Custom Code Adaptation for SAP S/4HANA

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Agenda

Introduction

- What is SAP S/4HANA
- Challenge for your custom code

Custom code adaptation

- Custom code analysis
- Functional adaptation
- Custom code optimization

## Summary and Outlook

Introduction

SAP S/4HANA – Digital Core

SAP S/4HANA Enterprise Management
is SAP's next generation Digital Core

▶ Optimized for SAP HANA

▶ New architecture and data models

▶ "Principle of One"

▶ Renewed applications

▶ Fiori based User Experience

▶ Cloud & on-premise deployment models

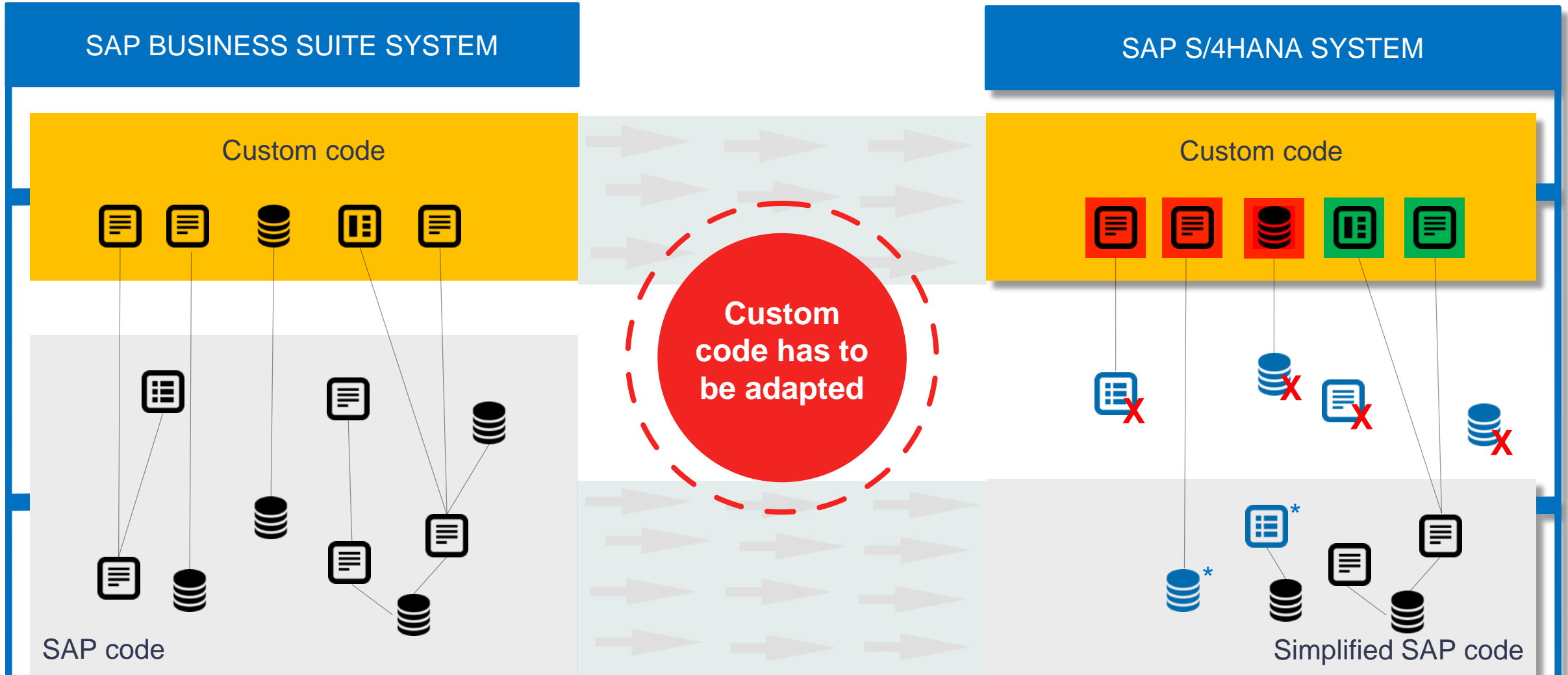**SAP S/4HANA is a *new* product line**

The classical SAP Business Suite & SAP ERP is a separate product line and will still be available

