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ITIL and Grid services at GridKa

H. MARTEN, T. KOENIG[1]

Karlsruhe Institute of Technology[2]
Forschungszentrum Karlsruhe GmbH
Steinbuch Centre for Computing
Herman-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen

E-mail: holger.marten@kit.edu, tobias.koenig@kit.edu

Abstract. The Steinbuch Centre for Computing (SCC) is a new organizational unit of the Karlsruhe Institute of Technology (KIT). Founded in February 2008 as a merger of the previous Institute for Scientific Computing of Forschungszentrum Karlsruhe and the Computing Centre of the Technical University Karlsruhe, SCC provides a broad spectrum of IT services for 8.000 employees and 18.000 students and carries out research and development in key areas of information technology under the same roof. SCC is also known to host the German WLCG [1] Tier-1 centre GridKa.

In order to accompany the merging of the two existing computing centres located at a distance of about 10 km and to provide common first class services for science, SCC has selected the IT service management according to the industrial quasi-standard "IT Infrastructure Library (ITIL)" [3] as a strategic element. The paper discusses the implementation of a few ITIL key components from the perspective of a Scientific Computing Centre using examples of Grid services at GridKa.

1. Introduction

With first elements published in 1989 by the Central Computer and Telecommunications Agency of the British government, the IT Infrastructure Library, ITIL, emerged as an industrial quasi-standard of Best Practice Recommendations for IT Service Management. It describes IT management processes and recommends rules for their handling in order to increase service quality, decrease long term cost of service delivery, and arrange IT services according to current and future requirements of the enterprise and its customers.

[1] To whom any correspondence should be addressed.
[2] KIT, the cooperation of Forschungszentrum Karlsruhe GmbH and Universität Karlsruhe (TH).

ITIL Version 2 was published in the year 2000 and it is process orientated. ITIL Version 3 (published 2007) is service orientated. Version 3 puts focus on the Service-Life-Cycle but you also find the processes (Management Areas) of version 2 there (see table 1). At the SCC we historically prefer Version 2. ITIL is only a best practice recommendation for IT Service Management it does not prescribe rules or tools for their implementation, leaving it up to the computing centre which parts to use.

Table 1. Mapping of the processes of ITIL Version 2 and ITIL Version 3

Publication V2	Management Area V2	Process Function V3	Publication V3
Service Support	Change Management	Change Management	Service Transition
Service Support	Configuration Management	Service Asset and Configuration Management	Service Transition
Service Support	Incident Management	Incident Management	Service Operation
Service Support	Problem Management	Problem Management	Service Operation

This is not a complete overview of all ITIL processes. Only four Service Management Areas of ITIL Version 2 are shown.

ITIL Version 2 is structured in two building blocks, 'Service Support' and 'Service Delivery', which in turn consist of 11 management processes in total. The six 'Service Support' processes Service Desk[3], Configuration, Incident, Problem, Change and Release Management mainly shape the daily service operations and support by the staff, while the five 'Service Delivery' processes Service-Level, Finance, Capacity, Continuity and Availability Management are understood to rather serve for a mid and long term planning and optimization of the service efficiency by the centre management.

In general, IT services themselves consist of service blocks which in turn may at the same time be parts of other services. For example, the Grid File Transfer Service at GridKa is using the central DNS and built on top of an Oracle cluster which itself also serves for the LCG File Catalogue Service. Service blocks in turn usually consist of several service components like servers, switches, disks etc. with several different persons in charge. On the other hand, the customer is not interested in all these local details but only in the availability of his required service, in a respective service description and the responsible person in case of requests. When designing ITIL processes it turned out to be advantageous thinking in terms external (i.e. customers') and internal (i.e. operators') views for all services, tools and processes in use. The following sections will concentrate on some of the ITIL 'Service Support' processes that have been implemented for Grid(Ka) services, discussing these internal and external views as well as respective roles.

2. Configuration management

2.1. Internal view

The Configuration Management Data Base (CMDB) serves as the central source of information for the whole staff as well as the management. This CMDB contains descriptions of all physical and logical components in terms of so called Configuration Items (CI) (hardware, racks, software, licences, maintenance contracts, IT services, blocks and components), their logical relationships and persons in charge, as well as process descriptions. With the CMDB as the main tool, Configuration Management serves as the solid basis for all other ITIL management processes and thus should provide a complete logical model of the whole IT infrastructure in terms of

- **planning** (of strategies, roles, activities, tools, configuration data, resources, …),

[3] Although being rather a function, the Service Desk is usually referred to as a Service Support process.

