EGI-InSPIRE

DEPLOYED MIDDLEWARE SUPPORT UNIT OPERATIONS PROCEDURES

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Abstract

This document describes the workflow for the Deployed Middleware Support Unit from its daily operation to the weekly follow up meeting and its relation to the OMB and the TCB. The procedures for the handling of issues and the responsibility as compared to the 1st and 3rd line support are defined. Finally, metrics evaluating performance of DMSU itself, external technology providers, and quality of delivered software are described.

This document is update of the previous version, MS502 [R4].

I. COPYRIGHT NOTICE

II. DELIVERY SLIP

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III. DOCUMENT LOG

Issue	Date	Comment	Author/Partner
1	31/05/2011	First draft	Aleš Křenek/CESNET
2	08/07/2011	Reviewers comments	Aleš Křenek/CESNET
3			

IV. APPLICATION AREA

This document is a formal deliverable for the European Commission, applicable to all members of the EGI-InSPIRE project, beneficiaries and Joint Research Unit members, as well as its collaborating projects.

V. DOCUMENT AMENDMENT PROCEDURE

Amendments, comments and suggestions should be sent to the authors. The procedures documented in the EGI-InSPIRE "Document Management Procedure" will be followed: https://wiki.egi.eu/wiki/Procedures

VI. TERMINOLOGY

A complete project glossary is provided at the following page: http://www.egi.eu/about/glossary/.

VII. PROJECT SUMMARY

To support science and innovation, a lasting operational model for e-Science is needed – both for coordinating the infrastructure and for delivering integrated services that cross national borders.

The EGI-InSPIRE project will support the transition from a project-based system to a sustainable pan-European e-Infrastructure, by supporting 'grids' of high-performance computing (HPC) and high-throughput computing (HTC) resources. EGI-InSPIRE will also be ideally placed to integrate new Distributed Computing Infrastructures (DCIs) such as clouds, supercomputing networks and desktop grids, to benefit user communities within the European Research Area.

EGI-InSPIRE will collect user requirements and provide support for the current and potential new user communities, for example within the ESFRI projects. Additional support will also be given to the current heavy users of the infrastructure, such as high energy physics, computational chemistry and life sciences, as they move their critical services and tools from a centralised support model to one driven by their own individual communities.

The objectives of the project are:

1. The continued operation and expansion of today's production infrastructure by transitioning to a governance model and operational infrastructure that can be increasingly sustained outside of specific project funding.
2. The continued support of researchers within Europe and their international collaborators that are using the current production infrastructure.
3. The support for current heavy users of the infrastructure in earth science, astronomy and astrophysics, fusion, computational chemistry and materials science technology, life sciences and high energy physics as they move to sustainable support models for their own communities.
4. Interfaces that expand access to new user communities including new potential heavy users of the infrastructure from the ESFRI projects.
5. Mechanisms to integrate existing infrastructure providers in Europe and around the world into the production infrastructure, so as to provide transparent access to all authorised users.
6. Establish processes and procedures to allow the integration of new DCI technologies (e.g. clouds, volunteer desktop grids) and heterogeneous resources (e.g. HTC and HPC) into a seamless production infrastructure as they mature and demonstrate value to the EGI community.

The EGI community is a federation of independent national and community resource providers, whose resources support specific research communities and international collaborators both within Europe and worldwide. EGI.eu, coordinator of EGI-InSPIRE, brings together partner institutions established within the community to provide a set of essential human and technical services that enable secure integrated access to distributed resources on behalf of the community.

The production infrastructure supports Virtual Research Communities (VRCs) – structured international user communities – that are grouped into specific research domains. VRCs are formally represented within EGI at both a technical and strategic level.

VIII. EXECUTIVE SUMMARY

This document describes the workflow for the Deployed Middleware Support Unit from its daily operation to the weekly follow up meeting and its relation to the OMB and the TCB. Further, the interactions with 1st and 3rd line support are defined.

The main tasks are defined as: a) Issue analysis, which is conducted by a small sub team, the assigners, within the DMSU, b) Issue resolution, which is conducted by the assigners, as well by a larger pool of experts, the resolvers, and in collaboration with 3rd line support, c) Issue follow-up, d) informal communication with the users through community fora etc., e) assessment of requirements on the middleware, and management as well as coordination with the other units in EGI-InSPIRE and partners. Finally, knowledge build up within EGI-InSPIRE on middleware component quality, expected patch delivery and possible workaround is an important DMSU task.

