



SAP® MaxAttention™ Innovation Workshop

Downtime Optimized Conversion for SAP S/4HANA Move

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PUBLIC



Agenda

Abordagem a Downtime optimized

- Downtime-optimized DMO
- Downtime-optimized Conversion

Transição para a Nuvem

- Private managed Cloud, RISE, IaaS (Hyperscaler)
- DMO with System move, DMOVE2S4

S/4HANA usando downtime optimized Conversion

- doC: Detalhes Técnicos – Part I

S/4HANA usando downtime optimized Conversion

- doC: Detalhes Técnicos – Parte II

Abordagem a Downtime optimized



Motivation and Approach

why and where?

why

- Every customer has mission-critical applications along with integration needs
- SAP landscapes become more sophisticated the more comprehensive & integrated they are, and this requires new Software and technical solution
- Delay of the system availability effects
 - Delay of business operations
 - Impact on revenue
 - Loss of Productivity

where

Downtime Optimization for

Upgrades

- ☐ SAP (EHP,SPS)
- ☐ OS
- ☐ DB
- ☐ Kernel

Transition to Hyperscalers

- ☐ OS/DB Migrations
- ☐ Data Center Relocations
- ☐ Non-SAP DB Migrations
- ☐ Unicode Conversions

SAP DB Migrations

- ☐ Suite on HANA (SoH)
- ☐ SAP ASE (Sybase)
- ☐ DMO Migrations + Upgrade

S/4HANA Conversions

- ☐ Technical Conversion
- ☐ Data Model Conversions

Special Scenarios

- ☐ HANA Upgrade
- ☐ Functional Release
- ☐ Transports Optimization

SAP S/4HANA conversion methodologies

Decision depends on many factors & should be taken during/after Migration Planning Workshop!



Standard approach

Generally availability
SAP Note [3106931](#)



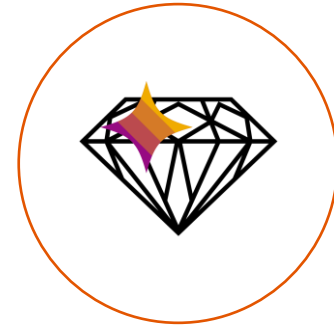
downtime-optimized Database Migration Option

Generally availability
SAP Note [2547309](#)



downtime-optimized Conversion

Generally availability
[doC Portal Page](#)



Near-Zero Downtime Technology

Minimized Downtime Service
SAP Note [693168](#)

EFFORT

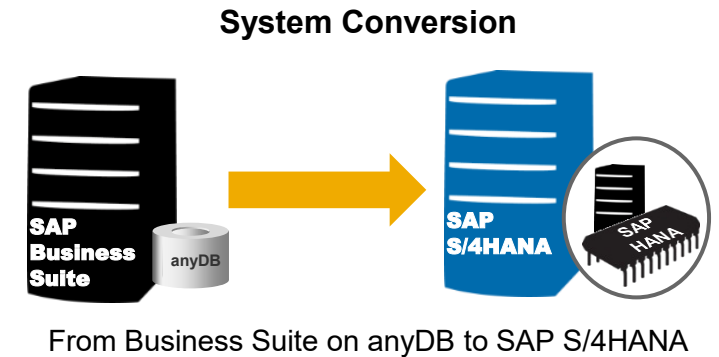
DOWNTIME

Transition Approaches and Tools

Downtime-optimized Approach – **downtime-optimized DMO**

Approach Description

- Basis of the downtime optimization feature of DMO for SUM is a trigger-based replication of a certain amount of application table data during uptime
- While the system is still up and running, the content of some application tables is already being migrated to the SAP HANA database
- This leads to less downtime in total.
- The amount of downtime that can be saved is depending on the size of the tables handled the downtime-optimized DMO, but also on the amount of data that is changed during the procedure (“delta”).
- This approach is currently available with the following conditions:
 - Source: SAP ERP 6.0 EHP 0-8 on anyDB (not on SAP HANA), Unicode
 - With SUM 2.0 SP 18 (and higher), doDMO is supported for homogeneous DMO (SAP HANA to SAP HANA) as well
 - Target: SAP Basis 750 or higher (Only SAP HANA is supported)
 - Prerequisites and restrictions as well as the registration process for using downtime-optimized DMO are documented in SAP Note [2547309](#).

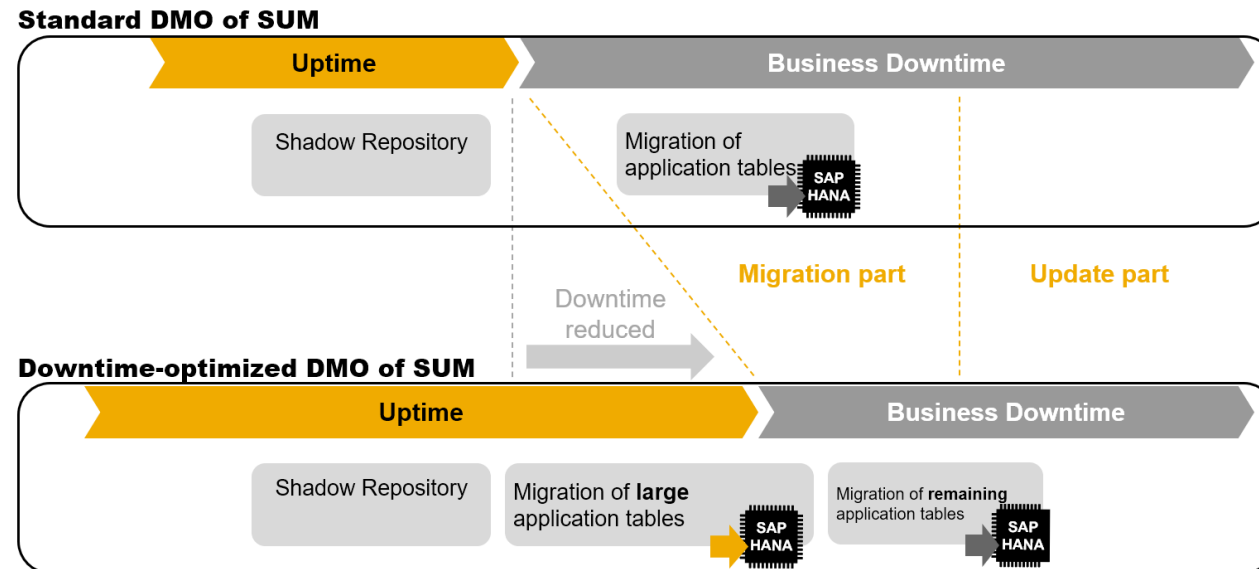


Transition Approaches and Tools

Downtime-optimized Approach – **downtime-optimized DMO**

Technical downtime of a migration scenario with DMO of Software Update Manager (SUM) scales with database size

- **Downtime-optimized DMO approach** moves migration of selected large application tables to uptime
- **A delta replay mechanism** ensures that any uptime changes (by end users) are considered



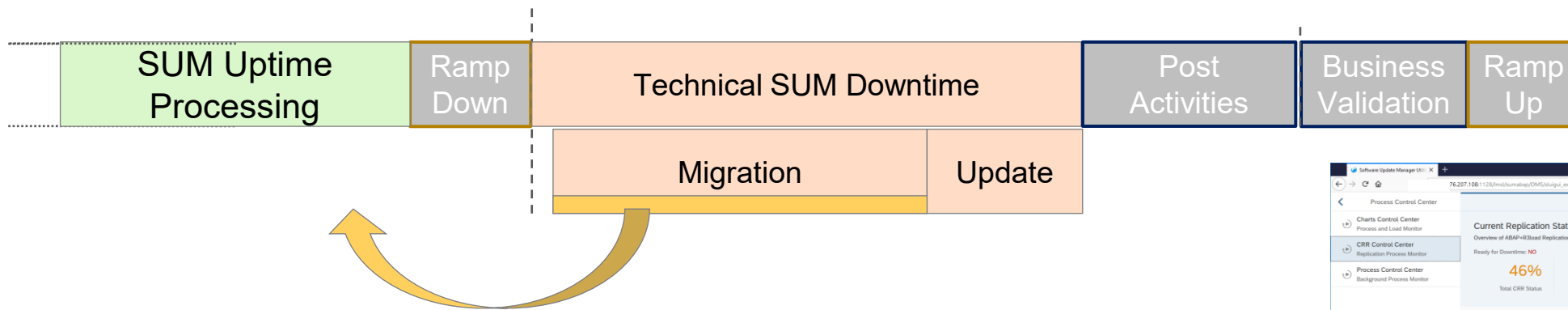
- **More information**
 - SAP Note [2547309](https://support.sap.com/en/notes/2547309) for Prerequisites and Restrictions
 - Blog in SAP Community <https://blogs.sap.com/?p=113050>

Transition Approaches and Tools

Downtime-optimized Approach – **downtime-optimized DMO**

Generally available with SUM 2.0 SP 06 (and higher) for system conversions and migrations

- **Uptime migration** for selected large application tables
 - User changes are reflected with record-and-replay technology of SUM
 - Includes initial and delta migration in uptime, remaining delta migration in downtime



- Option is offered on SUM dialog on scenario strategy
- Report available to select appropriate tables for uptime migration
- Replication monitoring is part of SUM Utilities

The screenshot shows the 'Change Recording & Replay Control Center' interface. It displays the 'Current Replication Status' with three main indicators: 'Ready for Downtime: NO', 'Total CRR Status: 46%', 'ABAP CRR Status: 47%', and 'R3load CRR Status: 0%'. Below these, there are sections for 'ABAP Replication Monitor' and 'R3load Replication Monitor'. The 'ABAP Replication Monitor' shows 'Number of Batch processes: 6' and 'Number of R3load processes: 12'. A table at the bottom lists tables being migrated, including 'EDM40' and 'CDCLS', with columns for 'Table Name', 'Replay Status', 'Recorded Changes', 'Replayed Changes', 'Pending Changes', and 'Percentage (in %)'.

Table Name	Replay Status	Recorded Changes	Replayed Changes	Pending Changes	Percentage (in %)
EDM40		0	0	0	0
CDCLS		0	0	0	0

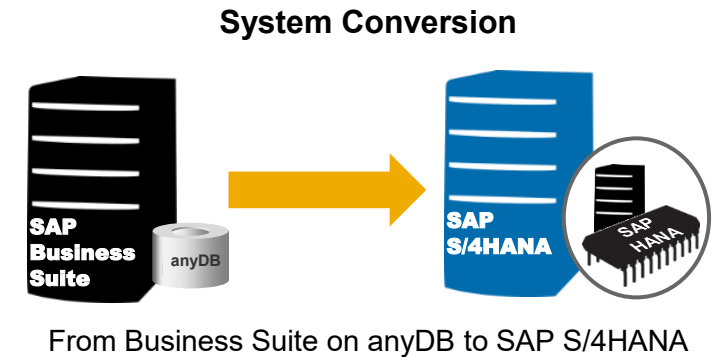
<https://blogs.sap.com/2014/09/08/dmo-downtime-optimization-by-migrating-app-tables-during-uptime/>

Transition Approaches and Tools

Downtime-optimized Approach – **downtime-optimized Conversion**

Approach Description

- The “downtime-optimized Conversion” approach utilizes the Downtime-Optimized Data Conversion capability in DMO of SUM to move the data conversion activities into the uptime portion of the SAP S/4HANA conversion process.
- The approach will partly move the data conversion to uptime, especially: Table conversion for FIN, MM-ML, MM-IM and Field conversion for KONV and VBFA
- In addition, it is possible to move the migration of dedicated big application tables to uptime. Based on downtime optimized DMO. SAP Note 2442926.
- To execute the approach, you need a consultant as part of the project that has successfully taken the ADM329 training and passed the related assessment.
 - Source: SAP ERP 6.0 EHP 0-8 on anyDB or SAP HANA DB, Unicode
 - Target: SAP S/4HANA 2021 and higher
 - Prerequisites and restrictions as well as the registration process for using downtime-optimized Conversion are documented in SAP Note [3347255](#).



The downtime objective for an SAP S/4HANA 2021 conversion is to convert a 10TB system (uncompressed) in 48 hours of technical downtime under “healthy conditions” (e.g. system/network performance).

Concept of Downtime-Optimized Conversion Approach

- downtime-optimized Conversion is a SUM option to reduce the technical downtime.
- Data Conversion is partially executed during the uptime processing of SUM.
- If source database is not SAP HANA, migration is partially executed in uptime.
- A delta replay mechanism ensures that any uptime changes are considered.
- Benefit is reduced downtime.
- Approach requires higher effort and a dedicated project plan.
- Option can only be chosen if assessment was successfully taken.
- Like for a standard conversion, SUM 2.0 is used.

General Prerequisites

See [downtime-optimized Conversion SAP Support Portal Page](#)

- **Target product: SAP S/4HANA 2021 FPS00** (and higher stacks or releases)
- **Target SAP HANA database version:** SAP HANA 2.0 SP 04 rev 46 (or higher)
 - If the source system is already on SAP HANA, it must be **SAP HANA 2.0 SP 05 rev 52** (or higher)
 - If the source system is already on SAP HANA and uses scale-out, the approach is currently not supported
- Source system: **Unicode** only (like for standard system conversion)
- Your source system must fulfill the SAP Kernel requirements for TCR as listed in the following SAP Notes
 - SAP HANA: SAP note 2706055
 - Oracle: SAP note 2698521
 - IBM DB2 for LUW (DB6): SAP note 2700555
 - IBM DB2 z/OS: SAP Note 2723627
 - MS SQL: SAP Note 2728988
- The technical procedure requires that you execute a complete standard conversion run at least on the very first system of your landscape (for example sandbox or development).
- If your source system is not yet on SAP HANA database, you have to consider the requirements and restrictions described in SAP Note [2547309](#) for downtime-optimized DMO with SUM 2.0.
- To execute the approach, you need a consultant as part of the project that has successfully taken the ADM329 training and passed the related assessment.

Downtime-optimization approaches for maintenance activities

Approach	Abbreviation	Scenario	Availability*	SAP Note
near-Zero Downtime Maintenance (ABAP) **	nZDM (ABAP)	Update/Upgrade	Unrestricted available	1678565
Zero Downtime Option	ZDO	Update/Upgrade	Pilot Unrestricted available	Business Suite: 2163060 SAP S/4HANA: 2707731
downtime-optimized Database Migration Option	downtime-optimized DMO	Migration to SAP HANA database	Unrestricted available	2547309
downtime-optimized Conversion	doC	Conversion to SAP S/4HANA	Available for educated experts	doC Portal Page
Near Zero Downtime Technology	NZDT	Multiple (such as SAP S/4HANA Conversion)	Service-based	693168

* This is the current state of planning and may be changed by SAP at any time.

** This is different to *nZDM for SAP HANA database*

Possible combinations of downtime-optimization approaches and scenarios

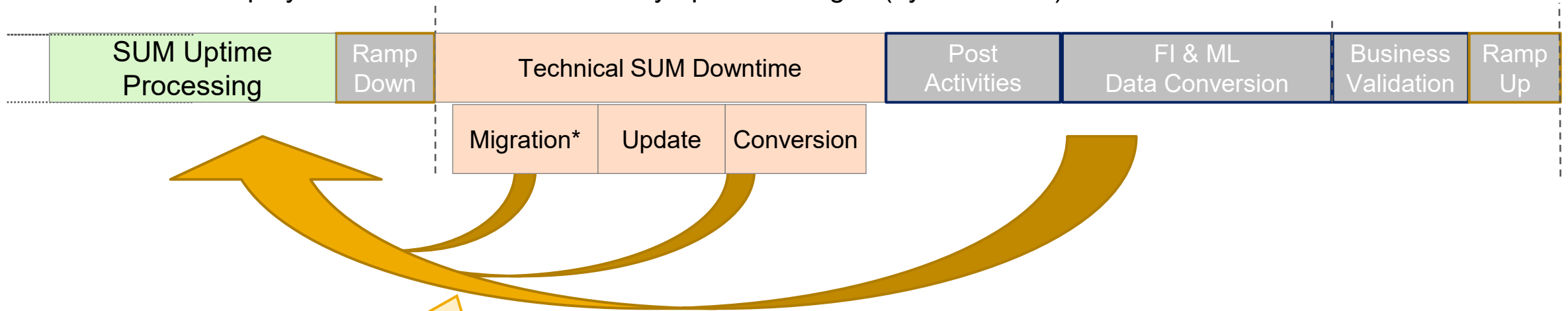
Approach \ Scenario	nZDM	ZDO	downtime-optimized Conversion	downtime-optimized DMO	NZDT
Upgrade/ Update	✓	✓	Not applicable	Not applicable	✗
Conversion	✗	✗	✓	(part of downtime- optimized conversion)	✓
Migration (DMO)	✗	✗	✗	✓	✗

Transition Approaches and Tools

Downtime-optimized Approach – **downtime-optimized Conversion**

System Conversion to SAP S/4HANA with “downtime-optimized Conversion”

- **Table conversion** (e.g. BKPF -> ACDOCA)
- **Field conversion** (for KONV and VBFA tables)
- **In addition**, selected big application tables (without data conversion) can be migrated in uptime
- A delta replay mechanism ensures that any uptime changes (by end users) are considered



Conversion partially moved to uptime for

- FIN and Material Ledger (MM-ML) & Inventory Management (MM-IM)
- KONV and VBFA tables

▪ **More information**

- <https://support.sap.com/en/tools/software-logistics-tools/software-update-manager/downtime-optimized-conversion-approach.html>

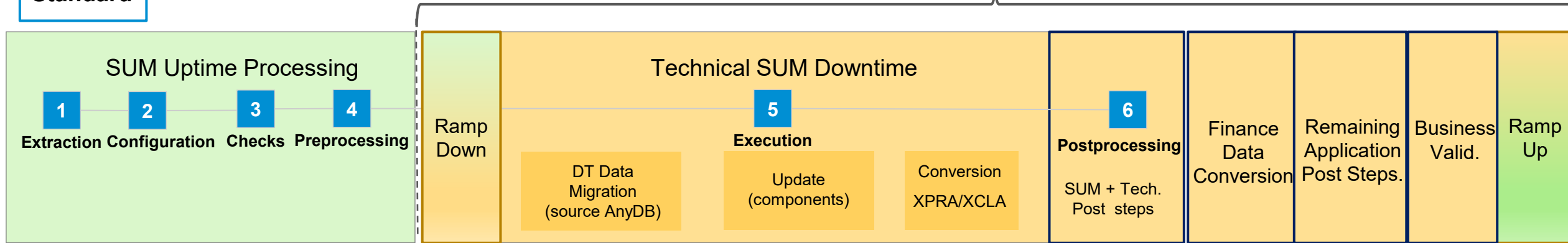
*Migration is only relevant for source systems on non-HANA database

Transition Approaches and Tools

Downtime-optimized Approach – **downtime-optimized Conversion**

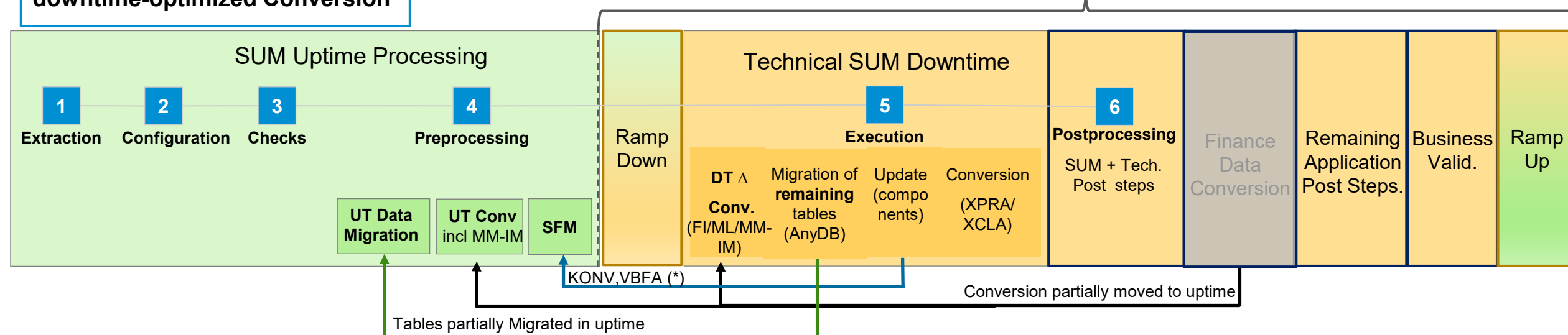
Standard

Business Downtime



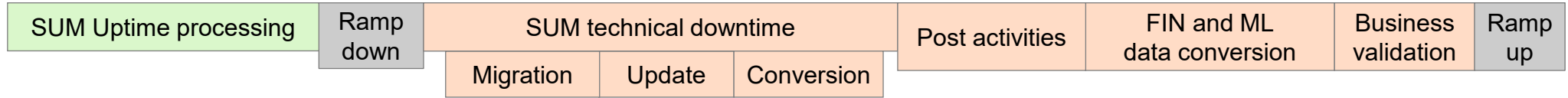
downtime-optimized Conversion

Business Downtime

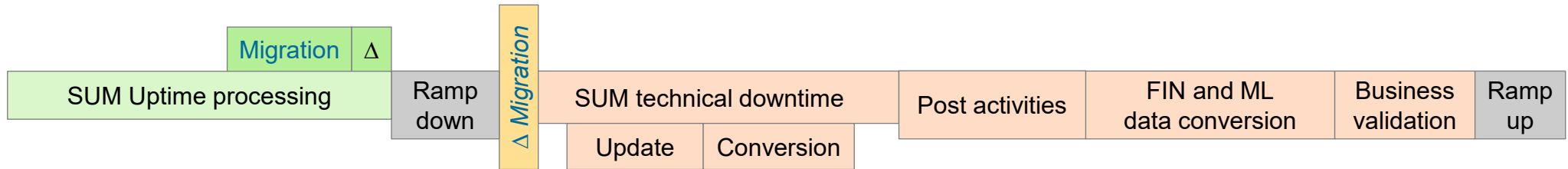


Downtime optimization approaches in Software Update Manager

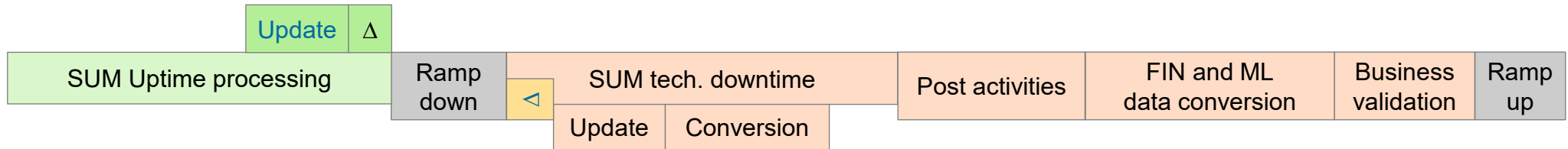
Standard Conversion



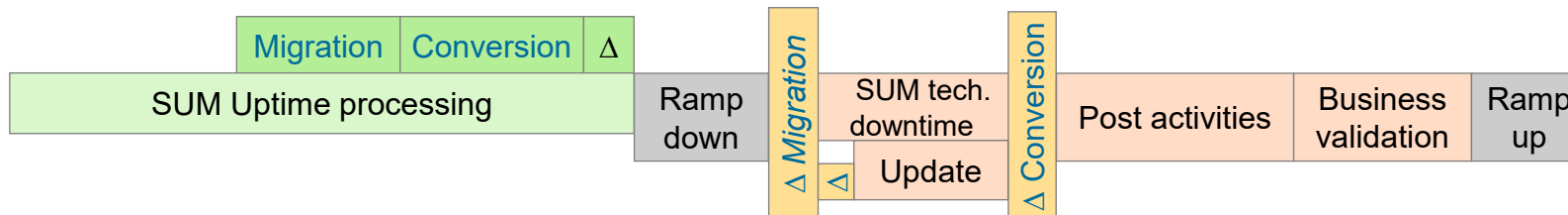
Downtime-optimized DMO (source on non-HANA)



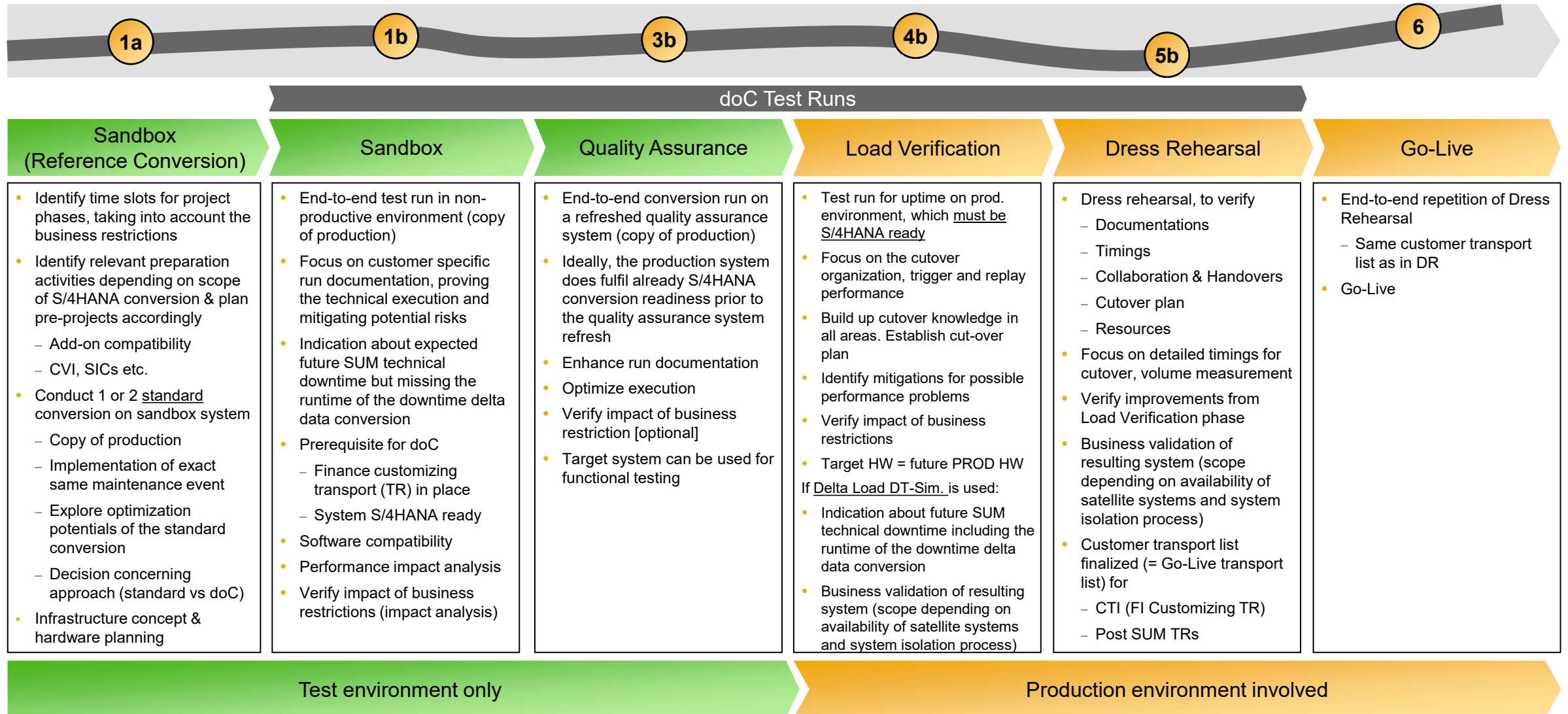
nZDM (source on HANA)



downtime-optimized Conversion



downtime-optimized Conversion (doC) – Project Cycle Roadmap



Questions & Answers



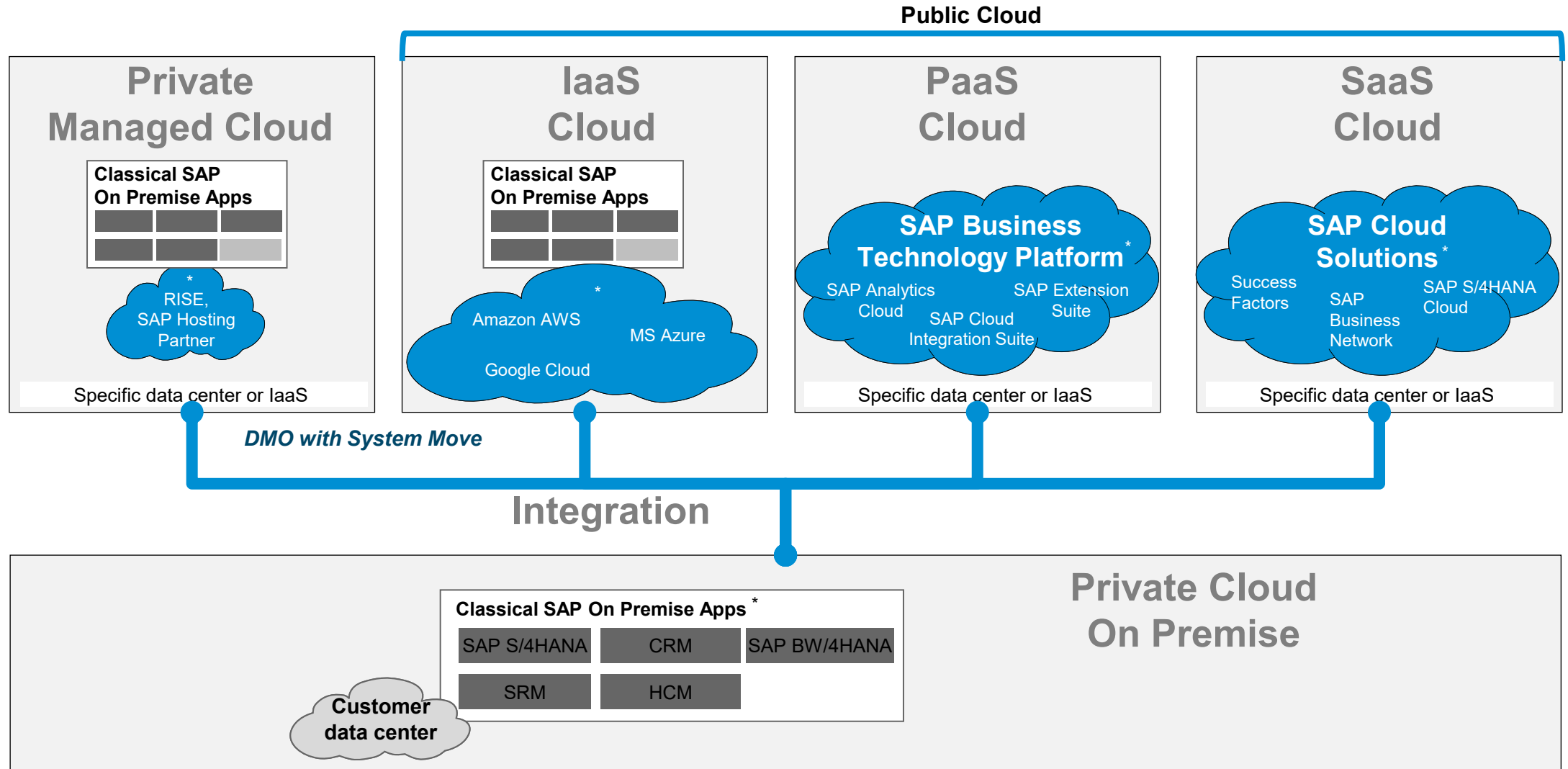
Transição para a Nuvem

Private managed Cloud, RISE, IaaS (Hyperscaler)



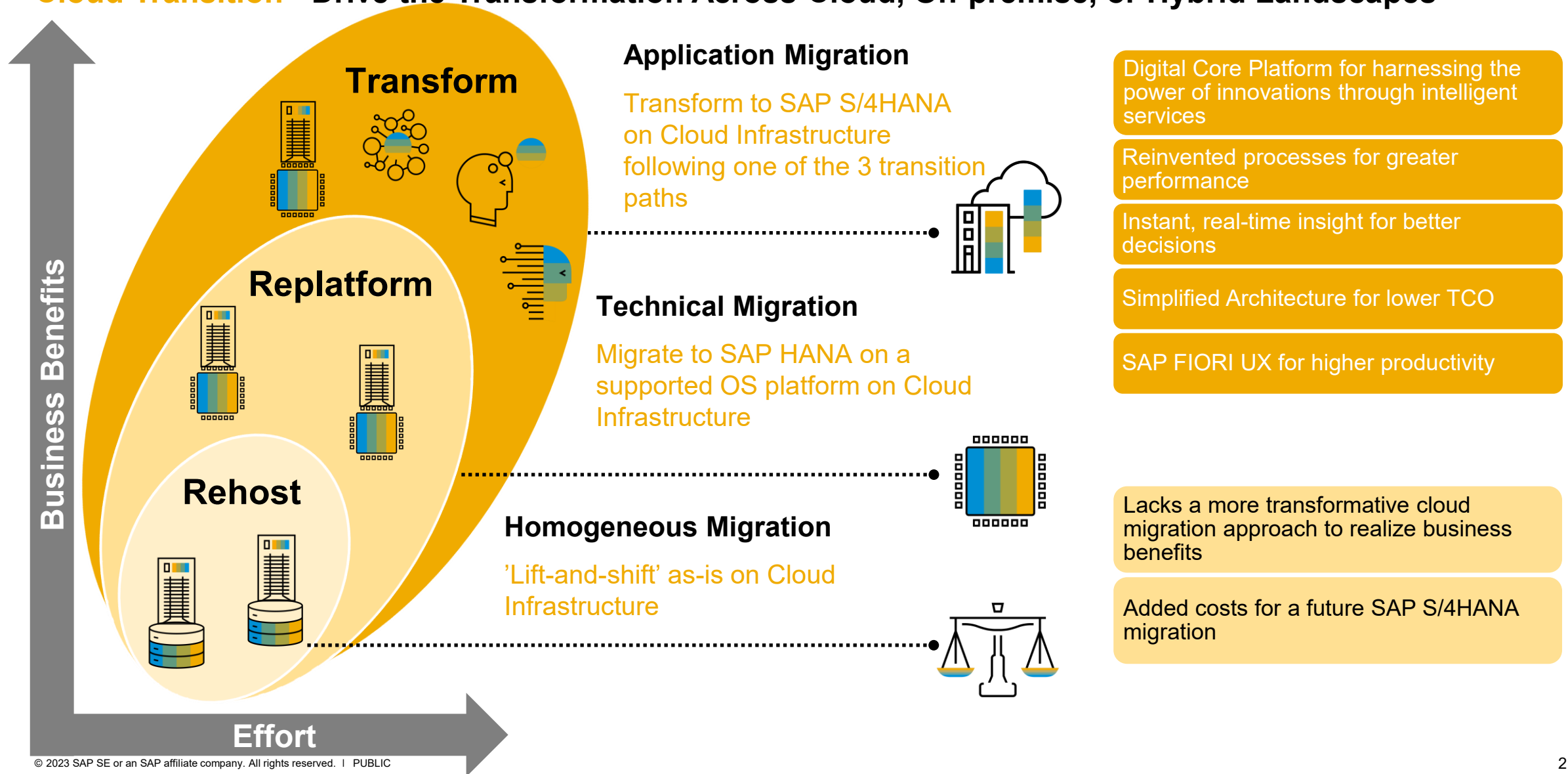
Hybrid Cloud General Overview

Cloud Consumption Models



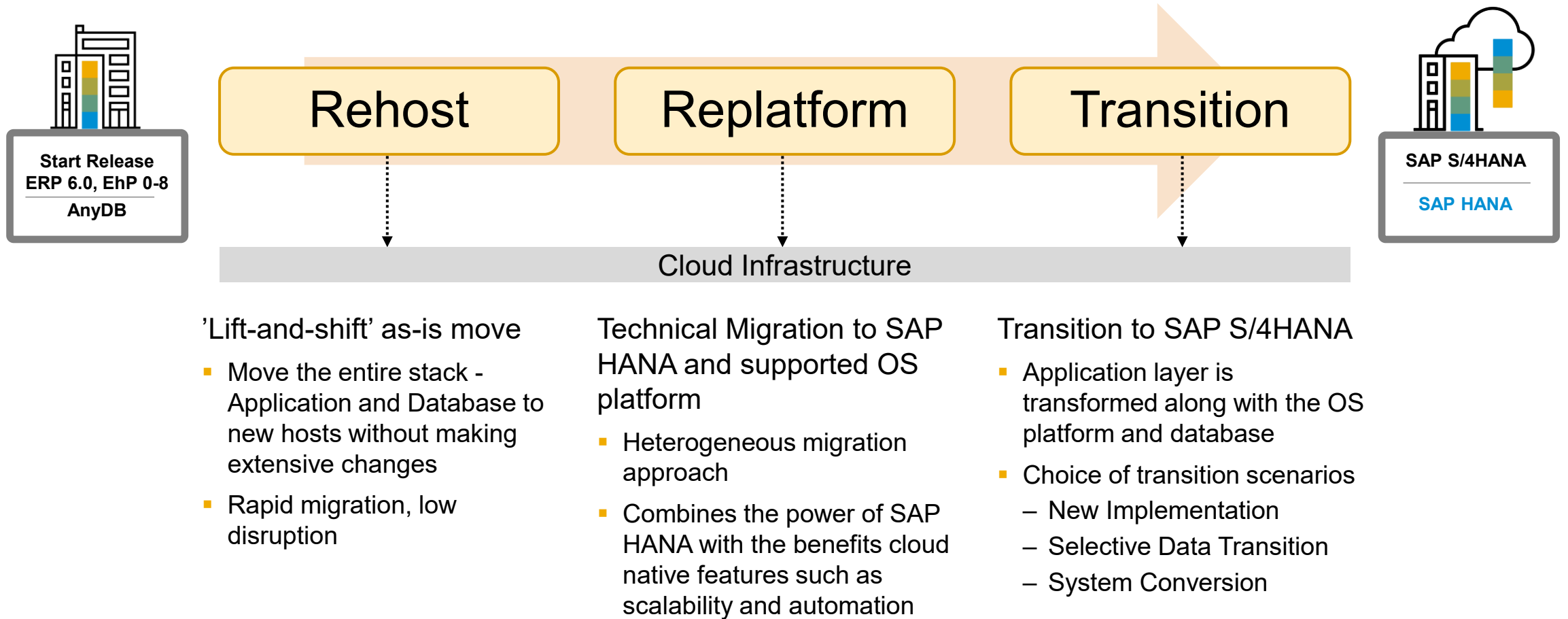
Transition Approaches and Tools

Cloud Transition - Drive the Transformation Across Cloud, On-premise, or Hybrid Landscapes