System conversion including custom code from existing SAP Business Suite or SAP ERP is possible
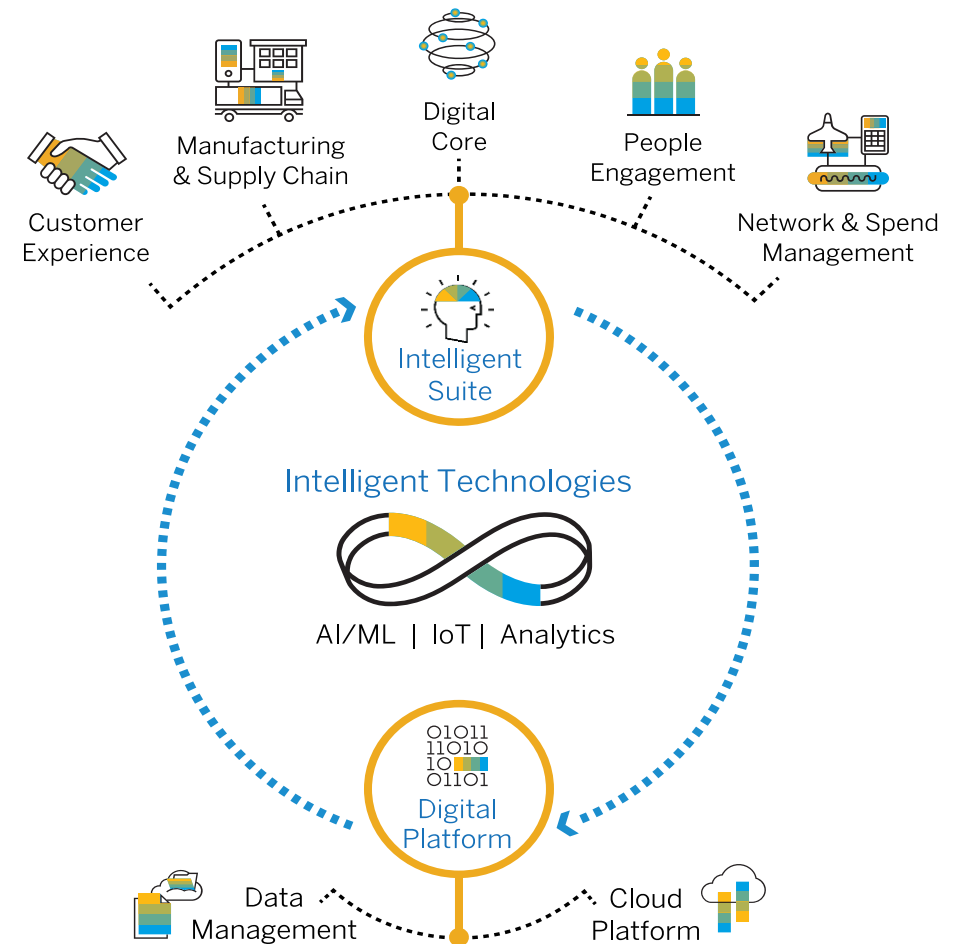
Challenge for custom code after SAP S/4HANA system conversion
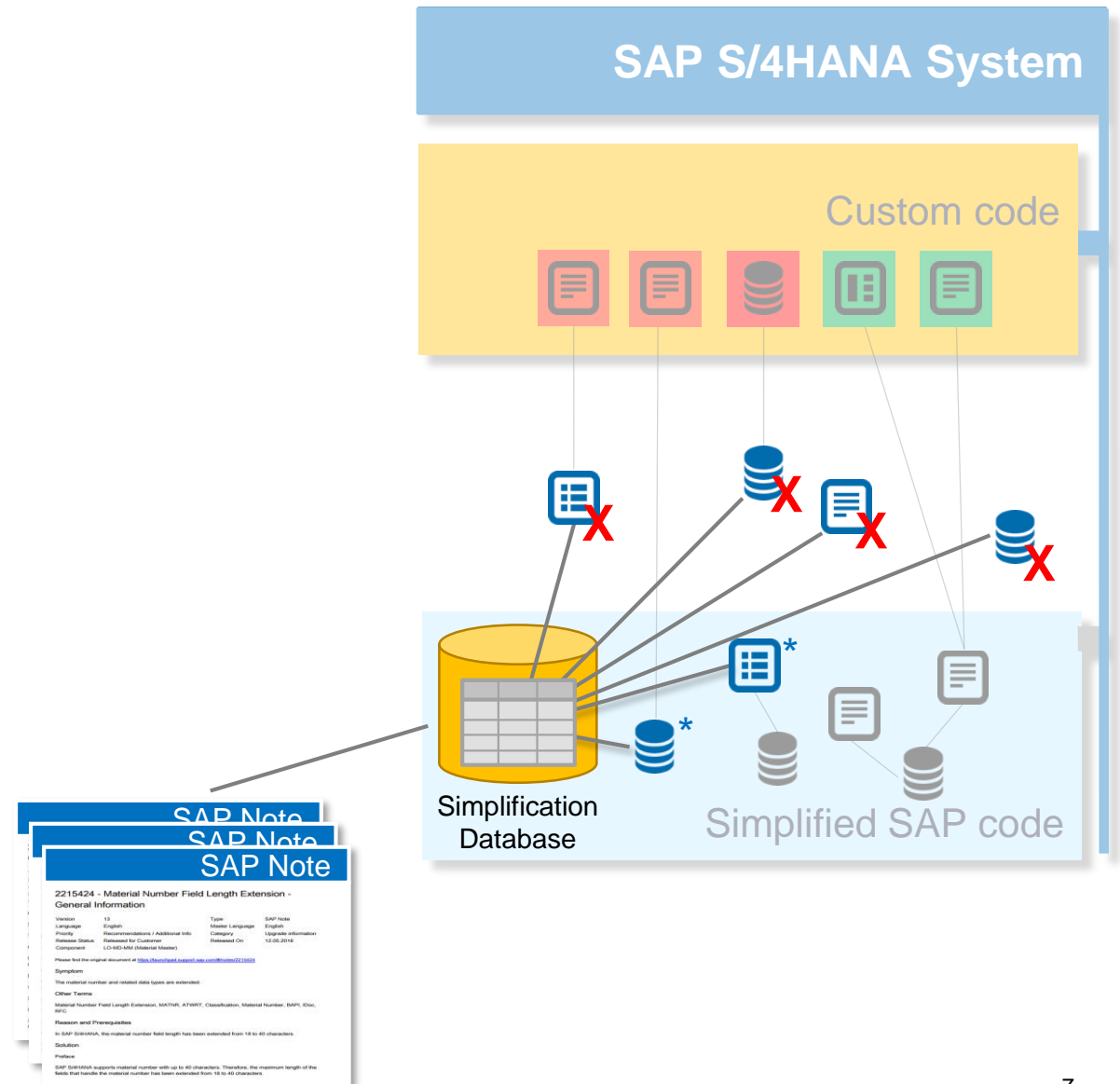
Adapt your custom code using Simplification Database

Simplification Database contains a list of **SIMPLIFICATION ITEMS**

Each simplification item refers to

- An SAP Note that describes the impact and how related custom code can be adapted

- Changed or removed SAP objects

SAP provides **TOOLS** based on the Simplification Database to detect custom code that needs to be adapted to SAP S/4HANA
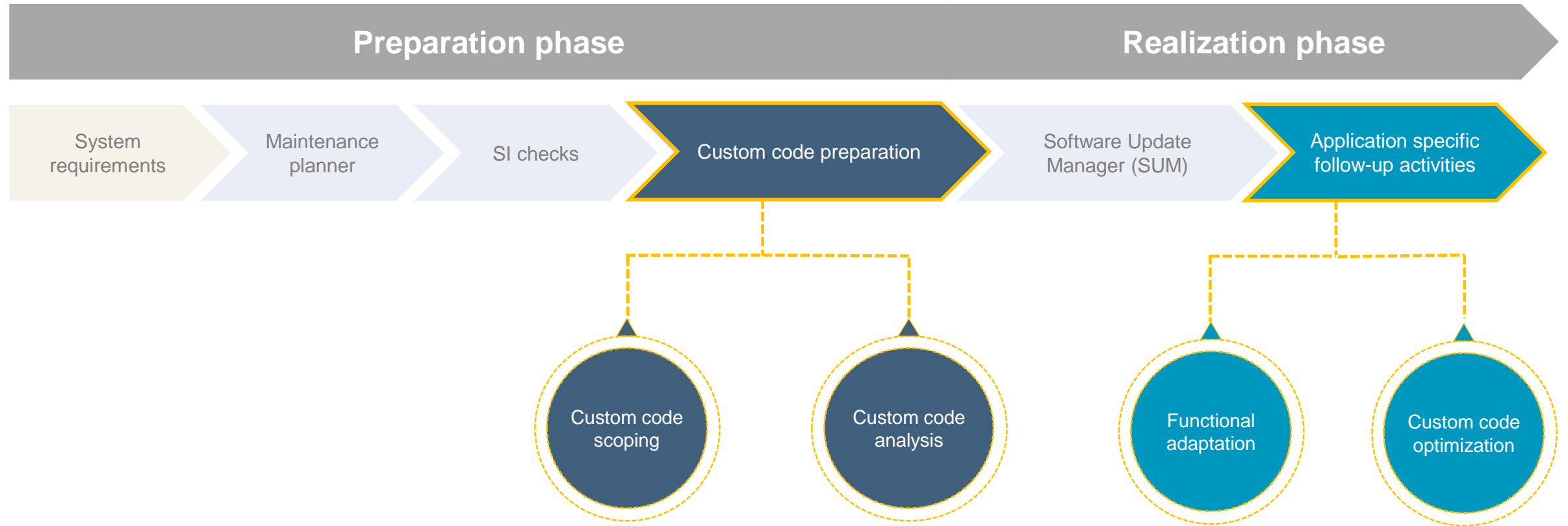

SAP S/4HANA System

Custom code

Simplification Database

Simplified SAP code

SAP Note

SAP Note

SAP Note

2215424 - Material Number Field Length Extension - General Information

Custom code adaptation

SAP S/4HANA system conversion

Custom code related process

Preparation phase					Realization phase
System requirements	Maintenance planner	SI checks	Custom code preparation	Software Update Manager (SUM)	Application specific follow-up activities