The tracking of all issues will be conducted using GGUS [R3].

The interaction with 1st line support is centred around the delegation of middleware issues from the 1st line support to the DMSU and collaboration with the operators at 1st line on the resolution of configuration related issues.

The interaction with 3rd line support, which consists of several support units external to the project, will be centred on collaboration on patch requiring issues as well as following up on the resolution of these.

This document is a revision of previous version [R4]. It describes the DMSU procedures as updated after the experience of the first project year. In particular, the introduced changes address the identified issues in the DMSU work: a) too high ratio of tickets assigned to 3rd line support with unclear followup, b) lack of communication with EGI operations, and c) occasional long reaction time to tickets due to unclear intra-DMSU responsibilities.

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1 INTRODUCTION

The purpose of this document is to report on the role of the Second-line support, the Deployed Middleware Support Unit, DMSU, in EGI-InSPIRE.

The document describes the Deployed Middleware Support Unit's Operations Procedures i.e. the interaction with the EGI first line support and the interactions with the external technology providers. The DMSU's management was hampered by two task leaders resigning in the first half of the first project year, which delayed augmentation of its procedures. Therefore, the changes with respect to the predecessor document MS502 [R 4], described throughout this document are mostly in the stage of plans for the second year.

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2 DMSU OPERATION WORKFLOW

The Deployed Middleware support unit (DMSU) provides a dedicated second-line support function for the middleware technologies used in production in the EGI-InSPIRE infrastructure, receiving issues from the EGI first line support and working with the external technology providers to resolve the issues (the third line support). Further, the DMSU interacts with the EGI Technology Coordination Board, TCB, in two ways: by providing feedback on the trends seen through the resolving of issues and by acting as a clarification and examination task force for the TCB looking into issues and worries not easily examined elsewhere. Further, DMSU liaise with the EGI COO and the NGI Operations Managers, to jointly assess the impact of issues on the production infrastructure and their severity.

The issues handled by the DMSU are mainly middleware-issues, i.e. issues relating to limitations or bugs in the deployed middleware that can be solved either through configuration tweaks, alternative component installations or by fixing the actual bug in the middleware.

The main rational and motivation of the creation of the DMSU is the shift from the EGEE-III project with project internal software development and expertise to a more sustainable setup with project external software development. This induces a need for a project internal software competence group enabling support of the deployed middleware, fixing of configuration issues and monitoring of the external technology providers and their ability to deliver fixes. The DMSU enters naturally in the EGI-InSPIRE support workflow as a second-line support unit with specific expertise in the deployed software in the EGI-InSPIRE infrastructure.

The definition of the procedures and the workflow has used the statistics from the EGEE GGUS system from 2009 to assess proper procedures based on the assumed load of tickets per week. Especially, the follow up scheme based on an ETA (estimated time of arrival) was introduced to keep the number of open tickets that need closer attention at the weekly meeting of the DMSU assigners (more details to follow) on a scale of 10 tickets. The gathering of statistics and further experience through the next year might drive recommendations to further changes to the workflow.

In the sections below, the interaction with the first and third line support as well as the TCB are clarified taking into account the different timescales of the interactions. First we define the grouping of the staff to clarify the organization of the tasks.

2.1 Introduction to tasks

The overall team involved in the DMSU counts around 24 people on 5 different partners. To manage this team a hierarchical structure has been established. The DMSU tasks can be divided into the following categories:

- Work Package Task management
- Initial analysis, assignment and follow up of issues
- Resolving issues within the DMSU
- Monitoring of user forums and proactive support
- Requirements assessment and follow-up

The management of the DMSU task is undertaken by the task leader, and involves day-to-day project management as well as managerial interaction with the EGI.eu Chief Operations Officer, the SA2 workpackage leader, the Operations Management Board, OMB, the TCB and the 3rd line support by the external technology providers.

The initial analysis, assignment and follow up of issues are conducted by the *assigners*. The assigners are a group of senior representatives from each of the partners capable of analysing the technical issues and delegate the resolving of these to either the 3rd line support or to a *resolver*.