- **identification** (of all Configuration Items CIs, their dependencies, documentation, persons in charge, …),
- **control** (e.g. that only authorized and identifiable CIs are accepted and comply with agreed, standardized specifications, …),
- **fostering or status accounting** (of all CI changes, like 'ordered', 'received', 'in test', 'in production', 'in repair' etc.), and
- **verification and audits** (of the physical existence of CIs, the correctness of documentation etc.).

2.2. External view

According to the definitions above, Configuration Management with its CMDB provides a completely internal view. The external view is restricted to the services themselves plus respective service descriptions. Examples for the Grid(Ka) services are the File Transfer Service (FTS), the Compute Service in terms of Compute Elements (CE), Storage Elements (SE), Resource Brokers (RB), User Interfaces (UI), LCG File Catalogues (LFC) or the Certificate Authority, GridKa-CA. Respective already existing service descriptions on the Web will gradually be integrated into the CMDB and re-published from this central place after approval in the future.

In general, service descriptions in turn should be provided by the Service Level Management through Service Level Agreements (SLA). SLAs basically are contracts between the customers and the computing centre about Key Performance Indicators (KPI) of required services. KPIs are for example the average availability during exactly defined periods, reaction times in case of malfunction, as well as responsibilities of the provider on the one hand and the customer on the other hand. At GridKa the services are grouped into different Service Class Levels (SCLs) that are derived from the WLCG Memorandum of Understanding. Depending on the importance and impact by potential incidents, each SCL has a different set of availabilities, support time scales and reaction times upon incidents [3]. The Service Availability Monitoring framework (SAM) [4] is the basis to monitor at least service availabilities from outside. Every week site reports explain the downtimes and the unavailability of services to the other Tier centres.

2.3. Roles

The CMDB at SCC is a central development based on Open Wiki for the whole institute and contains all Configuration Items – not only those of GridKa – from all SCC IT departments. Consequently, the role of the Configuration Manager has been given to a central person of the department 'IT Security and Service Management' for the whole institute. This person is accompanied by one contact person per department that operates the services and components – for networks, desktop systems, storage, Grid services etc. – to guarantee the actuality of the CMDB and implementation of the processes.

3. Incident management

An incident is an event that leads to a degradation or interruption of a service and, at appearance, usually has an unknown cause. Incident Management serves to recover to normal service operation as quickly as possible without trying to find the problem or finally solving it (the latter is subject to ITIL Problem Management discussed in the next section). It is obvious from this definition, that Incident Management intimately relates to on-call procedures in case of 24x7 operations concepts, like those implemented at GridKa.

3.1. Internal view

The internal view of Incident Management concentrates on the three topics incident detection & notification, documentation and follow-up procedures like hand-over to Problem Management. The central tool for automatic internal incident detection and notification at GridKa is Nagios [5], which on

incident detection either generates a ticket to the responsible local system expert (LSE) during prime service hours, or an SMS to the mobile of an on-call engineer (OCE). During prime service hours, the LSE has to acknowledge the ticket, during on-call service hours the OCE has to acknowledge the SMS receipt, which in turn triggers a ticket generation in the central Service Desk system. In this way, the incident is always documented, and the remaining staff is informed that somebody is working on recovery. This is especially important during service hours, where the Service Desk team is immediately informed and can intercept potential further incident notifications coming from the users on the same topic.

During incident recovery, system engineers can fall back on a separate GridKa Wiki system as a knowledge data base with work flows and potential solutions. At the same time, he is obliged to document his own work on the incident and to close the respective ticket such that the next shift can take over or the information is handed over to Problem Management. Regular meetings are held during the week in order to discuss emerged incidents and required further actions.

3.2. External view

Concerning the external view of Incident Management, external communication with the customer is of utmost importance. At first, users should be notified that an incident has been detected and somebody is already working on it. At GridKa, this is realized either by posting a message on the GridKa monitoring Web page [6], on the Service Desk portal or by using the whole suite of EGEE broadcasts and tools [7] in case of a larger expected outage. Secondly, the user should be able to call the providers attention to an issue that she has detected, and the Service Desk is the general interface to the provider for this case. GridKa uses the Global Grid User Support (GGUS) platform [8] based on a Remedy workflow engine [9] that has been developed by SCC in the framework of the EGEE projects as an international Service Desk platform for all kinds of problems on the Grid. Additionally, a monitoring Web page with all services operated by GridKa has been made available such that a user could have a first status check in case of a potentially GridKa-specific incident on her own.

