DCRUM – SAP Monitoring

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1. Overview

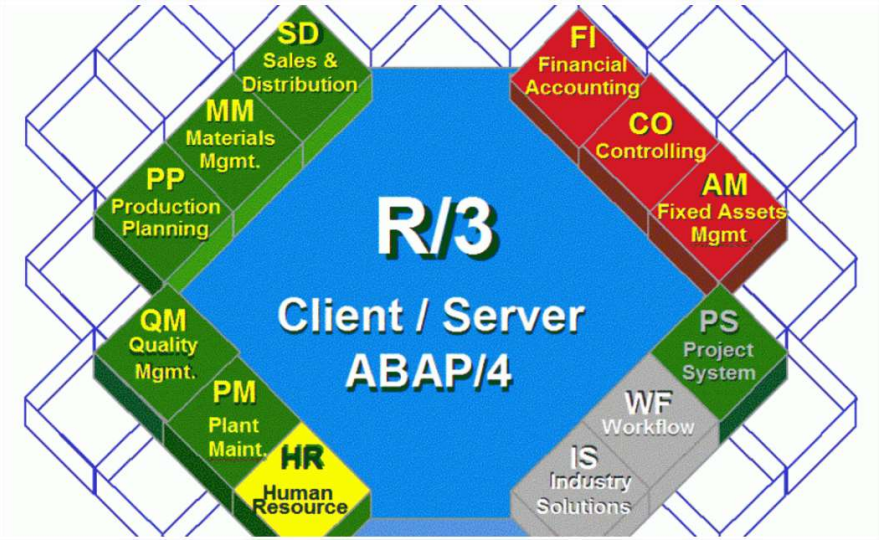
The goal of this document is to describe the monitoring of SAP system in DCRUM. It starts by the description of what is a SAP systems, then continues with the process of the onboarding in DCRUM and finally the reportin.

2. SAP ERP System description

Definition

SAP solution (Systems, Applications and Products for data processing)

The ERP solutions are crucial for enterprise with a certain size because it helps the different functions / services of the enterprise working together.



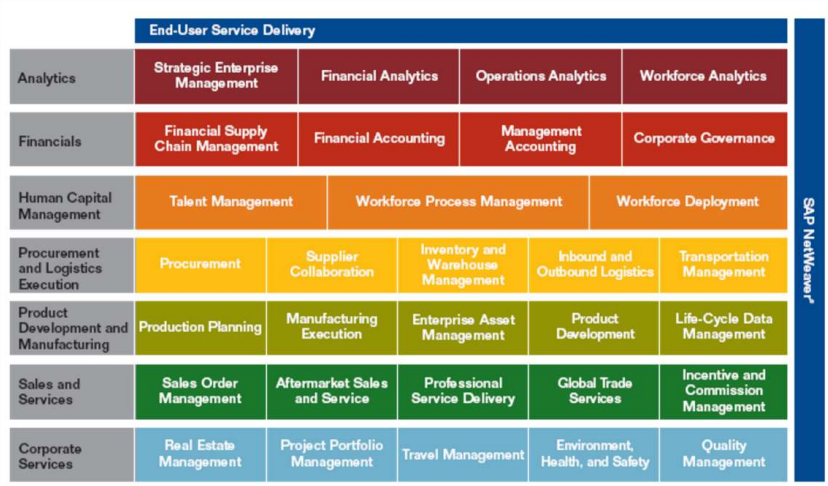
In the ERP market, there are multiple vendors and the most famous vendors are SAP, Oracle and Microsoft. However, the leader is SAP with the solution SAP ERP.

Modules

As explained the ERP solution must work with the different functions or divisions of the enterprise. For example, the Financial division should be able to access the client accounts and in the meantime the Production one should be able to access the production planning for the same contracts.

For that reason, SAP ERP is organized in modules corresponding to the functions for one SAP ERP system. All the modules access the same root systems of SAP ERP with the same data.

During the installation of an SAP ERP system, all the modules are installed and active, there is no need to enable / disable modules with the licensing (see chapter related to licensing).