Custom code preparation:
- Custom code scoping
- Custom code analysis

Application specific follow-up activities:
- Functional adaptation
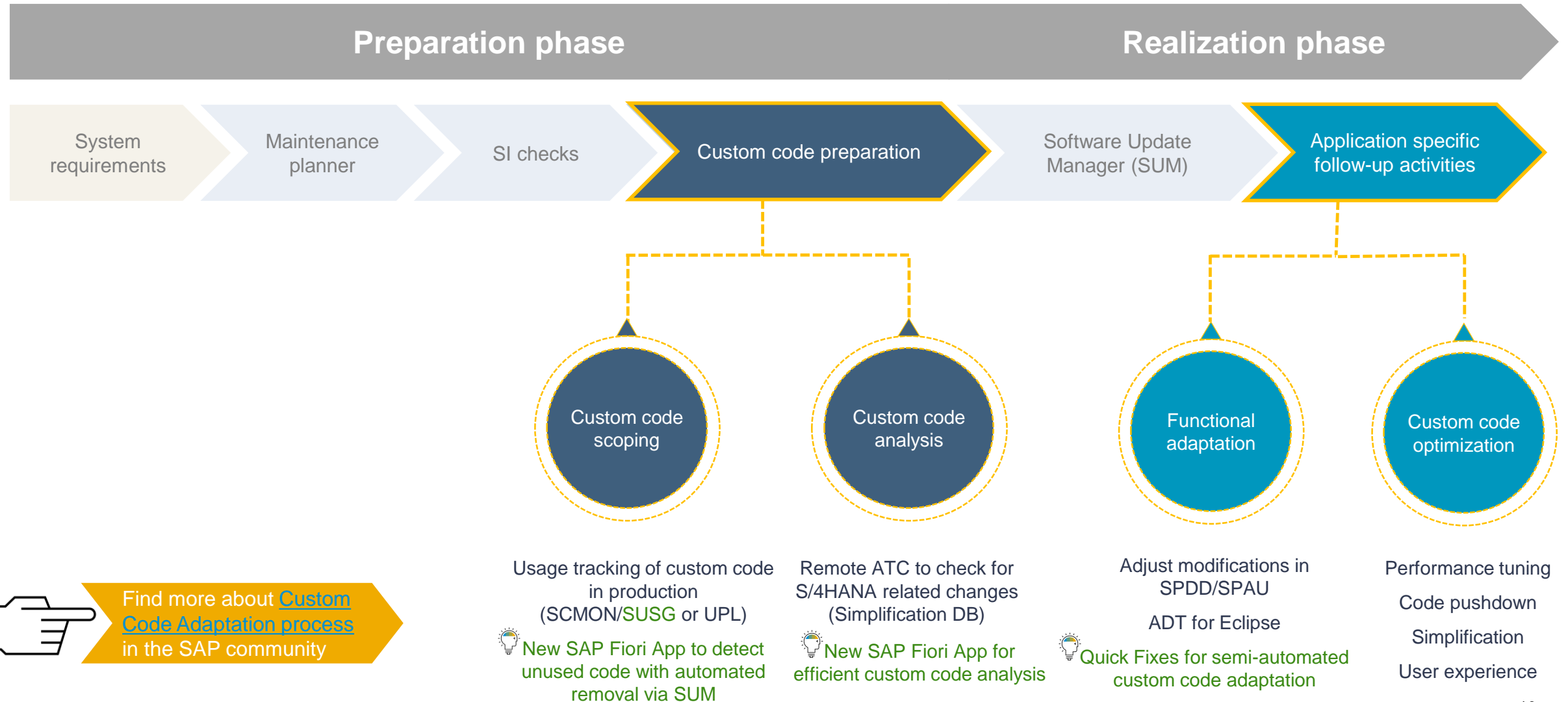- Custom code optimization

Find more about Custom Code Adaptation process in the SAP community

SAP S/4HANA system conversion
Custom code related process

Preparation phase — **Realization phase**

| System requirements | Maintenance planner | SI checks | Custom code preparation | Software Update Manager (SUM) | Application specific follow-up activities |

Custom code scoping

Usage tracking of custom code in production (SCMON/SUSG or UPL)

New SAP Fiori App to detect unused code with automated removal via SUM

Custom code analysis

Remote ATC to check for S/4HANA related changes (Simplification DB)

New SAP Fiori App for efficient custom code analysis

Functional adaptation

Adjust modifications in SPDD/SPAU

ADT for Eclipse

Quick Fixes for semi-automated custom code adaptation

Custom code optimization

Performance tuning

Code pushdown

Simplification

User experience

Find more about Custom Code Adaptation process in the SAP community

SAP S/4HANA system conversion

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Custom code scoping

MONITOR usage of your custom code via the ABAP Call Monitor (transaction SCMON)

AGGREGATE usage data in your production system with SUSG transaction (*)

ANALYZE usage data in SAP Fiori App Custom Code Migration to define custom code migration scope

REMOVE unused code during the SAP S/4HANA conversion automatically via SUM

Aggregate usage data in SUSG transaction

Usage Data: Aggregation State

| Activate | Deactivate | Create Snapshot | Manage Snapshots | Display Log | Application Help |

State	
Aggregation	■ Active (Aggregation scheduled at: 26.02.2019 02:30:00)
Aggregation Period	From: 13.12.2018 To: 24.02.2019
Aggregated Days	Days available: 74, Days missing: 0
Aggregated Records	Data records: 191.508, Object data records: 41.576, Request data records: 1.017
Aggregation Log	Errors: 0, Warnings: 74, Deactivation Warnings: 0
ABAP Call Monitor	⚠ GET_LOG_STATUS not installed, see note 2701371

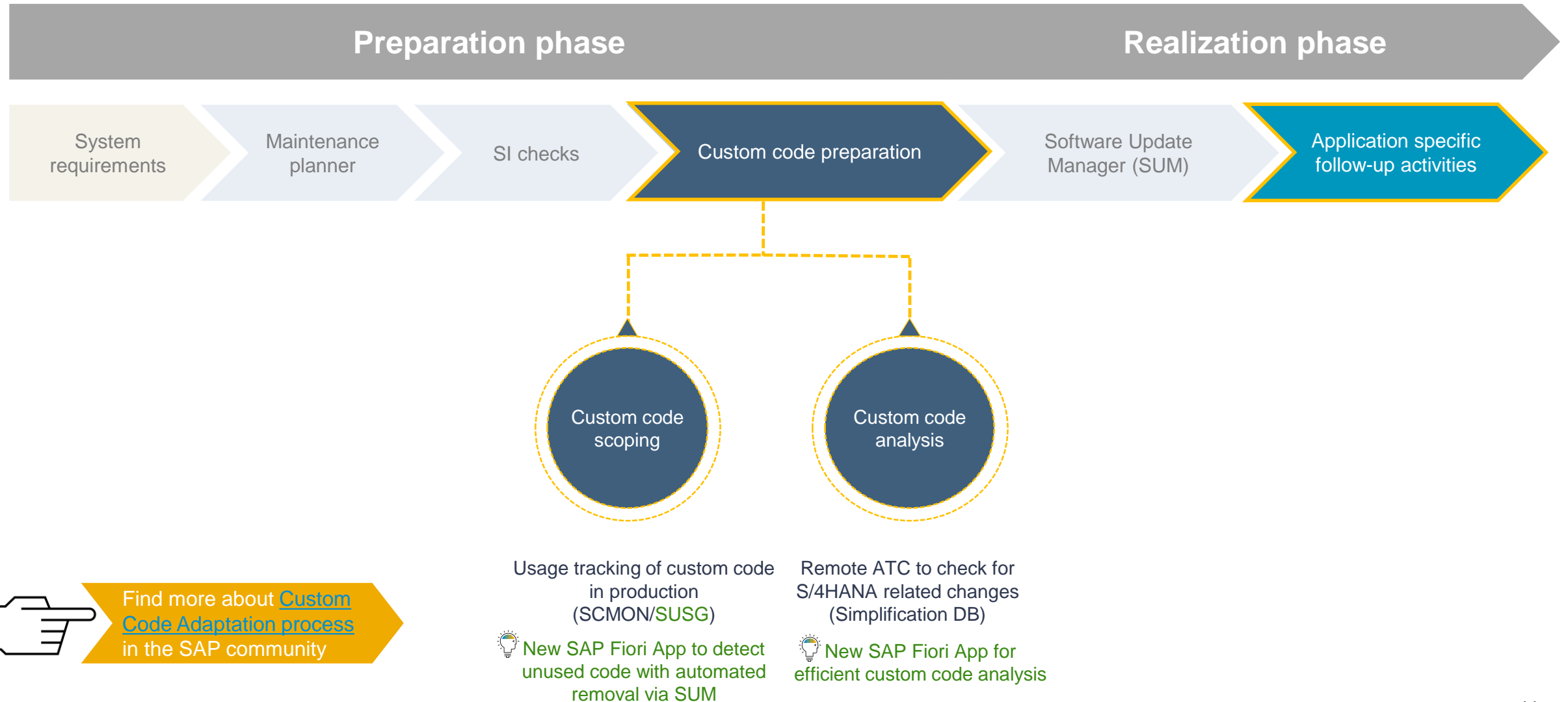## Scoping in SAP Fiori App Custom Code Migration