3.3. Special roles

In difference to the Configuration Management which has a special centralized Configuration Manager for the whole institute, incidents at GridKa are currently only followed up within the GridKa project team. The team has appointed a dedicated Incident Manager who is responsible for the quality assurance (documentation, hand over, on-call planning etc.) of this process. Additionally, there are a few special roles defined for incident handling during prime and on-call service hours.

During prime service hours, external tickets through GGUS are either directly answered or assigned by the first level support to the second level support, the technical experts (called Local System Expert or Local Application Expert, LSE or LAE, respectively). Inclusion of further experts in case of lager or combined technical issues is usually not a problem during prime service hours.

For on-call service hours, i.e. during night, weekend or public holiday, three on-call circles have been implemented, one for networks, one for data management and data bases, and one for Grid services, each of which has one appointed on-call engineer (OCE, rotating within these circles). Equipped with a mobile phone and a laptop with UMTS card, he should be able to recover the service remotely after notification by means of well documented procedures, but he is also obliged to call and involve an OCE from the other circles if required. Cases of severe incidents like loss of power, cooling or a local fire automatically involve respective experts from the KIT technical infrastructure via the KIT alarm centre and all on-call circles listed above.

4. Problem Management

According to ITIL, a problem is the unknown cause of one or several (potential) incidents. The task of Problem Management is to convert a problem into a known error, which means to understand the cause and to find either a workaround or a permanent alternative or solution. Please note that the final

implementation of the solution is not part of the Problem Management but afterwards taken up by Change Management!

4.1. Internal and external view
Problem Management is a completely internal process. Often, the cause of an incident and a respective workaround or solution is already found during incident handling, such that the whole process can be closed at the same time. However, in many cases the solution search can take weeks and may involve different parties like users, software developers, third party providers etc., such that the most important role of Problem Management becomes tracking the activities over weeks. At GridKa, this is done through the internal part of the Service Desk ticket system (e.g. re-open an internal ticket after incident removal) and by the special roles implemented.

4.2. Special roles
The GridKa Project Leader has the role of the Problem Manager. Additionally, the GridKa Technical Advisory Board (TAB) consisting of external experts tracks long term problems and discusses or gives advice on solutions. Furthermore, GridKa uses the method of internal "ad hoc" meetings at pre-defined times, where every staff member can call in technical experts from different IT departments for dedicated discussions.

5. Change Management
A change of the IT infrastructure may be induced by the Problem Management, by required default or security patches, upon customers request, new political or financial boundaries etc., and Change Management uses standardized procedures for their efficient handling in order to minimize change induced incidents.

5.1. Internal view
The internal view is a standardized Request for Change (RfC) that must be accepted by every person in charge of a service or component that might be affected. Currently, three kinds of RfCs are used:

- Standard RfC: The problem solution or the change is well documented and the past has shown that it can be done without resultant subsequent faults. Renewal of host certificates is a typical example.
- Planned RfC: The change has not to be implemented immediately but can be scheduled at a later time. Examples are the change of the operating system of the worker nodes or a migration of a service to new hardware.
- Emergency RfC: The change must be implemented immediately and cannot wait until the change is fully accepted. An example for an emergency RfC is if the Mass Storage System runs out of memory.

The CMDB provides the second, most important internal view for Change Management. Without a clear documentation of the services with all their components it will not be possible to include all persons in charge that might be affected by a change. Moreover, the complete Change Management process including all RfCs and change logs is documented in the central CMDB.