Licensing

The customer of SAP buys a certain number of users which can access the SAP system. Then, the SAP administrator will determine which users can access the different modules. To control the user licensing, it's important to know which users request the system, how many times and which activities are requested.

The user licensing previously described is block based, meaning SAP customers purchase blocks of licenses. In SAP the licensing is flexible because it allows to exceed the purchased number before any issue appears. For example, if 1000 user licenses were bought, more than 1000 users can be connected to the SAP systems. Of course, if this situation is frequent, more users (or block of users) must be acquired.

Knowing this information in detail is critical to avoid overutilization and overage fees or underutilization and useless licensing and this is where DCRUM can help.

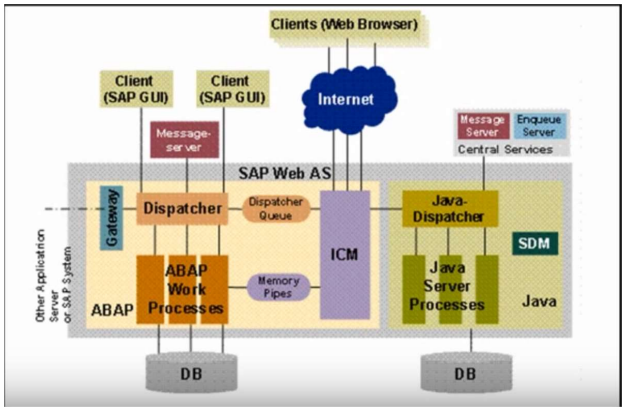
Architecture and dataflow

The users access the SAP platform using either the SAP thick client or a web interface. The TCP protocols are **SAP GUI** for the thick client and HTTP for the web interface.

The SAP GUI clients are connected to the application servers through the web dispatcher while the web clients are connected to the Internet Communication Manager (ICM), that ensures the communication between the SAP ERP and the outside world (HTTP or HTTPS).

The dispatcher has the role of selecting the best available SAP process for the client. Then, the client is connected to the selected one, and for the Web client through the ICM.

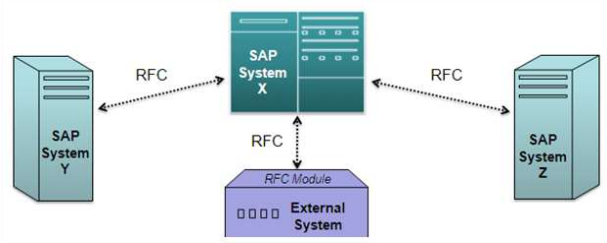
Lastly, there is the backend traffic between the application process/server and the database server.



When onboarding a SAP application, the architecture and the data flow are very important to understand in

order to be able to determine which servers or flows should be prioritized when it comes to monitoring. Of course, the first priority is the frontend users' traffic, but ignoring the backend traffic is not really an option, because monitoring them can bring very valuable information when it comes to fault domain isolation.

Moreover, a SAP system can be requested (request to the ABAP or non-ABAP process) by other SAP systems or by external systems implementing a Remote Function Call (RFC) module.



The protocols SAP GUI and SAP RFC are binary and non-human readable protocols, which means capturing the network traffic doesn't allow to retrieve or understand the actual calls. The DCRUM SAP GUI decode decrypts and retrieves the SAP GUI elements such as T-CODEs, step names, window names, usernames, etc.

Encryption

Secure Network Communications (SNC) is available for SAP Systems to provide secure authentication and to protect the data communication paths between the various client and server components of the SAP system that use the SAP protocols.

SNC provides three levels of security protection:

- Authentication only: minimum protection level offered by SNC
- Integrity protection: detection of any changes or manipulation of the data
- Privacy protection: encryption of the messages being transferred

User access

In order to get connected to the SAP ERP system, the users must get authenticated and have the right access. The SAP administrator manages this configuration.