Scope Packages   Scope Request Entry Points   Details   View By

Scope Information / Detailed Scope Information

Legend:
- In scope (by request entry point)
- In scope (by reference)
- In scope (by object)
- Not in scope
- In scope (by user selection)

* Custom code evaluation with CCLM/UPL tools of SAP Solution Manager is still possible
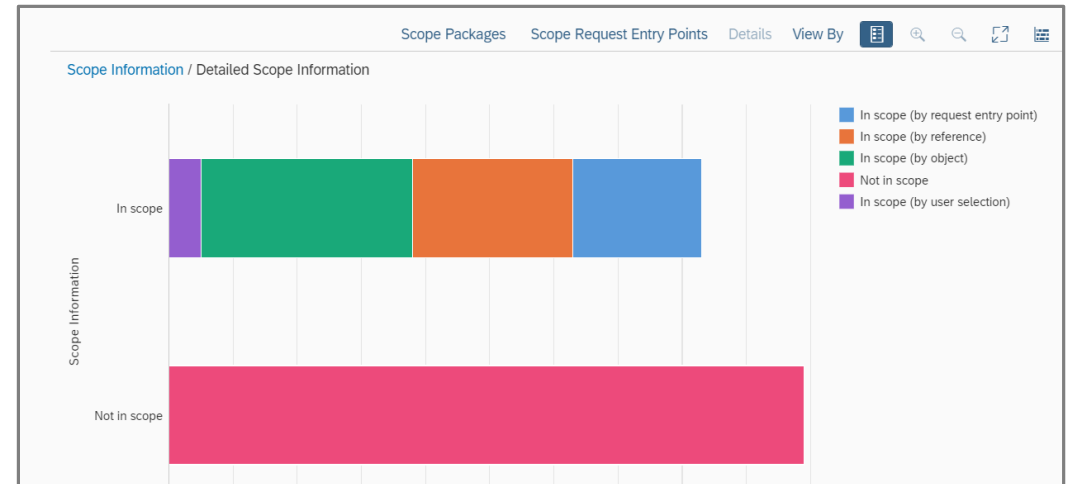
Demo

Analyze custom code usage data (SCMON/SUSG)

SAP S/4HANA system conversion

Custom code related process

| Preparation phase | Realization phase |

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💡 New SAP Fiori App to detect unused code with automated removal via SUM

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💡 New SAP Fiori App for efficient custom code analysis

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Technical infrastructure for custom code analysis

CENTRAL ATC SYSTEM TO ANALYZE CUSTOM CODE
in whole system landscape

- ▶ **REMOTE** stubs return a model from custom code

- ▶ **CHECK LOGIC** is executed on central system

- ▶ **RESULT** is analyzed in central system

- ▶ **INTEGRATED** in development environment

- ▶ **ALL KINDS OF CUSTOM CODE** are supported (incl. modifications and enhancements)

- ▶ **SUPPRESS** false-positive findings with pseudo-comments, e.g. for MATNR findings

- ▶ **INSTALL** Simplification DB via OSS Note 2241080

Central Check System

ABAP Test Cockpit (ATC)

Simplification DB

RFC   RFC   RFC

Checked System A (>=7.00)
Customer Code

Checked System B (>=7.00)
Customer Code

Checked System C (>=7.00)
Customer Code

Remote Stubs
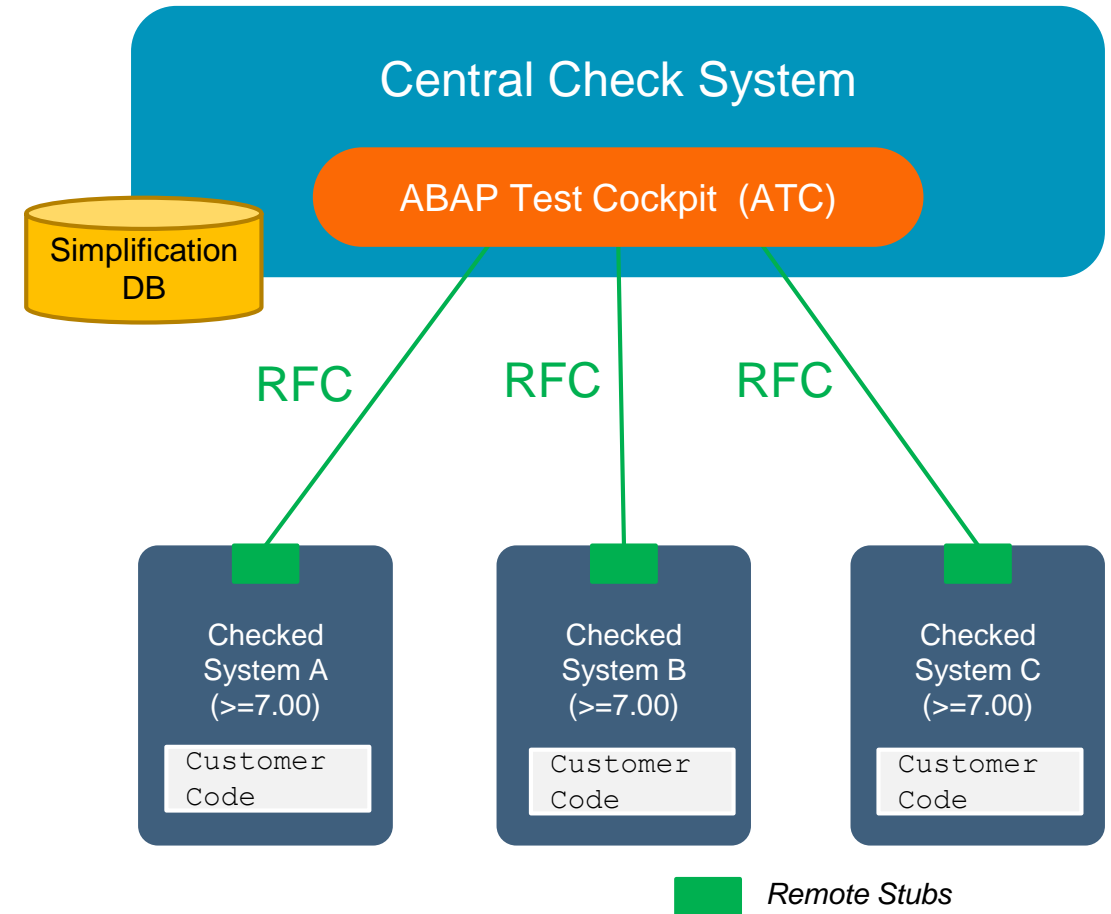
Find more about Remote code analysis with ATC in the SAP community