Transition Approaches and Tools

Transition strategy



Transition Approaches and Tools

Transition strategy

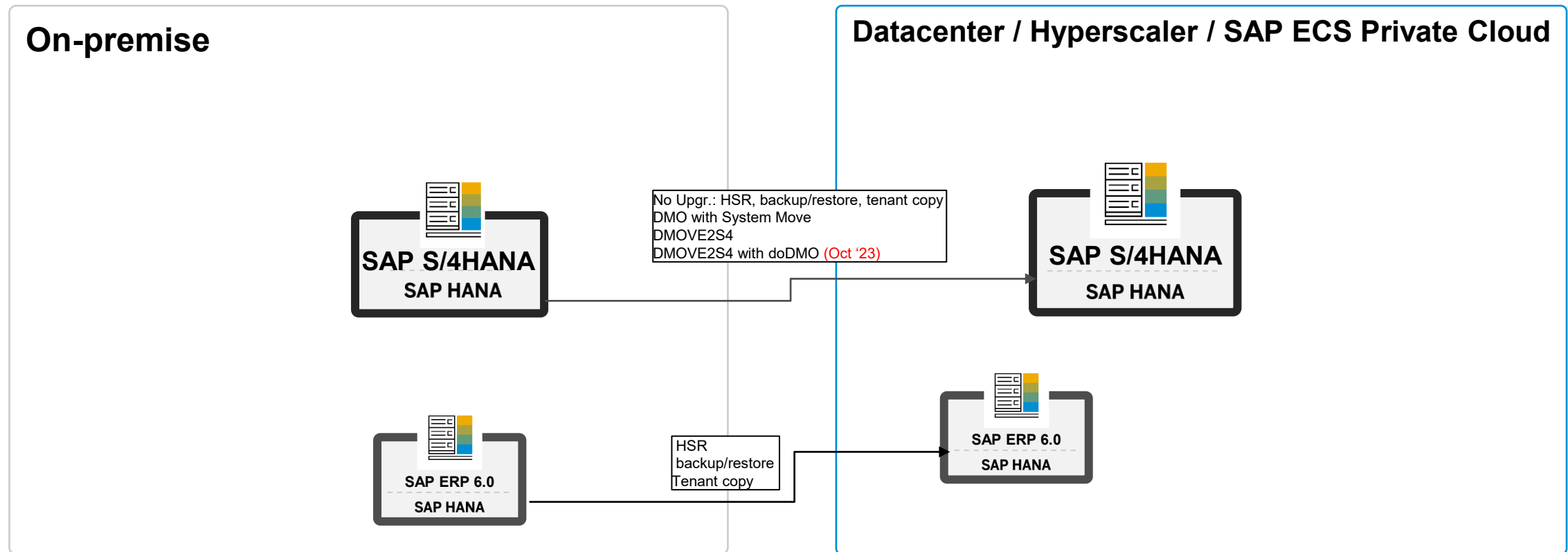
Rehost

Replatform

Transition

Lift-and-Shift as-is move to hyperscaler

- Source and target same – server platform (for DB), endianness (for DB), OS (for DB), DB



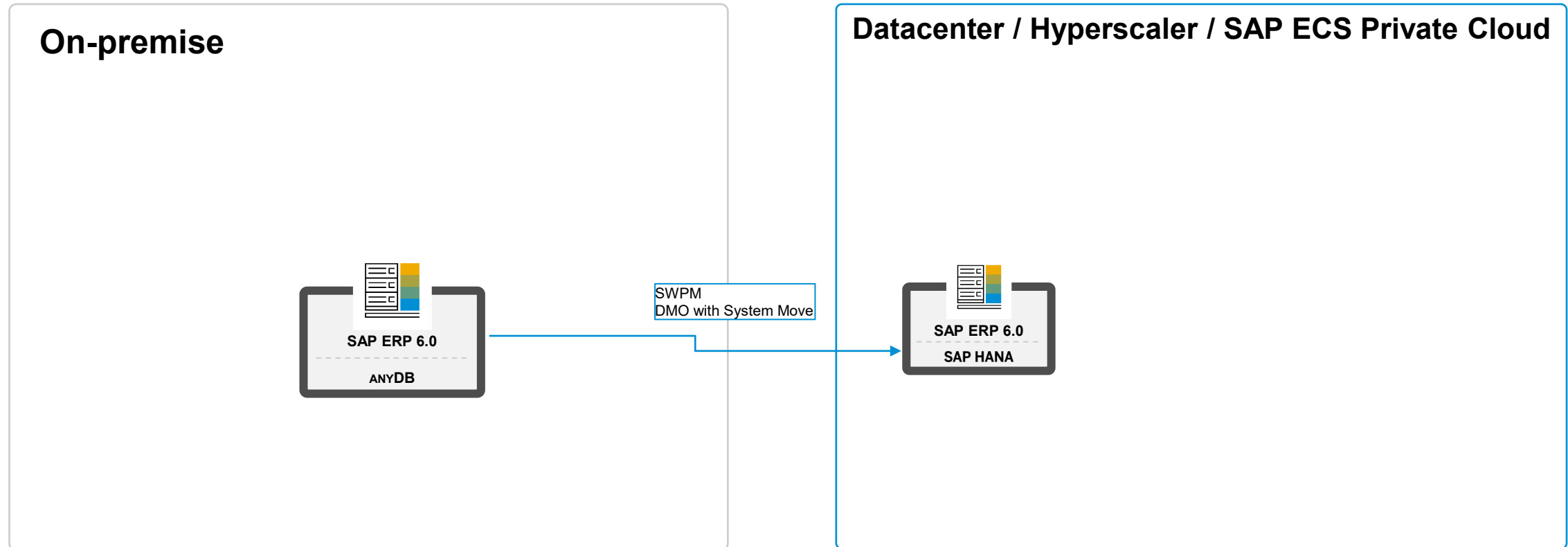
Transition Approaches and Tools

Transition strategy



Technical Migration to SAP HANA and supported OS platform in hyperscaler environment

- Source and target server platform (for DB), endianness (for DB), OS (for DB), DB is different



SAP S/4HANA and System Conversion Overview

Overview of Transition Scenarios

Rehost

Replatform

Transition

System Conversion



SAP ERP System



SAP S/4HANA
(any-premise)

SAP S/4HANA
Cloud, private
edition

New Implementation



SAP ERP
or
3rd -party
System



SAP S/4HANA
(any-premise)

SAP S/4HANA
Cloud, private or
public edition

Selective Data Transition



SAP ERP System
Region A



SAP ERP System
Region B



SAP ERP System
Region C



SAP S/4HANA
(any-premise)

SAP S/4HANA
Cloud, private
edition



Transition Approaches and Tools

Transition strategy – System Conversion

Rehost

Replatform

Transition



System
Conversion



SAP ERP
System



SAP S/4HANA
(any-premise)

SAP S/4HANA
Cloud, private
edition

“Uplifting” an existing SAP ERP system to
SAP S/4HANA
– with all its code, configuration and data

System Conversion



Co-deployment
of dedicated
capabilities in
one central
SAP S/4HANA
system

Transition Approaches and Tools

Transition strategy – System Conversion

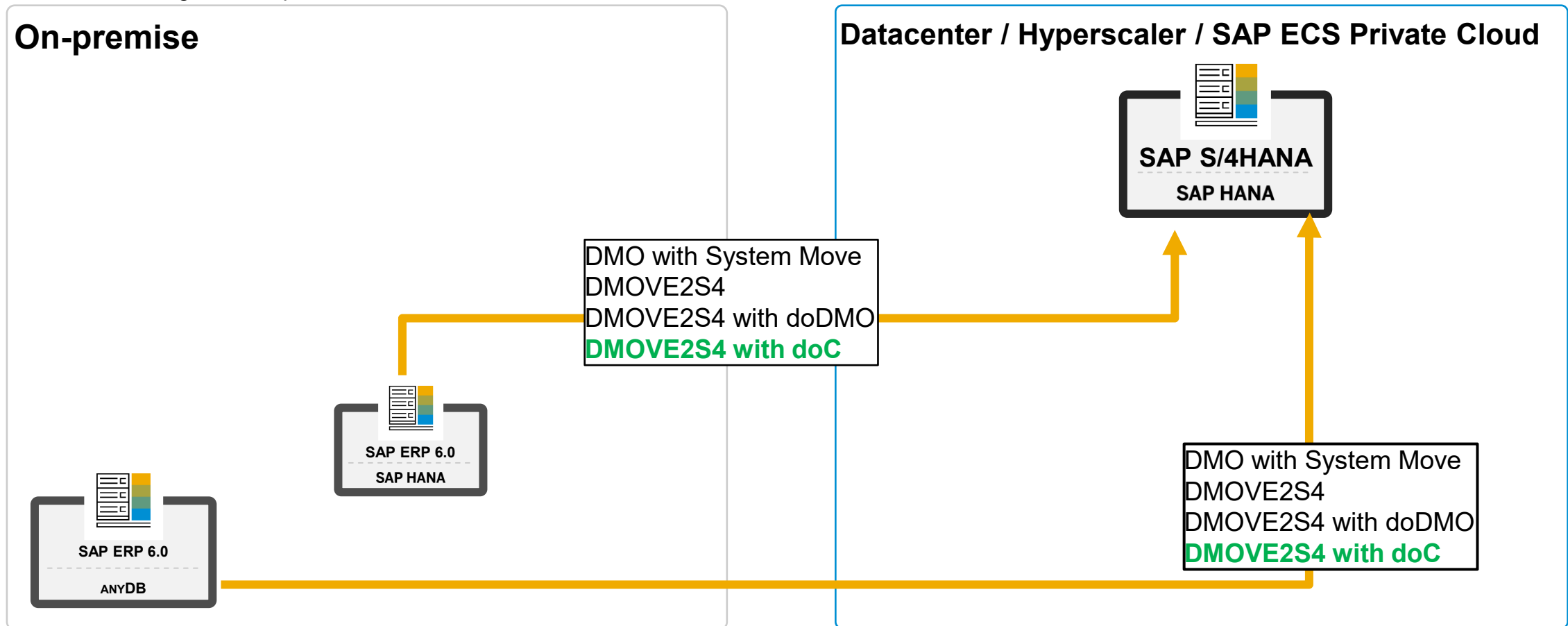


Transition to SAP S/4HANA on hyperscaler

- Source and target server platform, endianness, OS, DB is different

On-premise

Datacenter / Hyperscaler / SAP ECS Private Cloud



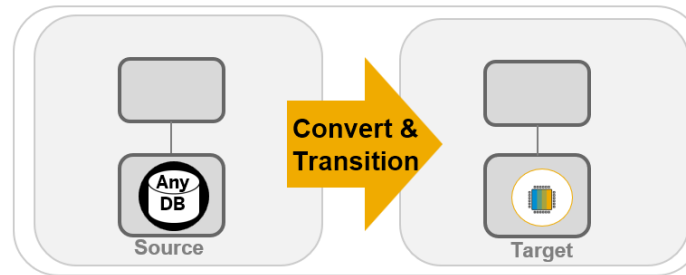
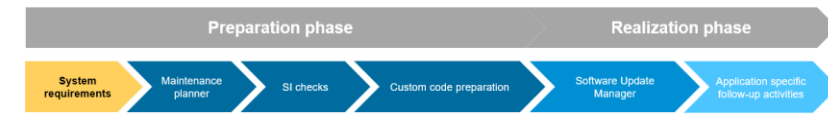
Transição para a Nuvem

DMO with System move, DMOVE2S4



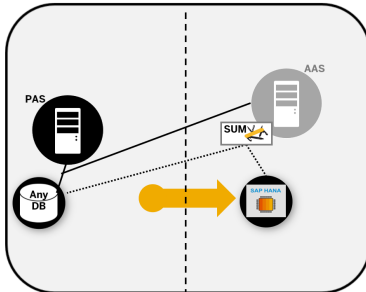
Overview of the tools and approaches

Two options available for conversion combined with transition to hyperscaler

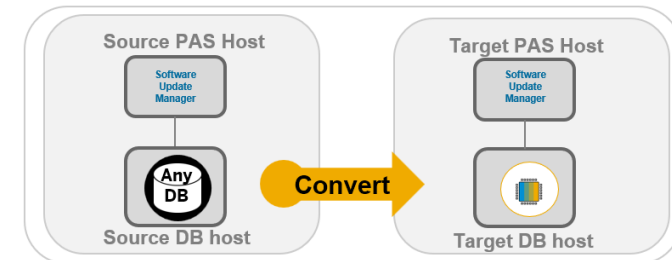


DMOVE2S4

DMO move to SAP S/4HANA (on hyperscaler)



DMO with system move



Overview of the tools and approaches

System Conversion with move to hyperscaler: Software Update Manager (SUM) is the tool

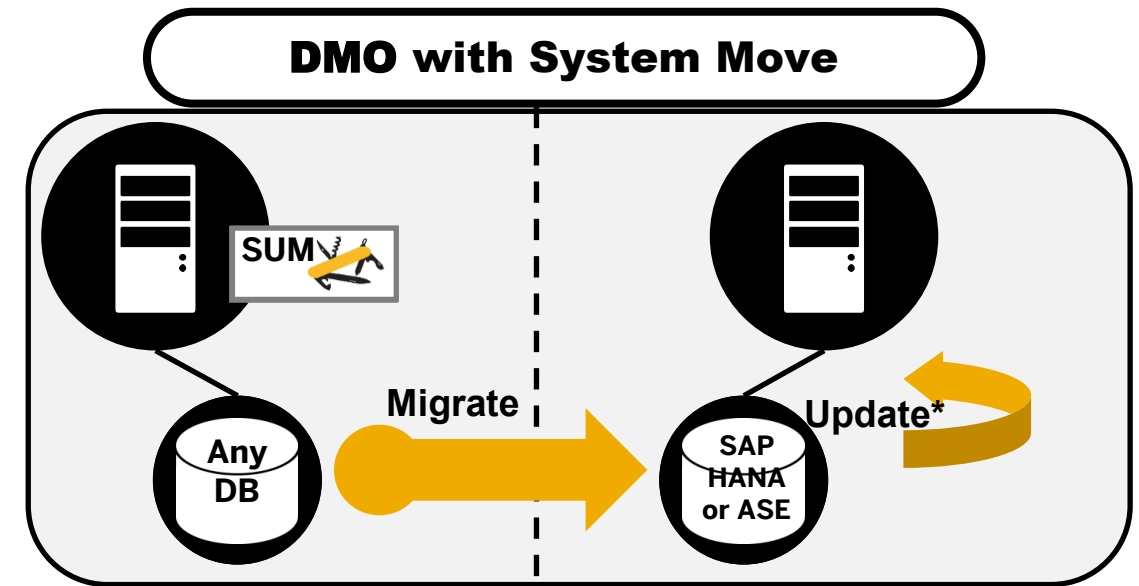
- **Transfer to hyperscaler** (SAP S/4HANA Private, cloud edition) (DMO, always)
 - DMO with system move
 - Serial mode
 - Parallel mode
 - DMOVE2S4
 - Standard
 - doDMO*
 - doC*

*: Availability for source systems on SAP HANA as of SUM 2.0 SP 18

DMO *Move* procedures (1):

DMO with system move

- DMO not supported for data center migration due to latency issues (source & target database in separate data center)
- **“DMO with System Move”:**
use case to move complete SAP system
 - Allows to switch PAS host
 - Allows to migrate across data centers
 - Allows to migrate to cloud (IAAS)
- Requirements:
 - Target database and target PAS are set up prior to start
 - Target database type is SAP HANA or SAP ASE
- Sequence:
 - Start SUM in source, export happens
 - Copy and start SUM on target, import happens
- Can be combined with *“DMO without Software Update”* and with *“SUM on AAS”*
- Does not allow to use downtime-optimization techniques (doDMO or downtime-optimized conversion)



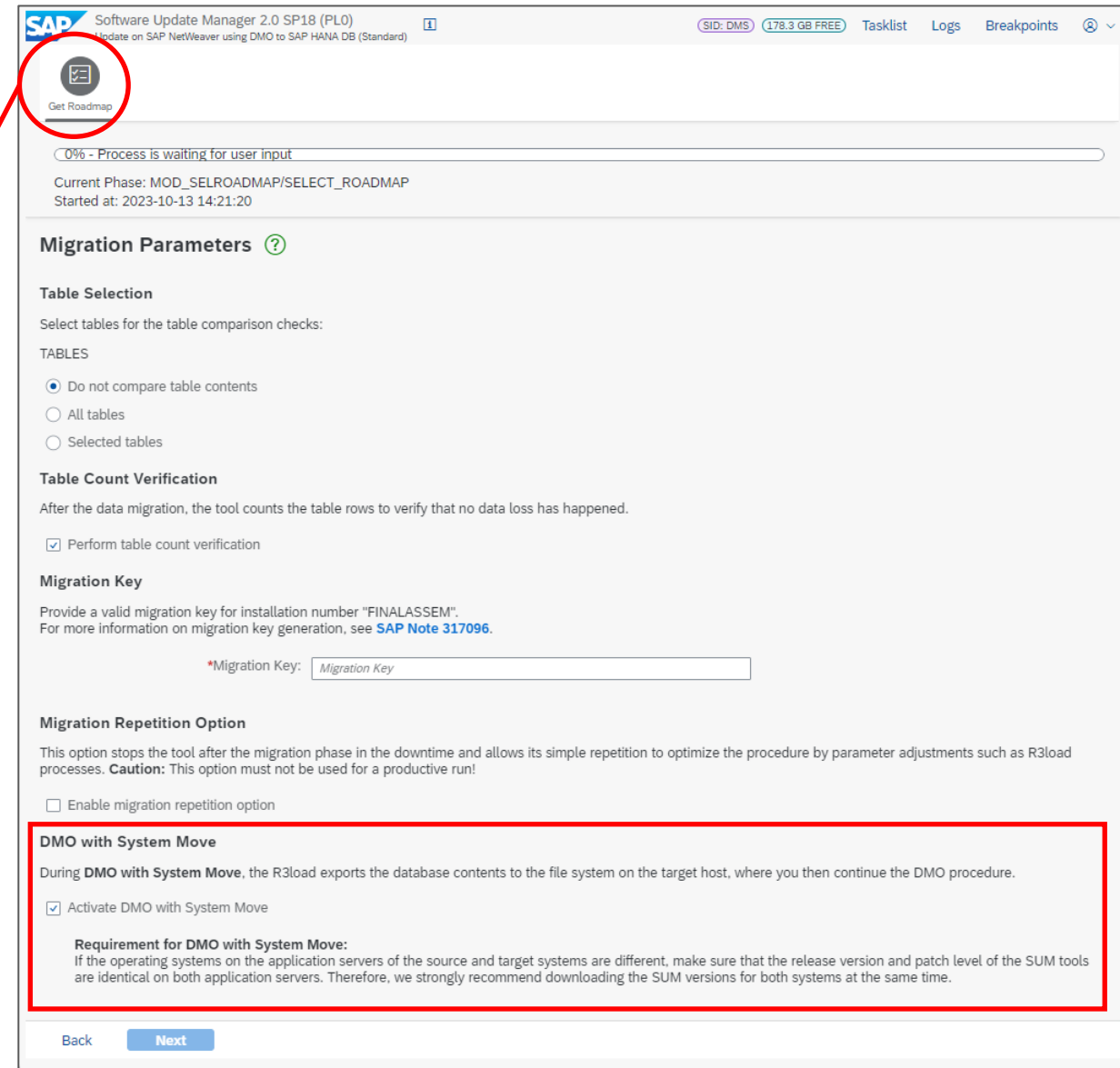
How to select “DMO with system move”

You select the option in one of the first dialogs.

- Dialog is shown before the roadmap is defined.

The option is only shown for a migration case:

- Either it is a **system conversion** from source system on non-SAP HANA DB (for which the migration option is enabled per default),
- Or it is a migration scenario (for which you have manually selected the migration option)



SAP Software Update Manager 2.0 SP18 (PL0)
Update on SAP NetWeaver using DMO to SAP HANA DB (Standard)

SID: DMS 178.3 GB FREE Tasklist Logs Breakpoints

Get Roadmap

0% - Process is waiting for user input

Current Phase: MOD_SELROADMAP/SELECT_ROADMAP
Started at: 2023-10-13 14:21:20

Migration Parameters ?

Table Selection

Select tables for the table comparison checks:

TABLES

☒ Do not compare table contents
☐ All tables
☐ Selected tables

Table Count Verification

After the data migration, the tool counts the table rows to verify that no data loss has happened.

☒ Perform table count verification

Migration Key

Provide a valid migration key for installation number "FINALASSEM".
For more information on migration key generation, see [SAP Note 317096](#).

*Migration Key:

Migration Repetition Option

This option stops the tool after the migration phase in the downtime and allows its simple repetition to optimize the procedure by parameter adjustments such as R3load processes. **Caution:** This option must not be used for a productive run!

☐ Enable migration repetition option

DMO with System Move

During **DMO with System Move**, the R3load exports the database contents to the file system on the target host, where you then continue the DMO procedure.

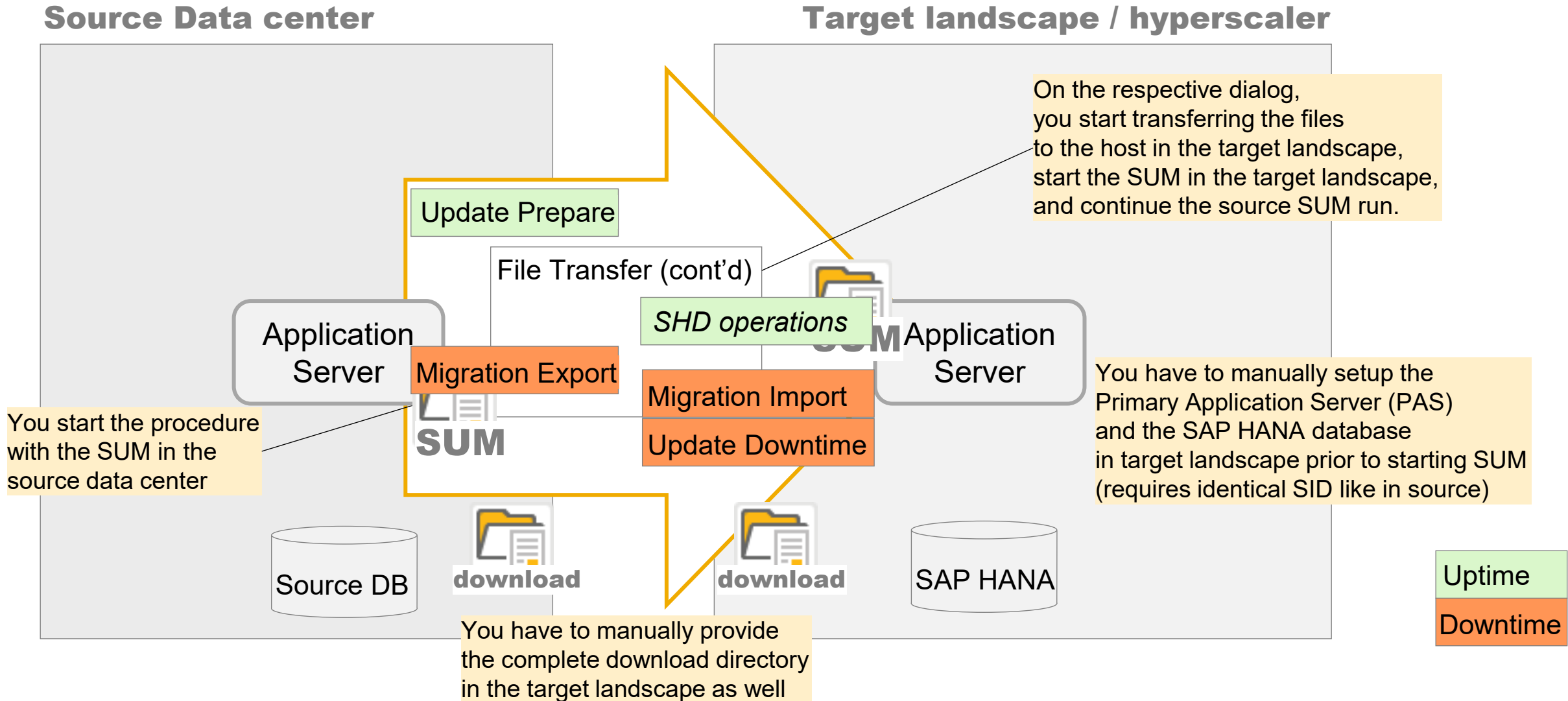
☒ Activate DMO with System Move

Requirement for DMO with System Move:
If the operating systems on the application servers of the source and target systems are different, make sure that the release version and patch level of the SUM tools are identical on both application servers. Therefore, we strongly recommend downloading the SUM versions for both systems at the same time.

Back Next

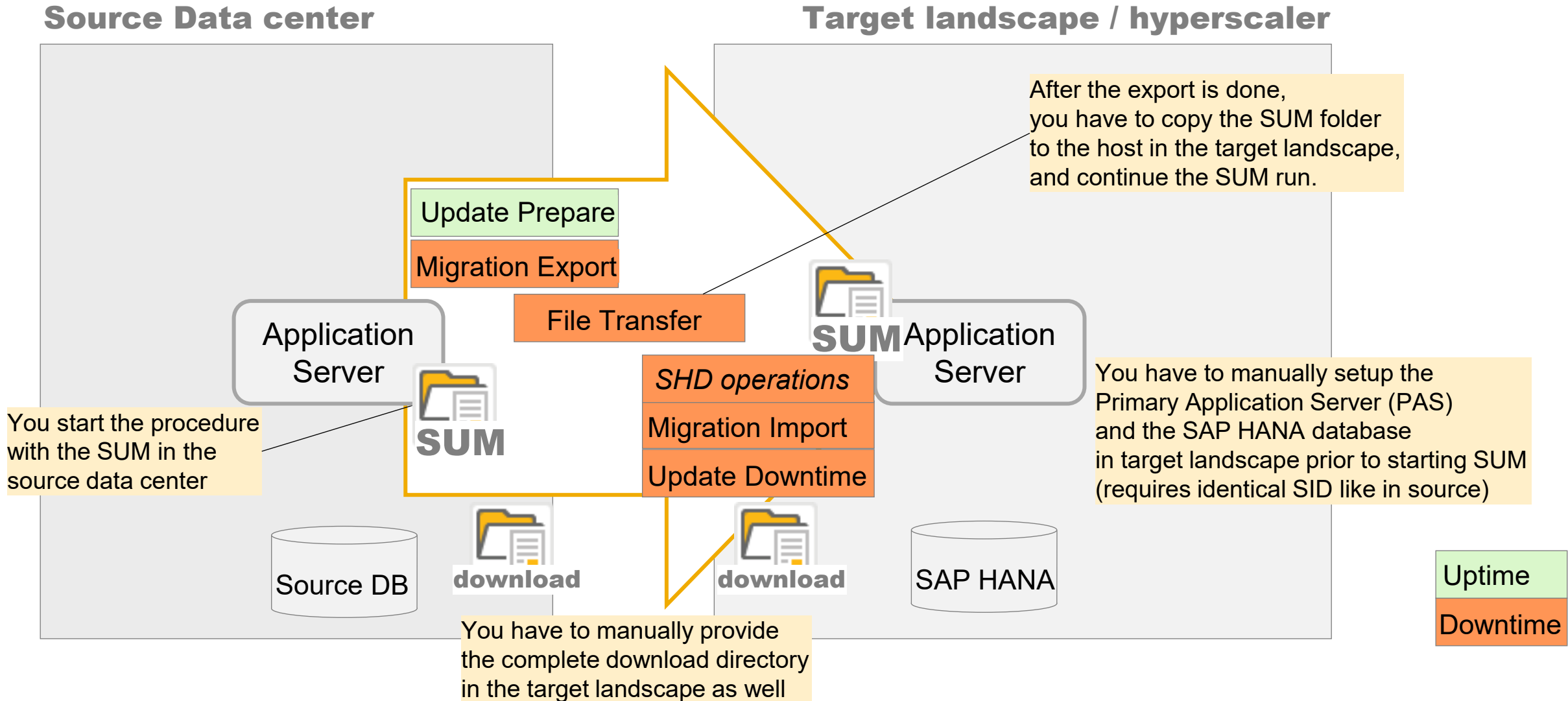
DMO with System Move

Parallel mode



DMO with System Move

Overview (**serial** mode)



Transition Approaches and Tools

Standard Approach – DMO with System Move

DMO with System Move (serial mode)

- Critical uptime phases like SPDD and Activation Phase... are running in the business downtime on the target system
- Higher risk on cutover weekend and longer business downtime
- Not recommended for production systems unless no sufficient network connection is available and transfer to be done i.e. via discs

DMO with System Move (parallel mode)

- Two different types of the file transfer in parallel mode do exist
- 1. continuous transfer to other DC whenever a new export file has been created (**parallel exp/imp**)
- 2. transfer all export files together when export has been done completely (**serial exp/imp**)
- 3. Critical uptime phases like SPDD and Activation Phase... are running in the uptime on the target system

Comments / Conclusion:

- *The difference between serial and parallel is not only the transfer approach of the export files from DC A to DC B*
- *Additional difference is that the shadow instance phases like SPDD and activation are running in serial mode in the business downtime*
- *Parallel mode means that the SUM execution runs in parallel in DC A and DC B compared to a sequential run of the SUM tool in serial mode*

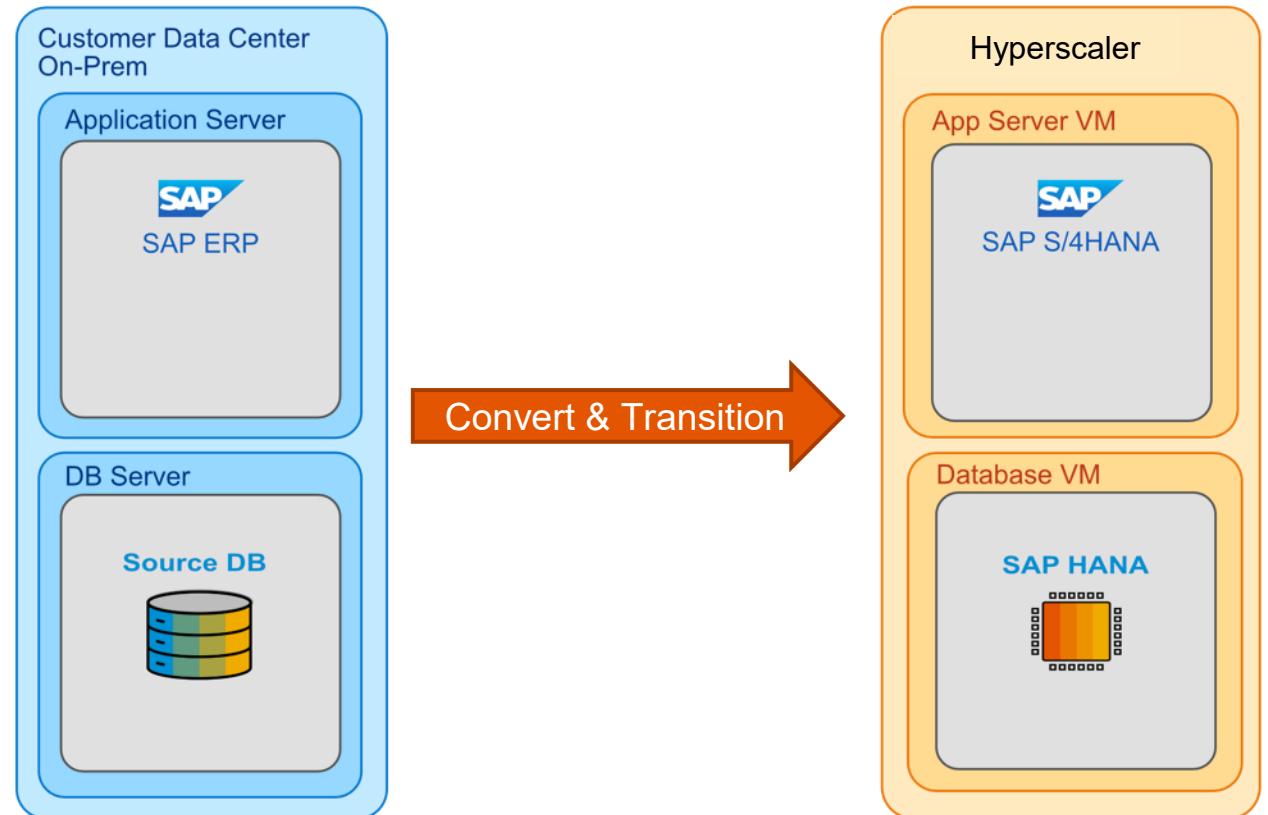
DMO Move to SAP S/4HANA (on Hyperscaler)

Use Software Update Manager (SUM) for a one-step conversion and transition to Hyperscaler

One-Step conversion & transition of your on-premise SAP ECC to SAP S/4HANA on hyperscaler

- Simplified approach for this use case
- Proven SUM technology
- Option to use downtime-optimized features
- Approach is generally available with SUM 2.0 SP17 (and higher) also for SAP ERP on SAP HANA

The approach simplifies the *technical* conversion and transition to a hyperscaler; the *application* specific preparation and post activities are similar to a standard conversion



DMO Move to SAP S/4HANA (on Hyperscaler)

doC combines system conversion, data migration and datacenter move

Supported target products:

- SAP S/4HANA (on-premise deployment)
- SAP S/4HANA Cloud, private edition
- SAP systems based on SAP S/4HANA Foundation

Prerequisites:

- low latency (< 20ms)
- high bandwidth (> 400 MBit/s)

Additional Information:

- The Software Update Manager checks the latency and writes the result to the DBSTAT.LOG file. If the latency is too high, a warning is additionally written to the CHECKS.LOG file
- Use network tools such as nipping, iPerf and tcpdump to check that the network connection is sufficient
- The benchmark migration tool for DMO can also be used to test the transfer rate and network quality from the source database to the additional application server host in the hyperscaler
- Ensure the VPN has the minimal number of hops possible between the SUM server on cloud and the source DB
- Implement the network parameters on the ENQ server and on the AAS SUM server before bring the latter online

DMO *Move procedures (2)*

DMOVE2S4: “DMO move to SAP S/4HANA (on hyperscaler)”, Alternative to “DMO with system move”

DMOVE2S4 allows to use downtime-optimization techniques (doDMO or downtime-optimized conversion), but it needs a good connection between locations.