SAP Solution Manager

SAP Solution Manager is an integrated solution in the SAP systems. It is an integrated end-to-end platform intended to assist users in adopting new developments, managing the application lifecycle and running SAP solutions. It provides figures about the SAP systems, for instance: utilization, performance, and availability. Information concerning how the SAP system works can be very deep in the SAP components, sometimes as far as ABAP (SAP programming language) code level and allow for root cause analysis.

The latter compared to the DCRUM perspective is very different; SAP Solution Manager retrieves the information from the SAP components i.e. from a server perspective, whereas DCRUM gets the statistics from a network perspective, allowing for end to end visibility. Although the system derived information is very detailed, the information from the end user perspective is more valuable as it encompasses and entire call through the application delivery chain rather than the performance of singular system components with little or no connection to actual calls.

The two tools can however be considered complementary for the monitoring of SAP systems.

3. Implementing monitoring of the SAP ERP system in DCRUM

The SAP application onboarding is very much alike any application onboarding: creation of Software Services and Business Units. However, some special considerations do exist and are very important to take into account: advanced Software Service configuration, configuring the SAP decode and modifying the mapping hierarchy for reporting purposes.

SAP Decode Licensing

The SAP decode must be enabled in the DCRUM platform. For that, the implemented license file must contain the SAP GUI (and optionally) SAP RFC decodes. Once installed, you should have the possibility to define SAP applications.

Information Gathering

The onboarding of an application in DCRUM naturally starts with gathering the required pieces of information: the architecture, the data flow and the server and client information (IP addresses, ports, nature of the network traffic and encryption). The best contact for this is most likely the application owner.

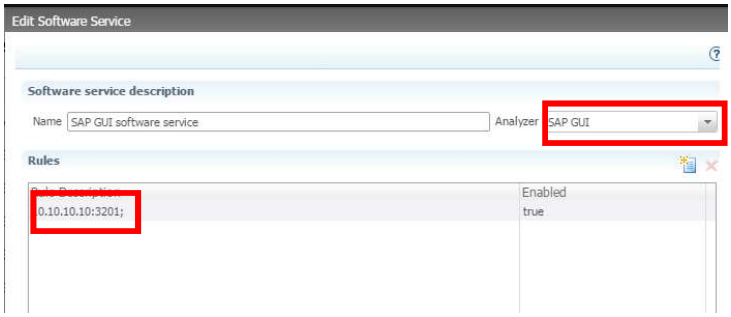
This allows to prepare the configuration by defining the Software Services and business unit configuration.

In this example, only SAP GUI traffic will be monitored.

Software Service Configuration

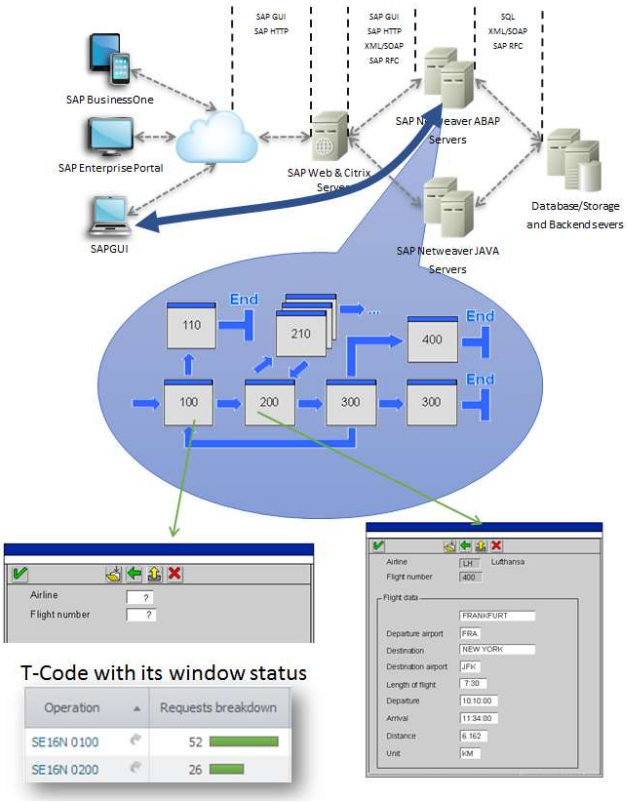
Like every onboarding in DCRUM, first task is to create the Software Services.

