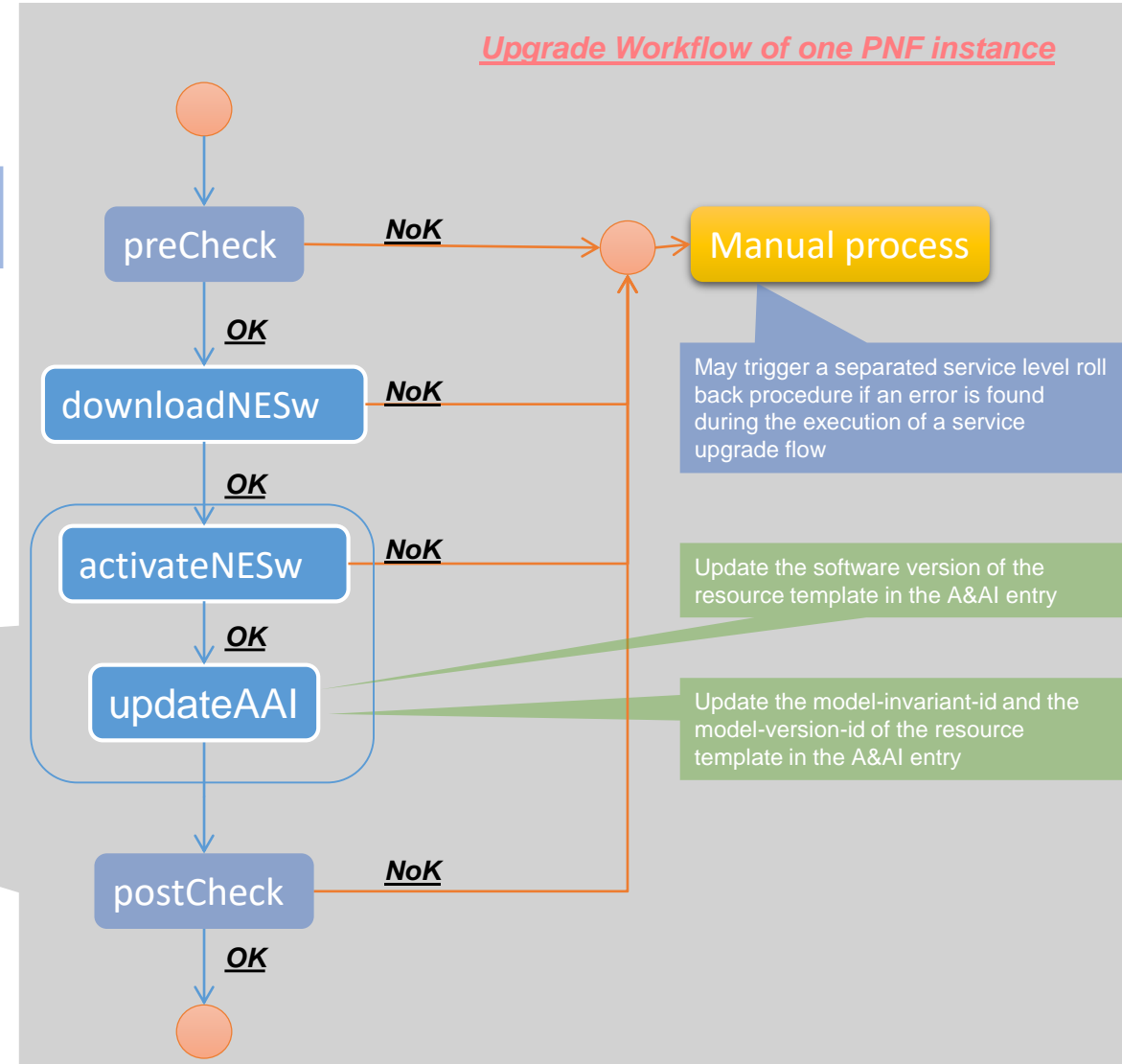
Repeat on each to-be-upgraded resource instance