SAP S/4HANA readiness checks

SIMPLIFICATION USE CASES

▶ Functionality not available anymore

▶ Data model changes

▶ Data type changes

SAP HANA USE CASES

▶ Use of DB vendor specifics (native SQL)

▶ DB operations on pool/cluster tables

▶ SELECT/OPEN CURSOR statements without ORDER BY

Use check variant **S4HANA_READINESS_REMOTE** which includes **SAP S/4HANA** and **SAP HANA** checks

SAP S/4HANA checks

SAP HANA checks

Analysis of SAP S/4HANA findings in ABAP Test Cockpit (ATC)

USE STATISTICS VIEW with display criteria

- SAP Note number

- Referenced simplified object

- Application component

USE SIMPLIFICATION INFORMATION in ATC result list
with filtering and sorting capabilities

- SAP Note number incl. title

- Referenced simplified object

- Application component

USE DOUBLE-CLICK NAVIGATION from ATC result

- Navigate to SAP Notes, Referenced Objects, ATC findings

ATC Statistics View with Simplification Item information

Analysis of SAP S/4HANA findings in SAP Fiori App Custom Code Migration

USE PREDEFINED FILTERS

▶ **Findings by SAP Note**
In which SAP S/4HANA simplification areas you get the most findings?

▶ **Findings by Scope**
How many findings are in the custom code you take over to SAP S/4HANA?

▶ **Findings by Priority**
What are the most important (urgent) findings?

▶ **Findings by Quick Fix Availability**
Which findings can be fixed automatically?

AGGREGATION AND FILTERING OF FINDINGS

FOCUS ON USED CUSTOM CODE

DRILL-DOWN TO ATC RESULTS

Analysis in SAP Fiori Custom Code Migration App
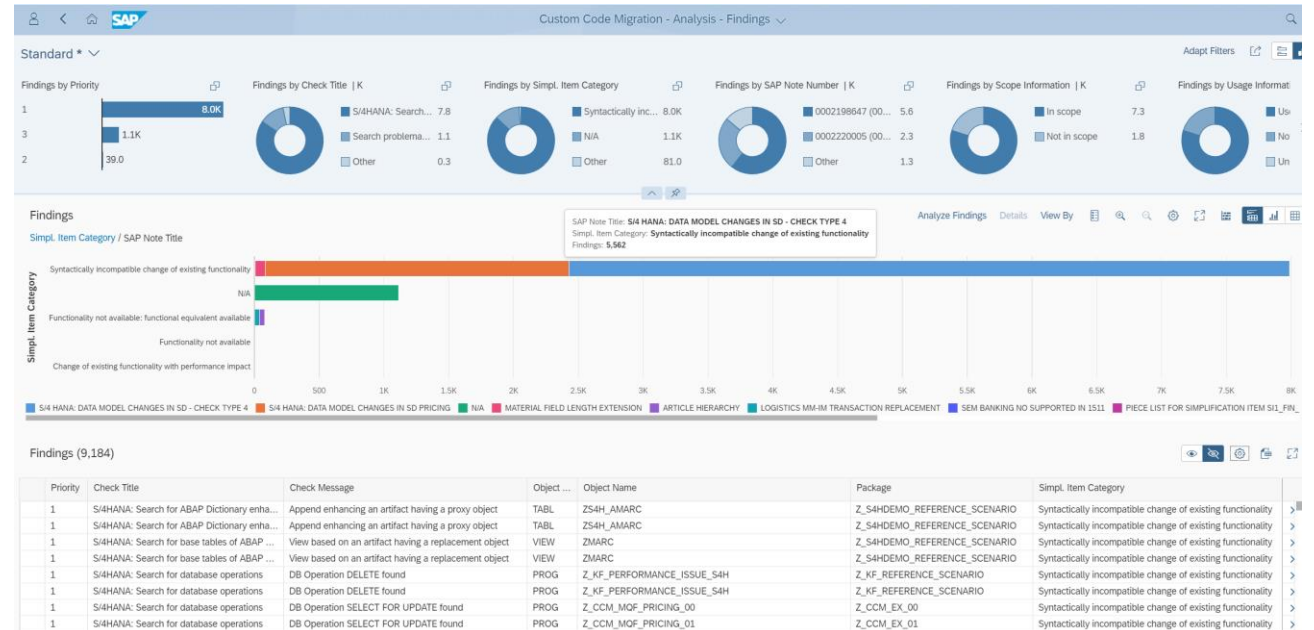
Find more about SAP Fiori App Custom Code Migration in the SAP community

Custom code analysis options

	Remote ATC with SAP GUI	SAP Fiori Custom Code Migration App	SAP Fiori Custom Code Migration App in SAP Cloud Platform
Required system	Central ATC check system **(SAP_BASIS 7.52)**	Central ATC check system **(SAP S/4HANA >=1809)**	SAP Cloud Platform, ABAP Environment
System location	in customer landscape	in customer landscape	cloud
Remote connectivity	via RFC	via RFC	via RFC and SAP Cloud Connector
Analyze SAP S/4HANA findings	✓	✓	✓
Simplification information in ATC result	✓	✓	✓
Filter results by scope and Quick Fix availability	✗	✓	✓
Define custom code migration scope based on usage data	✗	✓	✓
Remove unused code during system conversion via SUM	✗	✓	✓

Demo

Custom code analysis with SAP Fiori App Custom Code Migration

SAP S/4HANA system conversion

Custom code related process

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Functional adaptation in ABAP Development Tools (ADT) in Eclipse

ABAP TEST COCKPIT IN ADT

▶ Tightly integrated in development ("Run As…" menu)

▶ Browse all ATC check runs of the system (filter by users) using ATC Result Browser

▶ Display Simplification Item information (e.g. SAP Notes, Referenced Objects) incl. navigation

▶ Integrate checks in your on-going development activities, e.g. during transport release

▶ Change contact person to transfer findings

** Functional adaptation in ABAP Workbench (SE80) still possible with limitations:
no automatic code adaptation, CDS and AMDP not supported*

Run ATC in ABAP Development Tools in Eclipse

Coverage As	>	
Run As	>	✔ 1 ABAP Test Cockpit
Debug As	>	✔ 2 ABAP Test Cockpit With…
Profile As	>	3 ABAP Unit Test