For SAP GUI traffic, the default port is “3201”, but depending on the SAP implementation, it can (and most likely will), deviate from this and actually be a range rather than a singular port. Configuring SAP requires close cooperation with the application owner to determine that (see previous task).



After deploying the Software Services, statistics should be available in the CAS reporting interface. For example, looking at the report “Software Service” will give you performance, availability and utilization statistics for the users, servers and operations.

The DCRUM SAP GUI decode is very powerful as it retrieves information from the compressed SAP GUI protocol. That’s a key value for the monitoring solution.



By default, this decode will give you the SAP T-CODEs as operations, the SAP usernames as users and the SAP modules and descriptions of the related T-CODEs for the modules and tasks, respectively.

This configuration can be modified and improved by selecting more elements of the SAP GUI traffic or by importing a new mapping.

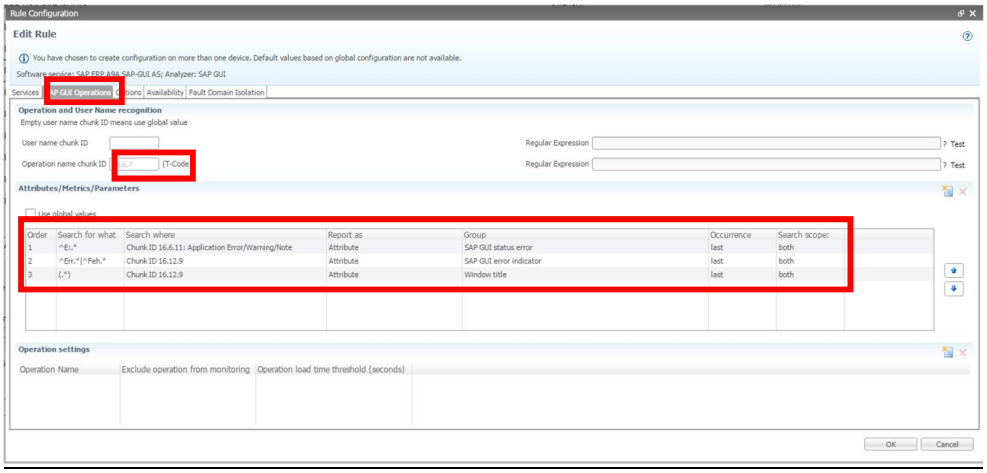
The DCRUM solution also has an operation mapping method, for which a default hierarchy is present with 3 levels:

- SAP Module
- TCODE description
- SAP operation (TCODE + TCODE description)

This hierarchy is available in the reporting and gives a business view of the user's activities. This default configuration doesn't reflect the SAP system implementation and needs to be updated with the custom mapping described in point 0.

Advanced Software Service Configuration (optional)

As already explained, the SAP GUI decode extracts some elements from the traffic, but by default few of them are retrieved and more of them are available. The software service configuration allows to select and retrieve the values for more SAP traffic "Chunk IDs" to further improve monitoring.



Modifying the hierarchy

When implementing the SAP system monitoring, new operations can be created depending on the customer need. In such situations, the new TCODEs aren't present in the default hierarchy mapping and for that reason they are put into the default container. In order to avoid that, the hierarchy should be updated with information taken from the SAP Solution Manager.