Service level workflow

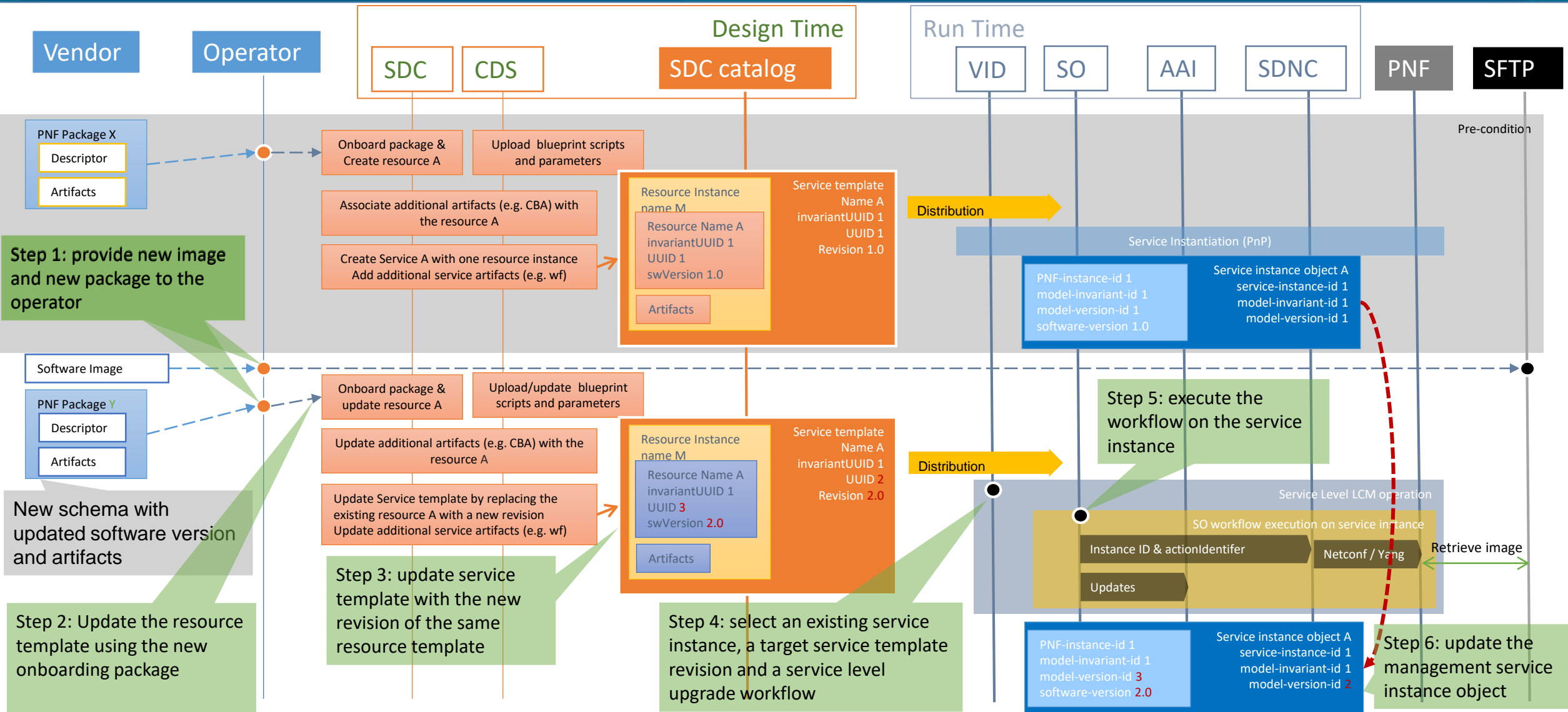
Upgrade Workflow of one service instance