The resolving of issues within the DMSU are carried on by either one of the assigners or by experts on different middleware components within the partners, i.e. the resolvers. A fairly large number of involved second line experts ensures that the needed expertise will always be at hand. However, it is also expected that the majority of the issue resolving work will be conducted by the assigner group, with most time allocated to the DMSU task, or delegated to the 3rd line support.

Existing user forums (for example, LCG-ROLLOUT@JISCMAIL.AC.UK, being used by wide user and site administrator community, despite of its legacy name) are live informal support channels, complementing the more formal way of support provided by the ticketing system. Monitoring and contribution to these forums is therefore one of DMSU tasks. Trivial issues can be resolved on the spot, giving the users the feeling of very fast reaction. More complicated issues are either linked to existing tickets if they exist, or new tickets are spawned.

Some fraction of issues handled by DMSU happens to call for missing functionality. Such tickets are digested into requirements and submitted through the standard requirement gathering channel of EGI.

2.2 Ticket processing – a daily effort

The daily effort within the DMSU is driven by the tickets of issues as reported via GGUS. Within GGUS a support unit has been created, Deployed Middleware, and issues reported to the EGI First line support believed to be related to the middleware are hence assigned to the DMSU by the 1st line support (TPM) or the TSA1.7 NGI international support teams.

The tickets are assigned to the assigner with the best knowledge of the problem. DMSU maintains a matrix mapping the component knowledge to each partner for use by the TPM in the delegation process, the so-called TPM DMSU Cheat Sheet. The TPM DMSU Cheat Sheet is updated when new components are added, other removed or when the task to partner mapping are changed. An updated version is kept on the EGI wiki [R1].

Once received from TPM the DMSU assigner analyses the ticket, and if the issues are considered to be configuration issues or they relate to a specific deployment scenario the assigner assigns the ticket to either her-/him- self or to a resolver with more expert knowledge of the affected component.

The ticket category is also checked. Currently GGUS supports “Incident”, “Change request”, and “Documentation” categories. According to the 1st year experience we will negotiate adding further categories or sub-categories of “Incident” with the GGUS team: (such as “Configuration/deployment issue”, and “Usage problem”).

If the issue does not indicate a software defect, and a final solution can be provided within DMSU, the ticket is closed by the resolver. If the issue is a symptom of a known problem, with a fix scheduled for a new software release, but not a straightforward duplicate of another ticket, the ticket is put into the “on hold” state.

If the reported issue indicates a new software defect, missing documentation etc., or it requires expertise going beyond the knowledge in DMSU, it is marked in the ticket’s internal diary in GGUS, and the ticket is postponed for decision at the DMSU meeting to be assigned to the 3rd line support eventually. The only exception are tickets generated in verification of new software release submitted by the technology provider to EGI (see [R5] for details); in this case a fast path to the technology provider is required, and the tickets are reassigned to the 3rd line support units without further delay.

In either case a clear feedback to the submitter must be given in terms of the GGUS ticket public diary. In general, all tickets related to software defect should contain a workaround suggestion for the user if possible.

It is the responsibility of the assigners and resolvers to maintain the appropriate ticket status, alternating between “in progress” and “waiting for reply” in particular.

The workflow from ticket creation, initial investigation to applied fix and deployment is illustrated below:

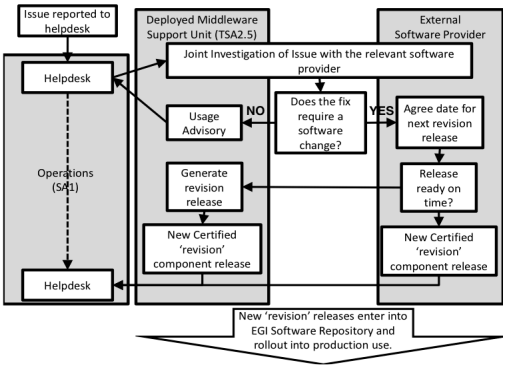

Figure X. The workflow of tickets and the resulting fix.

The model of 'direct assignment', where the issues go directly the 3rd line support, was evaluated not to be able to scale in the EGI environment. Further, it prevents the knowledge on the middleware issue to be gathered and the related metrics to be collected. For these reasons this path was disabled by technical means – it is only DMSU who can assign tickets to the 3rd line middeware support in GGUS now.