SAP Solution Manager is a tool for managing and monitoring the SAP system. One of the features is the possibility to extract the elements of the SAP system. To match this with the CAS reporting hierarchy, the 3 hierarchy levels must be extracted. In the DCRUM documentation, you can find the steps for this extraction:

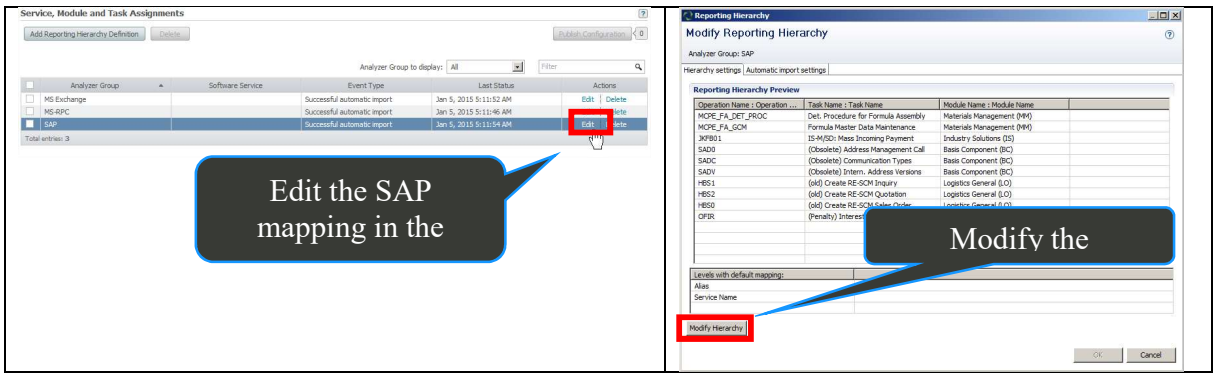
DCRUM_SAPAppMonitoringUserGuide.pdf, page 168

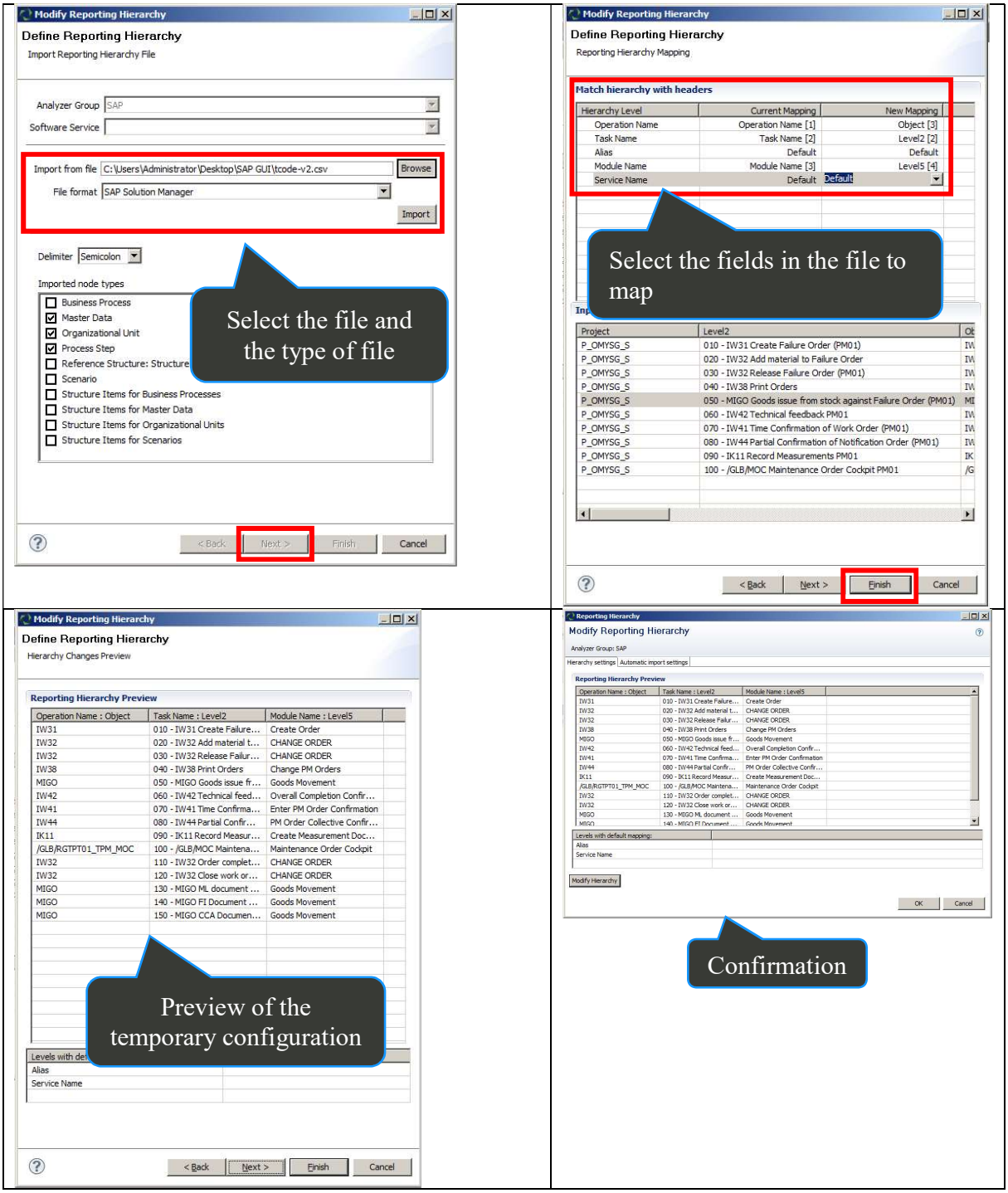
Once you have the custom hierarchy, it needs to be merged with the previous configuration file. You can find it on the CAS server here:

<Dynatrace Installation>\CAS\config\hierarchy\analyzer-10012.txt

It should be backed up before any change as modifying the hierarchy in RUM console will overwrite the previous configuration. The option to append configuration is currently not present.

Once you have the final hierarchy file (default + new mapping), you can import it with the RUM Console.





The new mapping is now effective and the result will be available in the reporting.

Table of SAP GUI elements in DCRUM

So, when configuring the SAP application in DCRUM, two aspects can be fine-tuned: the Software Service configuration (available data) and the hierarchy (reporting structure). The table below shows which SAP elements can be retrieved in DCRUM.

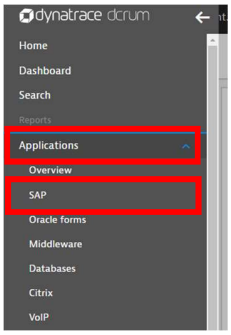
SAP GUI Element	Chunk ID	DCRUM element	Configuration
SAP Module	na	Module	Default
T-CODE description	na	Task	Default
Transaction code	16.6.7	Operation	Default
GUI Status	16.6.16	Operation	Default
Screen name	16.6.13	Miscellaneous Parameter X	Specific
Screen #	16.6.14	Miscellaneous Parameter X	Specific
Program	16.6.15	Miscellaneous Parameter X	Specific
Interface Name	16.12.9	Miscellaneous Parameter X	Specific
Interface Message	16.6.11	Miscellaneous Parameter X	Specific
User name	16.4.28	User name	Default
User OS Name	16.4.31	Miscellaneous Parameter X	Specific
User browser	16.4.32	Miscellaneous Parameter X	Specific
Language	16.4.27	Miscellaneous Parameter X	Specific
SAP Version	16.12.10	Miscellaneous Parameter X	Specific
SAP GUI Error	16.12.9	SAP GUI Errors (amount)	Default

4. Reporting for SAP GUI

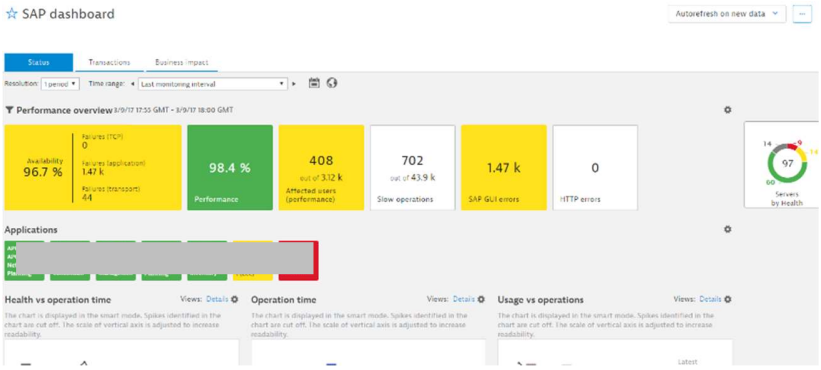
Default reporting

After you configure a SAP application in DCRUM, the reporting is very important to understand, especially how it works in terms of performance, availability and utilization. That's why a set of built-in reports and dashboards are present. They use both CAS and ADS (detailed information) statistics if available.