1. Install AAS in target

Install the HANA target environment and an Additional Application Server (AAS) which belongs to the source SAP ERP 6.0.

2. Extract and start SUM on that AAS

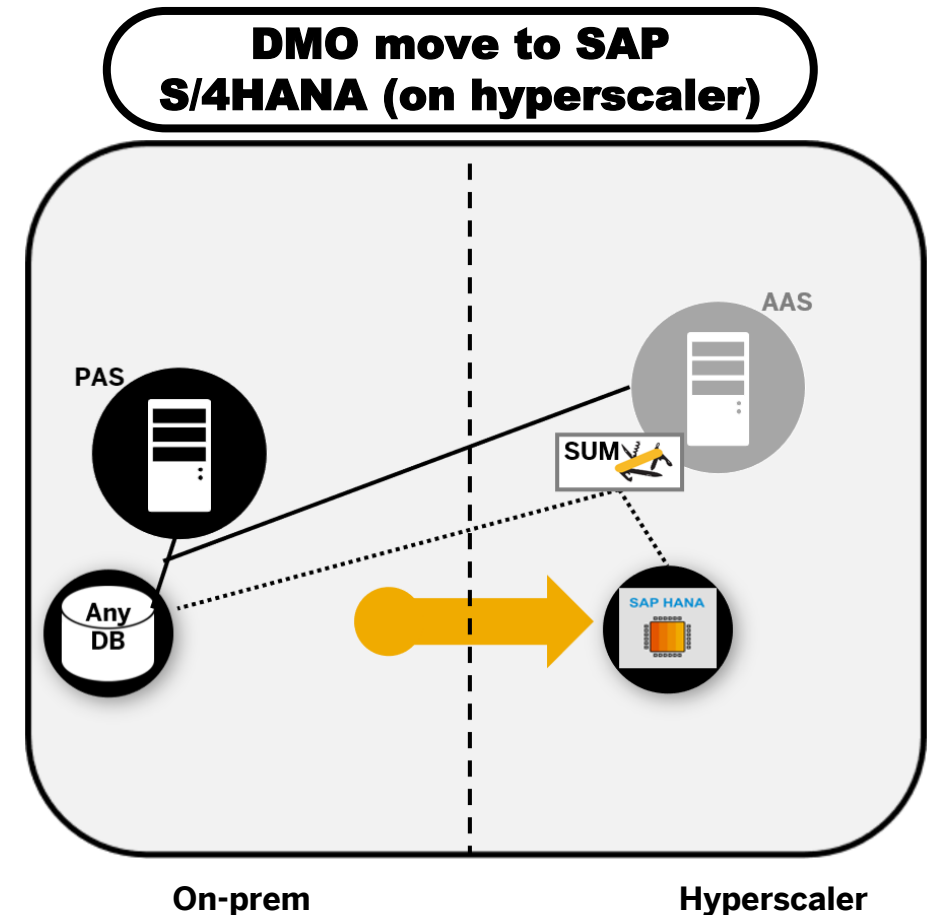
Start SUM for the conversion on that AAS host.

3. Confirm "*ACSC instance move*" offered by SUM

SUM detects it is not running on the Primary Application Server (PAS) host, so it offers the ASCS instance move.

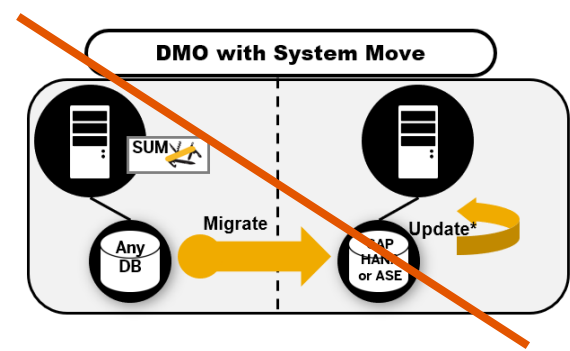
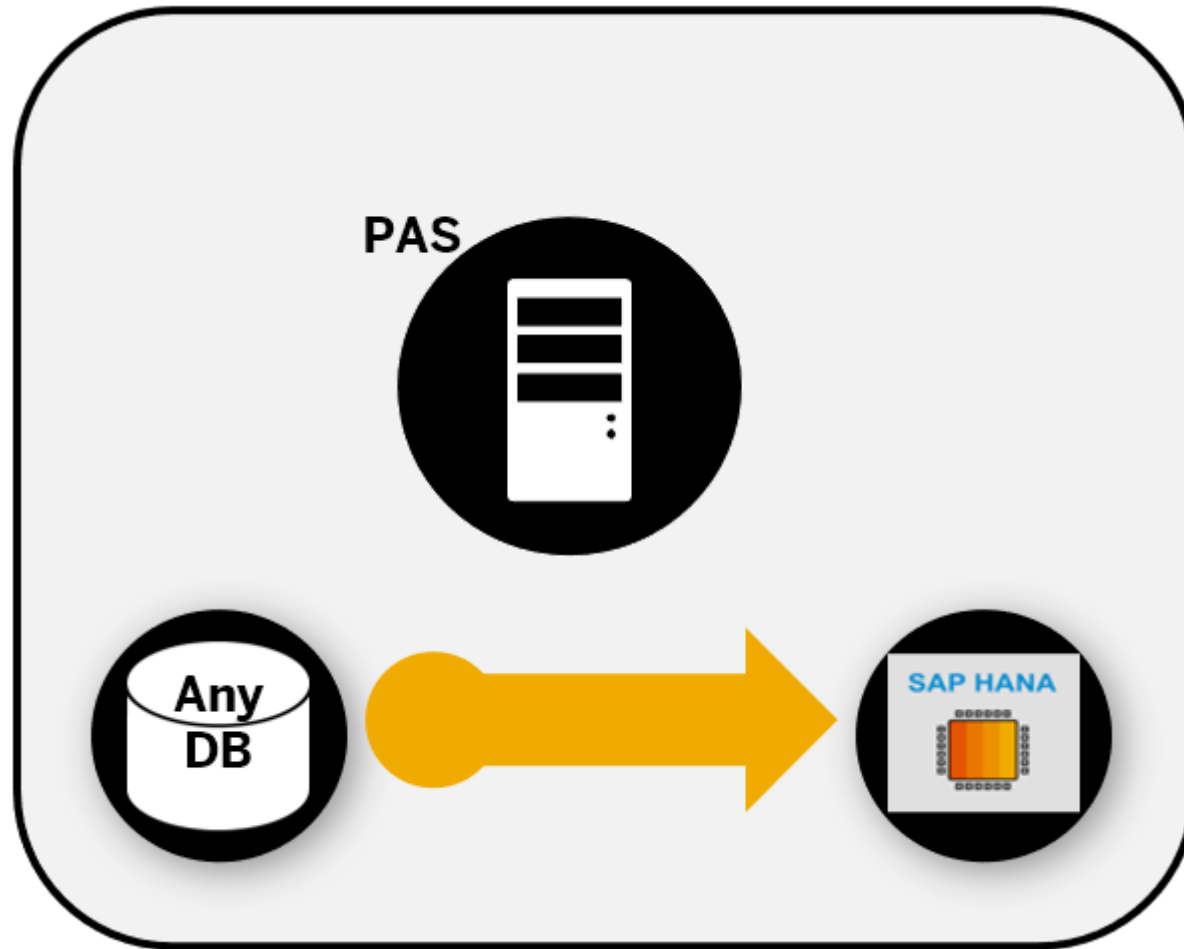
4. Post-activities

Some post activities are required which are described in the DMO Guide.



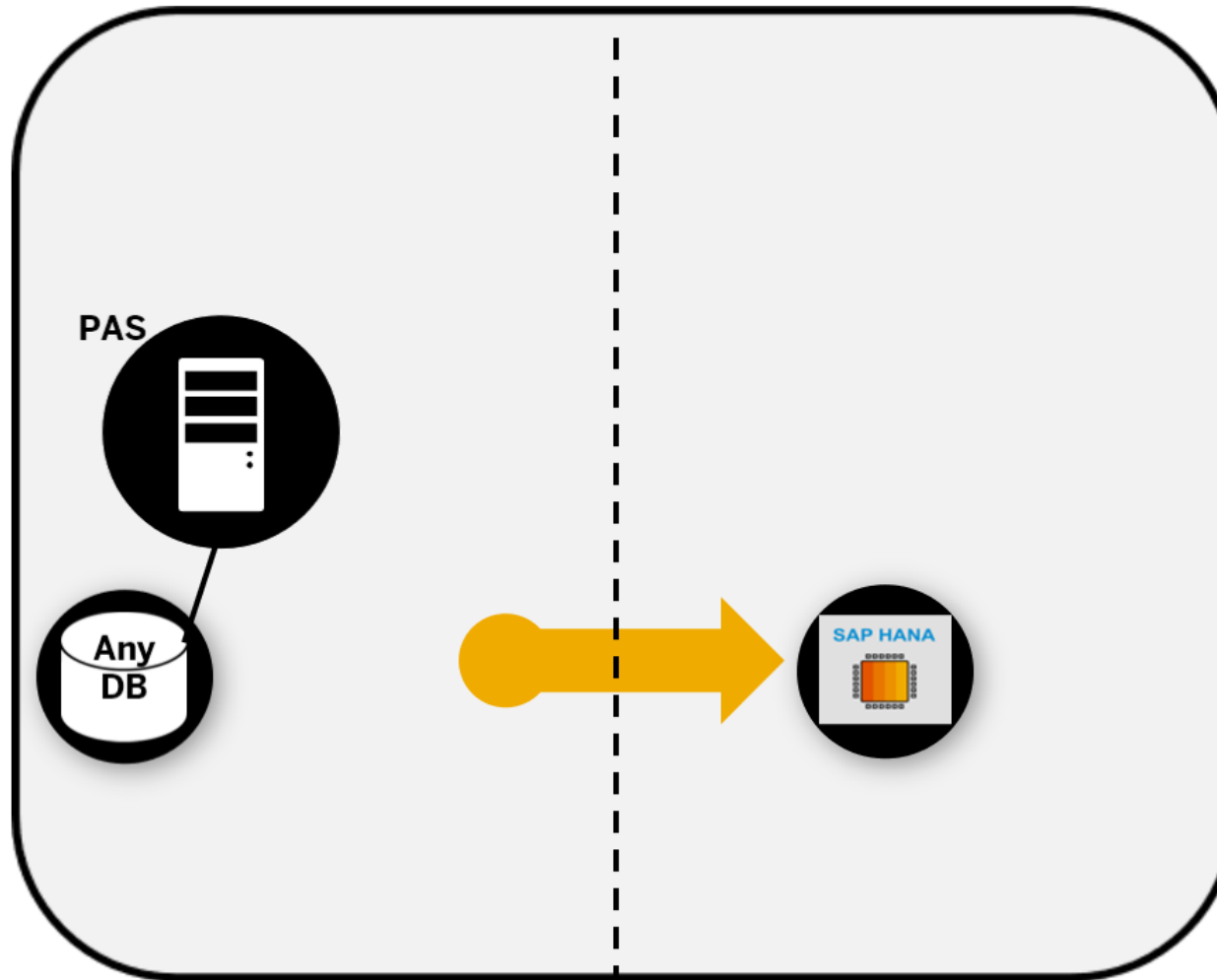
DMO Move to SAP S/4HANA (on Hyperscaler)

Use “plain DMO” for combined system conversion and datacenter move

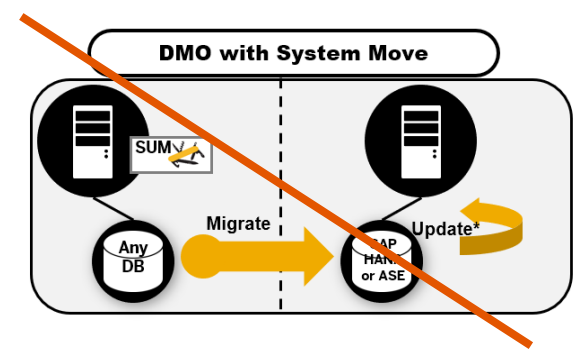


DMO Move to SAP S/4HANA (on Hyperscaler)

Use “plain DMO” for combined system conversion and datacenter move

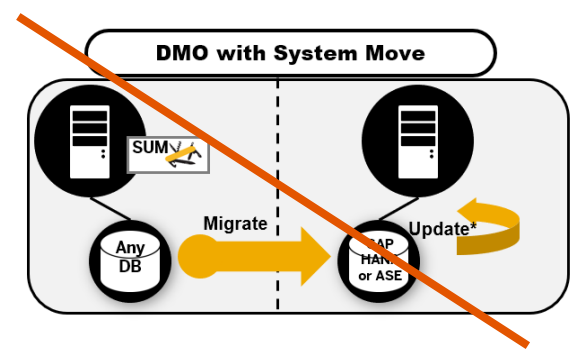
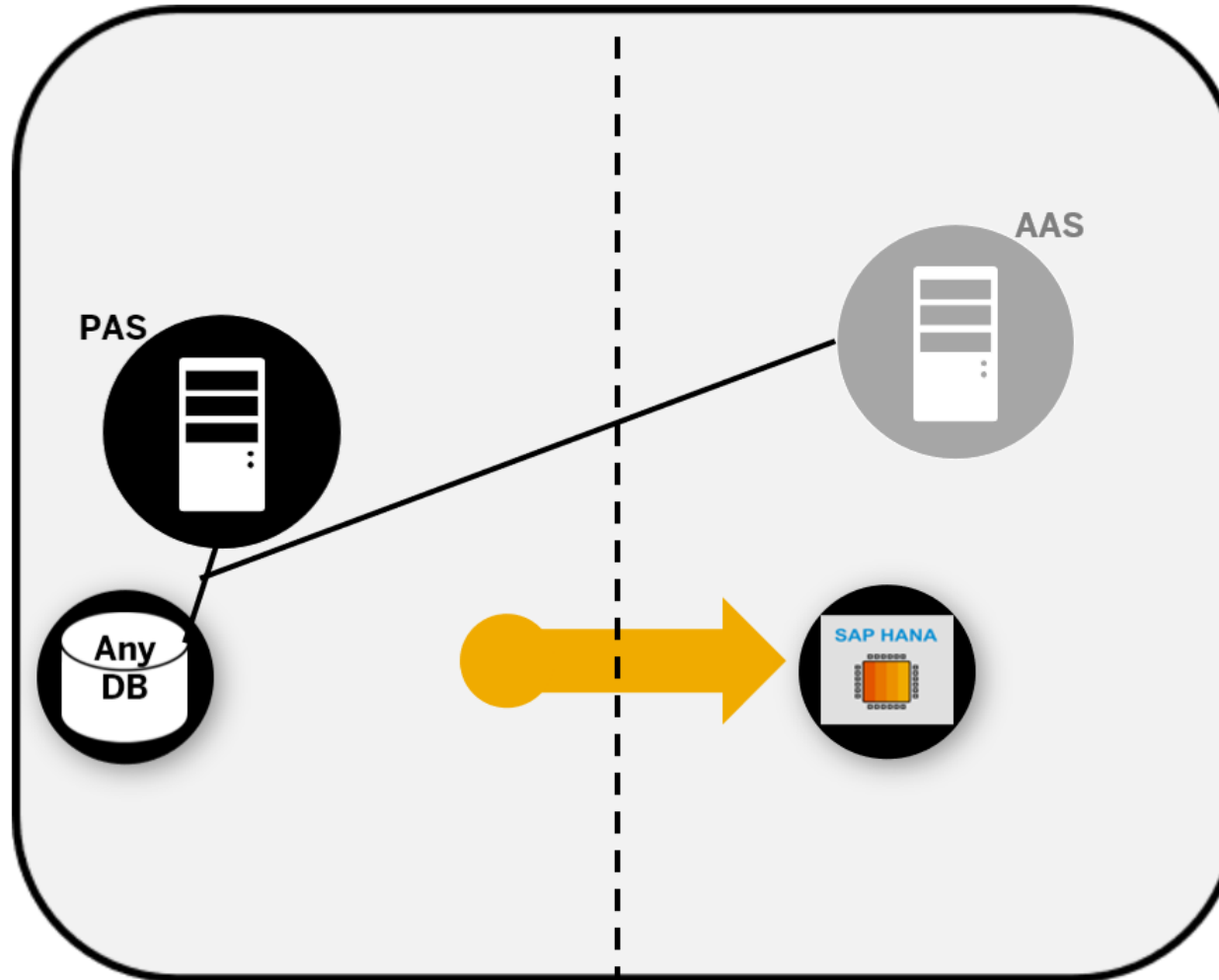


Distinguish source and target landscape



DMO Move to SAP S/4HANA (on Hyperscaler)

Use “plain DMO” for combined system conversion and datacenter move



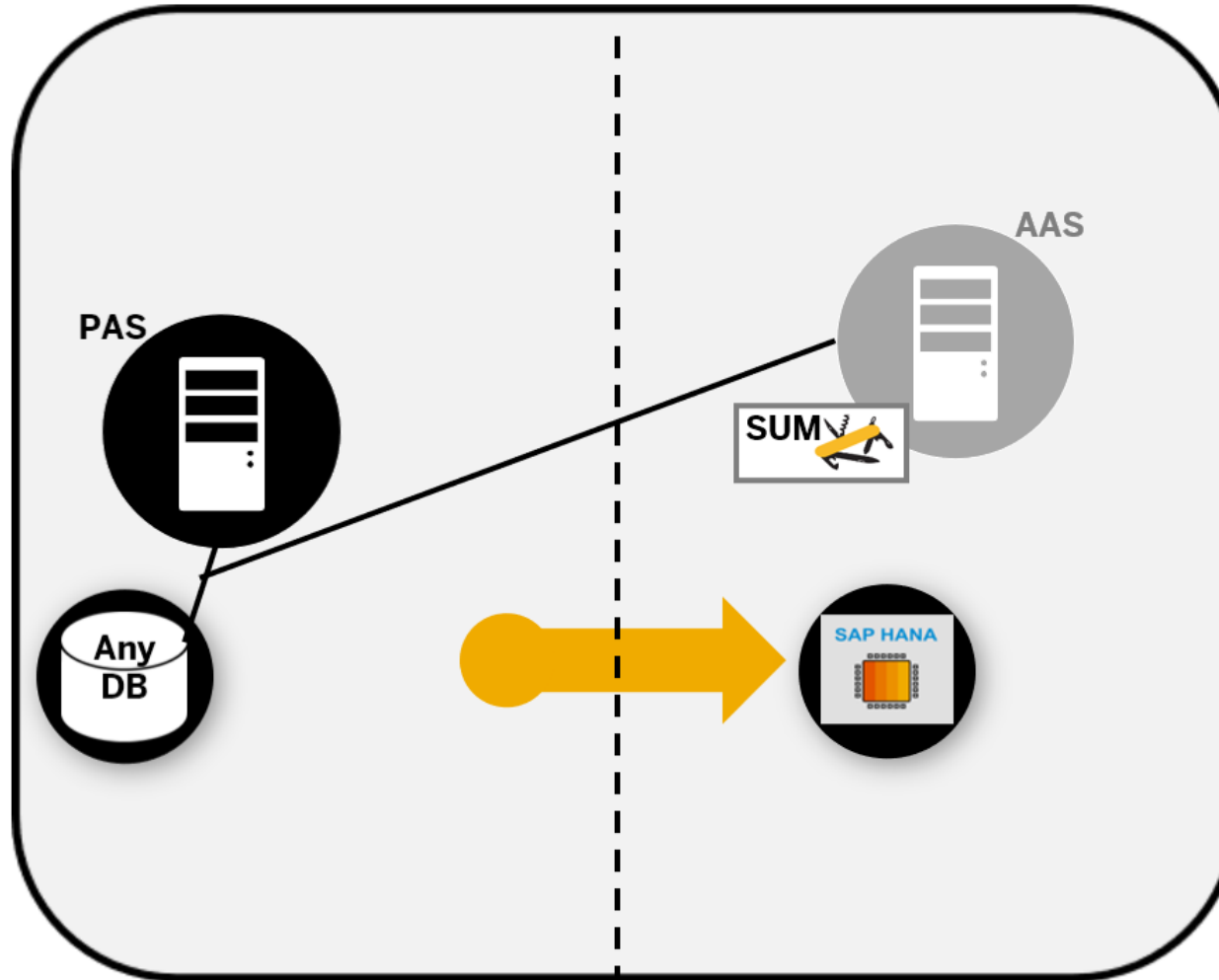
Like SAP HANA DB, an Additional Application Server (AAS) has to be installed in target

Note:

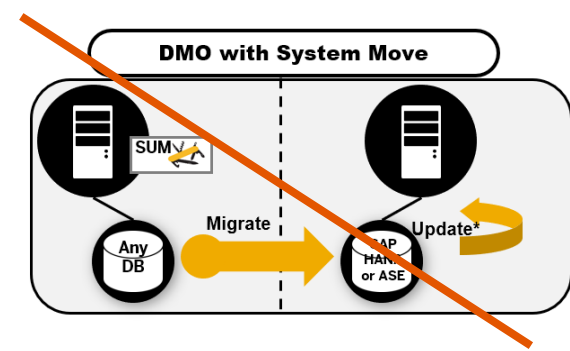
If the procedure is used as part of a RISE project targeting SAP S/4HANA Cloud, private edition, the AAS is to be installed on the Migration Server provided by ECS.

DMO Move to SAP S/4HANA (on Hyperscaler)

Use “plain DMO” for combined system conversion and datacenter move

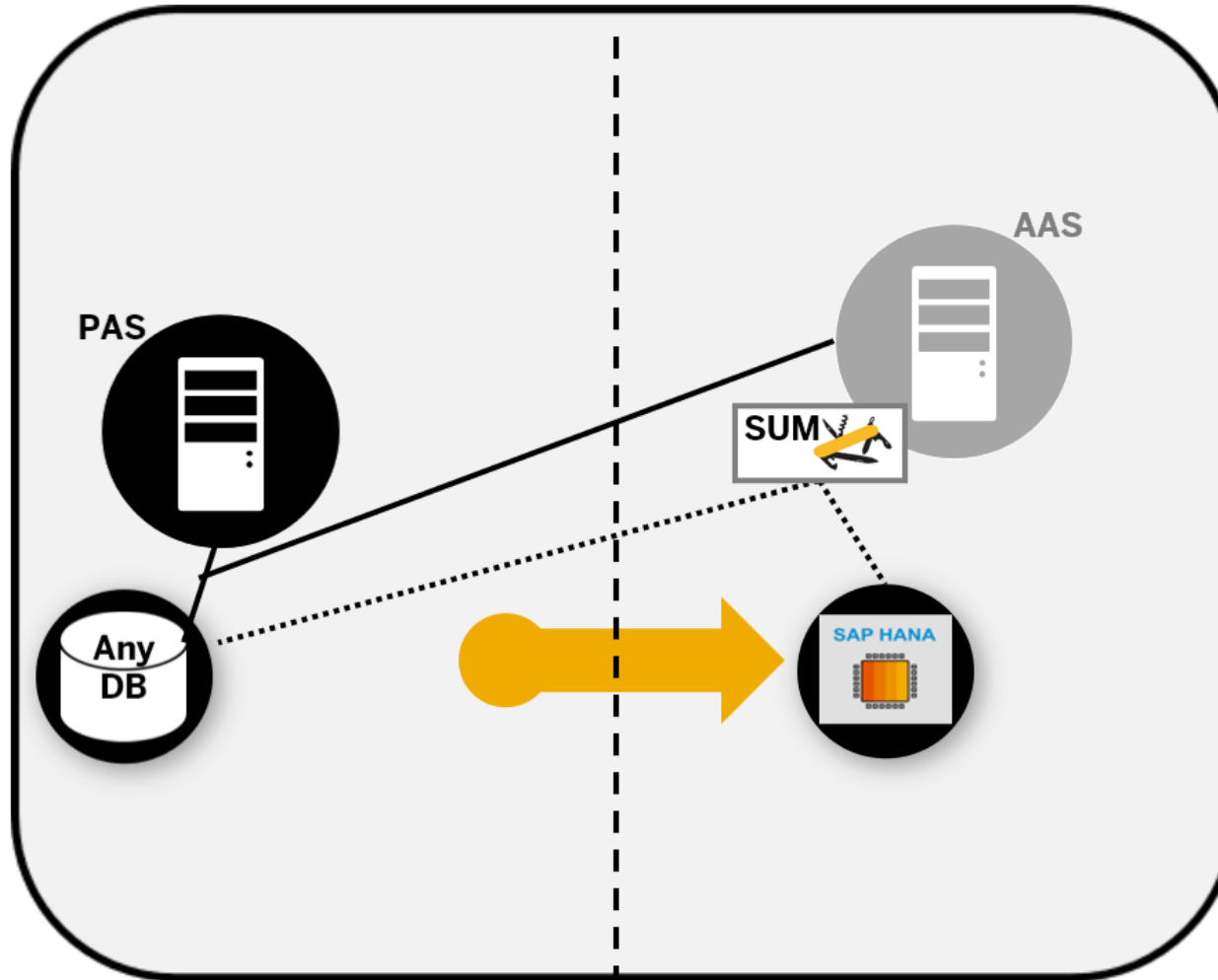


SUM is started on that AAS

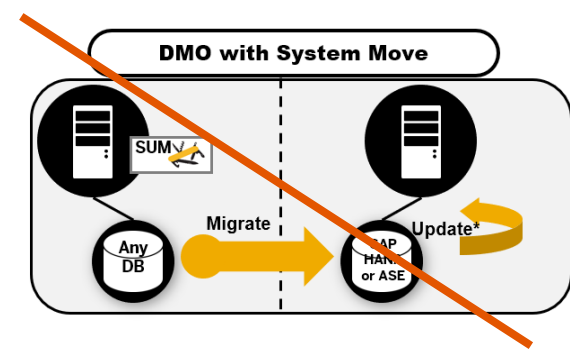


DMO Move to SAP S/4HANA (on Hyperscaler)

Use “plain DMO” for combined system conversion and datacenter move

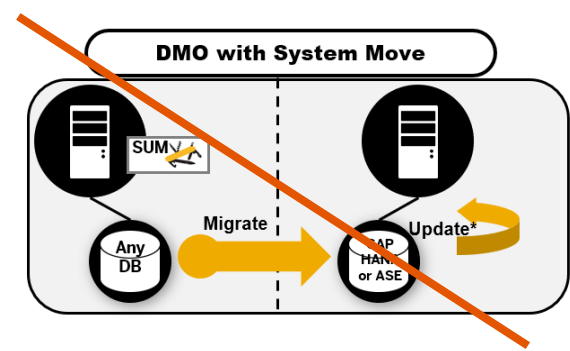
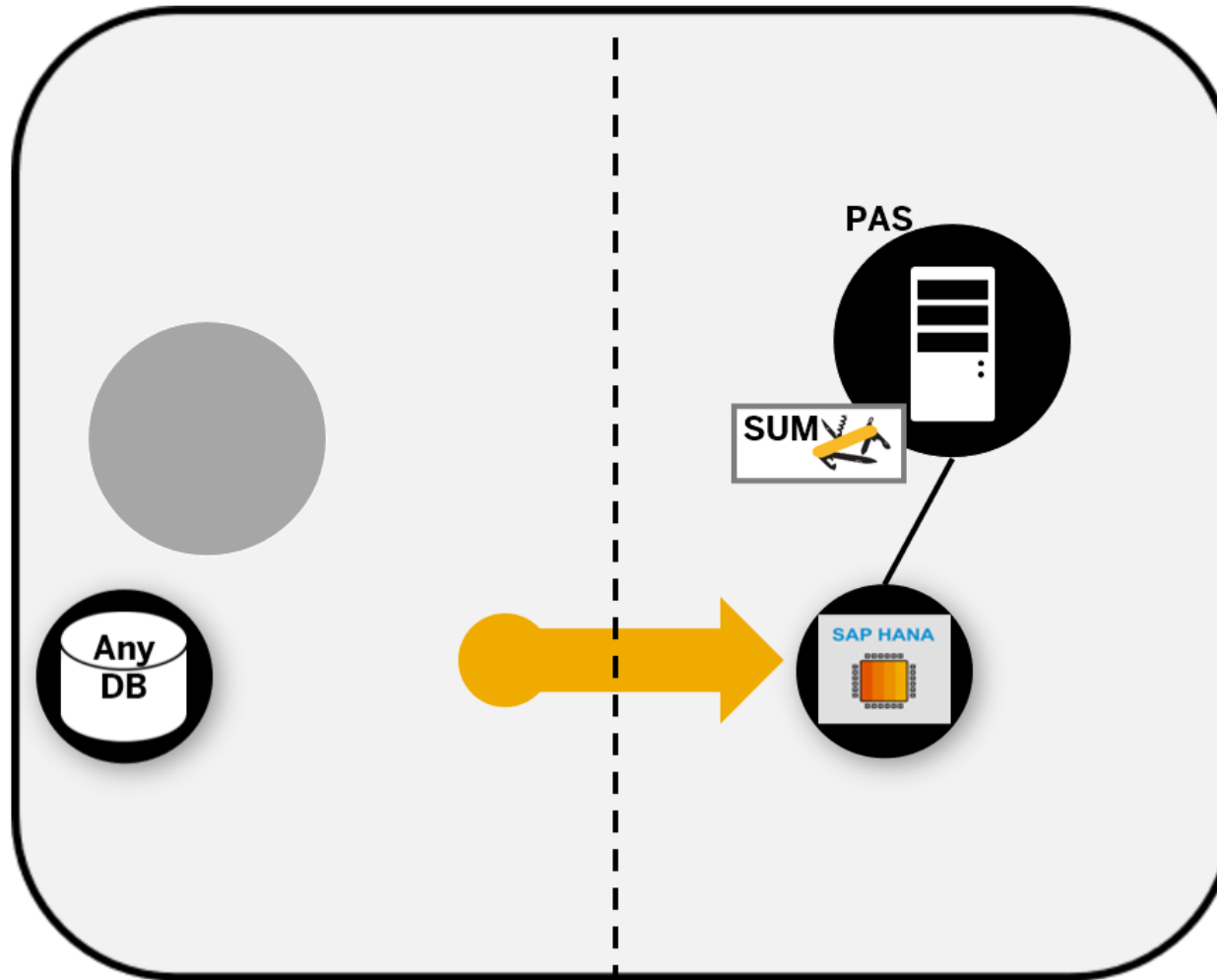


SUM will start the R3load pairs on that AAS, using pipe mode



DMO Move to SAP S/4HANA (on Hyperscaler)

Use “plain DMO” for combined system conversion and datacenter move




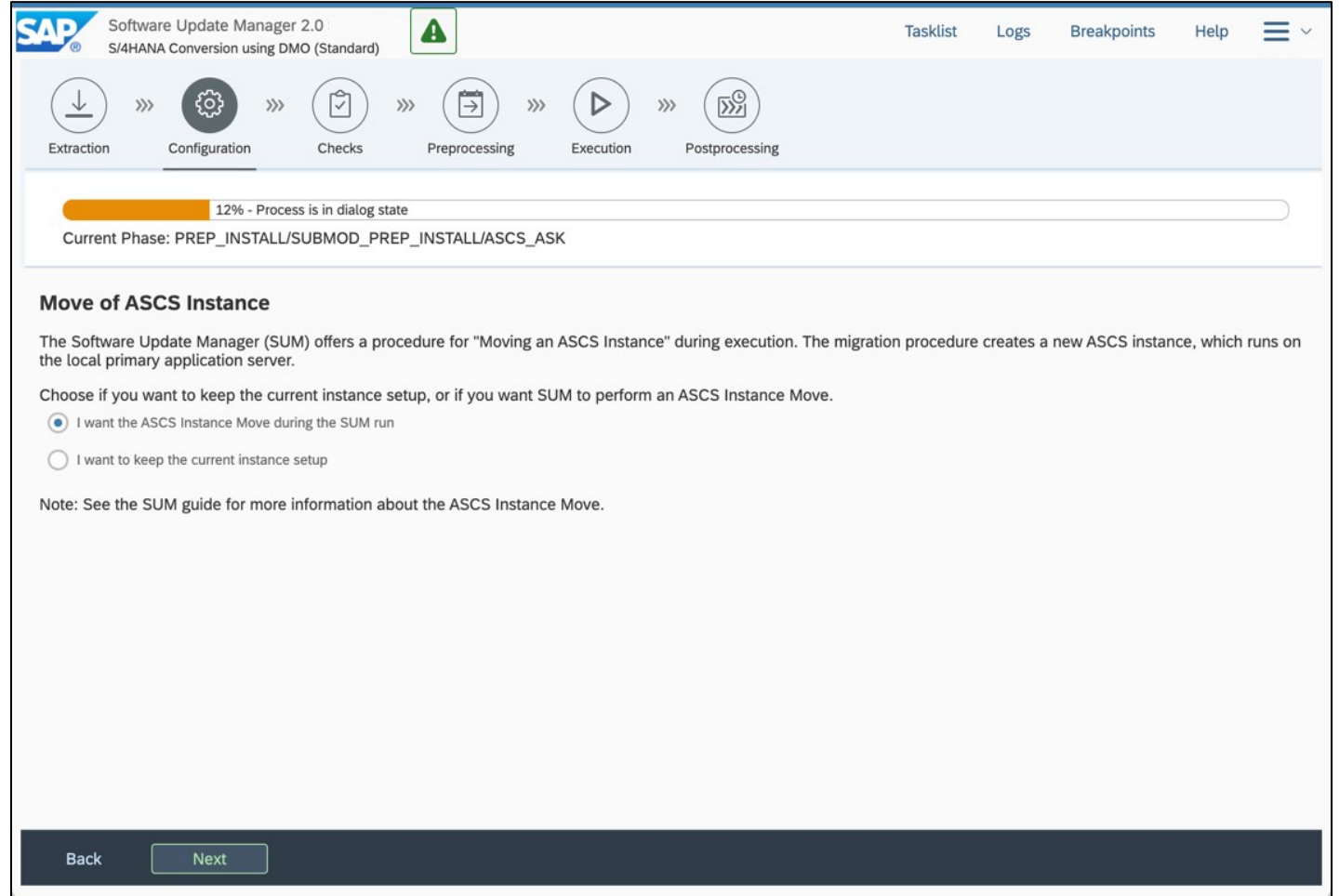
SUM offers to move ASCS to target AAS, making it a PAS

Performing the DMO process with SUM

You use the *usual* SUM approach (running SUM on AAS in target) to perform the system conversion

The only exception is to use the option **Move of ASCS Instance** which is offered by SUM when running on AAS

 SAP Community blog: [ASCS instance move: use SUM to switch your ASCS](#)



SAP Software Update Manager 2.0
S/4HANA Conversion using DMO (Standard)

Tasklist Logs Breakpoints Help

Extraction Configuration Checks Preprocessing Execution Postprocessing

12% - Process is in dialog state
Current Phase: PREP_INSTALL/SUBMOD_PREP_INSTALL/ASCS_ASK

Move of ASCS Instance

The Software Update Manager (SUM) offers a procedure for "Moving an ASCS Instance" during execution. The migration procedure creates a new ASCS instance, which runs on the local primary application server.