Tickets of the specific category of being assigned to the 3rd line support because of lack of expertise in DMSU which get solved are inspected, and the digest of the solution recorded at DMSU internal wiki for further use.

Finally, there is a "DMSU shift" duty rotated weekly among the assigners. The purpose of this duty is supervision of the DMSU operation at higher frequency (at least twice a day) in order to provide better coordination among the assigners, to guarantee faster response to new tickets as well as to stalled tickets being overlooked by a particular resolver (e.g. after waiting for user response for longer time).

2.3 Ticket follow up, internal and for 3rd line - a weekly effort

Each week the open tickets assigned to the DMSU are discussed and evaluated. Technically this is organized as chat room weekly meetings.

Tickets being resolved within the DMSU are followed up on, and eventual problems are resolved.

Open tickets with an ETA (ETA assignment is described in Sect. 4.1) within the coming week are also marked for follow up by the appropriate assigner.

In particular, tickets which were evaluated to be assigned to the 3rd line support are reviewed and reassigned to the appropriate support units. The non-defect tickets of this category (i.e. assigned to the 3rd line because of lack of expertise) must retain DMSU "involved" with the GGUS ticket to receive correspondence, and to be able to digest the solution finally.

On arrival of new software release, "on-hold" tickets in DMSU targeted for this release are moved to the "solved" status.

Unsolved tickets within the 3rd line support with expired ETA are checked, re-assessed, and escalated eventually.

Digest of the tickets handled by DMSU in the previous week is prepared by the DMSU shift on duty person as his/her final task, and it is published at the DMSU wiki [R6]. The digests are publicly available, and they are focused on issues that are likely to hit broader user community.

2.4 Requirement assessment and follow-up

The tickets that are identified to contain requirements for changed or new middleware functionality are reflected as tickets in the EGI requirement gathering channel – the *requirements* queue in EGI RT, linking the GGUS and RT ticket with each other in a bidirectional manner. Additionally, the counter-tickets in the RT *requirements* queue are marked with a "DMSU" tag for further tracking. Digests of the requirements gathered in this way, as well as status report on their processing are provided to TCB regularly at its meetings. On the other hand, established informal contacts with the technology providers are leveraged to route this information, provide further details, etc.

The DMSU middleware expertise can be also used to assess requirements entering the EGI RT [R7] requirements queue by other means. However, it is beyond DMSU ability to process the numerous requests there, digests must be provided instead. Details of this process are still to be discussed.

2.5 DMSU, the OMB and the TCB

During the weekly work of the DMSU issues found and reported on the infrastructure are collected in the wiki and used for generating recommendations to the TCB. These recommendations are broader than incidents raised within a single ticket and longer term suggestions to changes in the middleware or in the way it is deployed and used.

Further, the TCB can raise questions to the DMSU on issues that require clarification. DMSU hence acts as a project internal expert group for clarification of issues raised in the TCB.

Interaction with the EGI operations happens through "DMSU liaisons" who attend OMB and the regular operations meetings, and who report middleware-related issues raised there to DMSU task leader.

Issues raised by the OMB or the TCB use the same workflow as the daily tickets to the DMSU; a ticket in GGUS is created and assigned to one of the DMSU resolvers for further clarification and followed up on a weekly basis.

3 RELATIONSHIP WITH THE TPM

The relationship between the DMSU and TPM, the 1st line support is clear in the sense that TPM delegates to DMSU all middleware related issues. However, in the TPM there is quite a bit of knowledge that has already been built up regarding middleware issues and the teams that can solve these. This expertise is used to target the ticket to the right DMSU assigner.

The purpose of having a tiered support lines is to ensure that the highly specialised and technical skills contained within the 3rd line support unit is not used to do tasks that can be done with more general support units at the 1st and 2nd line. The delegation scheme presented below guarantees optimal use of the resources.

When the TPM receives a ticket it is analysed with respect to:

- Is the issue middleware related?
- Which component(s) are involved?

If it is a middleware issue then based on the components involved the TPM uses the TPM-DMSU cheat sheet to assign it to the proper DMSU partner.

It is hence the responsibility of the TPM to check if the issues are related to the deployed middleware and if so which component that is most likely the culprit.