To access the main dashboard, go to the following menu:



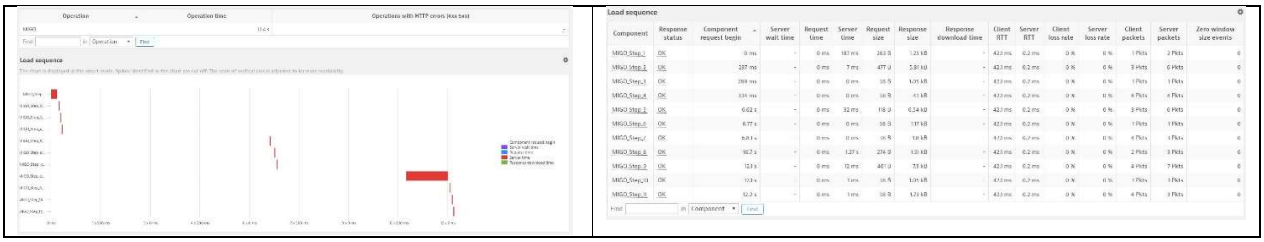
This dashboard is very interesting for an overview of all onboarded SAP applications. You will be able to see the statistics and split them by applications, by servers, by users or by operations



For example, this dashboard can use the defined hierarchy (the modules and T-CODE descriptions) and give business related information that is more relevant for business people. This is particularly the case for utilization statistics to understand which modules and T-CODES are the most popular ones.

Like for HTTP application, it's possible to get very detailed information from ADS. You can for instance have the component level call structure for each SAP GUI request.

This is an example of a Load sequence chart for the MIGO T-CODE.