Choose if you want to keep the current instance setup, or if you want SUM to perform an ASCS Instance Move.

☒ I want the ASCS Instance Move during the SUM run

☐ I want to keep the current instance setup

Note: See the SUM guide for more information about the ASCS Instance Move.

Back Next

Further aspects

- It is highly recommend a **latency lower than 20 ms**, and a bandwidth **higher than 400 Mbps**.
- The Software Update Manager performs a latency check when
 - a system conversion to SAP S/4HANA with database migration
 - an extended prerequisite check with a target database
 - the latency test is executed by SUM via database select
- It writes the result to the **DBSTAT.LOG file**. If the latency is too high, a warning is additionally written to the CHECKS.LOG file.
- Use network tools such as iPerf, nipping or even TCPdump to check that the network connection is stable and able to handle high data transfer loads.
- Use the **SUM benchmarking tool** as first indication for transfer rate and network quality, the *discard mode* is sufficient to test the network from source database to AppServer in hyperscaler

Comparing DMOVE2S4 with “DMO with system move”

DMOVE2S4



- ☐ Requires good connection*
- ☐ **Allows downtime-optimization techniques**
- ☐ Requires SAP S/4HANA as target
- ☐ Uses R3load pipe mode
- ☐ Only one SUM process runs, in target infrastructure
- ☐ Target AAS is a “full” instance belonging to source system
- ☐ *Source system* cannot be used independent of target system

DMO with system move



- ☐ **Can use any connection**
- ☐ Only offers the parallel mode
- ☐ Also non-S/4HANA targets are allowed
- ☐ Uses R3load file mode
- ☐ Two SUM processes: one on source & one on target, partially in parallel
- ☐ Target AAS is stub installation
No connection to source system
- ☐ Source system could be used independent of target system

Questions & Answers

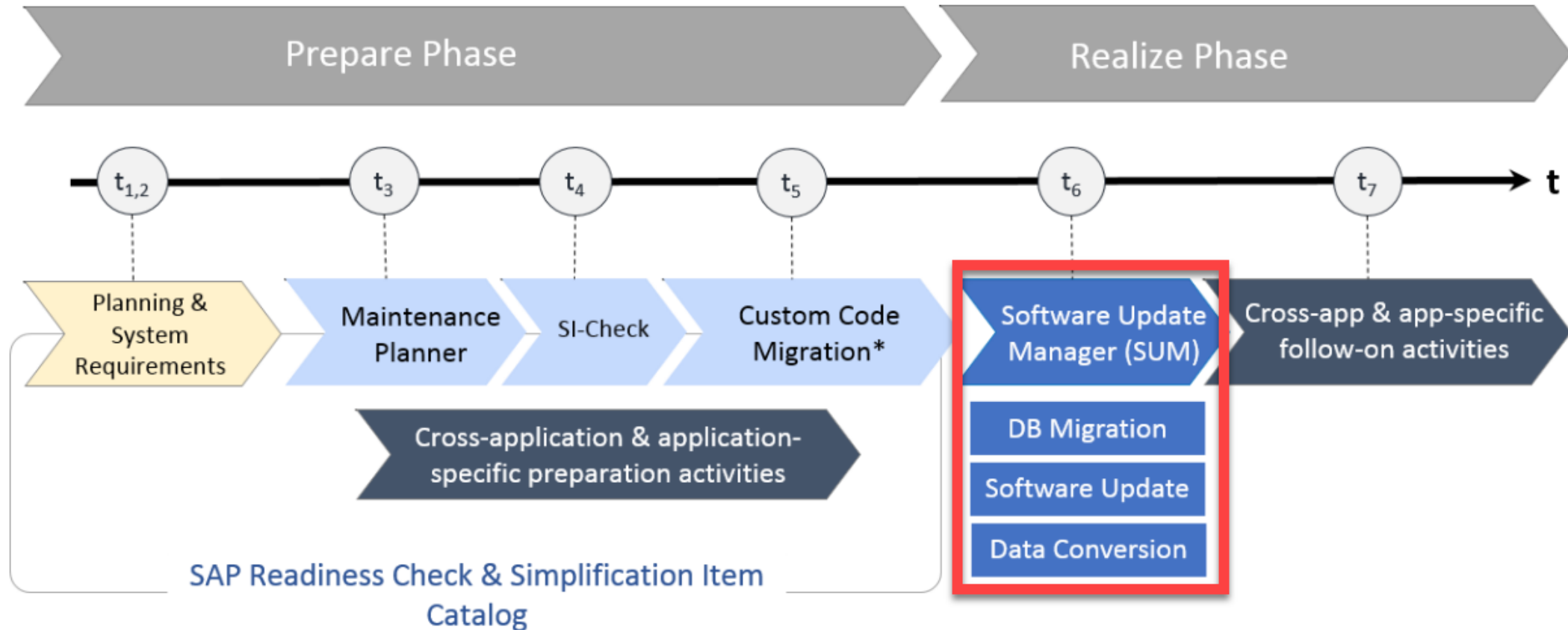


S/4HANA usando downtime optimized Conversion

doC: Detalhes Técnicos – Part I



Overview of the Conversion Process



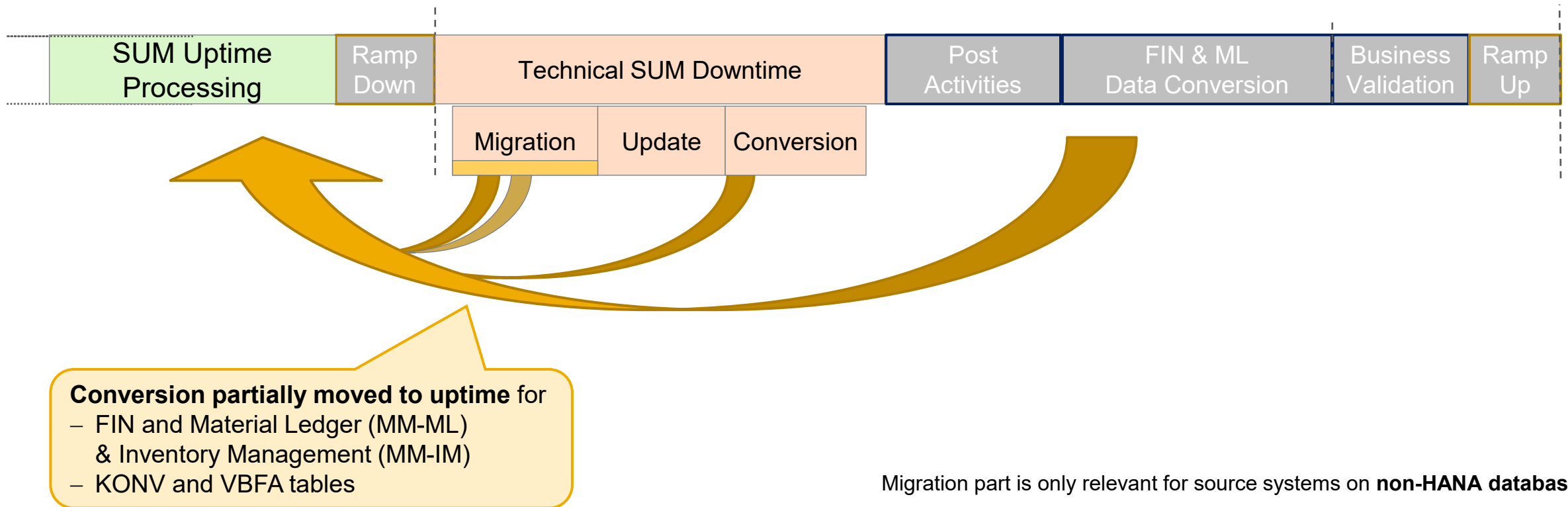
*Consists of preparatory analysis and post-SUM adaptation of custom code.

SAP S/4HANA System Conversion: Sequence

SAP S/4HANA system conversion overview

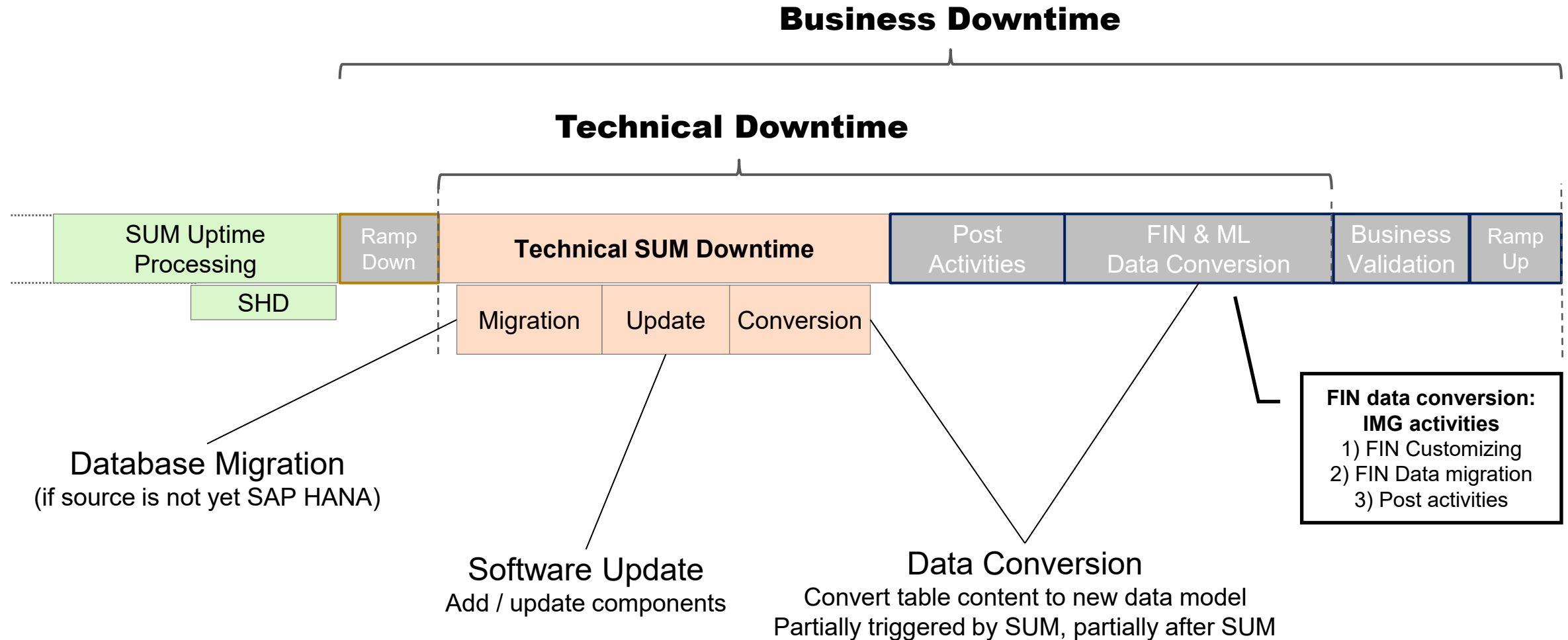
Downtime-optimized conversion approach

- **Table conversion** moved to uptime processing
- **Field conversion** moved to uptime processing (KONV and VBFA tables)
- **Uptime migration** for selected large application tables (which are not part of the data conversion)



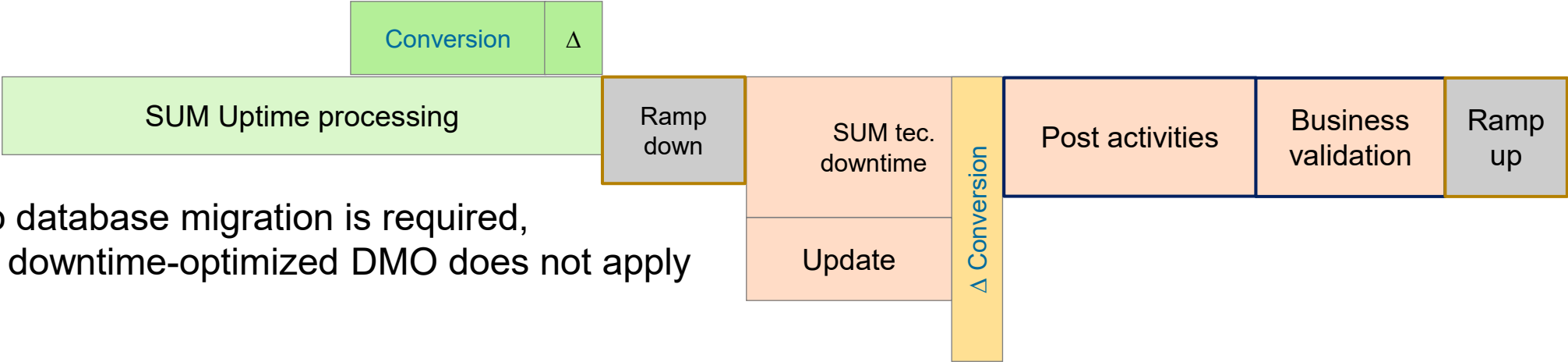
SAP S/4HANA system conversion overview

Standard approach



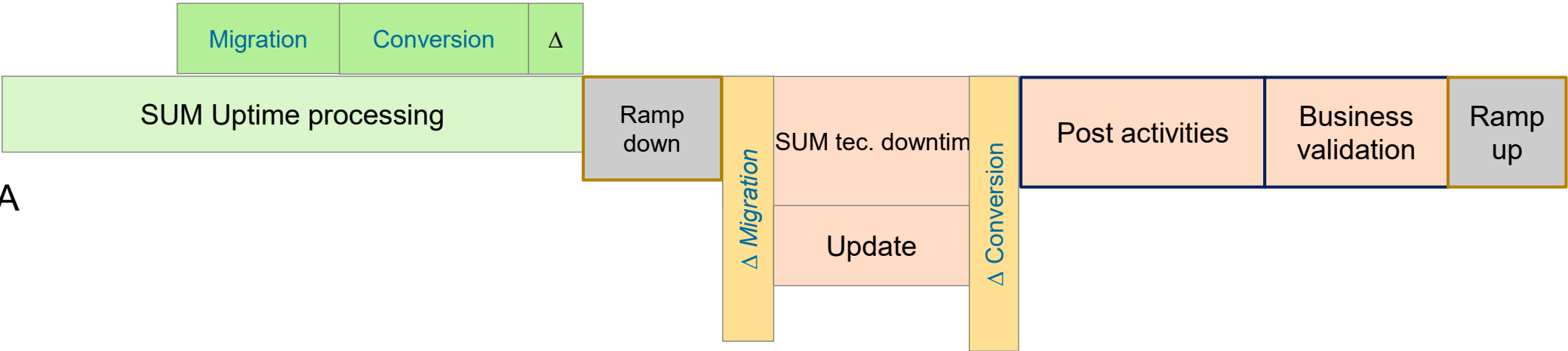
Downtime-optimized Conversion

Source on
SAP-HANA



No database migration is required,
so downtime-optimized DMO does not apply

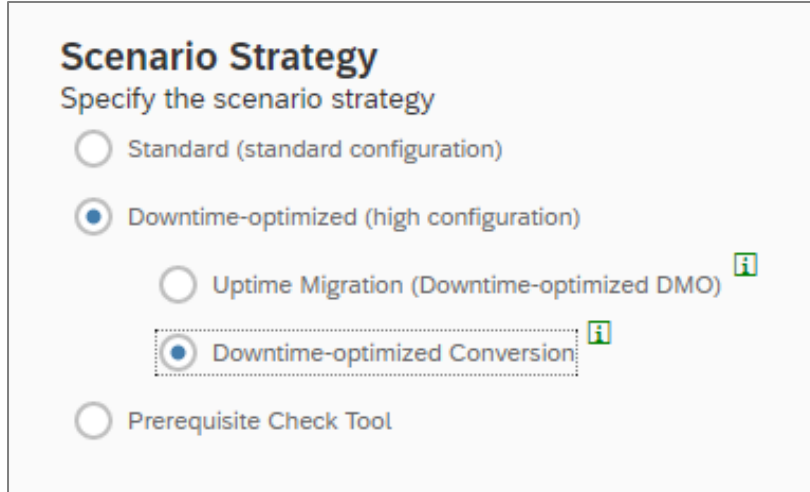
Source on
non-SAP-HANA



SUM dialog offering strategies

Possible conversion approaches


Source on **non-SAP HANA DB**




Scenario Strategy
Specify the scenario strategy

☐ Standard (standard configuration)

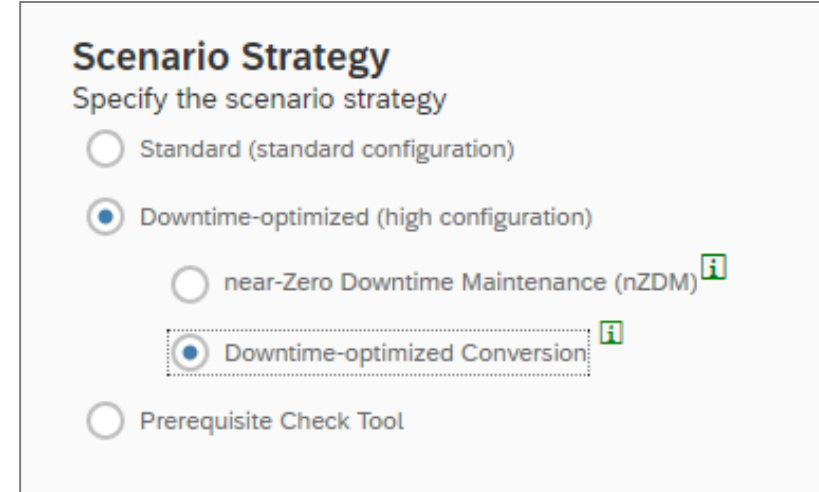
☒ Downtime-optimized (high configuration)

☐ Uptime Migration (Downtime-optimized DMO) 

☒ Downtime-optimized Conversion 

☐ Prerequisite Check Tool


Source on **SAP HANA DB**




Scenario Strategy
Specify the scenario strategy

☐ Standard (standard configuration)

☒ Downtime-optimized (high configuration)

☐ near-Zero Downtime Maintenance (nZDM) 

☒ Downtime-optimized Conversion 

☐ Prerequisite Check Tool



- **Near-Zero Downtime Maintenance (nZDM)**
Move table structure adaptations and import of new table content partly to uptime processing for a system update/upgrade.
- **Uptime Migration (Downtime-optimized DMO)**
Migrate selected large application tables partly in uptime.
- **Downtime-optimized Conversion**
Move migration and data conversion partly to uptime processing for a system conversion.

Pre-requisites for downtime-optimized Conversion as of SUM 2.0 SP18

✓ Note # 3347255 – Executing and Monitoring Downtime-Optimized Conversion to SAP S/4HANA with SUM 2.0 SP18

- Source system must be Unicode only
- If source system is already on HANA, it must be v.2.0 SPS05 rev. 52 or newer
- Target product version: S/4HANA 2021 FPS00 or higher
- Specific SAP Kernel requirements for each supported database type are listed in the SAP Note above.
- If data migration, support DBs are SAP HANA, Oracle, DB2 z/OS, DB6 and MS SQL
 - for source HANA DB, SUM SP17 now allows the homogeneous migration to another HANA DB as a pilot project and as SP18 pilot is not required anymore.
- A standard conversion must be executed prior to the doC one in order to get customizing transports for FIN, MM-ML, MM-IM as an input for the downtime-optimized procedure.
- The procedure can be executed by all certified persons that have successfully taken the ADM329 training and have passed the related assessment.
 - Alternatively, SAP can assist the execution on a service-based project

Restrictions for downtime-optimized Conversion as of SUM 2.0 SP18

✓ Note # 3347255 – Executing and Monitoring Downtime-Optimized Conversion to SAP S/4HANA with SUM 2.0 SP18

Source Product Version

- SAP Simple Finance 1503 and SAP S/4HANA Finance 1605 are not supported as source product version for a downtime-optimized conversion.

Interference with Other SUM Scenarios

- "DMO with System Move" is not possible for a downtime-optimized conversion.
- "DMO Move to SAP S/4HANA (on Hyperscaler)", aka DMOVE2S4, is supported for source systems on non-SAP HANA database and now, for an SAP ECC source system running on an SAP HANA database, are supported with SUM 2.0 SP 18 (and higher).

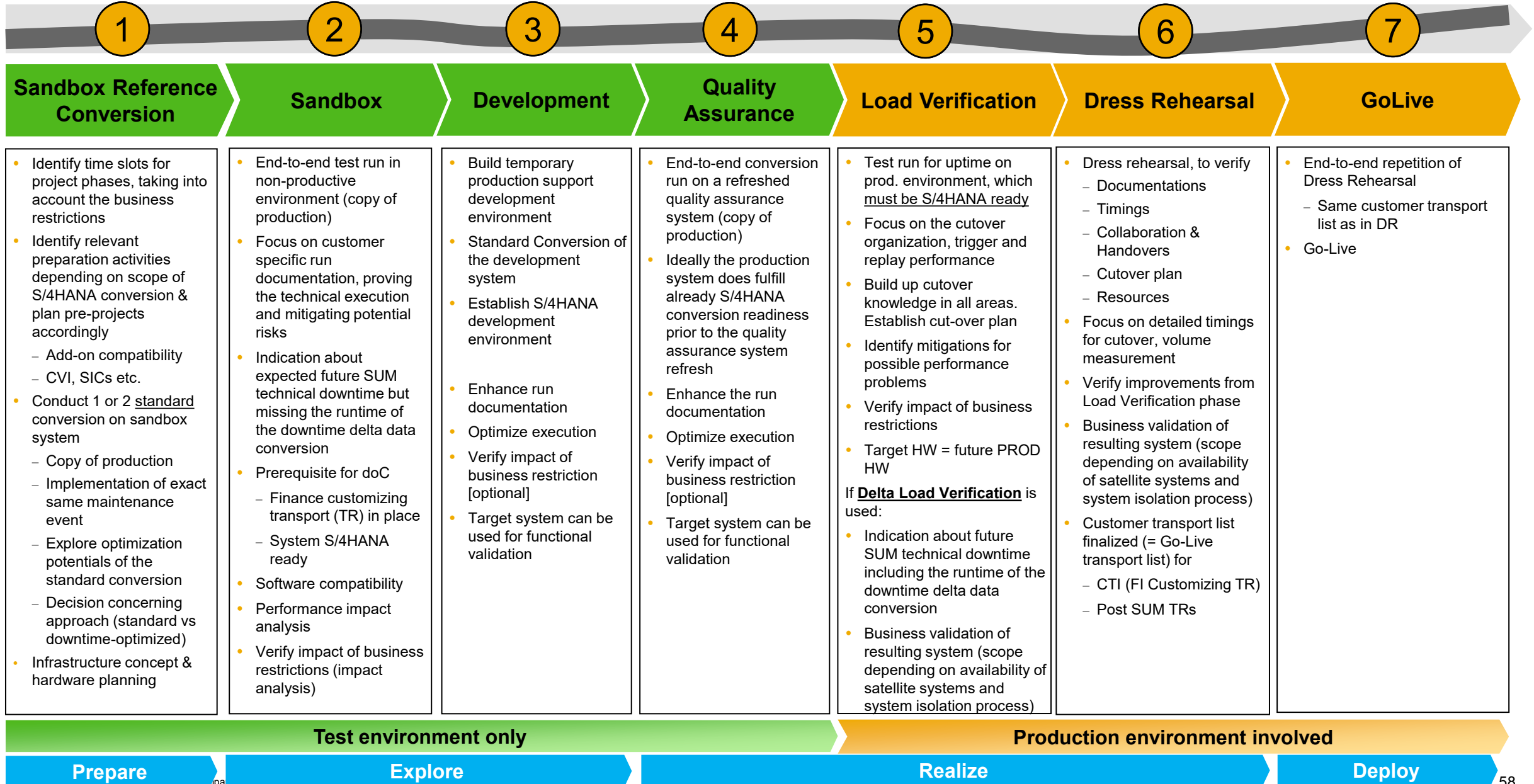
Application-Specific Restrictions

- Account-based CO-PA (account-based profitability analysis) must not be used in the source system.
- Source systems with MFLE / DIMP-LAMA active are not supported if long material number is used (>18 characters)

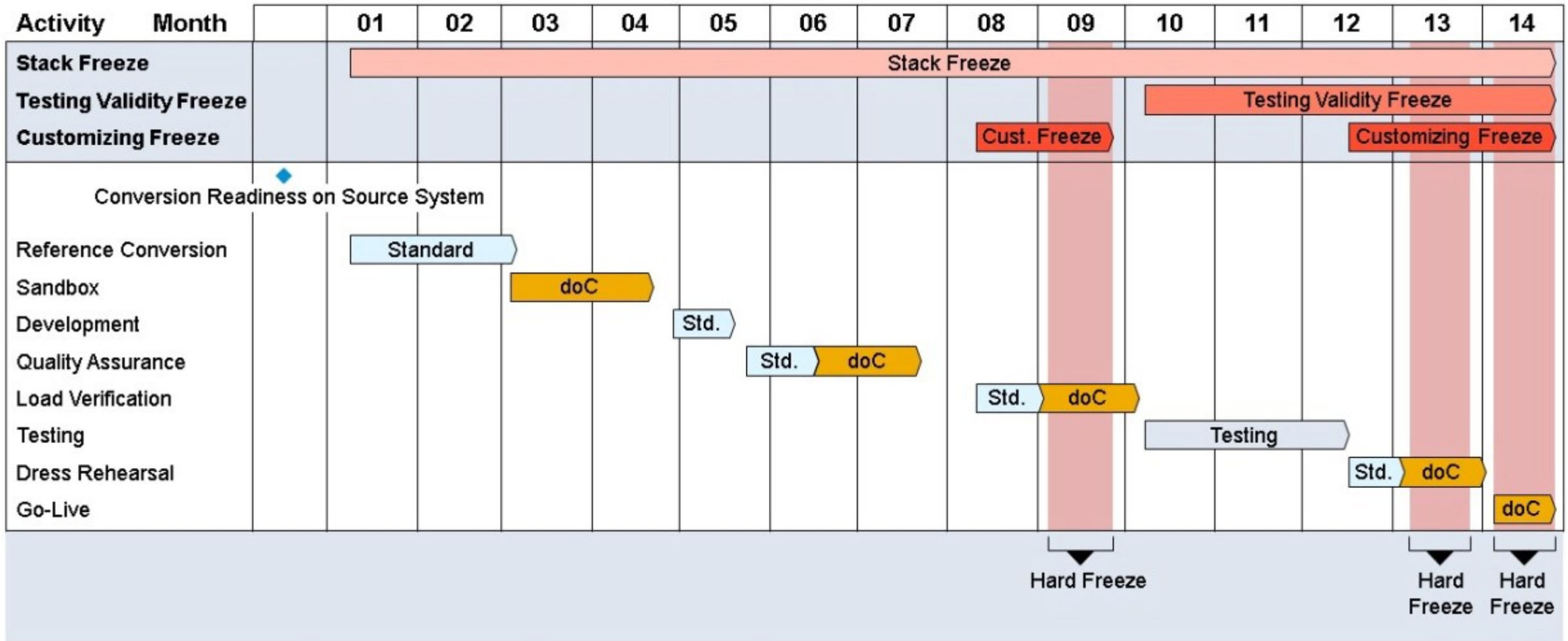
Project aspects for downtime-optimized Conversion

- The doC approach is used for PRD, but **not for all other systems** in the landscape (e.g. not for DEV)
- A standard conversion run **is required** prior to PRD run to set up FI customizing
- Triggers are set on specific tables (**tables affected by new data model**)
- Replication in uptime phase **creates load** on PRD system
- Mass changes/activities have **to be avoided** during replication (e.g. archiving to be avoided)
- Freeze triggers **prevent customizing changes**: tables become read-only
- Change rate during replication **has to be estimated**
- **Load-verification run**: potential approach to run test on PRD until downtime dialog to see freeze trigger impact and replication rate

Downtime-optimized Conversion – Project Cycles



S/4HANA Conversion Project – timeline of cycles



Finance Conversion

Overview

- The downtime-optimized conversion approach will execute the data conversion in uptime already.
- This includes executing the FIN data conversion as well, which is not handled by SUM in a standard conversion approach.
- A prerequisite for the FIN data conversion is the FIN customizing on the new data model of SAP S/4HANA.
- Therefore for the downtime-optimized conversion, you need to provide a transport request to SUM which includes the FIN customizing, taken from a previous standard conversion run

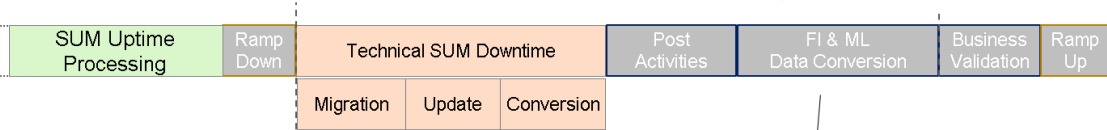
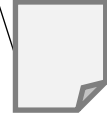
Project flow and Customizing Freeze

Downtime-optimized Conversion Approach

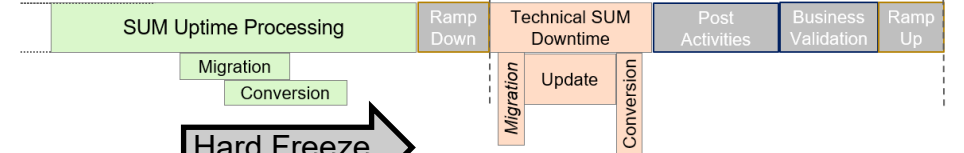
Create FIN Customizing

Put into customizing request

Provide customizing to SUM



Standard Conversion run on **SBX**



Downtime-optimized Conversion run on **PRD**

Hard Freeze

Soft Freeze (for customizing)

Soft and Hard freezing for doC

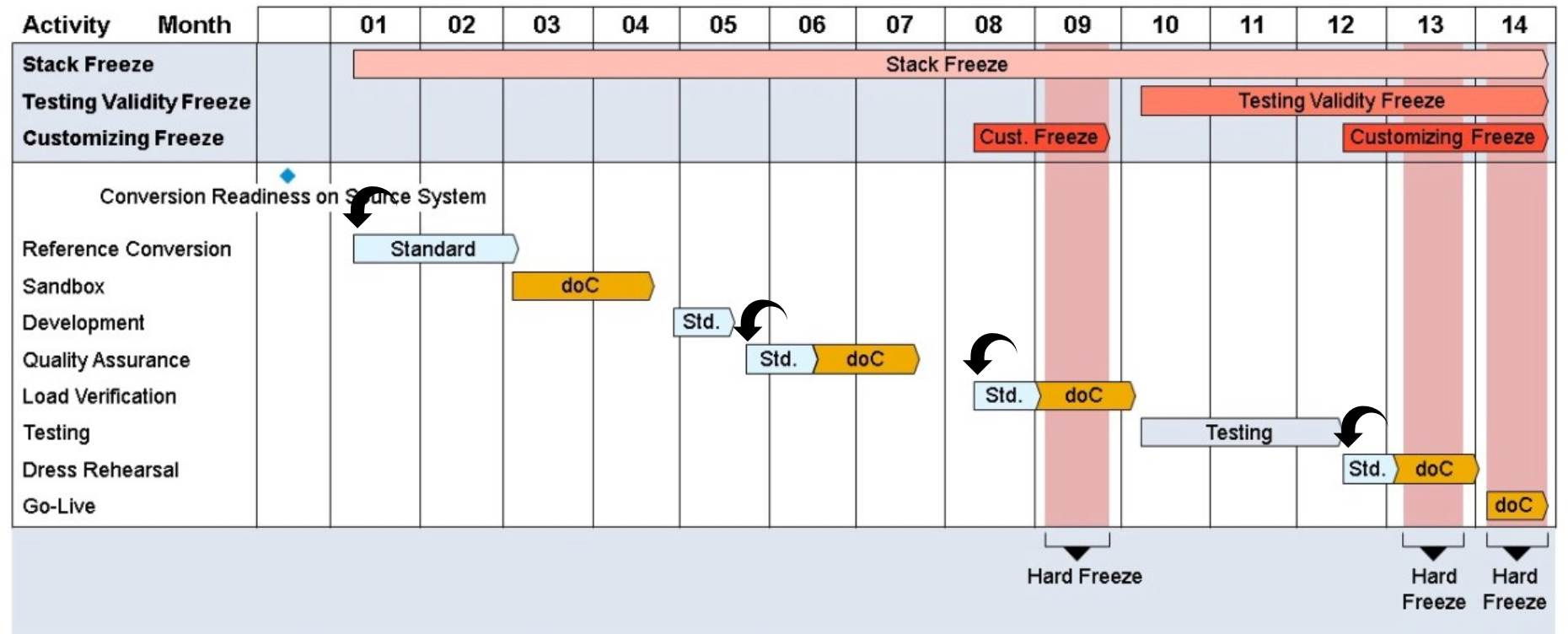
Reasons and implications

- Customizing Freeze (also called soft freeze) initiates a phase during which Customizing changes as well as many Finance and Controlling activities are no longer possible.
- In practical terms, it starts in every Standard Conversion cycle where (new) FIN customizing and data conversion is necessary, prior to the main doC cycle
- If changes are made *after* the Standard Cycle, they will potentially cause errors during the FIN Conversion in doC cycle. Depending on the severity of the issue, a new Standard Cycle should happen again
 - Note that transaction SPRO must not be used in the shadow/temporary system although it is not locked.
 - Instead, you may use the transaction UPG_SFIN_CUST on the shadow/temporary system to do additional changes that were made after the inclusion of the Customizing request.
 - There is only a very limited scope of Finance Customizing that can be changed during a downtime-optimized procedure run.
 - After SUM is finished, transaction SPRO is allowed to be used again
- Such freezing periods impact the project planning and need to be carefully evaluated against the customer's period end activities, parallel projects and business case
- From a technical standpoint, the soft freeze is applicable only for doC , not for Standard Conversion. However the whole cycles period (std+doc) the freeze should be in place.

Soft and Hard freezing for doC

Reasons and implications

- The *technical* Hard Freeze starts during the uptime execution for the Software Update Manager,
- During the Asset Accounting lock, the Software Update Manager locks the following transactions in the source system:
 - SARA
 - KA12
 - KA16
 - AS91
 - AJRW
 - AJAB



Soft and Hard freezing for doC

Summary

Customizing Freeze

- Starts with copy of PRD to prepare final FIN customizing.
- No change of FIN customizing in PRD or in SHD/TMP (exception exists).
 - Example: company code addresses may still be created and changed, but a deletion will cause inconsistencies in customizing.

Hard Freeze

- Starting during uptime execution of Software Update Manager.
- After workbench lock: No more transports & development possible.
- After trigger activation: restriction listed in downtime-optimized conversion guide apply, see section “Downtime and Business Restrictions”.
- Recommendation: execute period end closing *before* the hard-freeze.

Hard Freeze Application Restrictions

- Listed in the Guide of downtime-optimized conversion.
- Specific transactions are locked, for example SARA.
- Archiving in general to be avoided.
- ML: do not change Material Ledger costing runs.
- MM-IM: do not execute MM-IM inconsistency check reports.
- No change of exchange rates for date of conversion when triggers are active.