It is the responsibility of the DMSU to analyse the issue further, resolve it or delegate it to 3rd line using the ETA procedure to be described below.

It is the goal of the DMSU to keep track of problems reported through the use of the infrastructure caused by the deployed middleware. It is hence important that the ownership of the reported issues stays within the DMSU, even though the issues are just a simple and easily correctable bug. In order to model this in GGUS even a simple bug issue will always be assigned to the DMSU.

4 RELATION TO EXTERNAL TECHNOLOGY PROVIDERS

The real big change in moving from EGEE to EGI is the introduction of external technology providers [R2]. It is no longer a task internal to a project to develop or maintain the middleware deployed on the infrastructure. This also means that knowhow and expertise to be able to choose the right products and how to deploy these in the most optimal way need to be built up and maintained within the EGI-InSPIRE project. The DMSU is partly covering this need; through the continuous resolution or monitoring of the external providers resolution of issues, problems, strengths and weaknesses are understood and collected within the DMSU and reported to the TCB.

The relationship that EGI has with these external technology providers is defined at two levels:

- A general collaborative Memorandum of Understanding defining the relationship between the two independent activities.
- A Service Level Agreement that defines the operational relationship between the EGI.eu Technology Unit (which includes the DMSU and represents EGI in this relationship) and the technical activities within the software project. The SLA will include guidelines for TTF (time to fix) for different groups of issues.

This section described how the relationship to the external technology providers is setup and what the responsibilities are.

4.1 Division of responsibilities between 3rd line support and DMSU

The responsibility of the DMSU is to:

- Examine and analyse an issue
- In case the issue can be resolved by reconfiguration, or an alternative deployment configuration, e.g. by suggesting to switch to another and almost compatible component the responsibility of the resolution lies on the DMSU
- If the issue is caused by a middleware bug or by performance issues within the component an ETA is negotiated with the external technology provider. The responsibility of following up and possibly reporting on the progress to TCB and other bodies within EGI (e.g. the operations activity) lies with DMSU.
- Digest the encountered issues and regularly provide feedback to the TCB.

The responsibility of the external technology provider is to:

- In case of a bug in the middleware, either recommend a possibly workaround or to resolve the bug within the ETA negotiated with the DMSU
- To notify in due time if an ETA cannot be met

The coordination body for resolving responsibility disputes between the DMSU and an external technology provider is the TCB. The TCB is also responsible for establishing, managing, and monitoring the SLA with the external technology providers.

4.2 The delegation and follow-up procedure

The delegation and follow-up procedure is a three-step procedure.

It is initiated by an assignment of the EGI Helpdesk ticket from the DMSU and to the external technology provider, preferably with further information on the issue documented in the ticket. According to the severity and estimated impact of the issue DMSU adjusts the *Priority* field of the ticket.

Then the external technology provider communicates an ETA for a solution of the issue, depending on its severity and complexity of the fix. The ETA covers the full cycle for a new bug fix component, up

to and including the release of said fix to EGI, but excludes the EGI Software Provisioning process [R 5].

Missing ETA assignments as well as those not matching expectations are escalated as part of the monitoring of the Technology Provider against metrics associated with the respective SLA.

Once the ETA has been negotiated the resolution of the issue starts at the external technology provider and will then only be monitored and status checked once the ETA is due. The check will be part of the DMSU weekly meetings.

If everything goes according to plan the fixed component will be delivered to EGI-InSPIRE as part of a new release from the provider, be verified against the defined criteria, and then deployed into production following the defined rollout procedure [R8]. If the ETA cannot be fulfilled a possible new ETA is negotiated. ETAs are recorded and used in the metrics for the interaction with the external technology provider. In the case of non-fulfilled ETAs the issue can be raised on TCB level.

Technically, the process requires adding a dedicated ETA field to GGUS, and extended querying capabilities. The implementation at the GGUS side will be negotiated with the GGUS team.

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5 METRICS

The metrics used to measure the success of the DMSU falls in two categories. The first is an automatic generated and ticket based metric, the other is based on the quality of the recommendations delivered by the DMSU on the general problems as seen on the infrastructure.