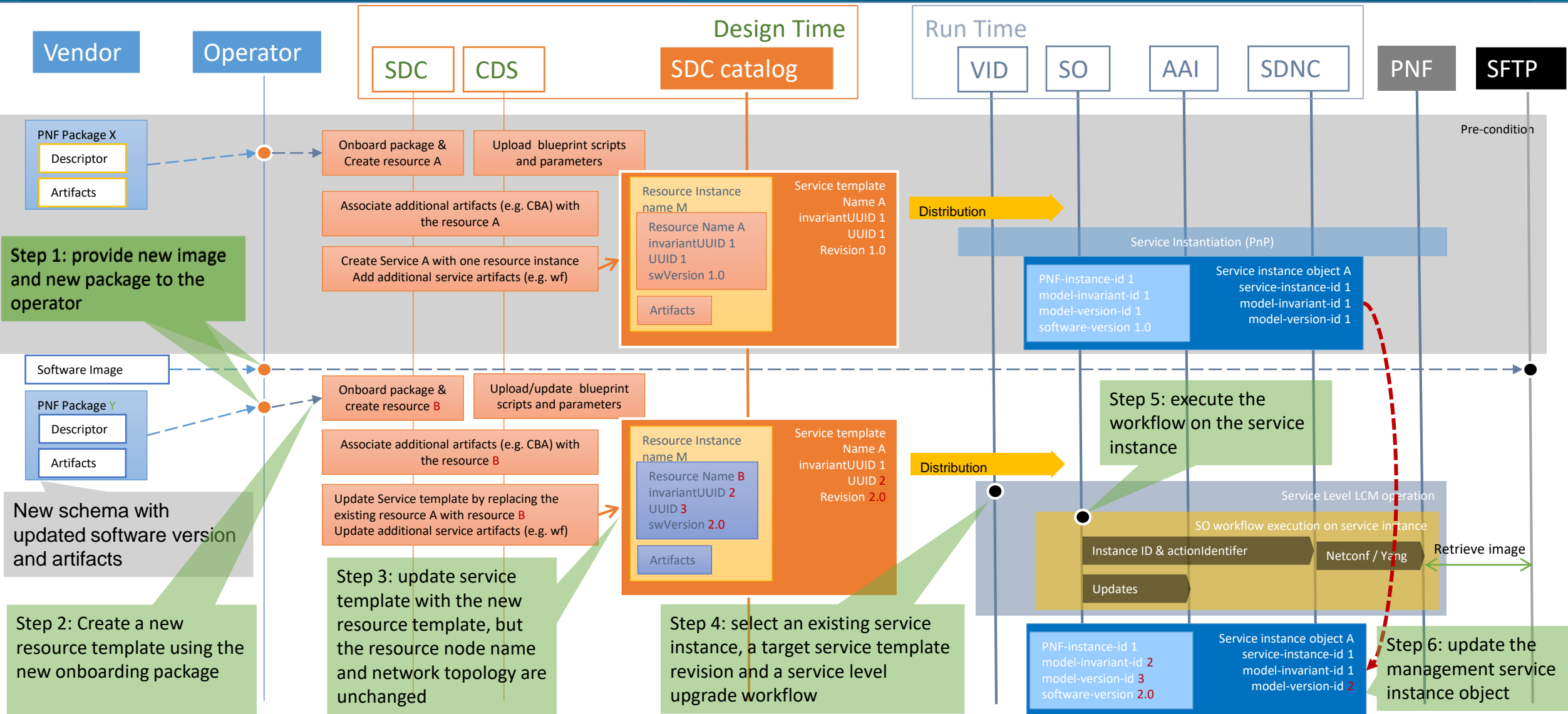
Upgrade Workflow of one PNF instance



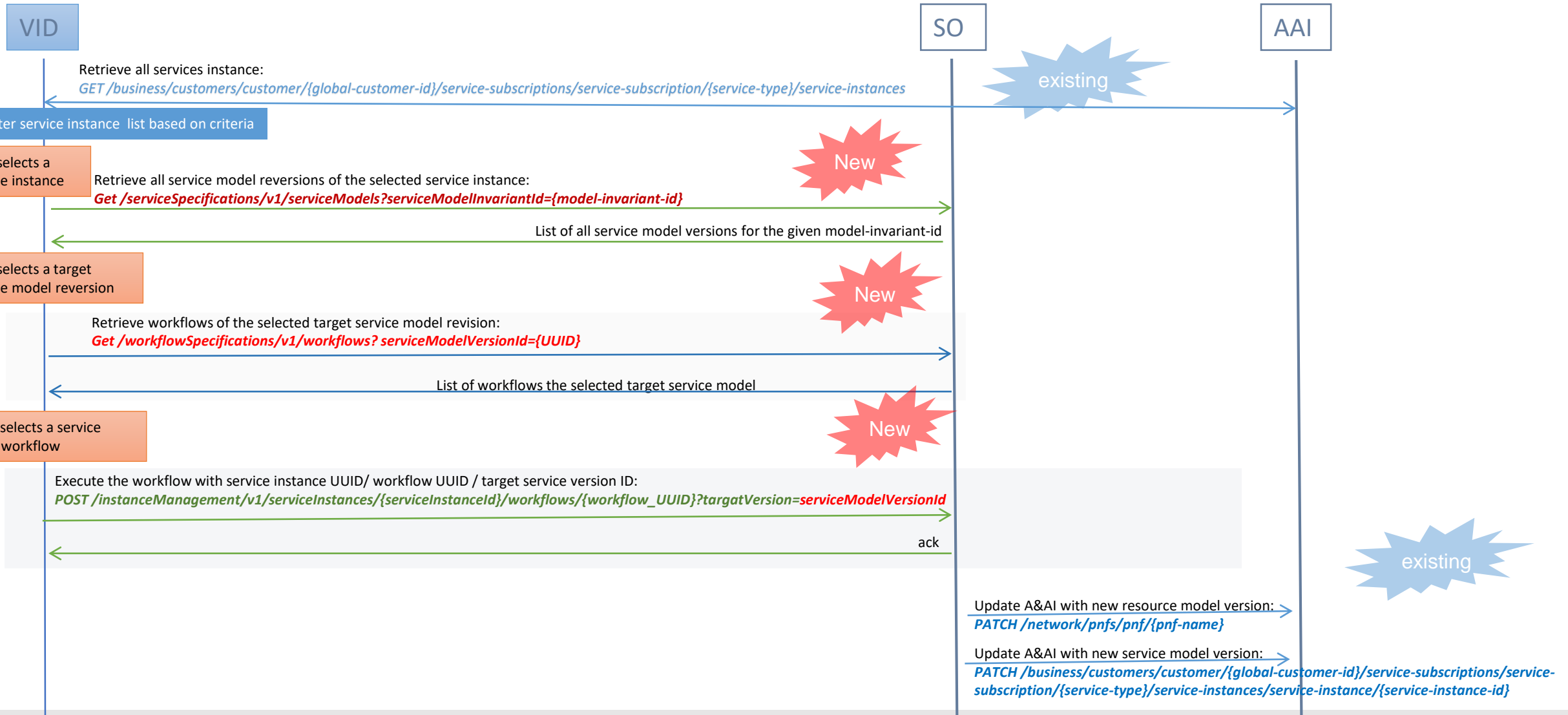
Service level LCM operation example with the same PNF resource name



Service level LCM operation example with a new PNF resource name



API Impacts



ONAP Impacts

Story	components
Update resource template based on a new onboarding package	SDC
Generic service level upgrade workflow	SO
Additional updates on resource level upgrade workflow	SO
New SO building block to enable service level LCM operation including update A&AI, new service level LCM BB, etc.	SO
Service model retrieving API	SO
Service level workflow retrieving API	SO
Service level workflow execution API	SO
Service level workflow operation GUI	VID
Documentation	VNFRQTS / Integration
integration / testing and demo	Integration



ONAP

OPEN NETWORK AUTOMATION PLATFORM

Thank You!