ATC Problems View

ATC Problems ✖

▶ 🗂 CWJ (Code Inspector) ▶ 🗎 S4HANA_READINESS_1809 ▶ 🔍 Last Check Run

type filter text

Description	Object Name
∨ 🗂 Findings: 9 Errors, 1 Warnings, 1 Infos	
∨ ✔ S/4HANA: Field length extensions (1 Warnings, 1 Infos)	
🔍 Structure-Component MATNR (DOMA MATNR, Note: 0002215424) type conflict C(40) -> C(18)	ZDEMO_LIST_MARA_RECORDS
🔍 Type DOMA MATNR, Note: 0002215424 -> Generic Parameter T_TABLE of Class CL_SALV_TABLE, Method FACTORY	ZDEMO_LIST_MARC_RECORDS
∨ ✔ S/4HANA: Search for database operations (4 Errors)	
🔒 DB Operation SELECT found (KONV, see Note(s):0002220005)	ZDEMO_ADJUST_CURRENCY_CODE
🔒 DB Operation SELECT found (VBUK, see Note(s):0002198647)	ZDEMO_LIST_COMPLB_SALES_ORDRS
🔒 DB Operation SELECT found (VBUK, see Note(s):0002198647)	ZDEMO_LIST_COMPL_SALES_ORDRS
🔒 DB Operation UPDATE found (KONV, see Note(s):0002220005)	ZDEMO_ADJUST_CURRENCY_CODE
∨ ✔ S/4HANA: Search for usages of simplified objects (3 Errors)	
🔒 Functionality not available: functional equivalent available (TRAN MATGRP03, see Note(s): 0002368680)	ZDEMO_DASHB_SAP_TRANSACTIONS
🔒 Functionality not available: functional equivalent available (TRAN MB11, see Note(s): 0001804812)	ZDEMO_DASHB_SAP_TRANSACTIONS
🔒 Syntactically incompatible change of existing functionality (DTEL VBTYP, see Note(s): 0002198647)	ZDEMO_SHOW_SALES_DOCUMENT
∨ ✔ Search problematic statements for result of SELECT/OPEN CURSOR without ORDER BY (1 Errors)	
🔒 READ .. BINARY SEARCH for result of statement at Include ZDEMO_LIST_COMPL_SALES_ORDRS line 12	ZDEMO_LIST_COMPL_SALES_ORDRS
∨ ✔ Test Existence of a Program (1 Errors)	
⬛ Syntax error in program ZDEMO_SALES_DOCUMENT_COUNTER .	ZDEMO_SALES_DOCUMENT_COUNTER

Semi-automatic custom code adaptation in ADT via Quick Fixes

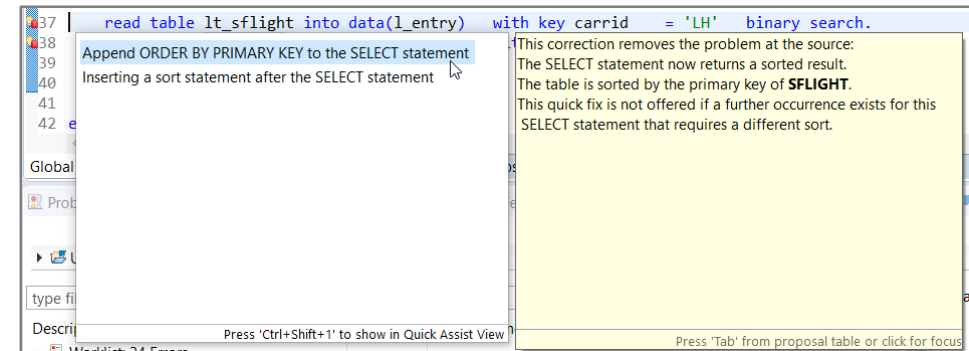**QUICK FIXES** to minimize adaptation efforts

▶ Order By

▶ MATNR and Amount Field Length Extension

▶ Data Model Changes, e.g.

   ▶ KONV

   ▶ VBUK/VBUP

   ▶ BSEG

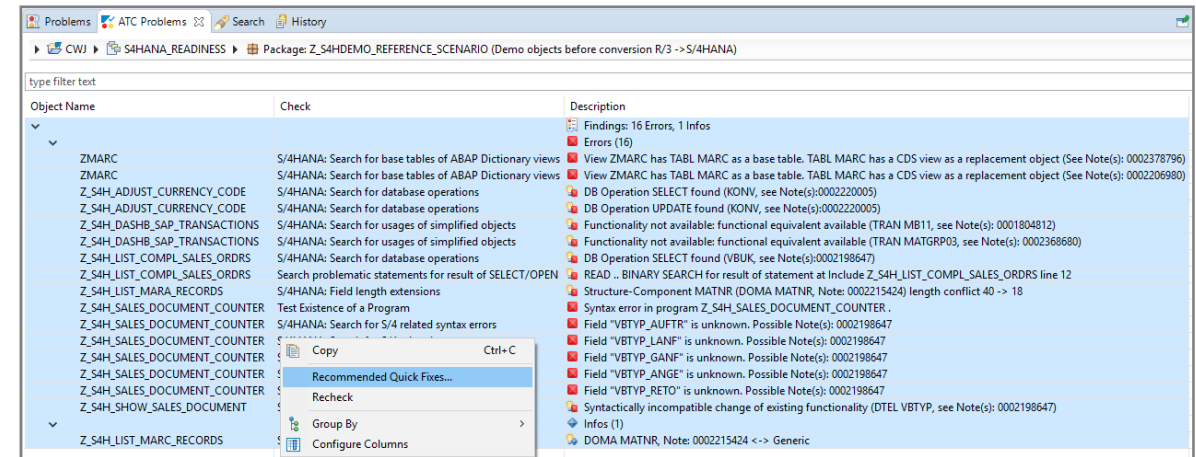**MASS-ENABLED** Quick Fixes to adapt whole work packages in one step

Find more about Semi-automatic custom code adaptation in the SAP community

Quick Fixes in the Source Code Editor

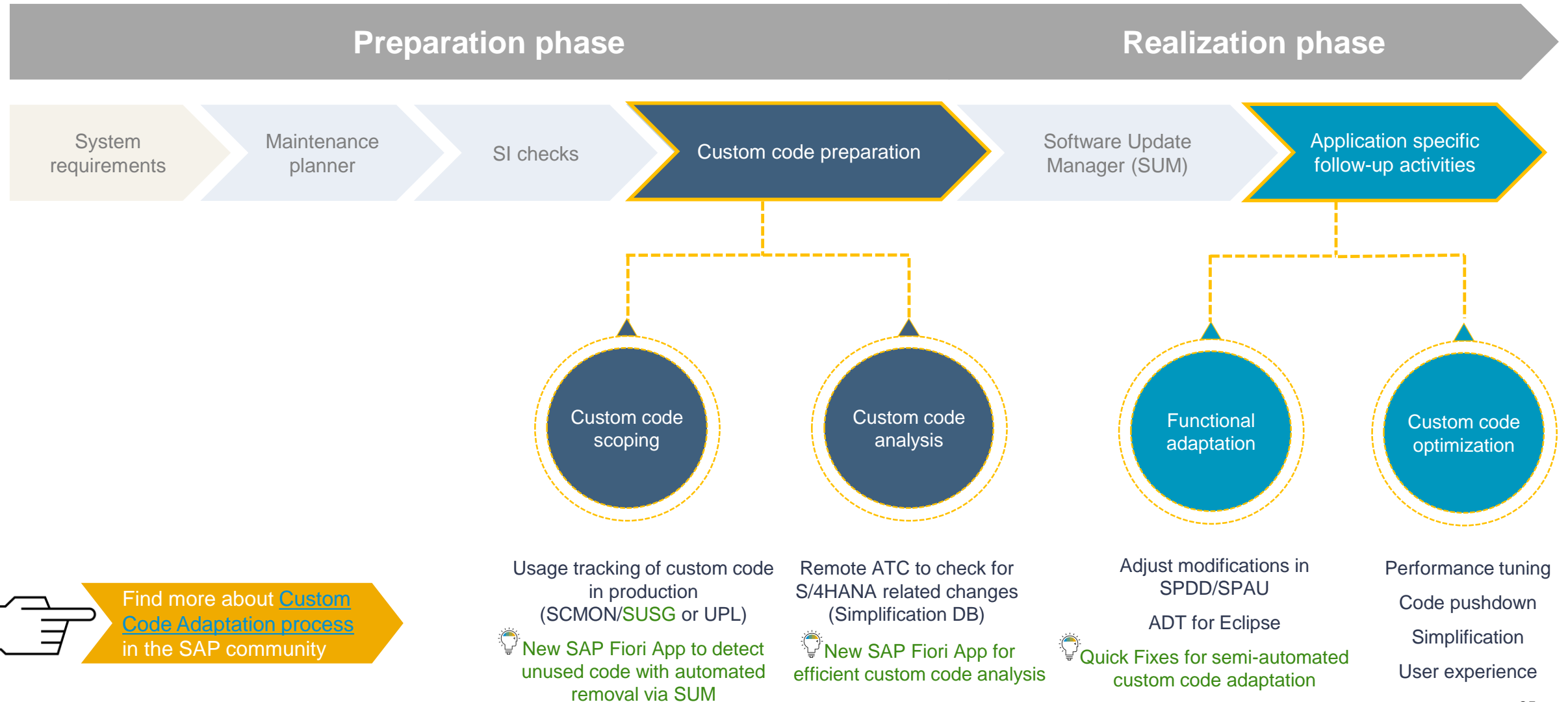## Mass-enabled Quick Fixes in the ATC Problems View