Soft and Hard freezing for doC

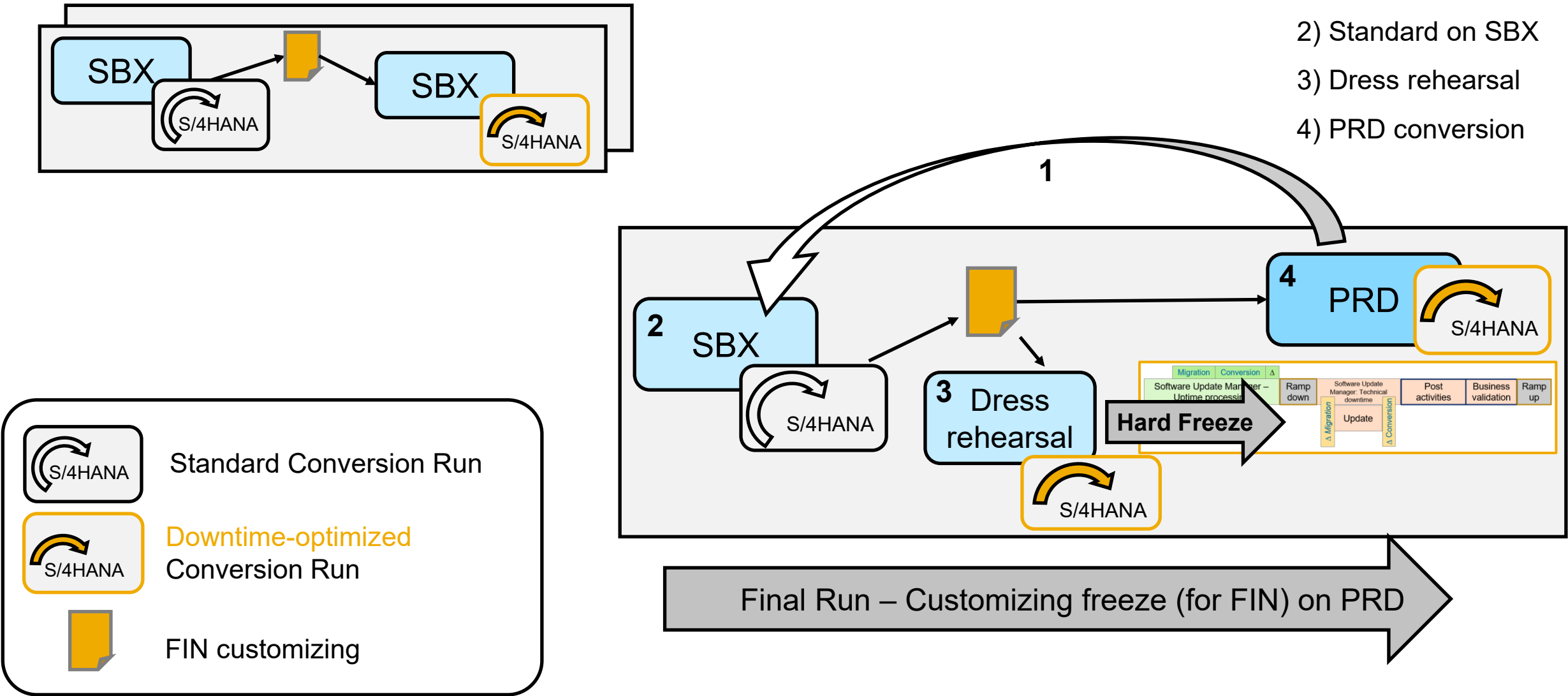
“Other” freezes

Other freezes typical of a doC project

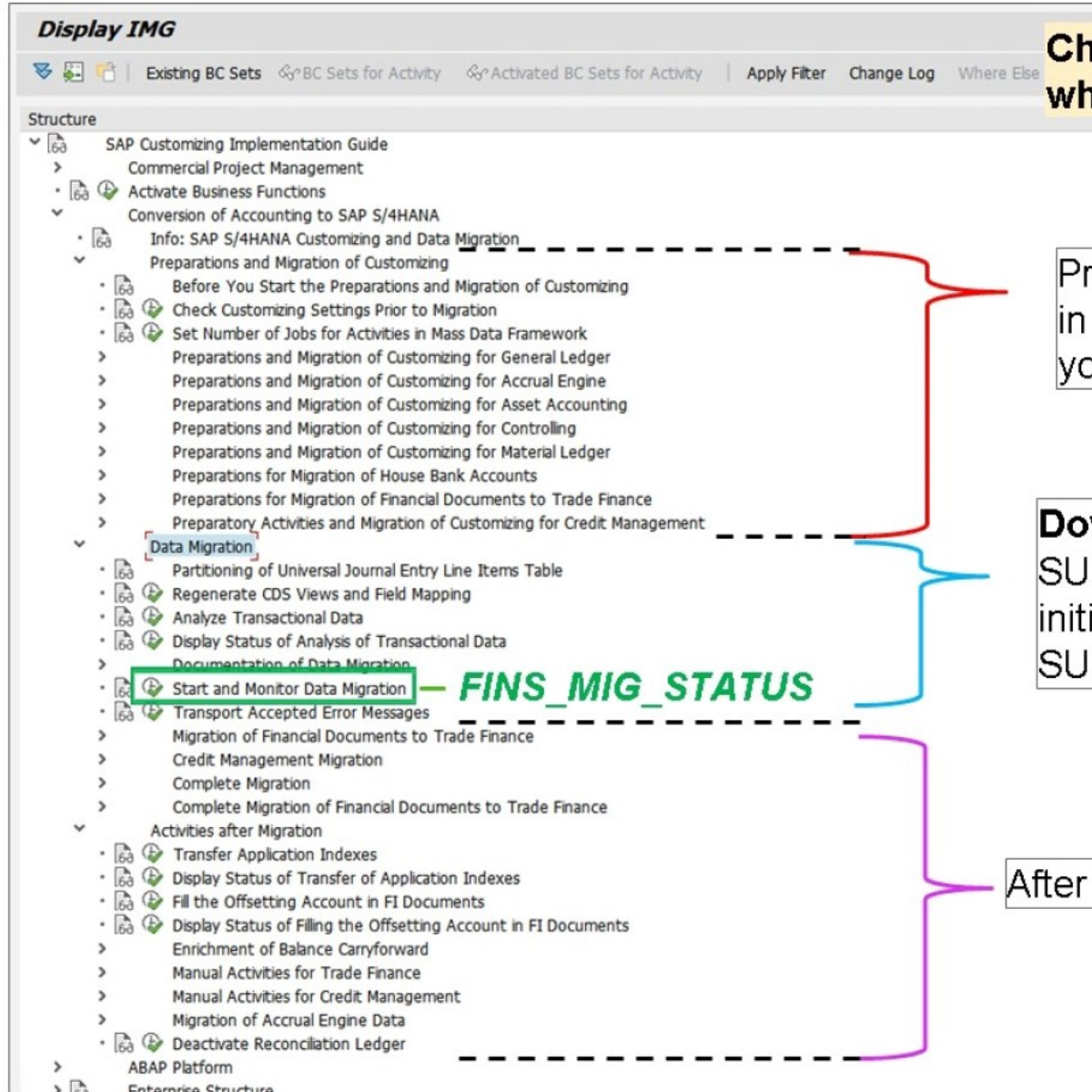
- Stack XML
- SUM tool version (patch level can be updated)
- HANA DB SPS (revision can be updated, but with restrictions)
- SI Check notes #2399707 and #2502552 versions
- OS version and SP
- Add-Ons (both standard and 3rd party)

Customer buffer system dependencies details

- 1) Fresh copy of PRD
- 2) Standard on SBX
- 3) Dress rehearsal
- 4) PRD conversion



Finance Conversion – transaction SPRO



Check **FIN_S4HANA_CONVERSION** guide which is attached to **SAP Note 2332030**

Prior to downtime-optimized run, in a standard conversion run, you have to setup FIN customizing

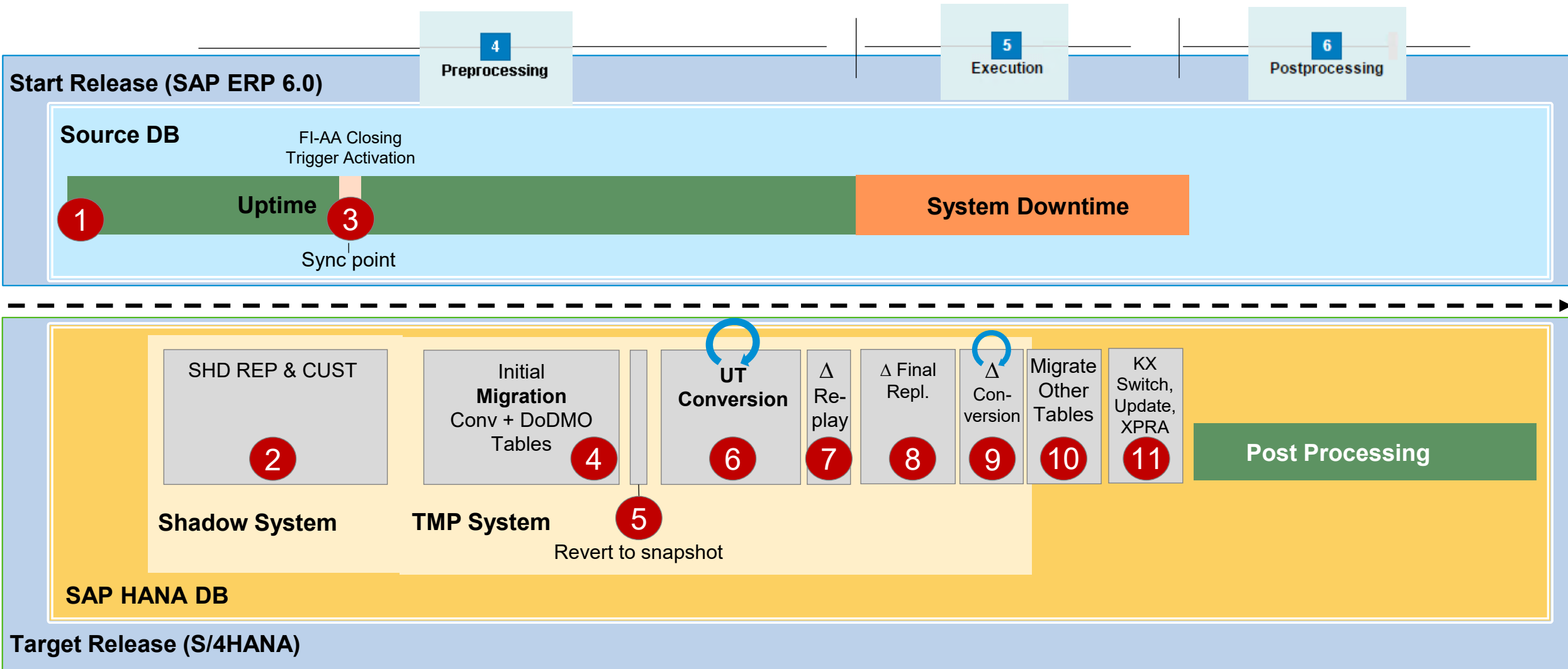
Downtime-optimized conversion:

SUM executes in uptime: preparation and initial data conversion for FIN, MM-IM, Material Ledger
SUM executes in downtime: delta data conversion

After SUM, post activities have to be executed manually

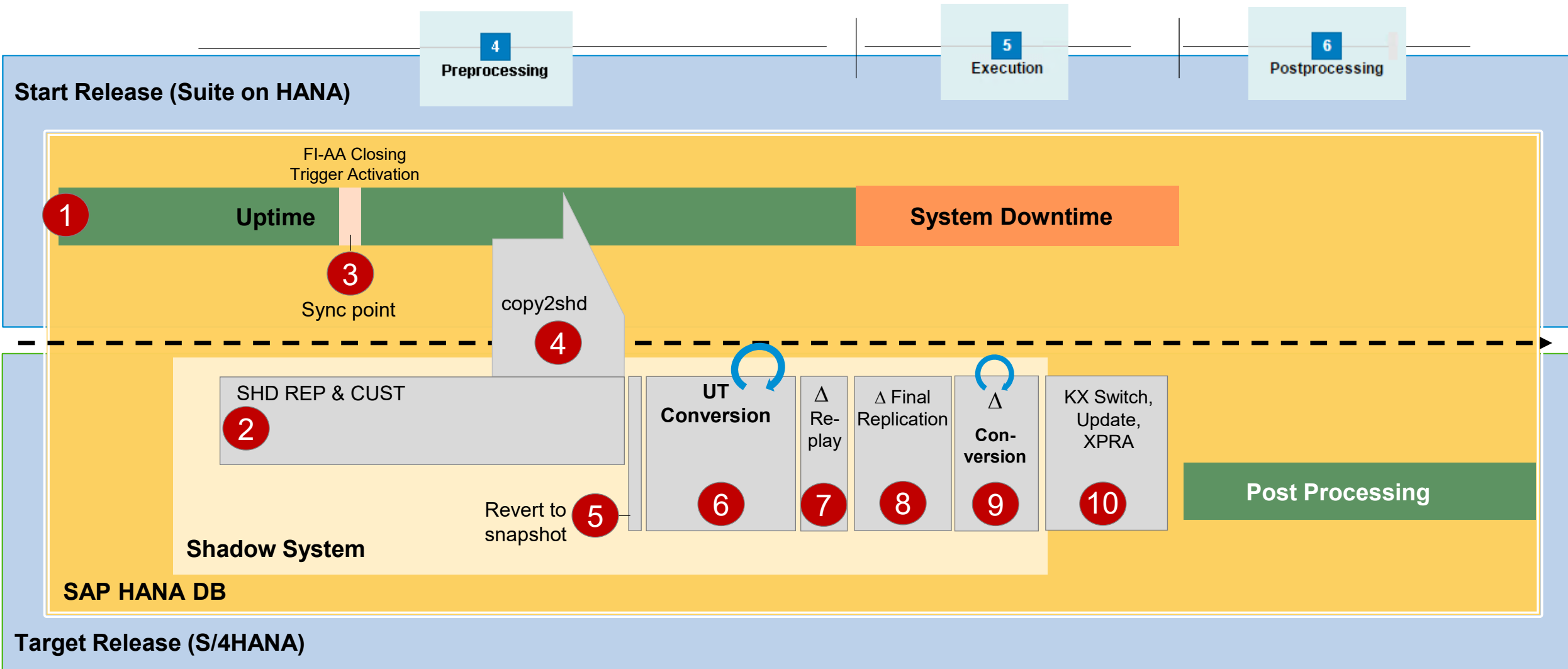
downtime-optimized Conversion

Main Blocks: Source on **non-HANA** Database



downtime-optimized Conversion

Main Blocks: Source on SAP HANA Database

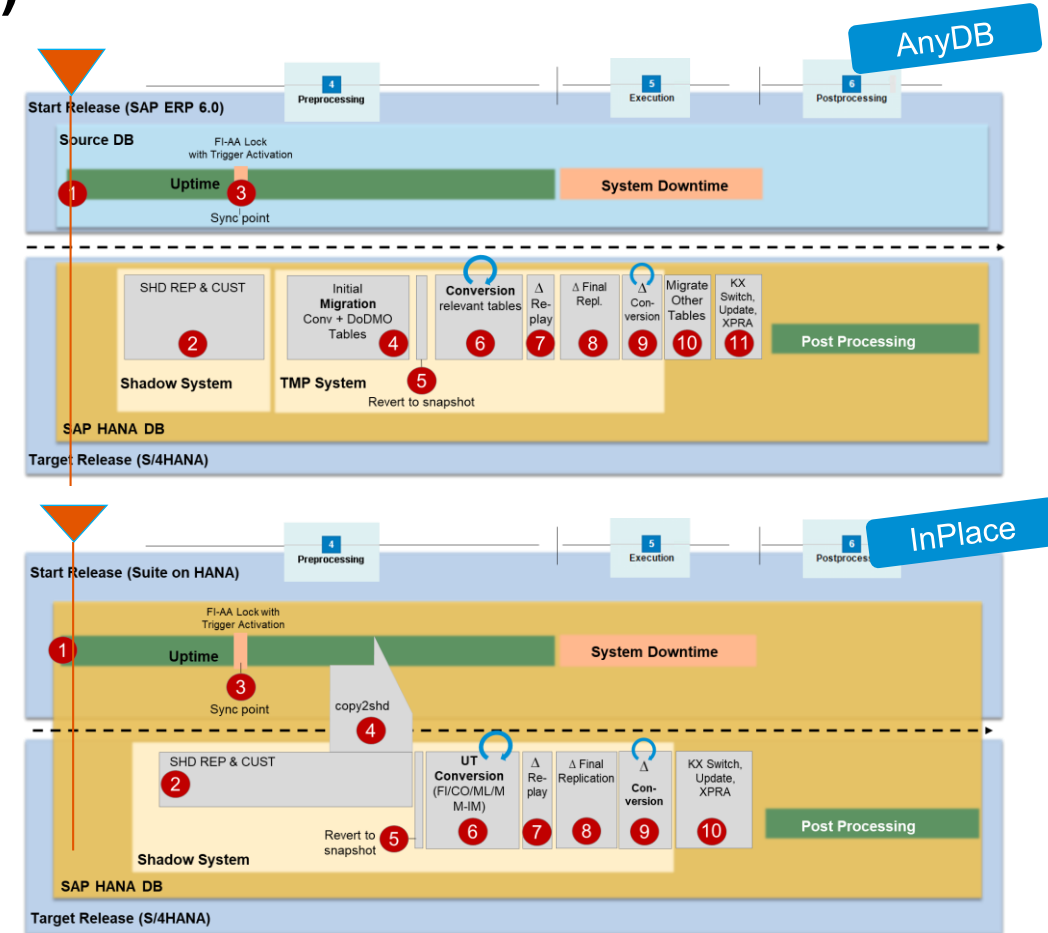


You start the Software Update Manager (SUM)

Step 1

- All preparations are done:
 - CVI is complete
 - SI_CHECK has been assessed and reported errors are done
 - Needed SAP notes are installed (if any).
 - Needed SPACE is allocated.
 - SUM parameters are set.
 - CTI buffer* is prepared with min SPDD and FI/CO/ML customizing
 - Impact analysis output is extracted from prod and copied in <DIR_SUM>/abap/save location
 - TADIR entries are verified
- SUM is started and Steps Extraction/Configuration/Checks are followed pretty similar standard scenario.

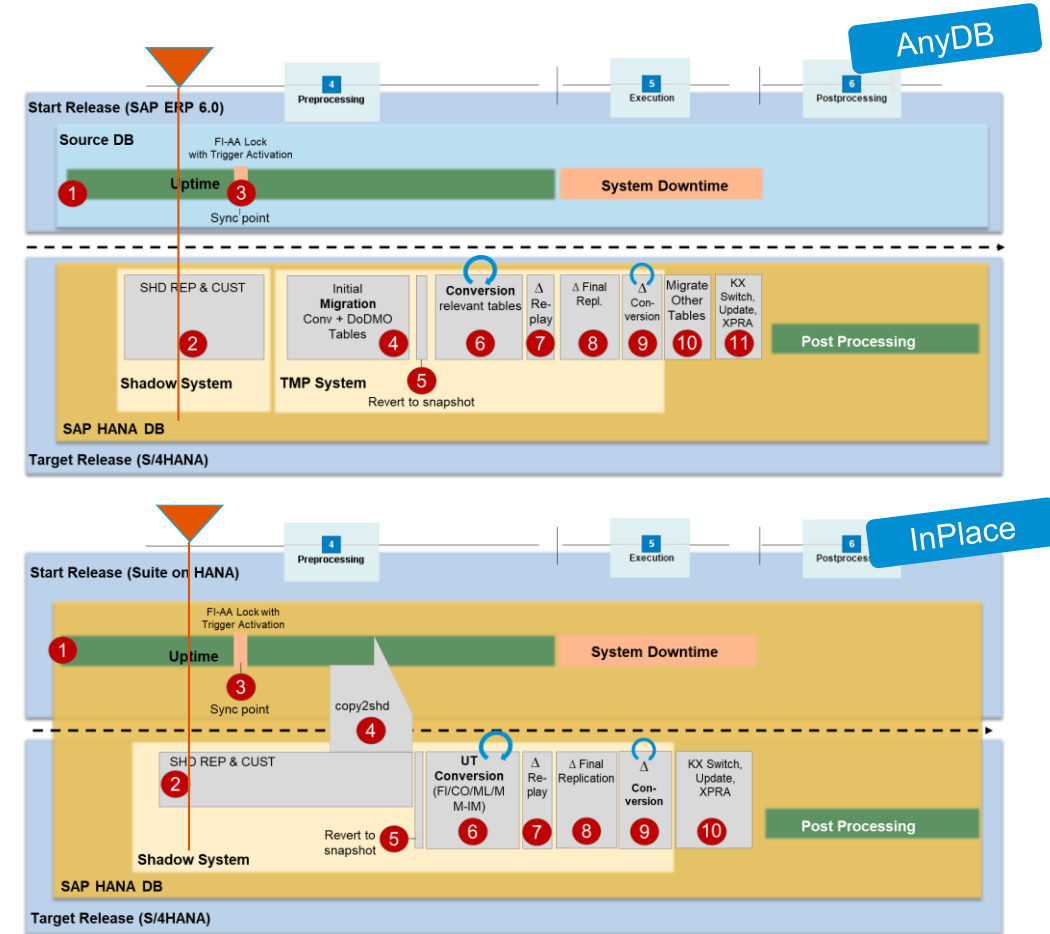
* CTI Customer transport buffer. Details in SAP Note 1759080 - Conditions for SUM including customer transport requests



Shadow Repository is created

Step 2

- **Lock workbench** is issued and shadow repository is created.
- As in every upgrade scenario, this is a critical milestone when touching prod line. Alignment with project members is needed and approvals are taken because of no-more-changes/corrections possible in workbench or customizing area.
- Shadow repository is being created and, classical SPDD/ACTUPG steps will be reached soon.
- Specific for S/4HANA conversion roadmap, beside classical SPDD work, additional actions might be needed in area of customer appends (for ex. Situation described in SAP Note [2206980](#) - *Material Inventory Management: change of data model in S/4HANA*).
- *Note: As of 1909, in Source AnyDB scenario, shadow repository is being created directly on HANA target DB*

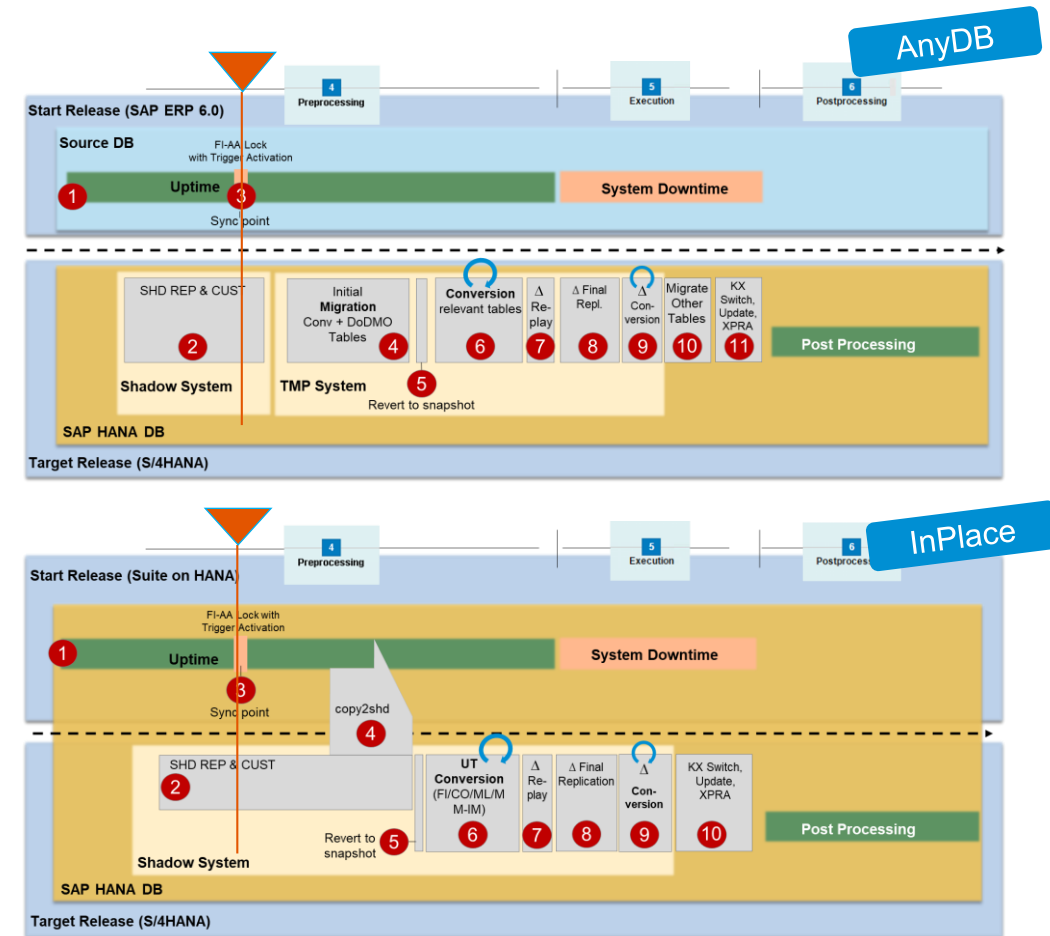


Sync Point (1)

Step 3

- A **sync point** is required for
 - Doing manual **FI-AA closing** steps including a short term lock for FI-AA postings
 - Activation of **DB triggers** (freeze and replication) to ensure the consistency of data and to keep track of changes during uptime steps.
 - Lock of some business transactions during further SUM uptime execution
- The objective of these synchronized activities is to achieve consistent data set for Uptime data conversion (step 6)
- **Business Restrictions** are becoming effective once this step completes.

Note: Further information about restrictions can be found in the recent notes on downtime-optimized Conversion that are referenced on the [downtime-optimized Conversion SAP Support Portal Page](#) in section “Relevant Sources of Information”.



Downtime-Optimized Conversion: specifics

Short term lock of Asset Accounting

- In addition, a short-term lock of Asset Accounting, leading tables are locked by database freeze trigger to prevent new postings.
- During this lock, manual activities are required on Asset Accounting. The required activities require a consistent state of the FIN Tables and they are described in the guide for downtime-optimized conversion, and on respective SUM dialogs as well.

SAP XAG Software Update Manager 2.0 SP15 (PL2) 69.8 GB FREE Tasklist Logs

S/4HANA Conversion (Downtime-optimized Conversion)

Extraction >>> Configuration >>> Checks >>> **Preprocessing** >>> Execution >>> Postprocessing

35% - Process is in a dialog

Current Phase: MAIN_SHDRUN/SUBMOD_SMIG_APPL_FREEZE/REQ_SMIG_APPL_LOCK
Started at: 2023-03-16 13:14:51

Short-term Lock of Asset Accounting for a Consistent Downtime-Optimized Conversion

To obtain a transactional consistent state of Asset Accounting before cloning the tables new postings in Asset Accounting need to be temporarily locked. By freezing the leading Asset Account system, we make sure that no further postings can be generated in the system (except those postings necessary for a period-end closing). The Asset Accounting lock will be released in phase REQ_SMIG_APPL_UNLOCK.

When you choose "Next", the leading Asset Accounting tables are locked for new postings.

Leading tables of Asset Accounting have been locked for further postings and you can continue with the following manual activities:

- Execute the periodic APC postings by using program RAPERB2000 or transaction ASKB completely. A current time stamp must be set. Check for update term have found. You perform this activity if you are using classic Asset Accounting, new Asset Accounting, or the SAP Simple Finance add-on 1.0.
- Run the program for recalculating the plan values for depreciation using transaction AFAR.

These steps are documented in the respective SAP Note for Downtime-Optimized Conversion.

Afterwards choose "Next" to continue the S/4HANA conversion.

Downtime-Optimized Conversion: specifics

Understanding TCR + Short term lock of Asset Accounting

- During this lock, manual activities are required on Asset Accounting. The required activities are described in the guide for downtime-optimized conversion, and on respective SUM dialogs as well.
- E.g Perform closing for period and Calculate the plan values for depreciation using transaction AFA

SAP XAG Software Update Manager 2.0 SP15 (PL2)
S/4HANA Conversion (Downtime-optimized Conversion)

- MAIN_SHDRUN/SUBMOD_SMIG_APPL_FREEZE/REQ_SMIG_APPL_LOCK → Begin of lock
- MAIN_SHDRUN/SUBMOD_SMIG_APPL_UNFREEZE/REQ_SMIG_APPL_UNLOCK → End of lock



Current Phase: MAIN_SHDRUN/SUBMOD_SMIG_APPL_FREEZE/REQ_SMIG_APPL_LOCK
Started at: 2023-03-16 13:14:51

Short-term Lock of Asset Accounting

To obtain a transactional consistent state in the system, we make sure that no further postings are possible during the lock. This is achieved by the program RAPERB2000 or transaction ASKB.

When you choose "Next", the leading Asset Accounting tables are locked for further postings and you can continue with the following manual activities:



35% - Process is in a dialog

Current Phase: MAIN_SHDRUN/SUBMOD_SMIG_APPL_FREEZE/REQ_SMIG_APPL_REPORTS
Started at: 2023-03-16 13:18:37

Perform Closing for Periodic Asset Postings in Asset Accounting ?

Leading tables of Asset Accounting have been locked for further postings and you can continue with the following manual activities:

- Execute the periodic APC postings by using program RAPERB2000 or transaction ASKB completely. A current time stamp must be set. Check for update term have found. You perform this activity if you are using classic Asset Accounting, new Asset Accounting, or the SAP Simple Finance add-on 1.0.
- Run the program for recalculating the plan values for depreciation using transaction AFAR.

These steps are documented in the respective SAP Note for Downtime-Optimized Conversion.

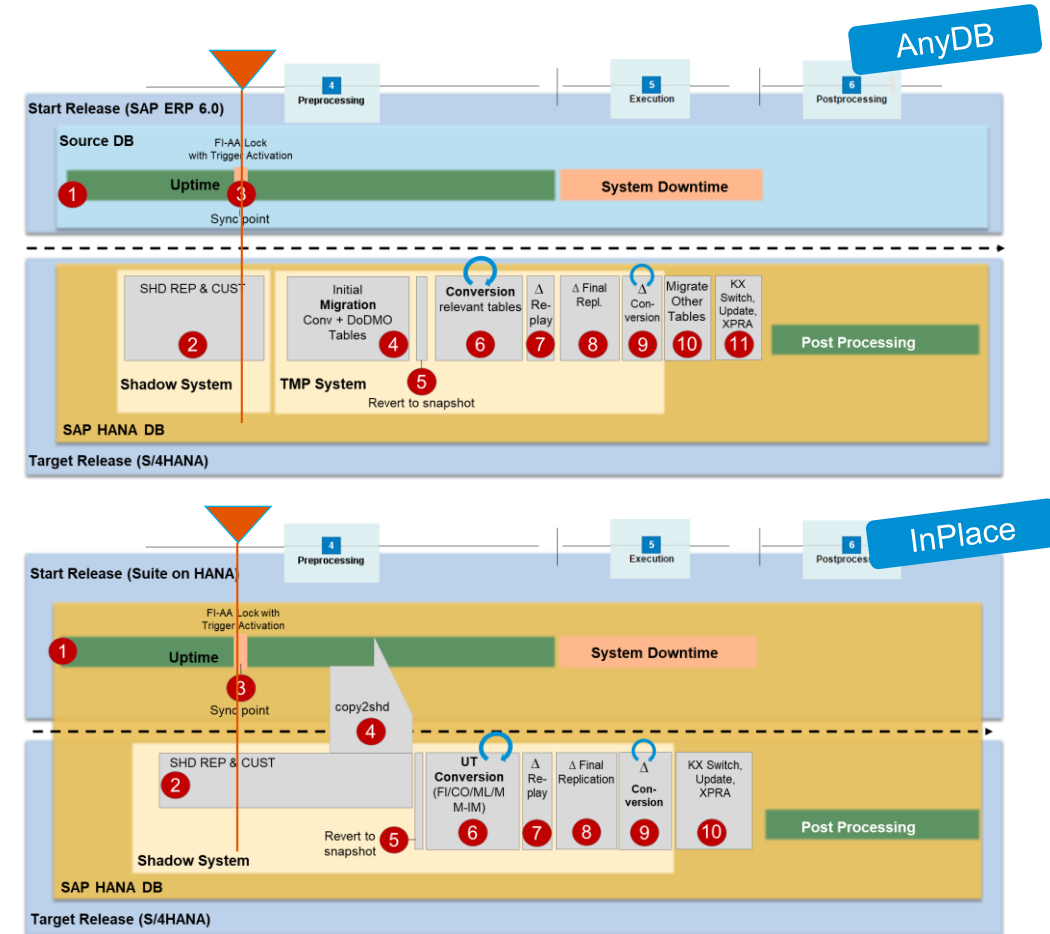
Afterwards choose "Next" to continue the S/4HANA conversion.

Sync Point (2) – Trigger Types

Step 3

2 types of triggers are used to assure data integrity and consistency:

- **Replication triggers** are used to record and replay data:
 - Replication mode:
 - Saves the primary key of every changed data record in a log table (/1CRR/LT*)
 - Recorded changes are replayed asynchronously to the target system starting with phase PROCESS_REPLICATE_RRC
 - Reverse to Snapshot Clone mode (RSC):
 - Saves complete before image of every changed data record in a separate snapshot table (/1CRR/RSC*), which is used at a later point during Revert to Snapshot to roll back to a transactional consistent state on the target system.
- **Freeze triggers** are used to prevent changes:
 - tables become read-only
 - Customizing may not be changed, as it could invalidate conversion results.
 - Used for hard freeze restrictions.

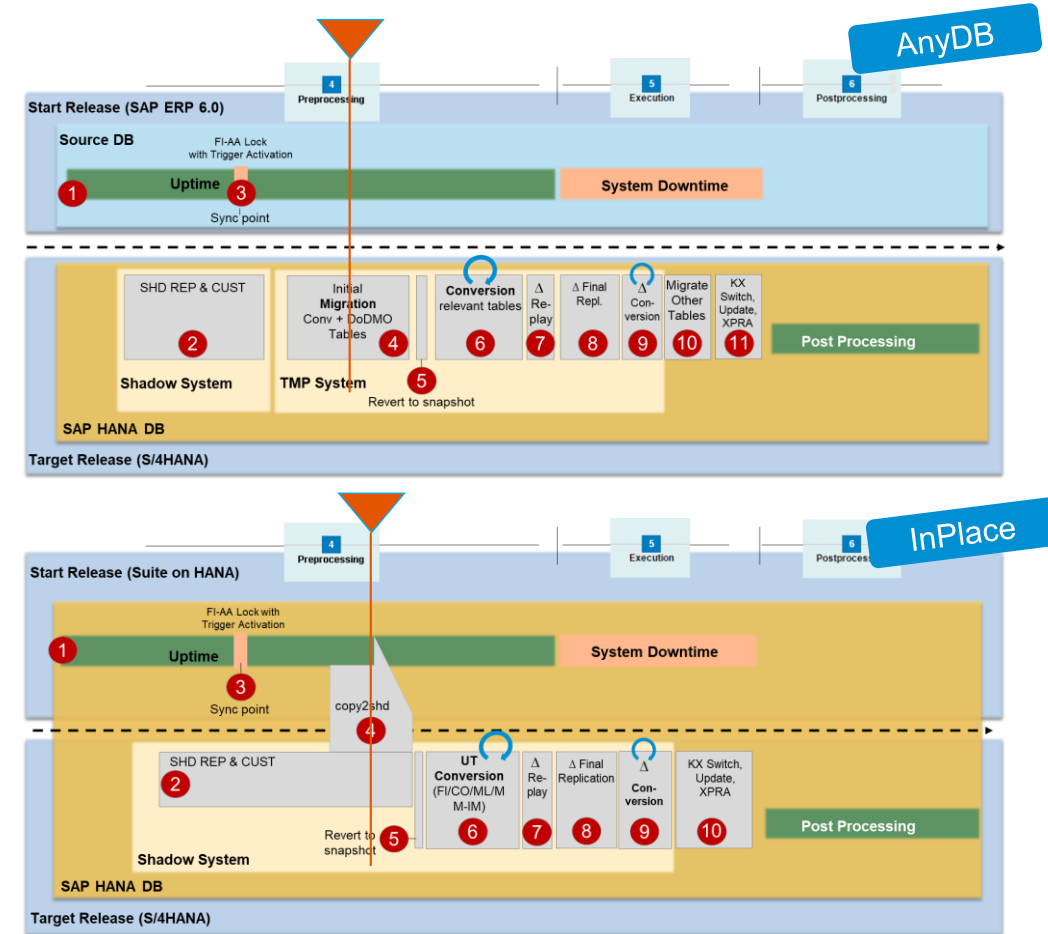


Initial Transfer of relevant tables

Step 4

- Tables needed for the uptime conversion – Finance (FI/AA/CO/ML) and MM-IM, are being migrated/copied to the HANA DB.
- The group of tables needed by Uptime conversion steps is predefined in SUM metadata.
- In “AnyDB scenario”, additionally to the standard table group needed for uptime conversion, other tables can be migrated in uptime following the downtime-optimized DMO of SUM features. Using this option, runtime of downtime table migration step is reduced.
- In “InPlace scenario”, nZDM features are facilitating the table transfer to shadow instance.