5.1 Ticket based metrics

The automatic generation of metrics from the EGI Helpdesk based on number of tickets, resolution times etc. has been used also in EGEE. The metrics suggested for the DMSU are:

- Number of tickets assigned to the DMSU assigners.
- Number and time for tickets to be resolved/closed by the DMSU resolvers.
- DMSU response time to tickets
- Number of tickets assigned to the external technology providers (the 3rd line support)
- Number and time for tickets to be resolved/closed by the external technology providers.
- Effectiveness of the external technology provider in accurately defining the ETA times for resolving the reported issues. Percentage of fixes provided by:
    - The initial ETA
    - Any revised ETA
    - Within a week of the agreed ETA
    - Within a month of the agreed ETA.

The metrics are reviewed monthly and collected on a quarterly basis and included in the quarterly reporting.

5.2 Forecast based metric

The forecast based metric is an attempt to measure the quality of the recommendations issued by the DMSU to the TCB. Those were suggested in the previous version of this document [R4], however, the 1st year experience shows we are in too early stage to implement these. The suggestions are retained here for further reference:

- At the end of each quarter, and based on tickets and analysis conducted on behalf of the TCB a recommendation for changes / fixes to the providers of the deployed middleware is authored. The list is accompanied with risks if not following the recommendations / improvements expected if recommendations are followed. This analysis will be conducted in collaboration with SA1.
- At the end of each quarter, and based on the analysis from the former quarter comments on the results of following / not following the recommendations are summarized

The quality of these recommendations and how well they can be used as a guideline to the severity of the tasks are commented on by the COO and the Director. This assessment serves as the forecast based metrics.

5.3 Per-product metrics

The feedback DMSU provides to TCB should include, among others, an assessment of relative quality of individual but self-contained pieces of software – *products* used on the EGI infrastructure. With the upcoming release of UMD-1 the project will also get a more exact classification of software products officially supported by EGI. Therefore it becomes feasible to collect also per-product metrics.

The suggested metric is the *number of tickets per product in a reporting period*, further classified according to the ticket category (configuration/deployment issue, documentation, software defect).

Gathering these raw numbers is not sufficient for meaningful interpretation, though. The products widely differ in the extent of their deployment, directly affecting the number of both system administrators and end-users who may face problems with the product. More widely deployed products are likely to generate more tickets but those do not mean lower software quality, and the products must not be penalized for their wide adoption. Hence the raw number of tickets must be weighted by some measure of the product deployment. The exact specification of such quantity will be discussed with EGI operations, candidate starting point is the number of registered instances in the information system, an alternative is the number of downloads from EGI repository.

In either case, the emerging metrics must be carefully interpreted before any conclusions are taken. Therefore in the following period we expect dry runs only, with gradual tuning of the exact metrics formula.

6 CONCLUSION

The operational procedures of the Deployed Middleware Support Unit, providing 2nd line support for middleware deployed in the production infrastructure are laid out in this document.

The responsibilities of the DMSU as compared to the external technology providers as well as the interaction between the DMSU and the 1st and 3rd line support have been specified in the previous version of this document [R 4].

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During the first project year the outlined processes were deployed successfully, DMSU regularly handles approximately 200 tickets per quarter at the time of writing this document, and the number is steadily increasing. Experience of the first year is reflected in augmented DMSU procedures described here. In particular, the high ratio of tickets passed to the 3rd line support becomes an issue, and corrective steps were taken. The missing piece are the ETA assignment and escalation procedures which are not followed thoroughly currently. The further activity of DMSU will focus on their thorough deployment.

The work of DMSU was also extended in two areas, follow-up and assessment of requirements, and observation and contribution to user community forums.

Further evaluation of the DMSU procedures is expected once UMD 1 becomes available. Specifically this release will enable gathering more exact per-product metrics used to evaluate quality of software delivered to EGI.

7 REFERENCES

R 1	DMSU Cheat Sheet, https://wiki.egi.eu/wiki/TSA2.5_Deployed_Middleware_Support_Unit#TPM_cheat_sheet
R 2	https://edms.cern.ch/document/1006814
R 3	GGUS, https://gus.fzk.de/pages/docu.php
R 4	MS502, http://documents.egi.eu/document/69
R 5	MS506, http://documents.egi.eu/document/503
R 6	https://wiki.egi.eu/wiki/InSPIRE-SA2:DMSU_digests
R 7	EGI RT, https://rt.egi.eu/
R 8	MS409, https://documents.egi.eu/document/478