Demo

Custom code adaptation with Quick Fixes in ADT

SAP S/4HANA system conversion

Custom code related process

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Custom code optimization & modernization

SAP S/4HANA®

… is not only about new applications. You also get a RENEWED TECHNOLOGY STACK

OPTIMIZE TOWARDS SAP HANA
(code pushdown, performance tuning)

EMBEDDED ANALYTICS
Execute reporting directly on your transactional data

DECOUPLE CUSTOM CODE
from SAP standard to prepare the code for the cloud

USE MODERN ABAP LANGUAGE

ABAP RESTful PROGRAMMING MODEL
To easily develop SAP Fiori-based Apps

Performance tuning using SQL Monitor

SQL Monitor allows to get performance data for all SQLs executed in your productive system

▶ What are the most expensive and most frequently executed SQLs?

▶ Which SQL reads/writes millions of records?

▶ What is the SQL profile of transaction VA01?

SQL Monitor allows to link the monitored SQL to the driving transaction

Available for **SAP NetWeaver >= 7.00**

SQL Monitor does not harm your business processes (**performance overhead < 3%**)

Request Entry Point	DB statements	DB Max T	DB Min T	DB Dvtn T	Max Rcrds
/IWBEP/SB	6.968	3.541.8...	1,000	303,972	100.000
/IWFND/MAINT_SERVICE	3.114	63.841,...	0,000	44,516	38.344
BOBX	3.348	328.106...	0,003	212,253	15.441
BP	10.143	1.801.4...	0,000	1.359,184	86.749
LTMOM	2.521	38.252,...	0,412	25,140	274.006
MM01	6.082	1.800.0...	0,002	1.060,292	409.950
MWB	6.027	366.905...	0,000	118,044	274.127
OS_APPLICATION	7.674	103.838...	0,000	108,758	89.057
SACC2	982	24.122,...	0,218	26,210	380.232
SCWB	7.389	1.349.7...	0,000	597,504	117.354
SE01	5.168	372.356...	0,003	309,018	497.853
SE09	6.903	3.636.7...	0,000	833,215	360.629
SE11	20.752	3.616.9...	0,000	814,769	4.709.072
SE18	7.803	982.535...	0,005	412,379	42.695
SE19	5.689	256.192...	0,009	185,794	50.344
SE24	15.820	3.623.5...	0,000	819,320	199.983
SE37	12.194	362.198...	0,002	227,158	71.882
SE38	15.332	1.875.3...	0,000	767,321	1.114.076
SE54	10.000	56.620,...	0,002	53,512	97.509
SESSION_MANAGER	2.155	3.644.6...	0,000	2.367,225	42.399
SEU_INT	34.526	3.627.8...	0,000	703,336	9.867.019
SFW5	833	7.674,482	0,178	9,091	3.177
SM30	21.616	387.754...	0,000	212,450	1.977.959
SM34	16.872	89.307,...	0,000	64,274	97.500
SPRO	29.208	377.131...	0,002	184,303	558.727
SU22	3.042	443.424...	0,003	154,133	122.463

Find more about SQL Monitor Guide and Best Practices in the SAP community

SQL Monitor – Example

BUSINESS PROCESS LIST RANKED BY TOTAL DB TIME

Total DB Time	Total Time	DB T..	Tot. DB E	Total Records	DB Mn T	Sessi..	Request Type	Request Entry Point	DB stmn..	DB Max T	DB Min T	DB Dvtn	Max Rcrds	Min Rcrds	Mean R..	Dvtn Rc..
880.399.164,4...	1.507.934.919,..	58,38	148.713.640	1.018.292.1...	5,920	527	Batch Job	ZSQLM_TEST	149	9.870,1...	0,089	20,433	100.000	0	6,847	751,439
454.645.987,6...	530.479.364,2..	85,70	74.191.995	495.636.853	6,128	6.287	Remote Func..	ZSQLM_CALLBACK_RFC	36	15.081,...	0,229	53,717	100.000	0	6,680	750,966
441.514.573,5...	447.770.339,2..	98,60	74.626.760	369.032.400	5,916	520	Batch Job	ZSQLM_TEST3	6	11.323,...	0,376	16,223	100.000	0	4,945	651,831
144.984.946,4...	156.231.746,6..	92,80	236.797.836	2.840.340.7...	0,612	3.156	Batch Job	ZSQLM_TEST11	3	214.15...	0,300	13,951	75.000	0	11,995	908,016
14.423.850,765	14.484.963,817	99,58	69.432	473.415.780	207,741	3.156	Batch Job	ZSQLM_TEST11_OPT	3	12.440,...	0,292	1.023,9...	75.000	0	6.818,4...	21.561,...
3.492.813,580	58.553.884,853	5,97	22.360	119.797.600	156,208	520	Batch Job	ZSQLM_TEST3_OPT	5	9.865,5...	10,521	729,088	100.000	0	5.357,6...	20.941,...
1.997.205,874	2.032.910,598	98,24	430.539	2.129.610	4,639	3	Submit Report	ZSQLM_TEST3	6	3.613,6...	0,393	8,855	100.000	0	4,946	651,934
1.785.592.073	3.065.212.992	58.25	287.938	1.955.274	6,201	284	Unknown	INITIAL_BOOTID	225	7.015.5	0.144	22.117	100.000	0	6.791	751.869

DRILL DOWN

SQL PROFILE OF REPORT *ZSQLM_TEST3* RUNNING AS BATCH JOB (6 SQL STATEMENTS)