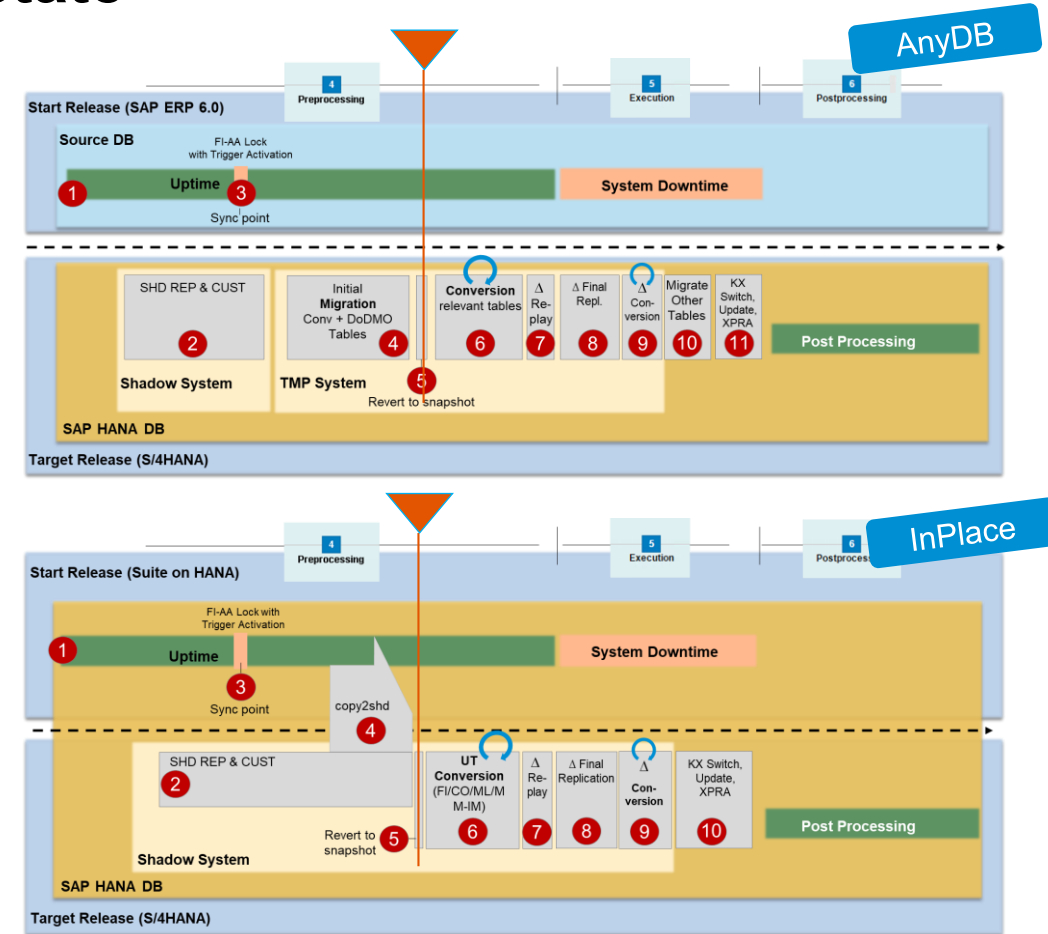
Note: For more information about adding additional tables check annex section “*Include additional tables in uptime (AnyDB scenario)*”



Revert to Sync Point: Set data to consistent state

Step 5

- In this step, data is logically reverted to the moment of the sync point state (when the short downtime was performed).
- The process is applying in “reverse mode” the changes gathered by RSC-triggers in RSC logging tables (/1CRR/RSC*). These were enabled in that moment (sync-point, mini-downtime).
- Transactional Consistent Replication (TCR)

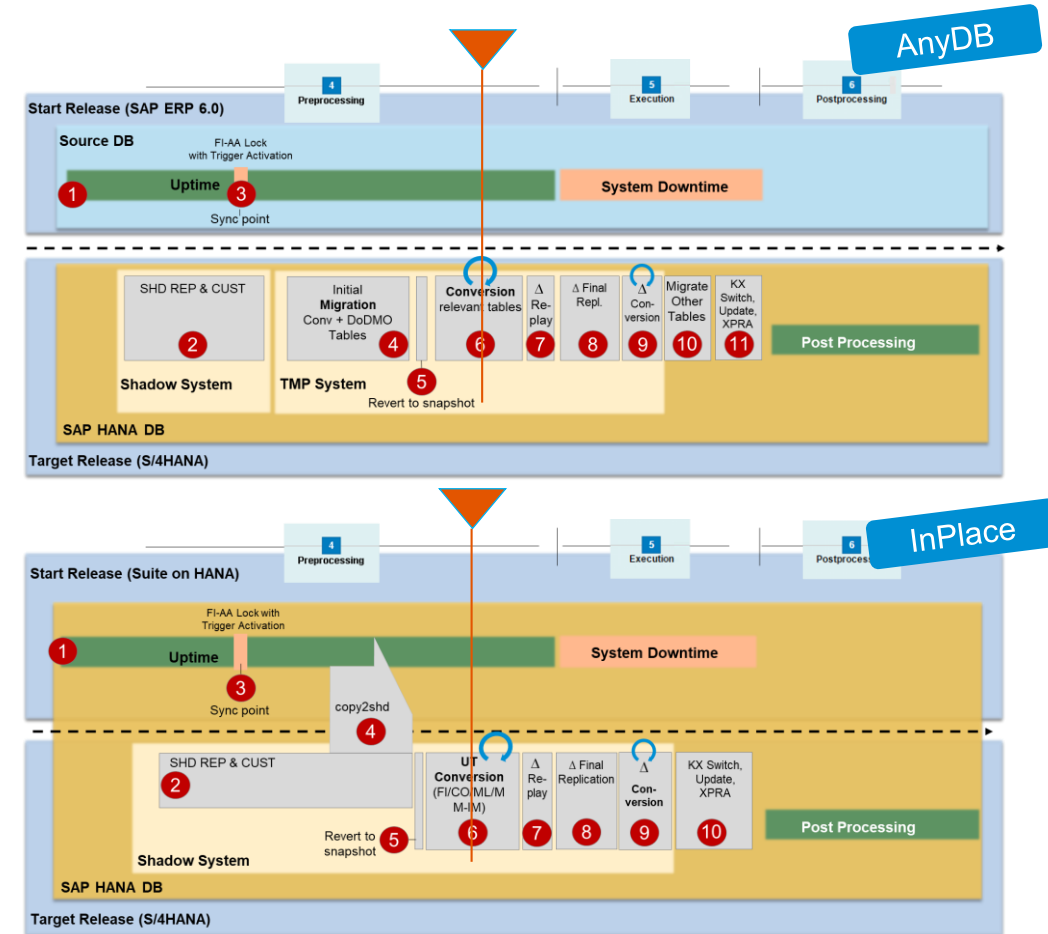


* RSC = Revert to Snapshot Clone

Conversion of transferred relevant tables

Step 6

- Based on the configuration captured in standard conversion and provided in SUM using CTI feature, the actual FI conversion is executed in this step.
- Once FI/AA/CO/ML conversion is completed, MM-IM conversion is executed automatically by SUM.
- Uptime field conversion is executed.



Replay of Delta data for relevant Tables

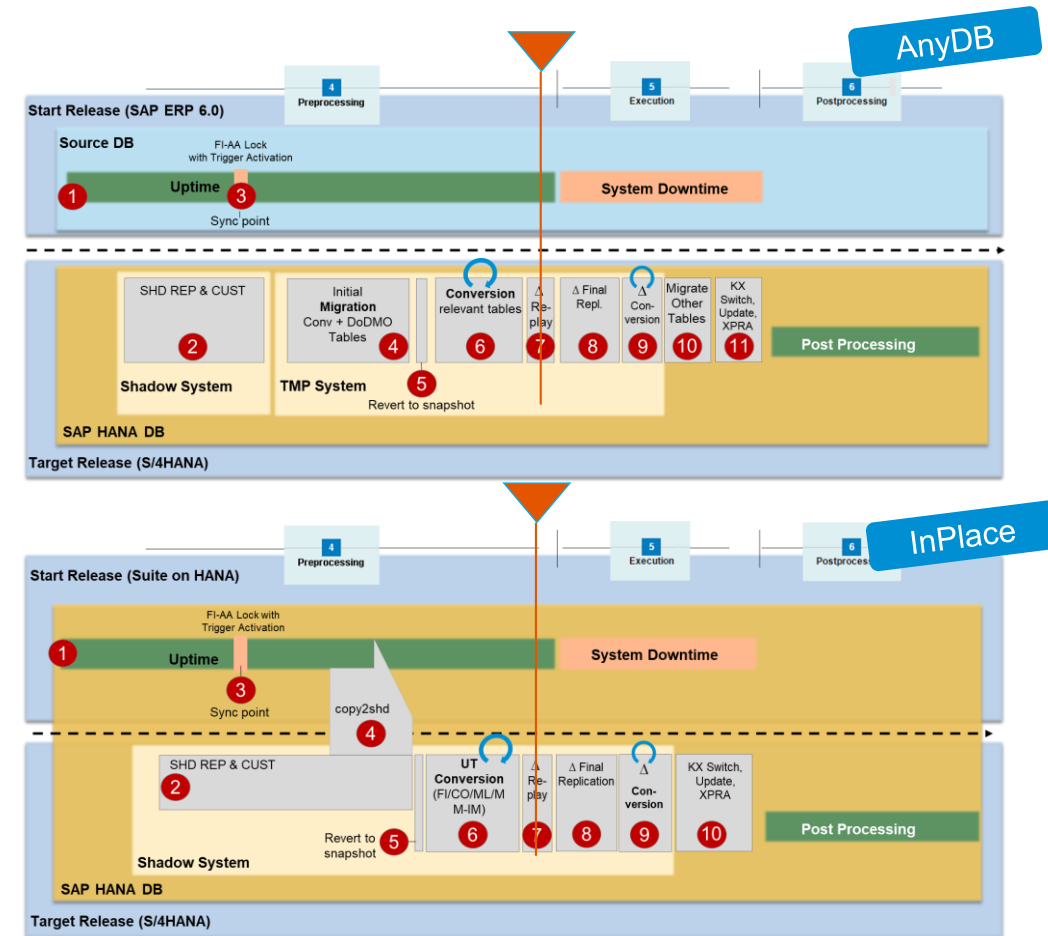
Step 7

- Data recorded in logging tables (/1CRR/LT) from the sync point moment is being transferred to the target tables on HANA Database.
- RRC component is the one taking care of this step using the CRR parallelization framework.
- This process can be monitored, controlled and configured in SUM UI -> *Utilities / Process control center / CRR Control center*. Also monitoring can be performed in SAP GUI / Shadow instance using transaction CRR_CONTROL (read only).
- Before starting the downtime, the replication process must be started and the replication rate of recorded changes must reach at least 75 percent.

Replay of Delta data is detailed in a section of this document

RRC* - (Record and Replay Component)

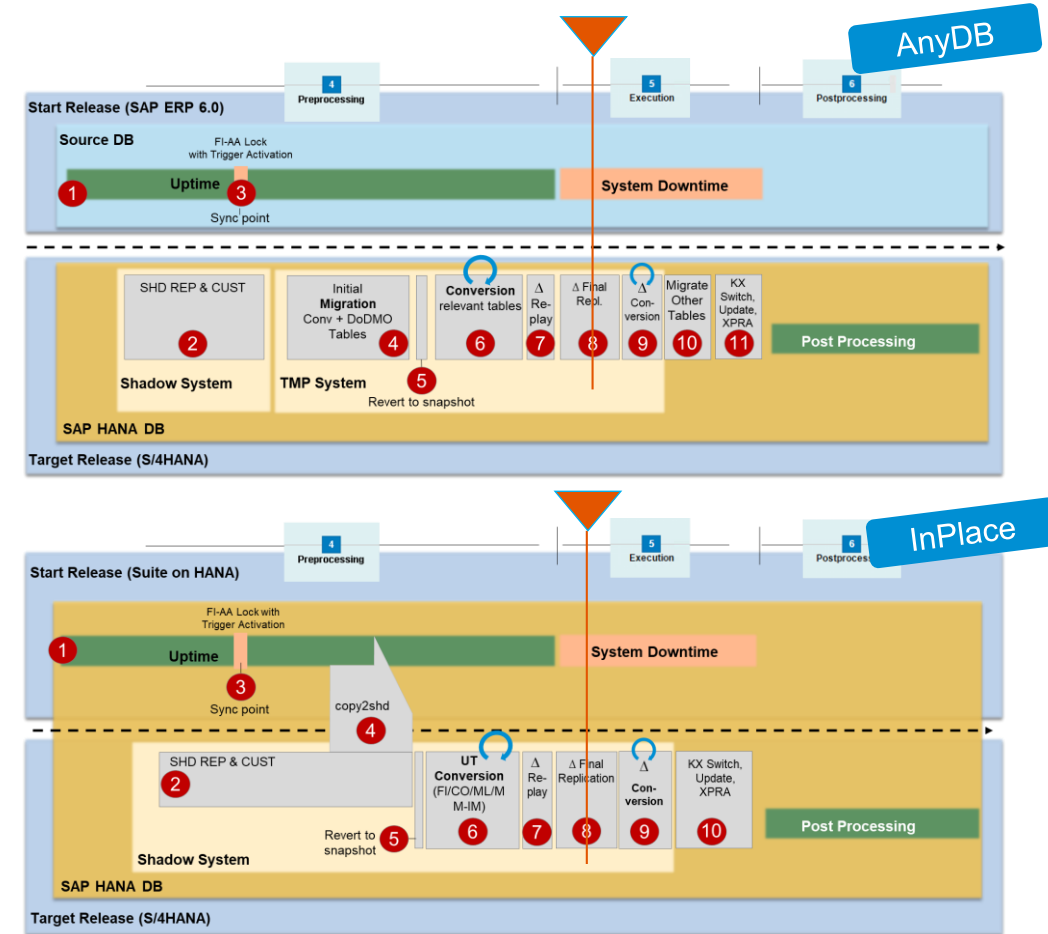
CRR** – change/record/replay parallelization framework



Remaining Delta Transfer (Final data replay)

Step 8

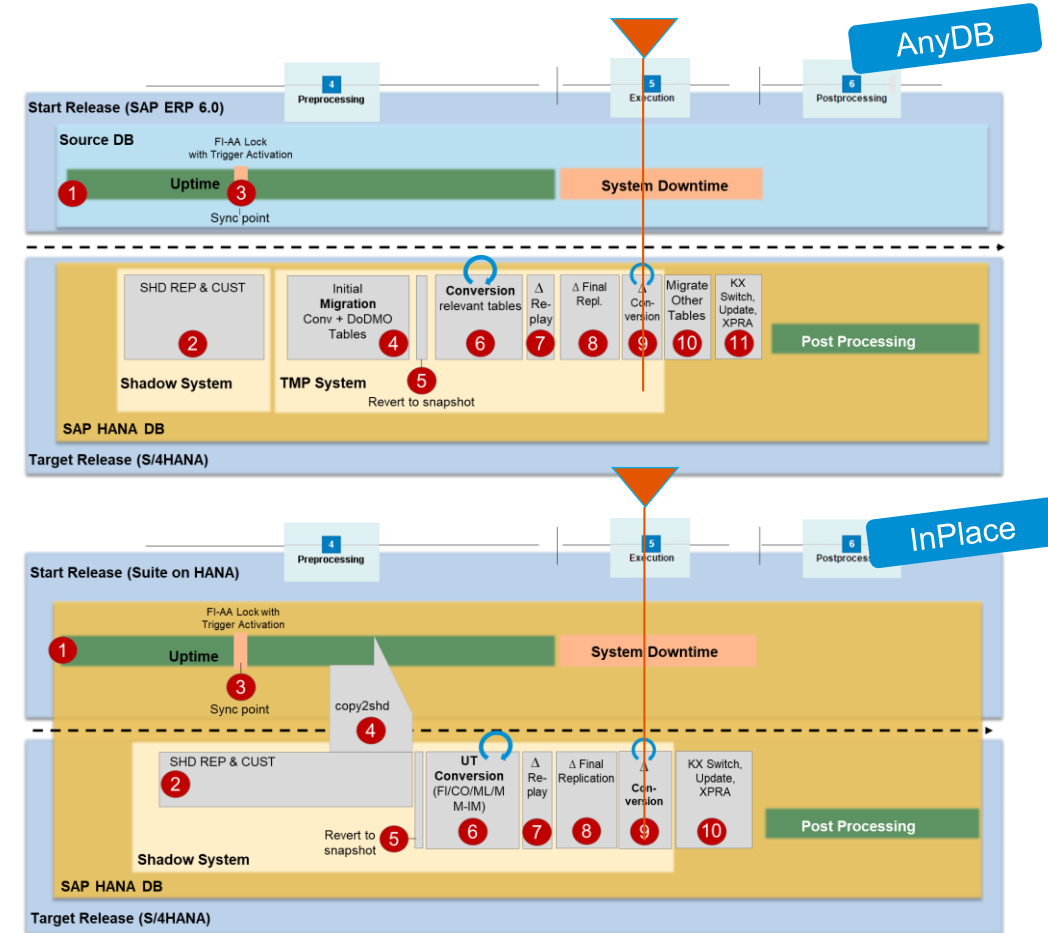
- System “Ramp down” has been performed and System is stopped at this stage.
- Remaining data recorded in logging tables (/1CRR/LT*) is being transferred in parallel to the target tables on HANA Database.



Delta Conversion of relevant Tables

Step 9

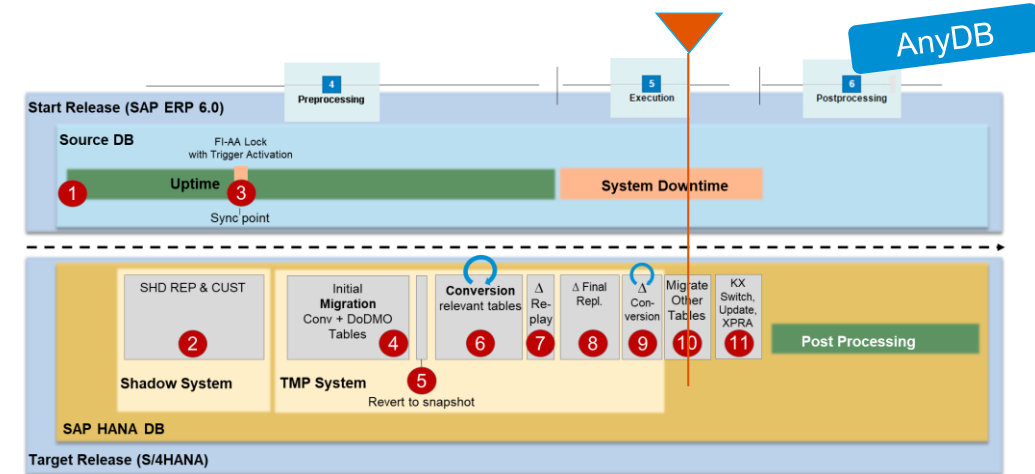
- Similar conversion steps as in uptime conversion (Finance and MM-IM) are executed in "Delta" mode using the subset of data gathered during uptime between sync-point until start of SUM downtime and transferred by CRR.



Migration of remaining application tables

Step 10

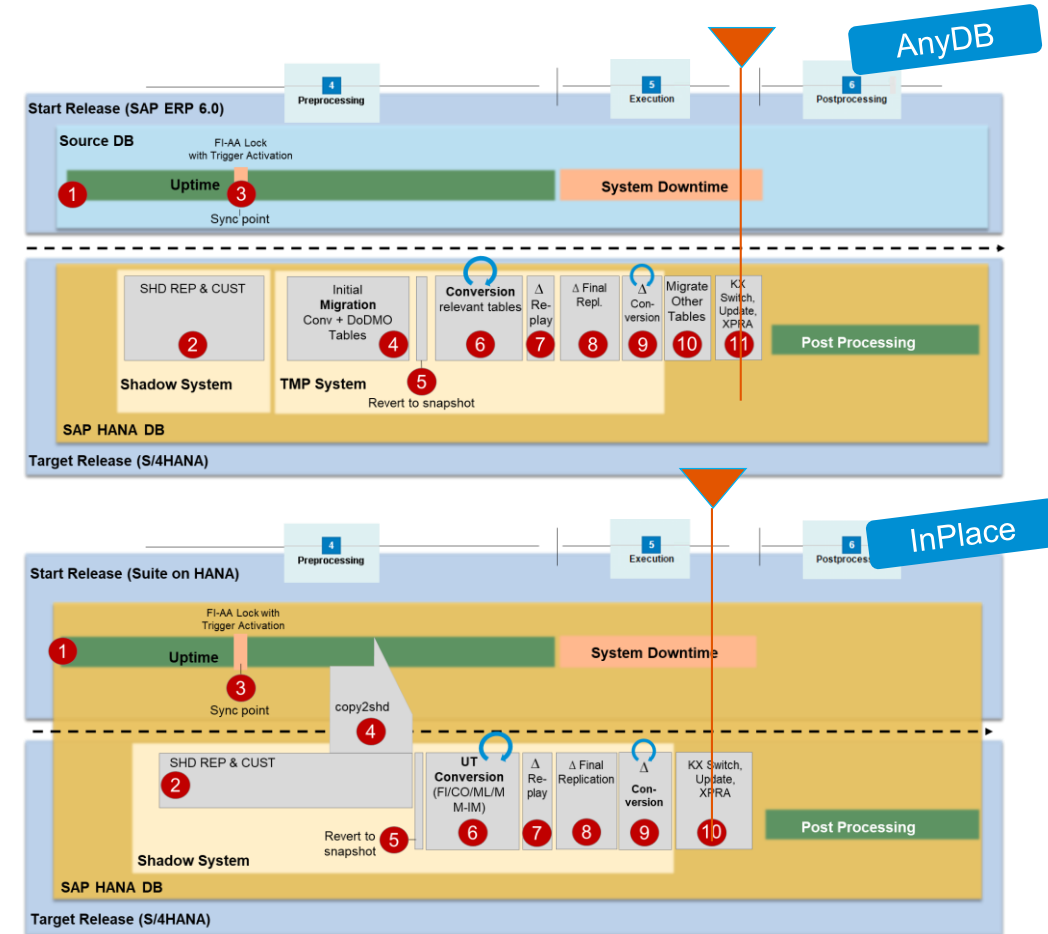
- Remaining tables being migrated to HANA DB.
- Not applicable for “InPlace scenario”



Update of application tables to new release

Step 11

- Upgrade common steps are executed until finishing of downtime (Ex. KX_SWITCH-kernel switch, TABIM_UPG table imports, XPRAS_AIMMRG, RSTLANUPG, etc)
- Specific to target version of the S/4HANA product, in SUM downtime, there are conversion reports executed which make use of the parallelization framework (PFW) these steps can be configured to run with different parallel steps. Details about steps and configuration can be found in SAP Note [2351294](#) - S/4HANA System Conversion / Upgrade: Measures to reduce technical downtime

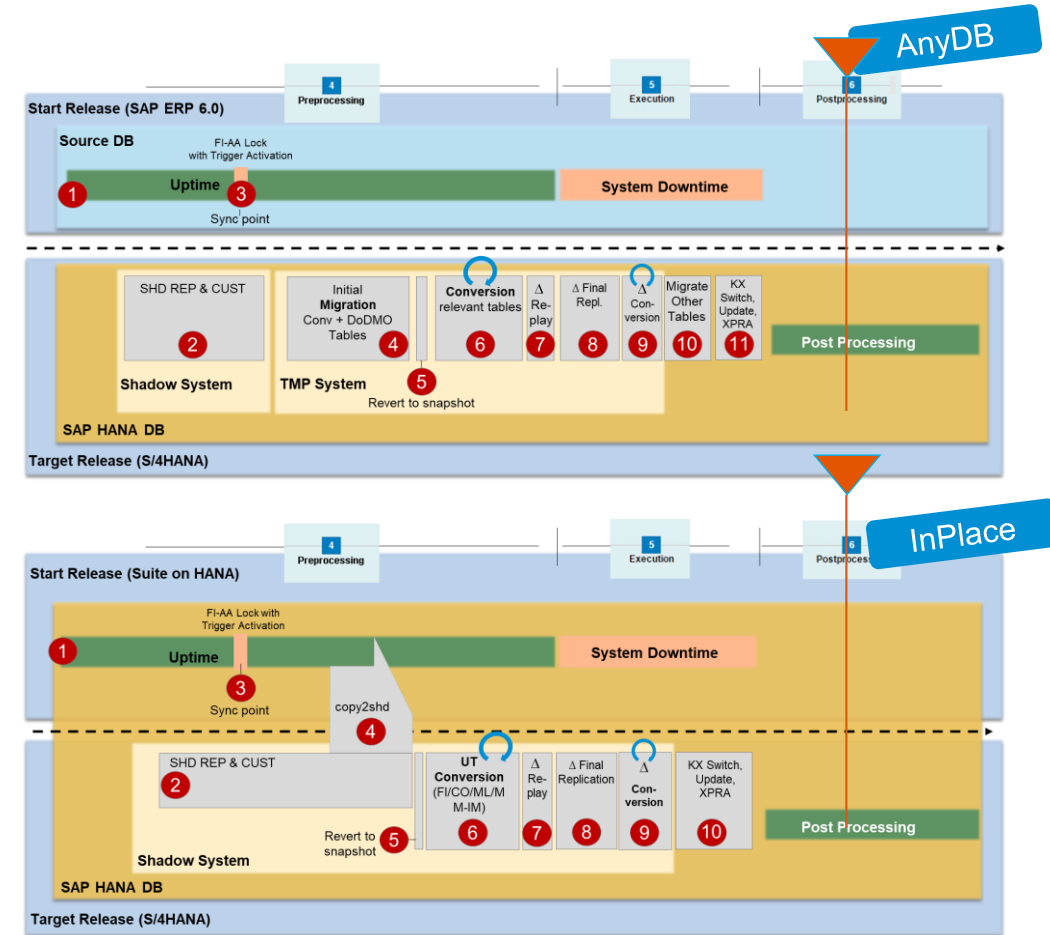


PFW (Parallelization Framework)

Post Processing

Step 12

- Once SUM completes normal technical post processing are being performed. Example:
 - Import of transports (SPAU, Z adjustments or other corrections)
 - Generation of ABAP objects which might have been invalidated
 - There might be cases when infrastructure parts are being switched (e.g. new app servers)
- Before business validation starts, there are post activities/follow ups in application area which are not delta enabled, not part of SUM and which usually are described in the conversion guide and in the Application follow up SAP notes (e.g. SAP Note [2816275](#) - *SAP S/4HANA 1909 - application specific notes in system conversion / upgrade follow-on phase*)
- Following doC scenario, the data conversion was executed in 2 step approach (Initial in uptime + Delta in downtime). Still, there are steps in Finance area part of the IMG tree that must be executed to be able to set the finance migration to complete (see specific information in document attached to SAP Note [3110934](#)).



Questions & Answers

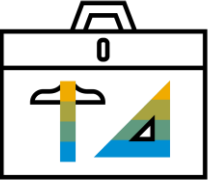


S/4HANA usando downtime optimized Conversion

doC: Detalhes Técnicos – Part II



Preparations: SUM toolbox install and use



Software Update Manager (SUM) Toolbox is a new ABAP-based transaction that allows you to run certain tools and reports related to the various scenarios offered by Software Update Manager. Especially, tools required for downtime-optimized approaches are in focus of SUM Toolbox

SUM Toolbox Transactions: STBX /SUMTOOLBOX | SAP Component: BC-UPG-DTM-TLA

Main entry SAP note: [3092738](#) Software Update Manager Toolbox - Central SAP Note

The implementation of SUM Toolbox requires the implementation of TCIs which in turn require a minimum Support Package level per release, as listed in SAP note [3092738](#)

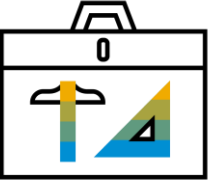
This needs to be implemented from the beginning, on production system and (its predecessors) in scope of

- Impact analysis (extraction is done from prod system)
- DoDMO correct table selection / determination as input for SUM.
- Selection of Uptime XCLA SUM standard preparation features

Note: Before you can implement TCI SAP Notes, the following prerequisites must be met:

- SAP Notes [1995550](#) and [2408383](#) are installed. See also SAP Note [2187425](#) for more information.
- SPAM patch level must be 66 (or higher)

Preparations: SUM toolbox | Functionalities in scope of DoC



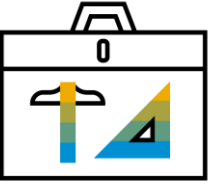
Before SUM:

- **Export data for Impact Analysis** - Export table statistics into XML file to be used in Impact Analysis
- **Uptime Table Selection for downtime-optimized DMO** - Selection of uptime tables for downtime-optimized DMO
- **Inactive repository Object Search** – check the system for any inactive objects

After SUM:

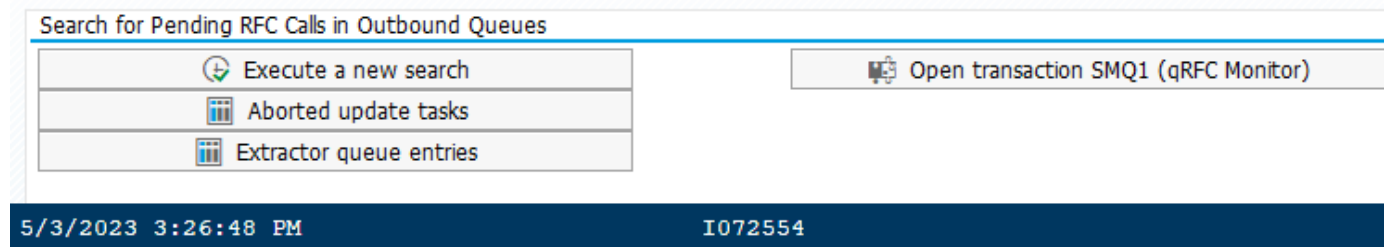
- **Impact Analysis** - Impact analysis by comparing Production Statistical data and sandbox SUM Classification data before production run
- **Export of SUM classification data** - Export of table SUM table classification data. Export SUM table content from PUTTB_SHD and PUTTBX_S4T into *.ZIP file
- **Selection of Uptime XCLAs** -Selection of uptime XCLAs by comparing Production Statistical data and XCLA metadata file

Preparations: SUM toolbox | Functionalities in scope of any scenarios



Below functionalities can be used for system preparation for any flavors of SUM (Standard, DoC, DMO, DoDMO, nZDM):

- Inactive Object Check (done by SUM before lock workbench/REPACHK..)
- Object Catalog-SW-Component-Check (done by SUM before lock workbench / RSUPG_TADIR_COMPONENT_CHECK or ZRSUPG_TADIR..)
- Open Workbench Requests and Tasks (SE01?)
- Aborted Update Tasks (done in the past with SM13 for update records and report RMCEXCHK / LBWE for logistic queues.



- Aborted Data Dictionary Table Conversions (done with SE14 / table conversions..)

Impact Analysis

Overview

The downtime-optimized Conversion approach cause certain kinds of impacts on the system, in particular additional DB space required due to the Uptime activities **when there is database migration**:

- Read-only restrictions for end users on the productive instance
- Database triggers might have to be removed from certain tables (only if source database type is SAP MaxDB)
- Additional DB space requirements due to table cloning
- Additional daily DB growth due to change recording

To prevent unexpected occurrence of such impacts during the maintenance event on your production system, you would like to identify them in advance. This can be achieved by exporting table statistics from your production system, and providing them to the SUM running on your local test system

As of SUM **SP17**, the **Impact Analysis** came embedded into the **SUM Toolbox**, which should be installed mandatorily before running SUM. There is a new check phase **RUN_IMPACT_ANALYSIS_CHECK** created running prior to UVERS_INIT so customer can still install SUM Toolbox in the system by then.