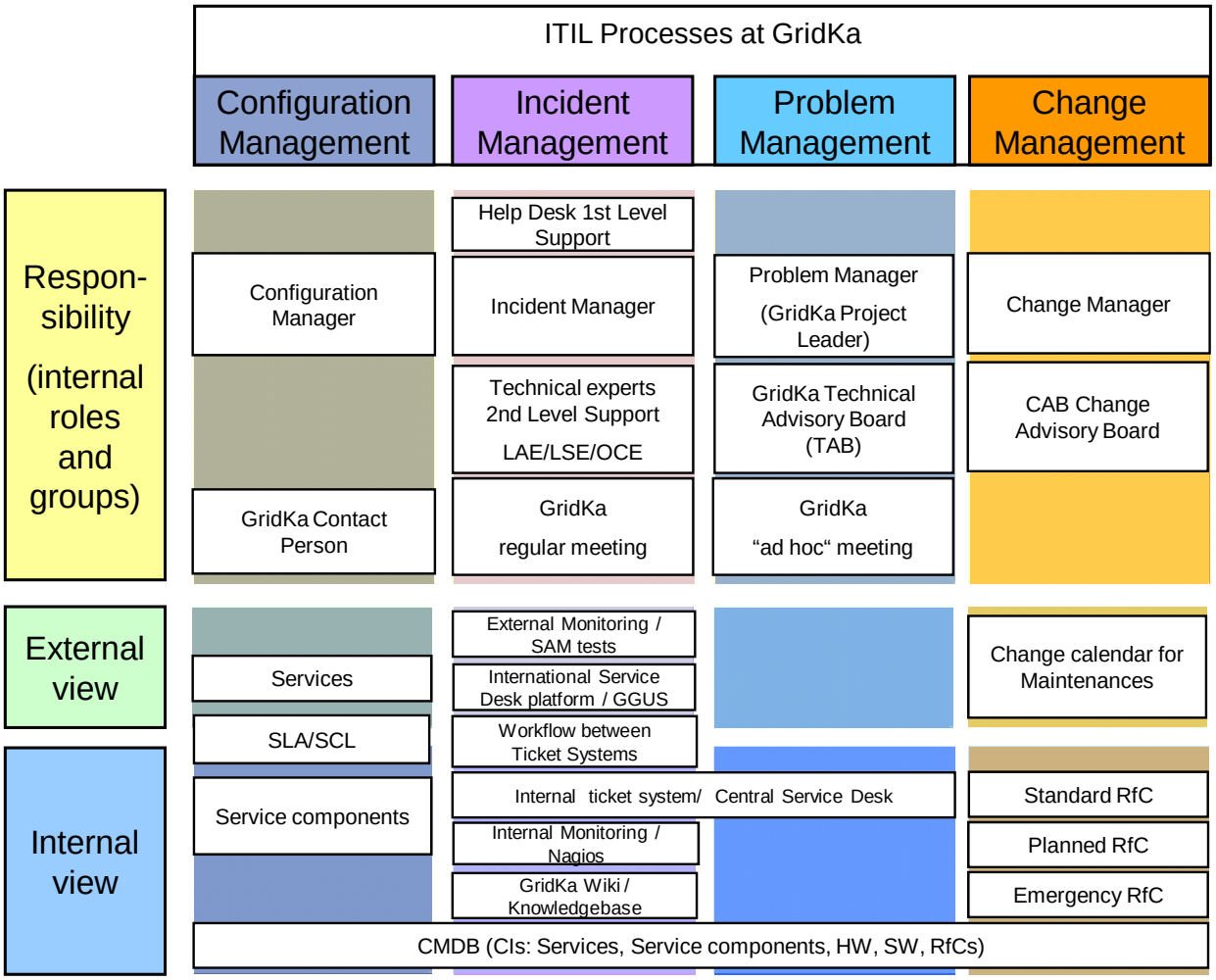
5.2. External view
Notification of users in case of changes is absolutely essential. Planned downtimes of Grid(Ka) services are announced via the CIC [10] and GGUS portal, and maintenances are published on the GridKa monitoring web page [6] including a short change log or calendar. Additionally, short messages via EGEE [7] broadcasts are sent to user communities and potentially affected other sites.

5.3. Special roles

The person in charge of the change process is a SCC-central, internal Change Manager. He is responsible for the formal correctness of the Requests for Changes, organizes the internal information flow and calls a meeting of the Change Advisory Board on the management level in case of larger changes with several IT departments involved.

6. Summary

IT Service Management according to ITIL requires significant effort and will certainly never stop once started. On the other hand, ITIL only gives Best Practice Recommendations and especially doesn't instruct or regulate rules or tools nor their implementation, i.e., there is enough freedom to re-use and start with whatever is already existing at a computing centre. Still, two ingredients are absolutely essential: an always up-to-date Configuration Management Data Base which provides the internal logical model of the whole own IT infrastructure, and a well managed Service Desk as the main interface to the customers. The figure below shows all the ITIL processes that are currently implemented at SCC. It includes the internal roles from the SCC service management department as well as the specific GridKa roles. Internal and external views are given as well for each of the ITIL processes.



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