Total DB Time	DBTime[%]	DB Tm/TT	DB Exctns	DB Exct[%]	Total Records	Records[%]	DB Mn T	Table Names	SQL Operation Type	Obj.	Object Name	Include Name	Include Li	ABAP Source Code Fragment
438.268.499,380	99,26	97,88	74.620.000	99,99	5.137.600	1,39	5,873	ZSQLM_TEST_ORDER	SELECT (Open SQL)	PROG	ZSQLM_TEST3	ZSQLM_TEST3	59	SELECT SINGLE * FROM ZSQLM_TEST_ORDER INTO WA WHERE ORDER_ID = DETAILS
2.668.066,669	0,60	0,60	520	0,00	52.000.000	14,09	5.130,897	ZSQLM_TEST_ORDER	INSERT (Open SQL)	PROG	ZSQLM_TEST3	ZSQLM_TEST3	101	INSERT ZSQLM_TEST_ORDER FROM TABLE ITAB.
402.158,996	0,09	0,09	2.600	0,00	233.997.400	63,41	154,677	ZSQLM_TEST_ORDER	SELECT (Open SQL)	PROG	ZSQLM_TEST3	ZSQLM_TEST3	33	SELECT * FROM ZSQLM_TEST_ORDER INTO TABLE ITAB WHERE ORDER_ID < 90000.
76.519,161	0,02	0,02	520	0,00	51.900.000	14,06	147,152	ZSQLM_TEST_ORDER	DELETE (Open SQL)	PROG	ZSQLM_TEST3	ZSQLM_TEST3	93	DELETE FROM ZSQLM_TEST_ORDER.
72.053,510	0,02	0,02	2.600	0,00	25.997.400	7,04	27,713	ZSQLM_TEST_ORDER	SELECT (Open SQL)	PROG	ZSQLM_TEST3	ZSQLM_TEST3	36	SELECT * FROM ZSQLM_TEST_ORDER APPENDING TABLE ITAB WHERE ITEM_NAME LI
27.275,880	0,01	0,01	520	0,00	0	0,00	52,454	<NO_TABLE>	Commit	PROG	ZSQLM_TEST3	ZSQLM_TEST3	102	COMMIT WORK.

CODE

```
method get_details.
  data details type t_order_details.
  data wa type zsqlm_test_order.
```

Simple Nested Reading DB OP (SELECT) found: Search DB Operations in loops across modularization units

```
  loop at important_order_details into details.
    select single * from zsqlm_test_order into wa
      where order_id = details-order_id and order_details_id = details-order_details_id and
            item_name like pattern. "check existence.
    if sy-subrc = 0.
```
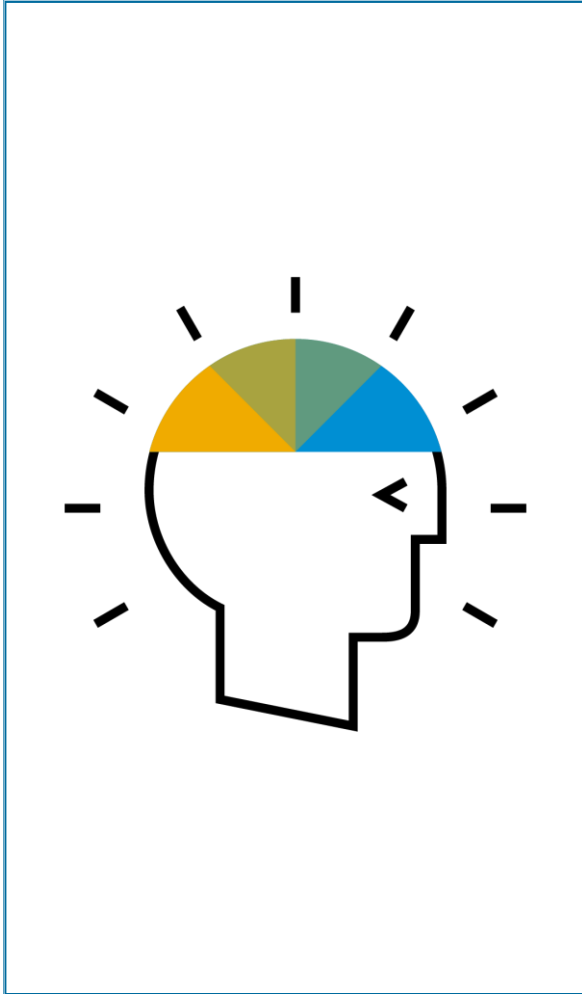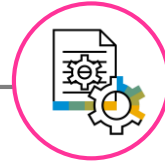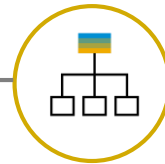
NAVIGATE

Summary and Outlook

Key takeaways

SAP S/4HANA is a new product and your custom code has to be adapted to its changes stored in Simplification Database
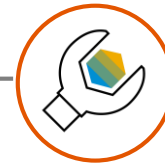
Start your SAP S/4HANA journey today and switch on usage analysis with SCMON/SUSG

Remote ATC is the technical infrastructure for all static checks on your ABAP custom code

SAP Fiori App Custom Code Migration guides you through the custom code adaptation process for SAP S/4HANA and supports you to remove unused code

ADT with mass-enabled Quick Fixes is the tool of choice for semi-automated custom code adaptation for SAP S/4HANA in a highly efficient way
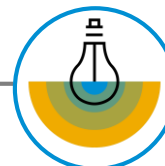
Optimize your custom code for SAP S/4HANA using code pushdown, performance tuning, ABAP RESTful Programming Model (RAP)

Outlook: Planned features

SAP FIORI APP CUSTOM CODE MIGRATION

Integration of effort estimation capabilities

Analysis of source code complexity

Integration of modification data (SPAU) to detect reset candidates ("Back to Standard")

Integration of SQLM data for performance analysis

Support for "Greenfield" projects

QUICK FIXES FOR SAP S/4HANA ON PREMISE

Additional Quick Fixes for SAP S/4HANA findings

Quick Fixes for non-source code artifacts, e.g. DDIC

Quick fixes for code modernization, e.g. new SQL syntax, usage of whitelisted APIs

What you can do today in your SAP Business Suite landscape

Get your custom code prepared for SAP S/4HANA

YOU **SHOULD**

Collect productive usage and SQL execution data

- Switch on SCMON/SUSG (recommended) or UPL
- Switch on SQL Monitor

Create new code "SAP S/4HANA ready"

- Setup remote ATC
- Use SAP S/4HANA ATC checks in your dev system

Make your developers "SAP S/4HANA ready"

- Gain practical skills in ADT in Eclipse
- Get familiar with SAP S/4HANA must-have technologies (e.g. CDS, BOPF, OData)

YOU **COULD**

Start to adapt your code in your dev system

- Convert to Unicode
- Fix SAP HANA ATC findings (e.g. NO ORDER)
- Optimize performance critical SQLs found in SQL Monitor

Estimate custom code adaptation efforts

- Run SAP S/4HANA ATC checks for all custom code

Further information

SAP Community for ABAP Testing and Analysis: https://www.sap.com/community/topics/abap-testing-analysis.html

Custom Code Adaptation for SAP S/4HANA

Find out how to adapt your custom code for SAP S/4HANA and which tools to use.

Read the blog | Read the FAQ

Remote Code Analysis with ATC

Recommendations for customers

Experiences from customers

Custom code analysis for SAP S/4HANA with SAP Fiori App Custom Code Migration

Learn how to analyze your custom code for SAP S/4HANA using the new SAP Fiori App Custom Code Migration.

Read the blog

Usage analysis for your custom code

Learn how to collect and aggregate usage data for your custom code. Collected usage data is the basis for transition of your custom code to SAP S/4HANA.

Collect usage data with ABAP Call Monitor (SCMON)

Aggregate usage data with SUSG

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Thank you.

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