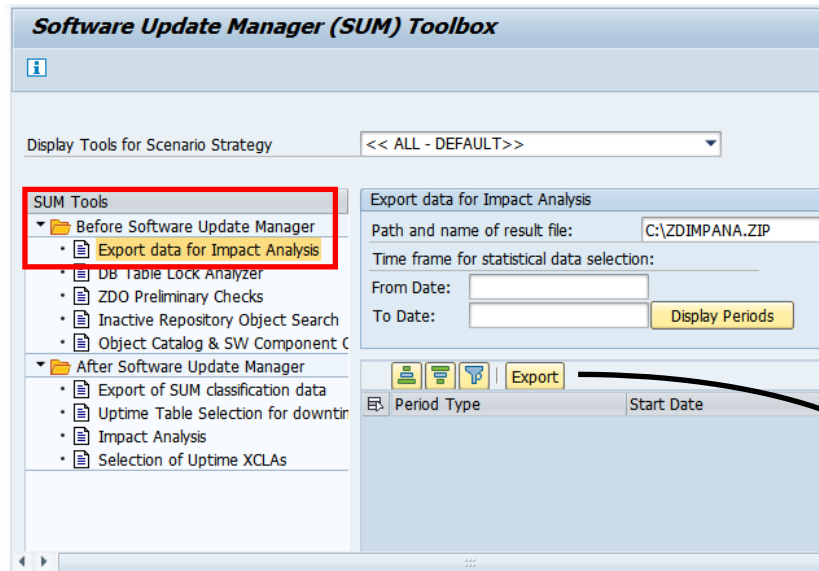
Important: only the installation of SUM Toolbox is checked, but not if any tasks were done

Also important: the Z-report from the Impact Analysis note should not be used anymore. See the **Remark** of Note **#2402270**

Impact Analysis

Sequence of steps *before* running the SUM tool

- Start SUM Toolbox in **PRD**
- Use tool *Export data for Impact Analysis* to export table statistics file ZDIMPANA.ZIP



PRD

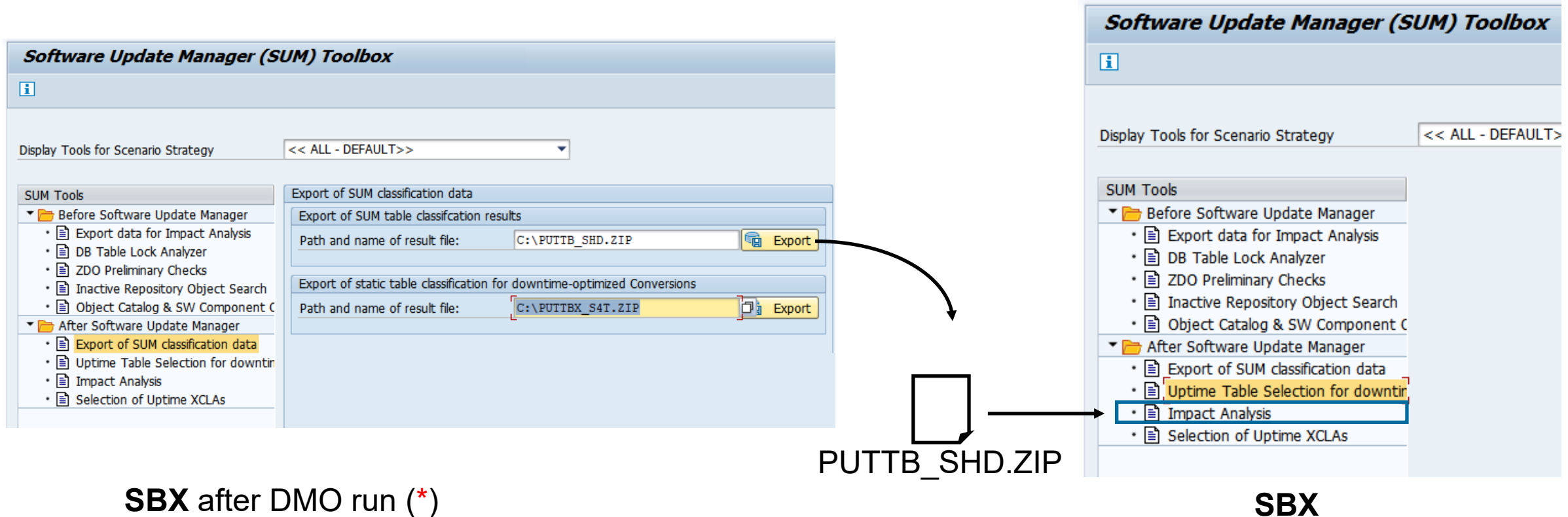
1) Start SUM run

2) Provide statistics file as
SUM/abap/save/ZDIMPANA.ZIP

Impact Analysis

Sequence of steps *after* running the SUM with doC usecase

To run the impact analysis on a separate system, export the table classifications from the **SBX** after doC run. Start SUM Toolbox and use tool *Export of SUM classification data* to export table classification



Impact Analysis

Sequence of steps *after* running the SUM with doC usecase

- PUTTB_SHD.ZIP taken from system (or exported from SBX after doC run)
- ZDIMPANA.ZIP was exported from PRD

File Selection

Table classification data:

Data from local system table PUTTB_SHD

Table statistics:

Y:\z_more\ZDIMPANA.ZIP

Execute

Overview

Header

SUM scenario:

DODMO/do

Source system ID:

DEV

Database platform:

HDB

Contains imports:

Yes

Number of evaluated days:

18

Overall Summary

Estimated DB size for cloned tables (GB):

N/A

Total number of read-only tables:

0

Total change volume for all tables per day (mio):

120.5

Total number of cloned tables:

0

Estimated growth for logging tables per day (GB):

8

Online replication volume for cloned tables per day (mio):

25.5

ImpactAnalysis Findings

Number of large tables:

N/A

Number of tables with database triggers:

0

Number of read-only tables:

1

Severity	Category	Message Text	Table Name	Package	Applic. Component	Software Comp
	Recording	Changes on table TABL KONV will be captured and replayed,but has 5,2 million chan	KONV	VKON	SD-MD-CM	SAP_APPL
	Read-only	BW data sources cannot be changed on original system due to read-only restriction on ...	ROOSOURCE	RSUM	BC-BW	PI_BASIS
	Recording	Changes on table TABL SFLIGHT will be captured and replayed,but has 7,8 million chan	SFLIGHT	SAPBC_DATAMODEL	BC-DWB-TND	BC-DWB
	Read-only	TABL T001W will become read-only, but has 1,6 changes/day	T001W	WFILCORE	LO-MD-PL	SAP_APPL
	Read-only	TABL T811IA will become read-only, but has 0,1 changes/day	T811IA	KALC	CO-OM-CCA	SAP_FIN

Uptime and Downtime table migration

Optimizations

Factors that affect the performance of tables migration:

- Network performance
- Number of parallel R3loads
- Database performance (both source and target)
- SUM AAS performance
- Tables selection for UT migration
- R3load replication for delta data
- Tools used
- OS settings/configuration



Uptime and Downtime table migration

Optimizations – Network performance

Network performance

- Minimum of 400MBit/s of **bandwidth** (180Gbp/hr)
- Ideal: 1Tbp/hr of **throughput**
- Network concurrent traffic needs to be considered
 - Minimum 5~10GBit/s of bandwidth
- Number of hops
- Firewall end-to-end
- Ability to manage network devices in between ends

Actual customer example



Uptime and Downtime table migration

Optimizations – Number of parallel R3loads

SUM phase INITSUBST

- The number of R3load should be set in accordance to the resources of the SUM AAS, as well as the capacity of both source and target databases to handle the migration load
- The number of R3loads set affect not only the migration itself, but also the number of splits that each table can have
- DMO limits the maximum number of splits per table to “200”. This can be overwritten with “SAPup_add.par” parameter “/clonepar/split/lowsegsz” by changing the second number to e. g. “0.001” which allow up to 1000 splits per table.
- The other limit applicable here is the maximum number of processes which is 1000, but that can be increased with parameter “range_num_R3load”

5% - Process is in a dialog

Current Phase: PREP_CONFIGURATION/INITSUBST
Started at: 2023-02-27 12:35:20

Parallel Processes Configuration

Enter the maximum number of ABAP processes (dialogue and batch) during the S/4HANA conversion:

*ABAP PROCESSES (UPTIME)	90
*ABAP Processes (Downtime)	90

Enter the maximum number of parallel processes for the execution of SQL commands:

*SQL Processes (uptime)	64
*SQL Processes (Downtime)	64

Enter the maximum number of parallel import processes:

*R3trans Processes (Uptime)	64
*R3trans Processes (Downtime)	64

Enter the maximum number of parallel R3load or table comparison processes:

*R3load Processes (Uptime)	48
*R3load Processes (Downtime)	128

Batch Host Configuration

Select the instance of your system that shall be used as background server:

Note:

- If the host name of the background server differs from the SUM instance host, the pa
- If the background server must be shut down during the system downtime, all backgro

Decide whether you want an automated batch job distribution, that is, the system decides v

☐ Automated batch job distribution

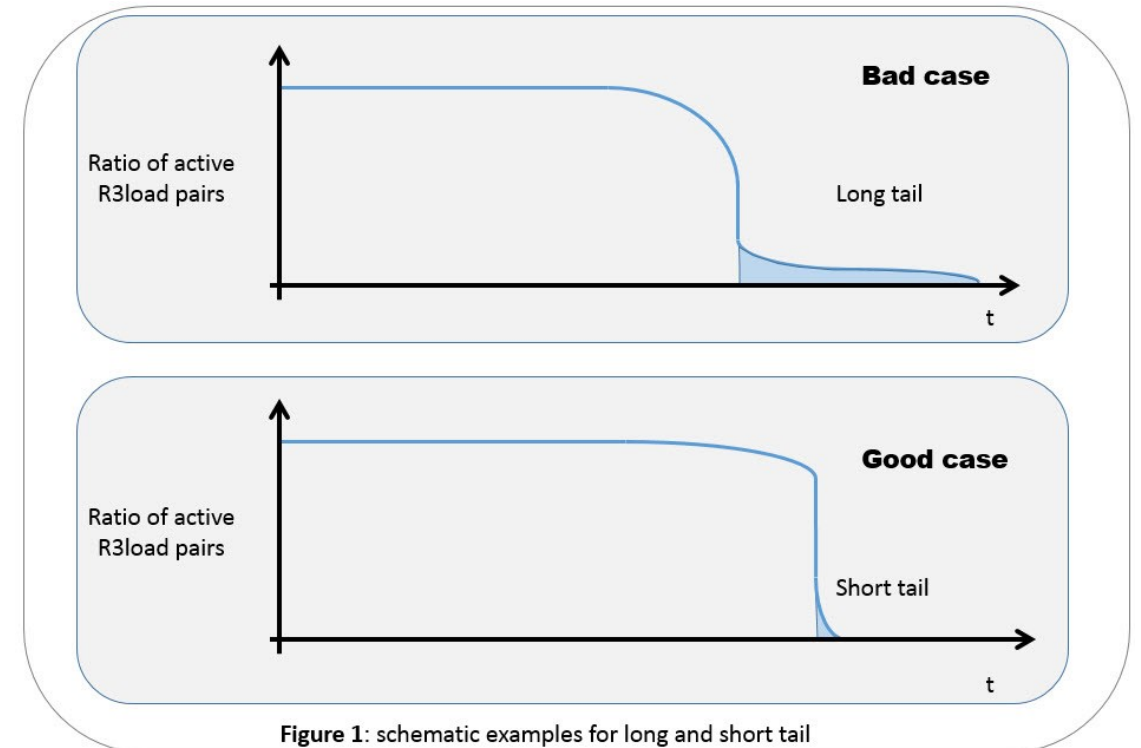
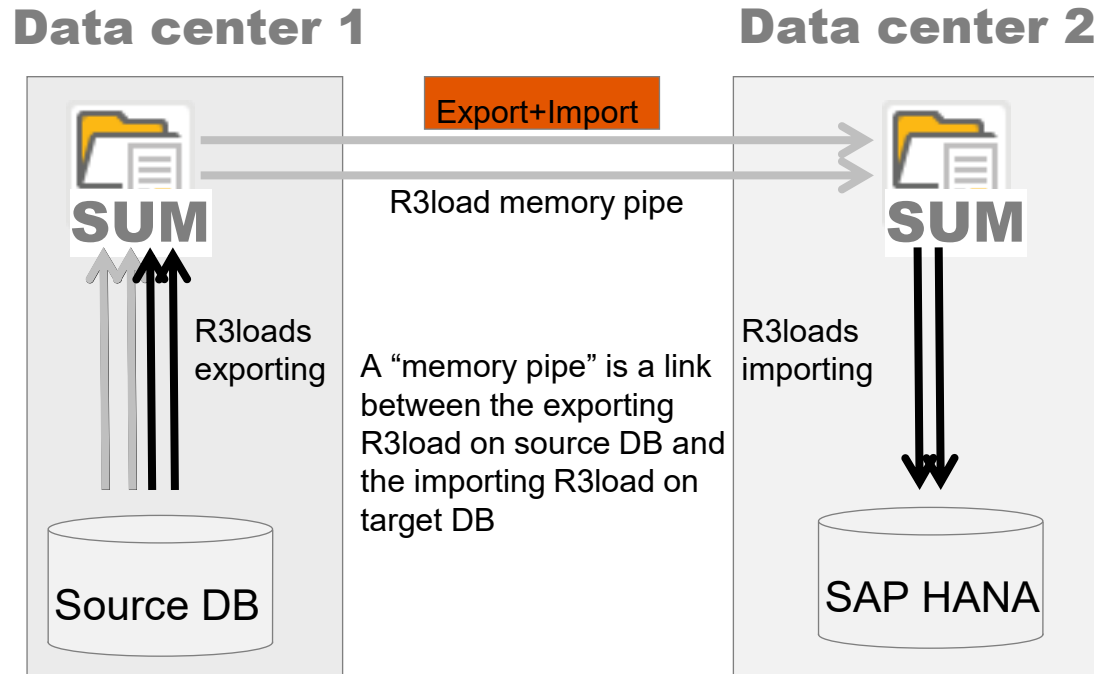
☒ xagapp01_XAG_00 (100 batchprocesses located)

Uptime and Downtime table migration

Optimizations – Number of parallel R3loads

SUM phase INITSUBST

- R3load pipe mode is used (so no dump files are created), transferring data in real time from source to target DB over the network
- Splits, # of R3loads, network performance contribute to an optimal data transfer, with no “long tail” (long running table transfers at the end)



Uptime and Downtime table migration

Optimizations – Number of parallel R3loads

Downtime data migration phase EU_CLONE_MIG_DT_RUN

- Use the duration files from previous cycles: MIGRATE*DUR.XML files

MIGRATE_DT_DUR.XML
MIGRATE_OPTDMO_INI_DUR.XML
EU_IMPORT_DUR.XML
CP2STAB_DUR.XML

- Ensure network is traffic-free as much as possible
- Consider upgrading network bandwidth even if temporarily
- Consider archiving of data

Actual customer example

Phase **EU_CLONE_MIG_DT_RUN** throughput (Migration of application tables)

- POC: 342.20 GB/hour
- Mock 0 – 2nd run: 336.76 GB/hour
- Mock LV0: 665.24 GB/hour
- Mock 1: 698.92 GB/hour
- Mock 2: 728.29 GB/hour

Uptime and Downtime table migration

Optimizations – R3load replication for delta data

Current Replication Status

Overview of ABAP+R3load Replication Status

Ready for Downtime: **YES**

< 98%

99%

Total CRR Status

ABAP CRR Status

> ABAP Replication Monitor **running**

✓ R3load Replication Monitor **running**

< Process Control Center

Charts Control Center
Process and Load Monitor

CRR Control Center
Replication Process Monitor

Process Control Center
Background Process Monitor

Change Recording & Replay Control Center

Current Replication Status

Overview of ABAP+R3load Replication Status

Ready for Downtime: **YES**

99%

1410.2M

1410.2M

0

Total CRR Status

Recorded Changes

Replayed Changes

Pending Changes

✓ R3load Replication Monitor **running**

Number of R3load processes: 40

– 40 +

 ✓ ↺ ⏸ 🔍

Tables

Planned

Idle

Running

Failed

Table Name	Replay Status	Recorded Changes	Replayed Changes	Pending Changes	Percentage (in %)	
TUCNTNM		0	0	0	0	
TFAAD_BSN_FUNC		0	0	0	0	
FAGL_PROT_DATA		0	0	0	0	
TCB11		0	0	0	0	
/ISDFPS/CIVPMP		0	0	0	0	
USREFUS		0	0	0	0	
EDIDS		0	0	0	0	
YD125INBHEAD		0	0	0	0	
/SAPDMC/LSGPRO		0	0	0	0	
T8JZ_FAGL		0	0	0	0	

Table Statistics - Planned: 18 / Idle: 0 / Running: 1795 / Failed: 0 / Inactive: 0

Buckets

Rescheduled

Running

Stopping

Failed

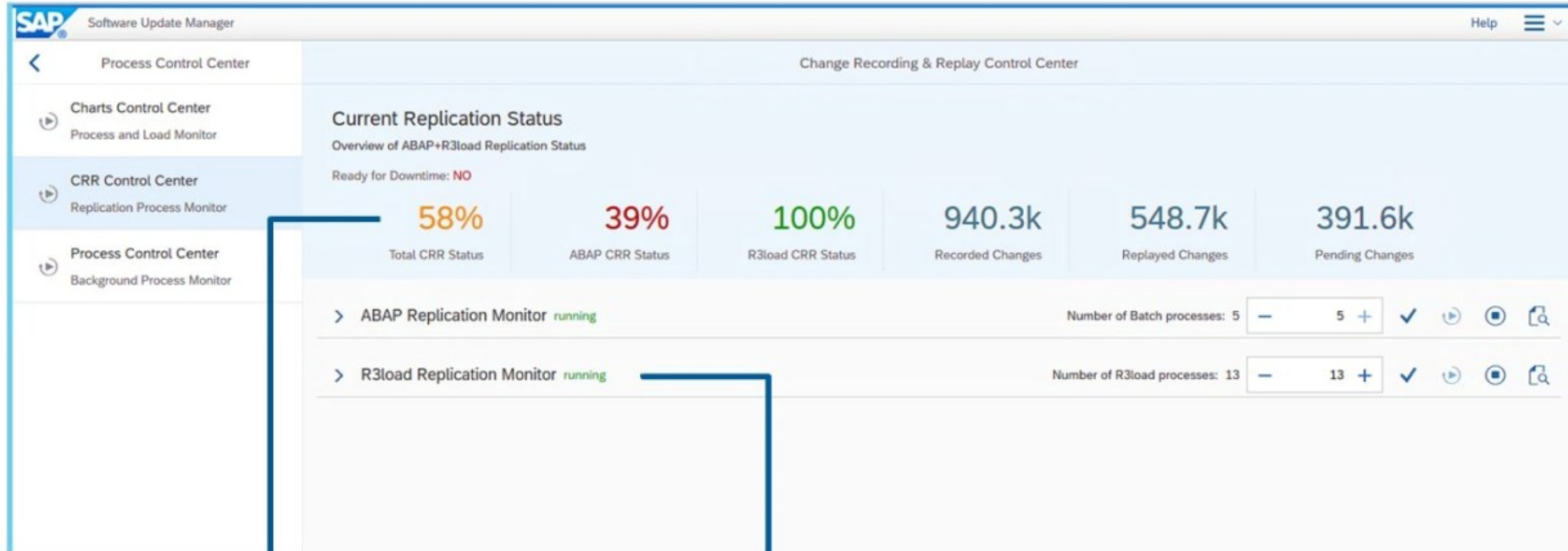
Finished

Ref. ID	Status	Duration Exp./Imp. (in sec)	Export	Import
---------	--------	-----------------------------	--------	--------

- You can increase or decrease the number of R3loads that replicating the delta data
- This setting affects the end of UT and beginning of DT

Uptime and Downtime table migration

Optimizations – R3load replication for delta data



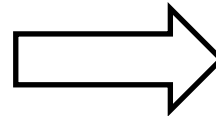
R3load Replication Monitor
only shown if source system not yet on SAP HANA database

Total CRR Status > 75 % required
to allow entering the downtime
(value is shown on downtime dialog as well)

Uptime and Downtime table migration

Optimizations – SUM AAS specifications/performance

- Have a dedicated AAS to run the SUM tool
 - Allocate extra resources (CPUs, memory) for SUM execution, even if on a temporary manner
 - Isolate that AAS from any load-balancing activities from the other AAS, like BGD job execution, RFC groups, limited user access, etc
- Setup the number of DIA and BGD processes accordingly to the number of CPUs. As per help.sap, a typical ABAP App Server can have 5x the number of CPUs for DIA and BGS, aside from other processes
 - The number of BGD processes affect some key phases, like XPRAs and SGEN
- For DMOVE2S4, the SUM AAS should be linked through a high-speed, dedicated network/VPN link
- When SUM AAS is on target Cloud, ensure all network parameters are set on both AAS and ASCS to avoid ENQ saturation and other network – related issues

















Actual customer example

Servers	Parameters	New Value	Old Value
ASCS enqueue server	enqueue/server/max_clients	5000	2000
	enqueue/server/max_query_requests	10000	2000
	enqueue/server/max_requests	60000	13500
	enqueue/server/threadcount	4	3
	enqueue/encni/set_so_keepalive	TRUE	Not set
	enqueue/ni_queue_size	1000	400
	enqueue/server/replication	FALSE	TRUE
GCP app server	rdisp/wp_auto_restart	600	14400
	rdisp/wp_no_vb	1	4
	rdisp/wp_no_vb2	1	2
	rdisp/wp_no_spo	1	2

Uptime and Downtime table migration

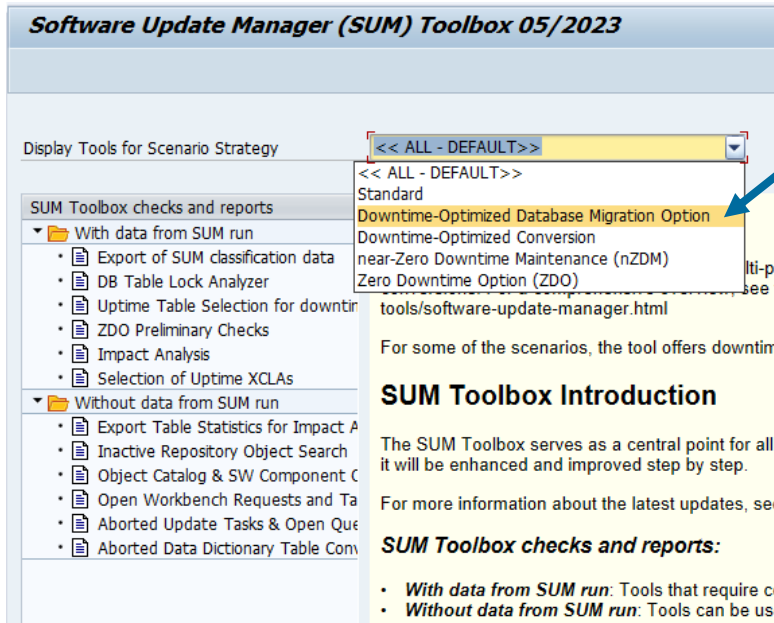
Optimizations – Tables selection for UT migration

- As for SUM SP17, the SUM Toolbox has been leveraged as the tool that unifies many activities related to SUM execution
- Within the tool you have to go through some steps to feed the tool with information in order to generate a file with the list of tables you want to migrate during the Uptime

SUM Toolbox checks and reports	
✓ 	With data from SUM run
	Export of SUM classification data
	DB Table Lock Analyzer
	Uptime Table Selection for downtime-optimized
	ZDO Preliminary Checks
	Impact Analysis
	Selection of Uptime XCLAs
✓ 	Without data from SUM run
	Export Table Statistics for Impact Analysis
	Inactive Repository Object Search
	Object Catalog & SW Component Consistency Cl
	Open Workbench Requests and Tasks
	Aborted Update Tasks & Open Queues
	Aborted Data Dictionary Table Conversions

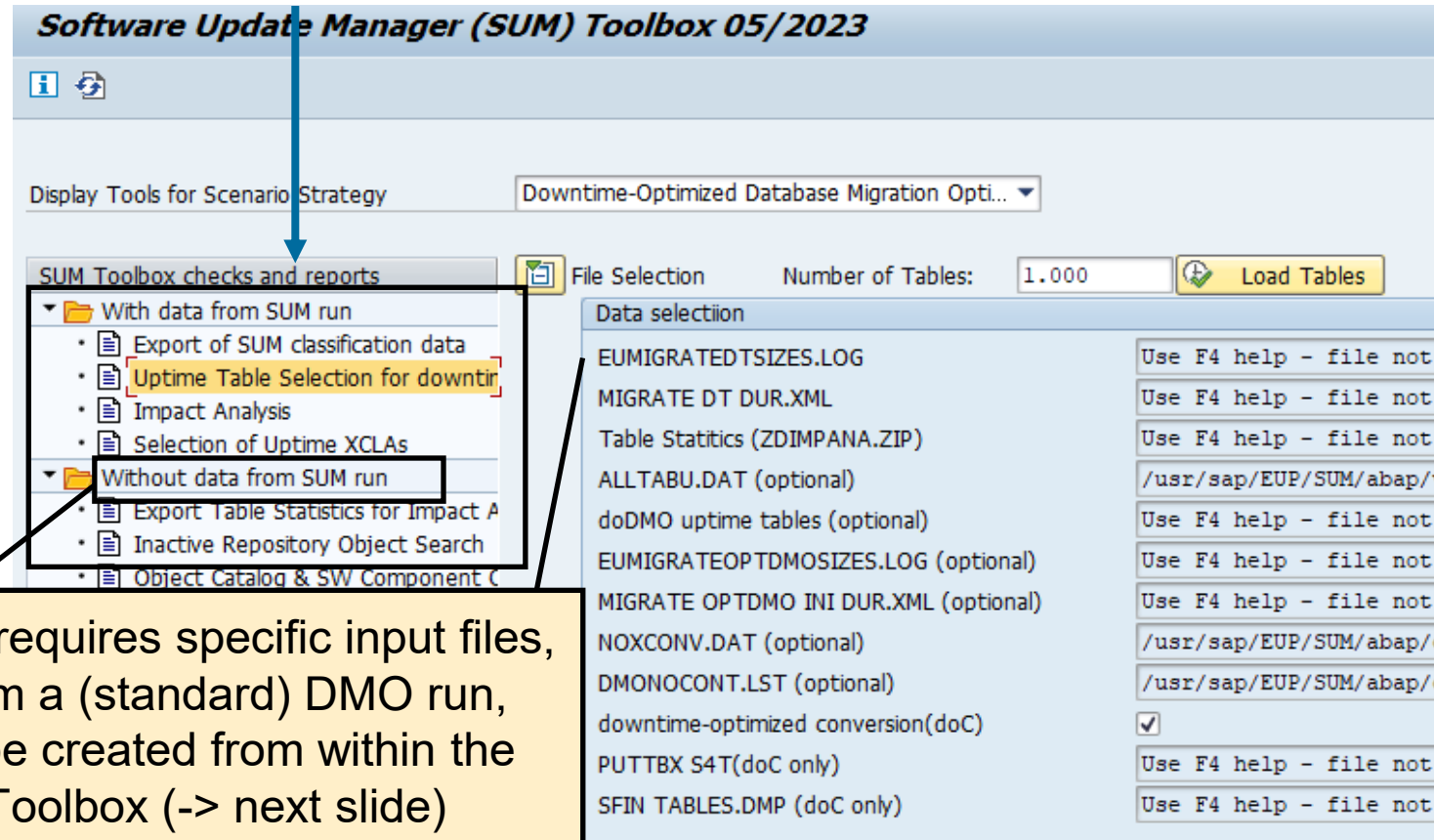
Uptime and Downtime table migration

Optimizations – Tables selection for UT migration → required input files



1) First select scenario *downtime-optimized DMO*

2) This will adapt the tools list



3) Then start *Uptime table selection* for *downtime-optimized DMO*

4) The tool requires specific input files, partly from a (standard) DMO run, partly to be created from within the SUM Toolbox (-> next slide)

Uptime and Downtime table migration

Optimizations – Tables selection for UT migration → providing input files

ZDIMPANA.ZIP

has to be created from within PRD

Most of the files are available after a first DMO run (*), so start the tool on the target system after that DMO run.

The screenshot shows a web-based interface for selecting files for migration. At the top, there is a 'File Selection' tab, a 'Number of Tables' input field set to '1.000', and a 'Load Tables' button with a green checkmark icon. Below this is a 'Data selection' section with a table of file names, their corresponding paths, and edit icons (pencil icons) in the rightmost column.

File Name	Path	Action
EUMIGRATEDTSIZES.LOG	/usr/sap/S2Y/SUM/abap/log/EUMIGRATEDTSIZES.LOG	Edit
MIGRATE DT DUR.XML	/usr/sap/S2Y/SUM/abap/doc/analysis/MIGRATE_DT_DUR.XML	Edit
ZDIMPANA.ZIP	Use F4 help - file not found in <DIR_PUT>/abap/save	Edit
ALLTABU.DAT (optional)	/usr/sap/S2Y/SUM/abap/var/ALLTABU.DAT	Edit
doDMO uptime tables (optional)	/usr/sap/S2Y/SUM/abap/mem/DMOCRRTABLES.LST	Edit
EUMIGRATEOPTDMOSIZES.LOG (optional)	/usr/sap/S2Y/SUM/abap/log/EUMIGRATEOPTDMOSIZES.LOG	Edit
MIGRATE OPTDMO INI DUR.XML (optional)	/usr/sap/S2Y/SUM/abap/doc/analysis/MIGRATE_OPTDMO_INI_DUR.XML	Edit
NOXCONV.DAT (optional)	/usr/sap/S2Y/SUM/abap/control/NOXCONV.DAT	Edit
downtime-optimized conversion(doC)	<input checked="" type="checkbox"/>	
PUTTBX S4T(doC only)	/usr/sap/S2Y/SUM/abap/var/PUTTBX_S4T.ZIP	Edit
SFIN TABLES.DMP (doC only)	/usr/sap/S2Y/SUM/abap/mem/SFIN_TABLES.DMP	Edit

These two files are only required (and available) if the approach is used as part of downtime-optimized Conversion

You can also start the tool in a separate system and provide the file locations

(*) Only available prior to a SUM cleanup!

Uptime and Downtime table migration

Optimizations – Tables selection for UT migration → providing input files

EUMIGRATEDTSIZES.LOG

Table sizes of tables migrated with R3load from a previous run.

MIGRATE_DT_DUR.XML

Migration duration and number of rows migrated from a previous run.

ZDIMPANA.ZIP

Table statistics (updates, inserts, deletes) from productive system

ALLTABU.DAT

Tables that receive import by R3trans.

DMOCRRTABLES.LST

Uptime tables from previous run (or previous tool usage)

EUMIGRATEOPTDMOSIZES.LOG

R3load table sizes from a previous downtime-optimized run.

MIGRATE_OPTDMO_INI_DUR.XML

Migration duration & number of rows migrated from a previous run.

NOXCONV.DAT

Further tables that are not suitable (due to special table handling)

Only for downtime-optimized Conversion:

PUTTBX_S4T.ZIP

Static classification data for downtime-optimized Conversion

SFIN_TABLES.DMP

Information about dynamic SFIN tables not suitable (anyhow handled in uptime)

Uptime and Downtime table migration

Using the tool for table selection

Estimated
downtime reduction

Create text file
containing names of
selected tables

Shows if table is suitable

Migration duration as
criterion

Change rate is shown

File Selection Number of Tables: 1.000 Load Tables

Table Selection

Total Table Size[GB] 68,54 Selected Tables [GB] 31,56

Total Duration [h:min] 43:21 Duration of Selection [h:min] 11:02

Total Changes/Day 32.744 Changes per Day(man.Selection) 320

ST10 data available from 27.04.2020 to 17.05.2020 recorded in 3 intervals Changes per Day(autm.Selection) 364

File Path: /usr/sap/trans/bin/DODMO_TABLES_S2Y.txt

Select	Saved	Suitable	Table	Duration [sec]	Rowcount (transferred)	Size (transferred) [kB]	Updates per day	Inserts per day	Deletes per day
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	WBCROSSGT	8.692	77.216.672	8.504.704	0	0	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E071K	6.976	26.220.904	4.832.320	0	0	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E071	5.601	23.070.313	2.469.280	0	0	0
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	JCDS	5.158	31.587.091	2.800.256	0	58	25
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EQUI	4.739	7.737.889	3.547.104	7	4	0
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	BALDAT	4.517	4.511.877	1.958.368	39	0	0
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EQUZ	4.132	7.737.889	2.220.704	0	4	0
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	OBJK	4.102	15.452.529	1.768.192	4	11	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DOKCLU	3.871	2.245.685	1.547.072	0	0	0
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ILOA	3.328	7.737.910	1.391.488	0	4	0
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	OCSCMPLOBJ	2.779	11.785.526	6.344.640	0	0	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COSB	2.468	749.285	999.392	0	0	13
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	IHPA	2.407	7.279.521	963.040	0	4	0
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ACCTIT	2.285	4.381.205	3.777.696	0	162	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	VBSK	2.228	4.871.344	875.968	4	58	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	VBFS	2.130	9.482.064	829.088	0	47	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	USRBF2	1.627	6.214.503	362.016	0	0	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ACCTCR	1.611	8.762.650	671.360	0	162	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CE11000	1.379	782.914	624.416	0	4	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NAST				106	107	13
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CDHDR				0	227	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	MCKALKW				42	6	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	JSTO				0	41	25
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	LIPS				0	14	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CMFP				0	60	13
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SCR_ABAP_SYMB_E	910	1.006	1.902.912	0	0	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	WBCROSSI	895	4.284.706	423.104	0	0	0

Downtime-Optimized Conversion: Execute long running XCLAs in uptime

Possible for both source on SAP HANA or on non-HANA

- XPRAs and XCLAs are ABAP coding that are assigned to a transport request. They execute **required adaptation on the imported ABAP objects**, and are defined by the development team delivering the ABAP objects.
- XPRAs are **ABAP programs**, XCLAs are **ABAP classes**. **Only XCLA** execution can be moved to uptime processing, not XPRAs.
- XCLAs can be of two types:
 - ABAP-based XCLA (implementing CL_CTS_TABLE_CONVERSION)
 - SQL-based XCLA (implementing CL_UPG_SQL_TABCONV_CTS)
- An XCLA works on one table at a time, this table is called Primary Table for that XCLA. Dependent tables on primary tables can be mentioned (by the XCLA developer) as secondary tables with different lock mode flag for accessibility in XCLA class methods.

Downtime-Optimized Conversion: Execute long running XCLAs in uptime

Customer example

- XCLAs (Cutoff Time: 30s)

Name	Time	Runs
CL_XCLA_EKPO	1:38:06	468
CL_XCLA_EKET	1:13:17	468
CL_XCLA_EBAN	0:11:15	58
CL_XCLA_VBAP	0:05:36	437
CL_XCLA_VBEP	0:03:42	405
CL_XCLA_BUT000	0:02:45	5

- XCLAs (Cutoff Time: 30s)

Name	Time	Runs
CL_XCLA_EKPO	1:47:18	510
CL_XCLA_EBAN	0:07:58	61
CL_XCLA_VBAP	0:05:07	429
CL_XCLA_VBEP	0:03:08	405
CL_XCLA_BUT000	0:00:55	5

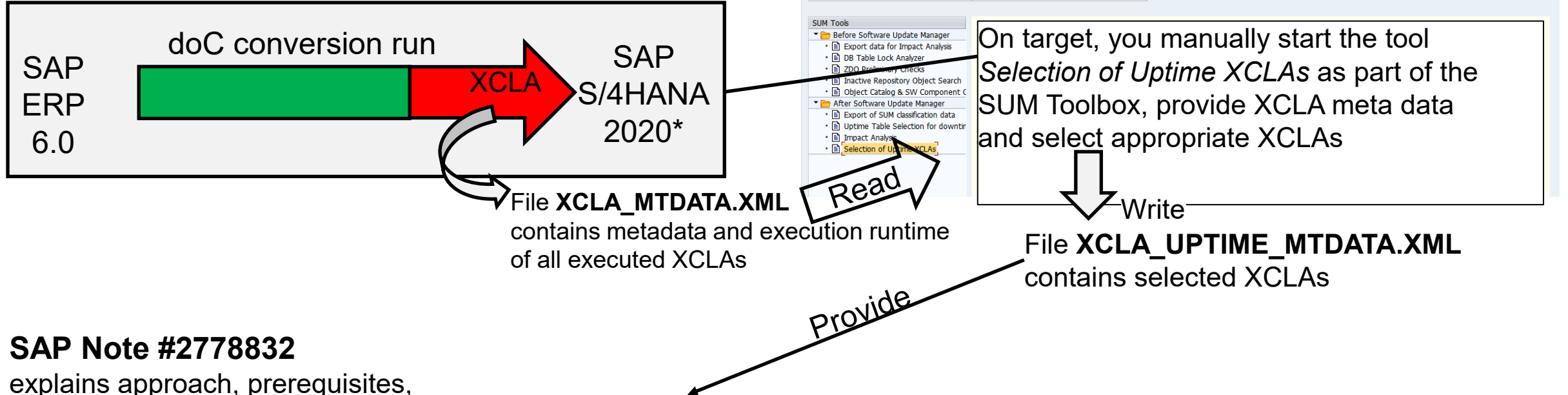
- XCLAs during Uptime (Cutoff Time: 30s)

Name	Time	Runs
CL_XCLA_EKET	1:12:05	509

Downtime-Optimized Conversion: Execute long running XCLAs in uptime

Implementing

SUM on SBX



SAP Note #2778832

explains approach, prerequisites, and tool usage for XCLA selection

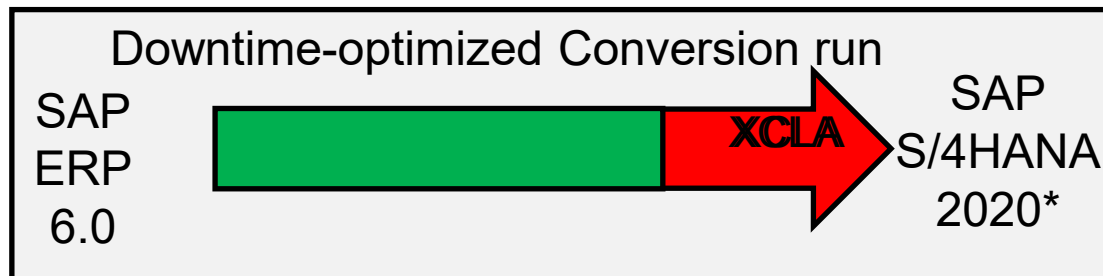
SAP Note #3053586

contains corrections for target SAP S/4HANA 2020

SAP Note #3092738

on SUM Toolbox implementation

SUM on SBX



Downtime-Optimized Conversion: XPRAs

Optimizations

- Main optimizations for XPRAs phase come from note #2351294 - work on table SHDB_PFW_CONF
- HANA SQL statements should be implemented prior to phase start in order to increase parallel threads, decrease wait time per WP, increase package size and so on. A breakpoint is usually set prior to XPRAS_AIMMRG
- Each long running XPRAs should have its own set of SQL statements
- Aside of XPRAs-specific SQLs, the HANA DB should be checked and optimized for specific SUM-related activities.
 - A HANA BDO service should be placed during the services for specific phases analysis
 - Likewise, the HANA Capacity Analysis service is highly recommended for proper load and sizing review
- The implementation of aggressive SQLs should be tested thorough in previous cycles.