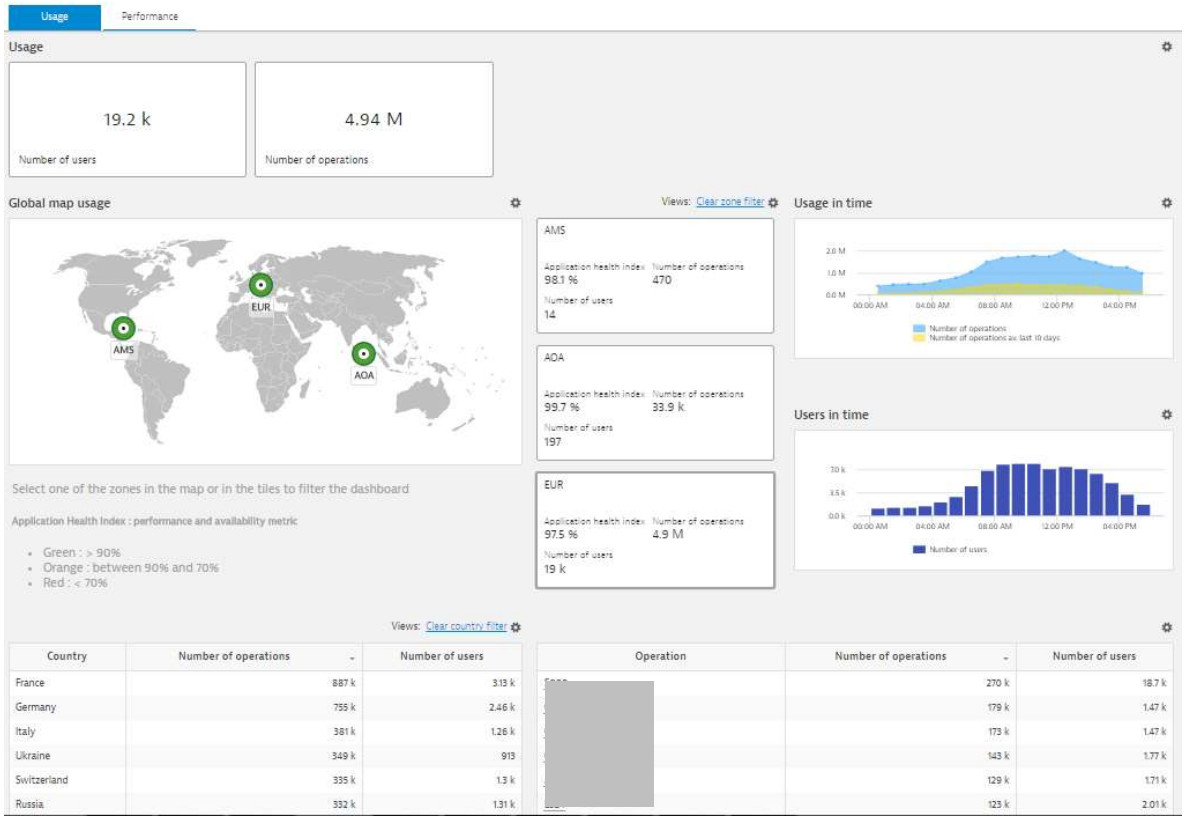
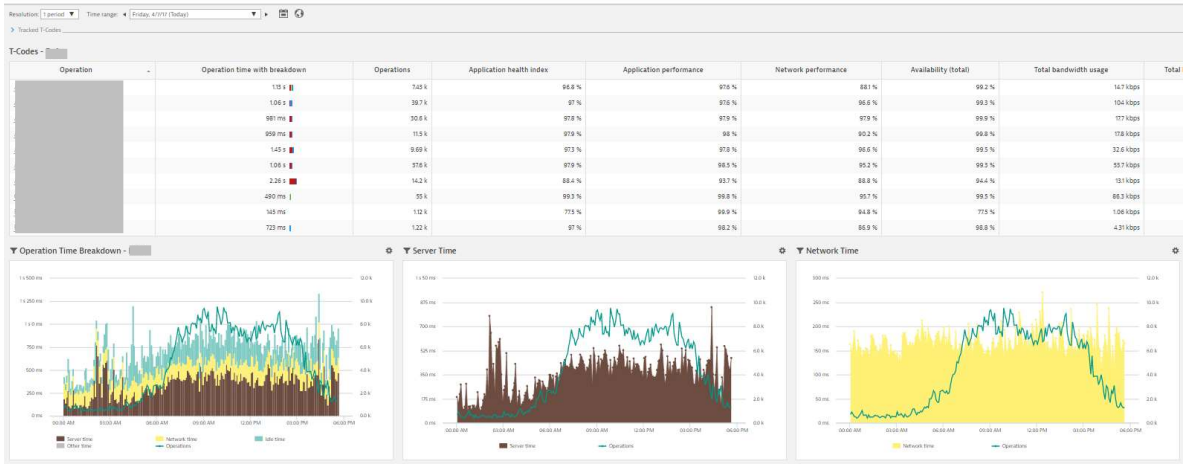


Custom reporting and best practices

it's of course possible to create custom reports using DMI with SAP information. Based on my experience, I will give you some best practices for dashboarding and reporting.

There are multiple perspectives when it comes to SAP reporting, which is valuable for the customer: licensing, management and technical.

- For the licensing, regarding the SAP model, it's obvious that it's critical to know the number of users by systems and locations. It will help manage the licensing cost and do capacity planning.
- For the management, the utilization of different SAP systems is very important. Most of the time, it's important to know how the users use the different modules and T-CODES. It also means the statistics by user location are also important. Thanks to that information, the manager can adapt the SAP users and modules.



- On the technical side, it’s important to have a detailed understanding of the performance of the T-CODES and SAP servers. The goal here is to determine the impact of the network and the servers to the performance from the end user perspective.