Actual customer examples

```
INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('LIPS_MIGRATION','DISPATCHER','MAX_WAIT_FOR_WP','I',4,0,'3000','N');
INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('LIPS_MIGRATION','RESOURCE_PROVIDER','ABAP_MAX_WP','I',4,0,'80','N');
INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('LIPS_MIGRATION','DISPATCHER','WAKEUP_INTERVAL','I',4,0,'1','N');
INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('LIPS_MIGRATION','RESOURCE_PROVIDER','HARD_DELTA_LIMIT_FOR_MERGE','I',4,0,'500000000','N');
INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('LIPS_MIGRATION','PACKAGE_PROVIDER','OVERWRITE_PACKAGE_SIZE','JSON',8,0,'[{"TABNAME":"LIPS","SIZE":5000000}]','N');
INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('LIPS_MIGRATION','DISPATCHER','MAX_WAIT_FOR_SPLIT','I',4,0,'5000','N');
INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('LIPS_MIGRATION','DISPATCHER','MAX_WAIT_FOR_COLLECTOR','I',4,0,'3000','N');

INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('RMXPRAS4SIMIGRATION','RESOURCE_PROVIDER','ABAP_MAX_WP','I',4,0,'64','N');
INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('RMXPRAS4SIMIGRATION','DISPATCHER','WAKEUP_INTERVAL','I',4,0,'1','N');
INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('RMXPRAS4SIMIGRATION','DISPATCHER','MAX_WAIT_FOR_WP','I',4,0,'3600','N');
INSERT INTO SHDB_PFW_CONF (APPL_NAME,COMPONENT,PARAM,TYPE,LENGTH,DECIMALS,VALUE,CHANGEABLE) VALUES ('RMXPRAS4SIMIGRATION','DISPATCHER','MAX_WAIT_FOR_COLLECTOR','I',4,0,'1800','N');
```

Downtime-Optimized Conversion: specifics

CTI – Customer Transport Integration

- The inclusion of the FIN TRs, plus additional SPDD, SPAU, notes, and custom developments (including client dependent and client independent, repository and customizing objects) should happen at the initial SUM dialog screen with the **transport buffer** that was created

SAP XAG Software Update Manager 2.0 SP15 (PL2)
S/4HANA Conversion (Downtime-optimized Conversion)

Get Roadmap

0% - Process is in a dialog
Current Phase: MOD_SELROADMAP/SELECT_ROADMAP
Started at: 2023-02-27 11:10:18

Inclusion of Customer Transport Buffer File ?

Customer Transport Buffer

Include a customer transport buffer file that contains customer transports for the target release.

Note: The dialogues to include SPDD or SPAU transport requests and single transport requests, which are normally displayed during phases SUI and necessary and will not be displayed as all transports in the customer buffer file are treated as SPDD/SPAU-related transports.

*Customer Buffer File

You can double-check the modifications later on in phase ACT_UPG even if all modification transports are completed. However, the Software Upg transports.
Do you want to double-check the modifications in phase ACT_UPG in any case?

☒ Yes, I want to check the modification transports

Yes, I want to check the modification transports

Downtime-Optimized Conversion: specifics

CTI – Customer Transport Integration

- The creation of a customer buffer can be achieved either with the tp option addtobuffer, or with the Customer Transport Integration tool (transaction SUPGINT_APP). Note that the transaction for that tool has to be started in the correct client.

```
tp addtobuffer <name_of_transport> buffer=<buffer_file_name>  
client=<client> pf=<profile_path_and_name> -dCTC=1
```

The image displays two screenshots related to SAP Customer Transport Integration (CTI).

The left screenshot shows a Windows Command Prompt window titled "Administrator: CMD". It displays the execution of the `tp addtobuffer` command. The command prompt shows the usage of `ADDIOBUFFER` and lists various options and arguments. The command executed was `tp addtobuffer` with the following options: `U<nnn>`, `buffer=<file>`, `tag=SPAMIX`, `remote=<SAPSID>`, `before <E-TR>`, `after <E-TR>`, `pf=<IPPARAM>`, `silent`, `-D"<entry>"`, `-t<k>`, `tf=<Filename>`, and `shdutadir=<tabname>`. The command prompt also shows the description of arguments and the return code summary.

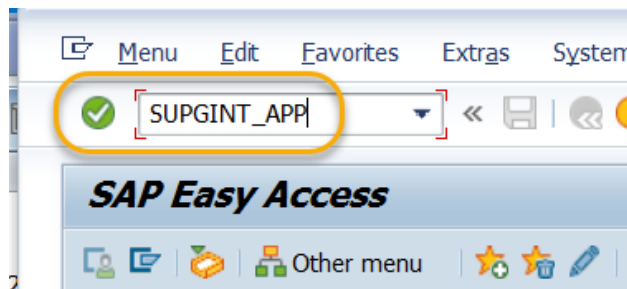
The right screenshot shows the SAP Upgrade Transport Integration Wizard (SUPGINT_APP) web interface. The interface is titled "Upgrade Transport Integration Wizard" and shows a progress bar with six steps: 1. Welcome, 2. Choose System, 3. Choose Integration Task, 4. Select Transports, 5. Confirm Selection, and 6. Download Buffer. The current step is 1. The interface also displays an introduction to the wizard and a list of tasks to be performed.

Client specific!

Downtime-Optimized Conversion: specifics

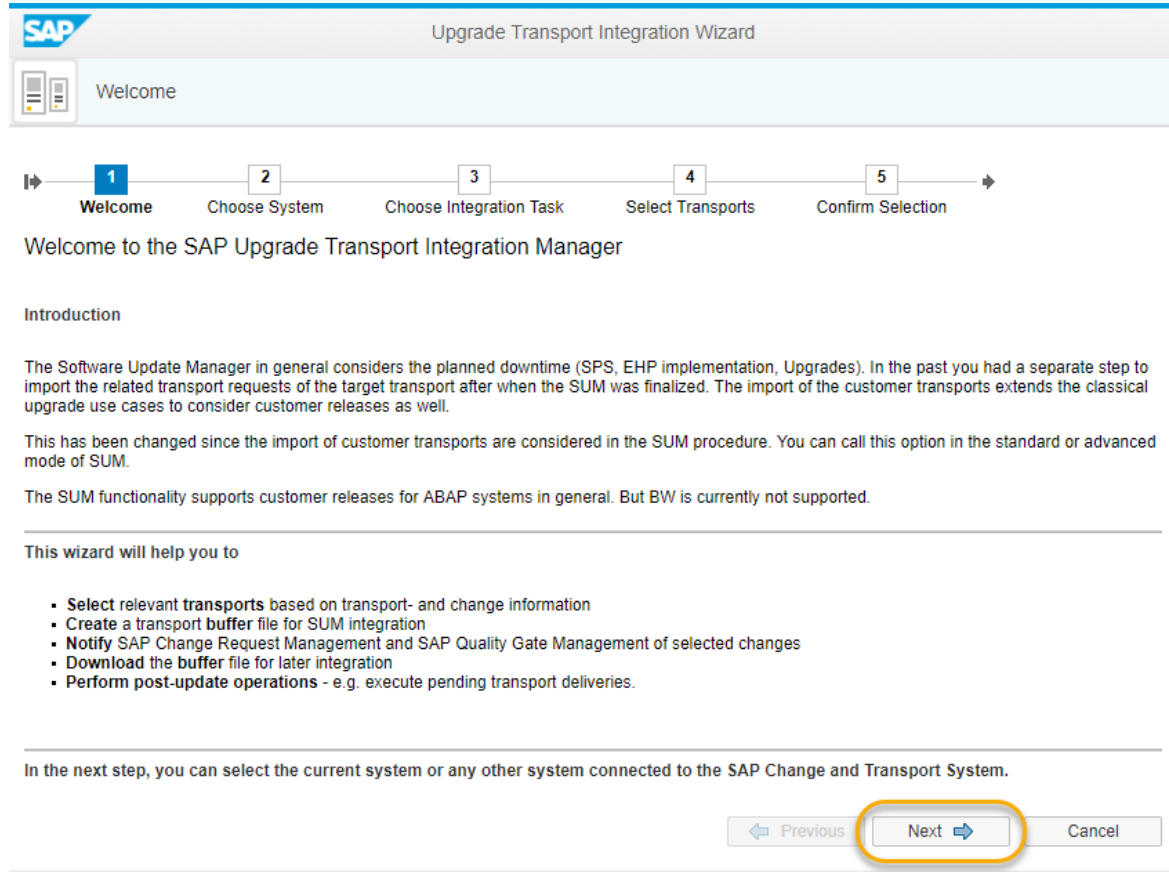
CTI – Customer Transport Integration

- Once you add the SPDD and SPAU TRs, there is no additional dialog screen asking to include them separately
- Several phases like DDIC_UPG, ACT_UPG, TABIM_UPG, XPRAS_UPG, TR_CMDIMPORT, etc are affected by the CTI buffer, receiving new names DDIC_**CUST**, ACT_UPG_**CUST**, TABIM_UPG_**CUST**, XPRAS_UPG_**CUST**, TR_CMDIMPORT_**CUST** and so on.
- The import of the TRs depend on their content, and is split during the Uptime and Downtime (see next slides)
 - Impact to runtimes is minimal
- the customer buffer file can contain multiple lines per transport with one target client per transport line (CTC=1 format)
- The transport Tool parameter CTC = 1 has to be set globally in case you want to create a customer buffer file using the command line tool tp addtobuffer
- Or you can call the CTI Wizard with t-code SUPGINT_APP



Downtime-Optimized Conversion: specifics

CTI – Customer Transport Integration



The screenshot shows the 'Welcome' screen of the 'Upgrade Transport Integration Wizard'. At the top, the SAP logo is on the left and the title 'Upgrade Transport Integration Wizard' is centered. Below the title bar, there's a 'Welcome' section with a small icon of two server racks. A progress bar with five steps is shown: 1. Welcome (highlighted in blue), 2. Choose System, 3. Choose Integration Task, 4. Select Transports, and 5. Confirm Selection. Below the progress bar, the text 'Welcome to the SAP Upgrade Transport Integration Manager' is displayed. The main content area is titled 'Introduction' and contains three paragraphs of text explaining the wizard's purpose and the changes in the SUM procedure regarding customer transport integration. A list of five bullet points describes the steps the wizard will help with: selecting relevant transports, creating a transport buffer file, notifying SAP Change Request Management, downloading the buffer file, and performing post-update operations. At the bottom, a note states that in the next step, the user can select the current system or any other system connected to the SAP Change and Transport System. At the very bottom, there are three buttons: 'Previous' (disabled), 'Next' (active and highlighted with an orange circle), and 'Cancel' (disabled).

SAP Upgrade Transport Integration Wizard

Welcome

1 Welcome 2 Choose System 3 Choose Integration Task 4 Select Transports 5 Confirm Selection

Welcome to the SAP Upgrade Transport Integration Manager

Introduction

The Software Update Manager in general considers the planned downtime (SPS, EHP implementation, Upgrades). In the past you had a separate step to import the related transport requests of the target transport after when the SUM was finalized. The import of the customer transports extends the classical upgrade use cases to consider customer releases as well.

This has been changed since the import of customer transports are considered in the SUM procedure. You can call this option in the standard or advanced mode of SUM.

The SUM functionality supports customer releases for ABAP systems in general. But BW is currently not supported.

This wizard will help you to

- Select relevant **transports** based on transport- and change information
- Create a transport **buffer** file for SUM integration
- **Notify** SAP Change Request Management and SAP Quality Gate Management of selected changes
- Download the **buffer** file for later integration
- Perform **post-update operations** - e.g. execute pending transport deliveries.

In the next step, you can select the current system or any other system connected to the SAP Change and Transport System.

Previous Next Cancel

Downtime-Optimized Conversion: specifics

CTI – Customer Transport Integration

The image shows two overlapping screenshots of the SAP Upgrade Transport Integration Wizard. The background screenshot is at the 'Welcome' step (Step 1), showing a progress bar with steps: Welcome, Choose System, Choose Integration Task, Select Transports, and Confirm Selection. The foreground screenshot is at the 'System Selection' step (Step 2), showing a progress bar with steps: Welcome, Choose System, Choose Integration Task, Select Transports, Confirm Selection, and Download Buffer. The 'Choose System' step is highlighted in blue. The main text in the foreground window says 'Please select the system' and 'Please choose the system for which you are planning to perform the upgrade from the list of systems below.' Below this is a dropdown menu with the selected value 'JF0 (DOMAIN_JF0) - System JF0'. At the bottom, there are three buttons: 'Previous', 'Next', and 'Cancel'. The 'Next' button is highlighted with an orange circle.

SAP Upgrade Transport Integration Wizard

Welcome

1 Welcome 2 Choose System 3 Choose Integration Task 4 Select Transports 5 Confirm Selection

Welcome to the SAP Upgrade Transport Integration Manager

Introduction

The Software Update Manager in g...
import the related transport request...
upgrade use cases to consider cus...

This has been changed since the in...
mode of SUM.

The SUM functionality supports cus...

This wizard will help you to

- Select relevant transports ba...
- Create a transport buffer file
- Notify SAP Change Request
- Download the buffer file for l...
- Perform post-update operat...

In the next step, you can select t...

SAP Upgrade Transport Integration Wizard

System Selection

1 Welcome 2 Choose System 3 Choose Integration Task 4 Select Transports 5 Confirm Selection 6 Download Buffer

Please select the system

Please choose the system for which you are planning to perform the upgrade from the list of systems below.

JF0 (DOMAIN_JF0) - System JF0

In the next step, you can create a completely new selection of transports for this system or load a selection saved earlier.

Previous Next Cancel

Downtime-Optimized Conversion: specifics

CTI – Customer Transport Integration

The screenshot displays the SAP Upgrade Transport Integration Wizard. The title bar reads "Upgrade Transport Integration Wizard". The main heading is "Upgrade Integration Task Selection". A progress bar at the top shows six steps: 1. Welcome, 2. Choose System, 3. Choose Integration Task (highlighted in blue), 4. Select Transports, 5. Confirm Selection, and 6. Download Buffer. Below the progress bar, the text "Create or Continue Upgrade Integration Task For System JF0" is visible. A dropdown menu is open, showing "Create New Upgrade Integration Task" as the selected option. Below this, a note states: "If you click 'Next' the transport buffer of the selected system will be loaded and earlier selections will be applied." At the bottom right, there are three buttons: "Previous", "Next" (highlighted with a blue border and a right-pointing arrow), and "Cancel". Below the "Next" button, there is a text input field containing "JF0 (DOMAIN_JF0) - System JF0". At the very bottom, there is a row of buttons: "Previous", "Next" (highlighted with a blue border and a right-pointing arrow), "Cancel", "Previous", "Next" (highlighted with a blue border and a right-pointing arrow), and "Cancel".

Upgrade Transport Integration Wizard

Upgrade Integration Task Selection

1 Welcome 2 Choose System 3 Choose Integration Task 4 Select Transports 5 Confirm Selection 6 Download Buffer

Create or Continue Upgrade Integration Task For System JF0

Create New Upgrade Integration Task

If you click 'Next' the transport buffer of the selected system will be loaded and earlier selections will be applied.

Previous Next Cancel

JF0 (DOMAIN_JF0) - System JF0

Previous Next Cancel Previous Next Cancel

Downtime-Optimized Conversion: specifics

CTI – Customer Transport Integration

Upgrade Transport Integration Wizard

Upgrade Integration Task Selection

Welcome to the SAP Upgrade Transport Integration Wizard

Create or Continue Upgrade Integration Task For System JF0

Create New Upgrade Integration Task

Create New Upgrade Integration Task

Upgrade Integration Task 2 (Created by DDIC_DEV Changed at 12.10.2017 12:43:24 Changed by DDIC_DEV)

Upgrade Integration Task 1 (Created by DDIC_DEV Changed at 15.09.2017 11:21:59 Changed by DDIC_DEV)

Upgrade Integration Task 3 (Created by DDIC_DEV Changed at 12.10.2017 12:47:56 Changed by DDIC_DEV)

Please select the system

Please choose the system for which you are planning to perform the upgrade from the list of systems below.

JF0 (DOMAIN_JF0) - System JF0

Next

CTI – Customer Transport Integration

Upgrade Transport Integration Wizard

1 Welcome 2 Choose System 3 Choose Integration Task 4 **Select Transports** 5 Confirm Selection 6 Download Buffer

Select Relevant Transports For System JF0

Select the transport relevant for upgrade integration from the list below. The data is built from the current buffer and enhanced with process information (e.g. SAP Change Request Management or SAP Quality Gate Management).

Select All Deselect All Reset Decision State Expand All Collapse All Clear All Filters

Change / Request	Short Description	Status	Technical ID	Owner	Details	Project/Cycle	Branch	Landscape
<input checked="" type="checkbox"/> JF0K900120	Release 1801: Correction for HR		JF0K900120	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900121	Release 1801: Correction for CO		JF0K900121	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900122	Release 1801: Correction for FI		JF0K900122	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900123	Release 1801: Correction for Basis		JF0K900123	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900124	Release 1801: User roles for MM		JF0K900124	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900125	Release 1801: User roles for RFC users		JF0K900125	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900126	Release 1801: New functionality for Master Data		JF0K900126	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900127	Release 1801: Critical correction for MM		JF0K900127	DDIC_DEV	More Information			

The different selection states explained

- ☒ This state indicates an undecided item, it must still must be processed in order to continue.
- ☒ This state indicates an selected item, it will be incorporated into the upgrade.
- ☐ This state indicates a deselected item which will not be considered during the upgrade.

If you click 'Next', the selected transports will be validated and presented for final confirmation.

Previous Next Cancel

Welcome to the SAP Upgrade Transport Integration Manager

Introduction

The Software Update Manager in general considers the planned transports for the target system. The import of the related transport requests of the target transport after the SUM was finalized. The import of the upgrade use cases to consider customer releases as well.

This has been changed since the import of customer transports are considered in the SUM procedure. You can now use the SUM functionality to import customer releases for ABAP systems in general. But BW is currently not supported.

The SUM functionality supports customer releases for ABAP systems in general. But BW is currently not supported.

This wizard will help you to

- Select relevant transports based on transport- and change information
- Create a transport buffer file for SUM integration
- Notify SAP Change Request Management and SAP Quality Gate Management of selected changes
- Download the buffer file for later integration
- Perform post-update operations - e.g. execute pending transport deliveries

Please select the system for which you are planning to perform the upgrade

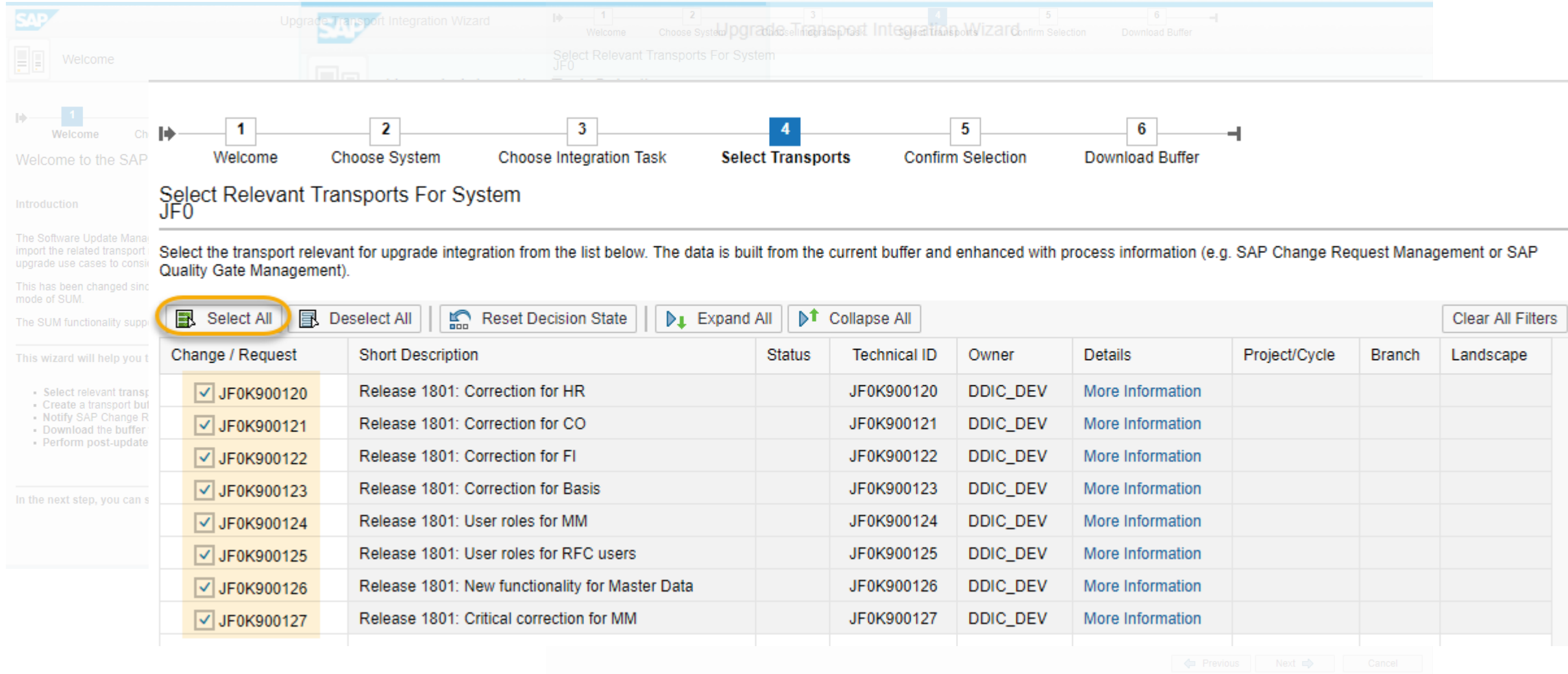
JF0 (DOMAIN_JF0) - System JF0

In the next step, you can select the current system or any other system connected to the SAP Change and Transport Management.

In the next step, you can create a completely new selection of transport requests.

Downtime-Optimized Conversion: specifics

CTI – Customer Transport Integration



The screenshot displays the SAP Upgrade Transport Integration Wizard, specifically the 'Select Transports' step (Step 4). The wizard's progress bar at the top indicates the sequence of steps: 1. Welcome, 2. Choose System, 3. Choose Integration Task, 4. Select Transports (current step), 5. Confirm Selection, and 6. Download Buffer.

The main heading for this step is 'Select Relevant Transports For System JF0'. Below this, a text box explains: 'Select the transport relevant for upgrade integration from the list below. The data is built from the current buffer and enhanced with process information (e.g. SAP Change Request Management or SAP Quality Gate Management).'.

Below the text box, there are several action buttons: 'Select All' (highlighted with a yellow circle), 'Deselect All', 'Reset Decision State', 'Expand All', 'Collapse All', and 'Clear All Filters'.

The main content area is a table listing transport requests. The table has the following columns: Change / Request, Short Description, Status, Technical ID, Owner, Details, Project/Cycle, Branch, and Landscape. The first seven rows of the table are highlighted in yellow, indicating they are selected.

Change / Request	Short Description	Status	Technical ID	Owner	Details	Project/Cycle	Branch	Landscape
<input checked="" type="checkbox"/> JF0K900120	Release 1801: Correction for HR		JF0K900120	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900121	Release 1801: Correction for CO		JF0K900121	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900122	Release 1801: Correction for FI		JF0K900122	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900123	Release 1801: Correction for Basis		JF0K900123	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900124	Release 1801: User roles for MM		JF0K900124	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900125	Release 1801: User roles for RFC users		JF0K900125	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900126	Release 1801: New functionality for Master Data		JF0K900126	DDIC_DEV	More Information			
<input checked="" type="checkbox"/> JF0K900127	Release 1801: Critical correction for MM		JF0K900127	DDIC_DEV	More Information			

At the bottom right of the wizard, there are navigation buttons: 'Previous', 'Next', and 'Cancel'.

Downtime-Optimized Conversion: specifics

CTI – Customer Transport Integration

The screenshot displays the SAP Upgrade Transport Integration Wizard interface. The main window shows a table of transport requests with columns: Change / Request, Short Description, Status, Details, Project/Cycle, Branch, Technical ID, and Branch. A modal dialog titled "Upgrade Transport Integration Wizard" is open, displaying a confirmation message: "When confirming your selection, a buffer file will be created and process tools will be notified." The dialog has "OK" and "Cancel" buttons, with "OK" circled in orange.

Change / Request	Short Description	Status	Details	Project/Cycle	Branch	Technical ID	Branch
JF0K900120	Release 1801: Correction for HR		More Information			JF0K900120	
JF0K900121	Release 1801: Correction for CO		More Information			JF0K900121	
JF0K900122	Release 1801: Correction for FI		More Information			JF0K900122	
JF0K900123	Release 1801: Correction for Basis					JF0K900123	
JF0K900124	Release 1801: User roles for MM					JF0K900124	
JF0K900125	Release 1801: User roles for RFC users					JF0K900125	
JF0K900126	Release 1801: New functionality for Master Data					JF0K900126	
JF0K900127	Release 1801: Critical correction for MM					JF0K900127	

When confirming your selection, a buffer file will be created and process tools will be notified.

OK Cancel

Downtime-Optimized Conversion: specifics

CTI – Customer Transport Integration

The screenshot displays the 'Upgrade Transport Integration Wizard' in SAP. The wizard is at step 6, 'Download Buffer', which is highlighted in blue. The progress bar at the top shows steps 1 through 6. The main content area shows the title 'Download Buffer For System JF0' and a message: 'The buffer file has been created and can be included during the upgrade. The file is stored in the buffer directory of the transport directory of the selected system under the filename: UPGSEL_20171023123813.JF0'. The filename is highlighted with a yellow border. Below this, it states: 'The final buffer can be included into any upgrade/update process in the correct pre-processing phase.' At the bottom right, there are buttons for 'Previous', 'Next', and 'Cancel'. The 'Next' button is highlighted in blue.

Upgrade Transport Integration Wizard

Download Buffer

1 Welcome 2 Choose System 3 Choose Integration Task 4 Select Transports 5 Confirm Selection 6 Download Buffer

Download Buffer For System JF0

The buffer file has been created and can be included during the upgrade. The file is stored in the buffer directory of the transport directory of the selected system under the filename:

UPGSEL_20171023123813.JF0

The final buffer can be included into any upgrade/update process in the correct pre-processing phase.

Previous Next Cancel

Downtime-Optimized Conversion: specifics

CTI – SPDD and SPAU handling



If Customer Transport Integration is active the dialog asking for SPDD/SPAU transports will not be shown.



Merge of several SPAU entries not needed anymore. Use as many SPAU transports as you want.



Based on the transport metadata the SPDD and SPAU transports are automatically identified.



The queue in the buffer file must be validated.

Return codes higher than 4 must be corrected.

Downtime-Optimized Conversion: specifics

CTI – RC 8 handling in SUM

Uptime



Activates ABAP Dictionary customer objects in shadow system

Phase name: MAIN_SHDRUN/ACT_UPG_CUST

RC8: resolve in SHD system; can be skipped. However, skipping may lead to subsequent issues and manual intervention needed after the update.



Imports TABU into the shadow tables and the new tables

Phase name: MAIN_SHDIMP/SUBMOD_SHD2_RUN/SHADOW_IMPORT_INC_CUST

RC8: resolve in SHD system or import a correction transport into SHD; cannot be skipped

Downtime



Imports entries into control tables

Phase name: MAIN_NEWBAS/TABIM_UPG_CUST

RC8: resolve in UPG system; cannot be skipped



XPRA and AIM execution

Phase name: MAIN_NEWBAS/XPRAS_UPG_CUST

RC8: resolve in UPG system; can be skipped. However, skipping may lead to subsequent issues and manual intervention needed after the update.

Downtime-Optimized Conversion: specifics

CTI – Frequently asked questions



Question

Does SUM use standard TMS for importing customer transports?

Does SGEN in the shadow system consider customer transports as well?

How does SUM import the transports?

How does the ChaRM integration work?

Will the transport logs be synchronized with the central DIR_TRANS log directory?



Answer

No, but like TMS also SUM uses the transport tool R3trans for SAP transports and customer transports as well.

Yes, SGEN is also executed for the included customer transports.

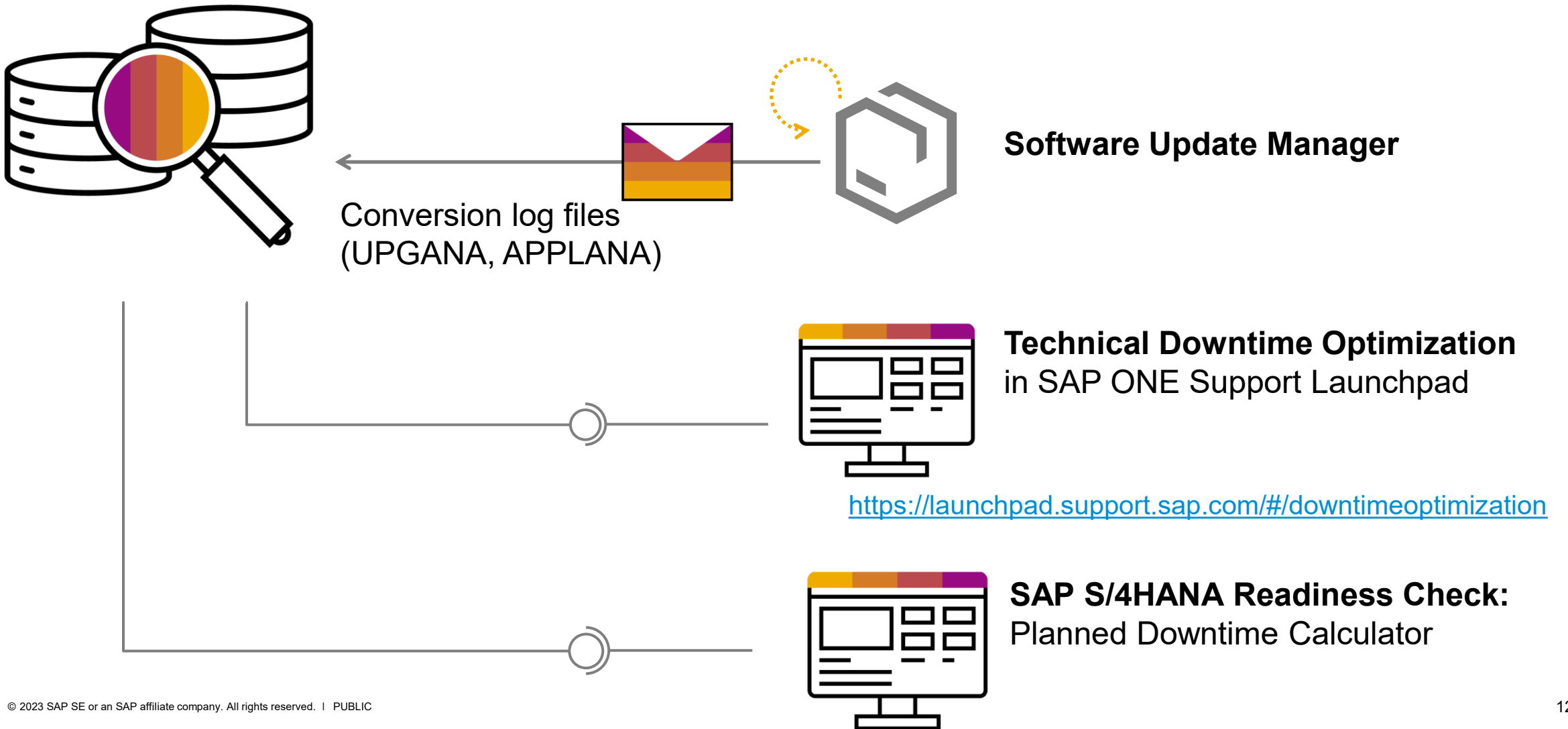
The transports are imported with “**IMPORT ALL**” which is similar to the mass transports in standard TMS.
This means, each import step is performed for all transport requests. All requests are imported into the target systems in the order they were exported and listed in the provided buffer file.

After the update the buffer in ChaRM need to be refreshed manually. This ensures that the import history will be read again and the change document will be updated accordingly.

Yes. As part of the post processing all log files will be synchronized. In the end, the logs can be displayed i.e. in SE01.

Estimating planned downtime

Putting runtime statistics to work



The Technical Downtime Optimization application

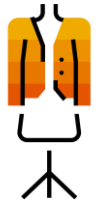
Helps to meet tight downtime requirements



Easy to consume
analytics



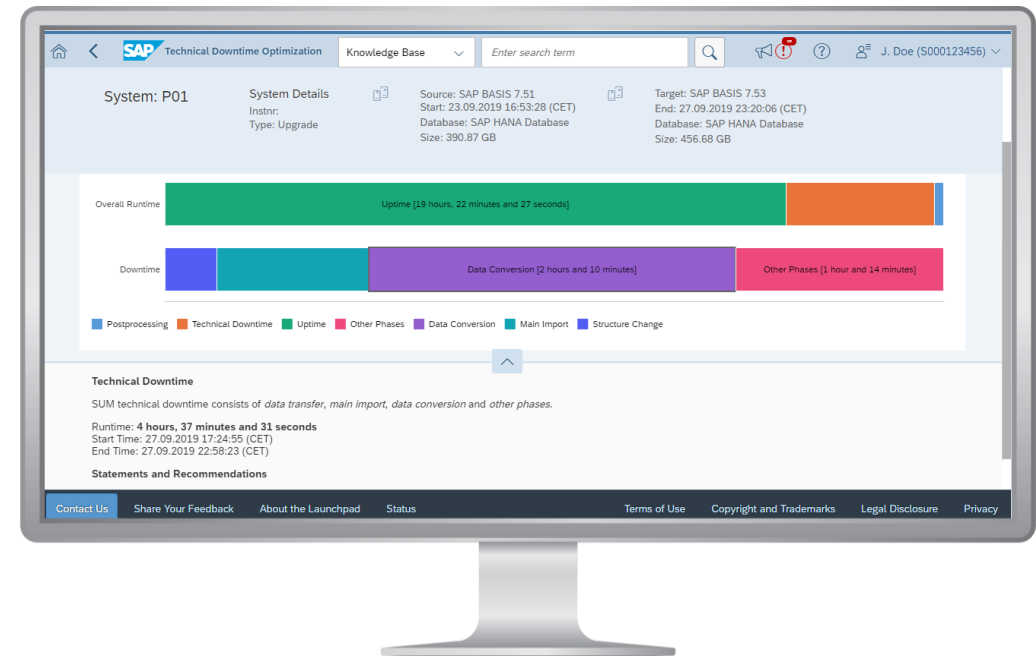
Simulation from up-to-
date knowledge base



Tailored downtime
minimization advice



Included in SAP support
offering. **No extra costs**



For more details, check SAP Note [2881515 - Introduction to the Technical Downtime Optimization App](#)

[3036423 - Frequently Asked Questions about Technical Downtime Optimization App](#)

Access the app via the SAP ONE Support Launchpad: <https://launchpad.support.sap.com/#/downtimeoptimization>

Read the blog post in the SAP Community: <https://blogs.sap.com/2020/09/16/downtime-optimization-get-insights-using-the-new-tdo-app/>

Questions & Answers



Thank you.

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