

# Future challenges for quality-assured IT support through cooperative structures

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## 1. ABSTRACT

In the future, various new challenges will arise in quality-assured IT support at universities. University computing centers are increasingly being encouraged to provide IT services not only for their own universities but for other universities and research institutes as well. Additionally, cooperation between various university IT service providers is essential. The joint service of different service providers of a university for additional external facilities leads to the need to adapt existing support structures in order to continue to guarantee the best possible quality of service. In the following these new challenges will be examined using the example of the IT Center at RWTH Aachen University within the context of transformation of support structures.

## 2. MOTIVATION

The IT Center of RWTH Aachen University is one of the central IT service providers at the university (apart from the central university administration (ZHV) and the university library (UB)). The service catalogue of the IT Center includes the provision of approximately 50 basic and individual services to students, staff, and the facilities of the university, as well as external cooperation partners. These services include identity management, e-mail, telephone, data network, backup, managed services for institutes and the CAMPUS information system.

In order to better meet customer needs and requirements IT Service Management (ITSM) was introduced in 2008 according to the IT Infrastructure Library (ITIL). This is a de facto standard that defines IT Service Management through good practice guidelines and incorporates it organizationally.

Objectives of ITSM at the IT Center of RWTH Aachen University:

- The IT Center is to be perceived as a reliable partner for all user groups.
- The IT Center is an interdisciplinary partner.
- The IT Center strengthens its customer orientation.
- The processes at the IT Center are optimized and there is an increase in transparency and liability towards the users (Bischof, Hengstebeck & Grzemeski, 2011).

As part of the establishment of ITSM the IT-ServiceDesk was opened in 2010 as the central point of contact for all inquiries regarding the IT services of the IT Center. It is responsible for responding to defined inquiries as well as for coordinating the communication between users and specialist divisions involved in more complex queries.

Through the establishment of the IT-ServiceDesk as a 'Single Point of Contact', it was possible to meet the users' request for high-quality IT support. In order to highlight and maintain a high support quality the IT-ServiceDesk was successfully certified according to the DIN ISO 9001:2015

standard in 2016 (Pieters, Hengstebeck & Grzemski, 2017). This certification confirms that a quality management system has been operated successfully and developed further.

The current 1st- and 2nd-level support structures are focused on service provision for members of RWTH Aachen University.

Due to emerging changes (Deutsche Forschungsgemeinschaft, 2016; Wissenschaftsrat, 2015a) in the academic landscape in North Rhine-Westphalia (NRW) and all of Germany, different services - for example HPC (high-performance computing) - will be consolidated. Because of this, the IT Center is striving for more closely knit collaborations with the ZHV and the UB of RWTH Aachen University. This will promote a strong common representation and positioning in the country. The goal is to act as a reliable collaboration partner both within RWTH Aachen University and with other interested research institutions. Already established support structures and services must be adapted and further developed according to these new requirements.

The focus of this article lies in the adaptation of support structures within the context of partnership with ZHV and UB as well as external research institutions. Besides some implications regarding financial aspects and challenges are addressed only marginally because these are not the focus of this paper.

### 3. DEMAND FOR MORE COOPERATIONS

The development and operation of IT services is becoming increasingly complex. In order to operate and develop an IT service with a defined quality of service ample resources are needed (in addition to the relevant technology, personnel with the appropriate qualifications). At the present time, a large number of university computer centers operate all necessary services themselves. Ultimately, this has a negative effect on the quality and availability of the respective services since the necessary resources can often not be provided with the required quality.

It stands to reason to focus competencies on a few specific services and offer them with an excellent quality instead of trying to provide all services and only being able to do so with lesser quality. Services that as a result can no longer be operated by a university are then obtained from other organizations that have focused their expertise on these. In this way the individual university computer centers form centers of competence for specific services and make use of services offered by others. Focusing on specific services thus builds a high level of know-how of the operation and further development of these services.

Not only have the computing centers themselves recognized that it is neither effective nor efficient to operate all services themselves. The Commission for IT Infrastructure (KfR) of the Deutsche Forschungsgemeinschaft (DFG) recommends a sustainable IT strategy in the opinion piece 'Informationsverarbeitung an Hochschulen - Organisation, Dienste und Systeme' (Deutsche Forschungsgemeinschaft, 2016) and states that required IT services do not necessarily have to be supported by the local computer center but can also be obtained from external service providers:

*'Die interne Optimierung von Prozessen, Organisationsstrukturen und inhaltlicher Ausrichtung der Hochschulen [...] führt typischerweise zu hochschulspezifischen Lösungen beim effizienten Einsatz von IT. Dieser Prozess kann jedoch nicht an den Grenzen einer Hochschule aufhören.'* (Deutsche Forschungsgemeinschaft, 2016)

In addition to the Deutsche Forschungsgemeinschaft (DFG), also states in its 'Empfehlungen zur Finanzierung des Nationalen Hoch- und Höchstleistungsrechnens in Deutschland' (Wissenschaftsrat, 2015a) that cooperative structures must be created. Moreover, future high-performance computers will also be available for nationwide use. This will result in an increase of the user groups which requires the support from the universities running a computing cluster.

These requirements are taken into account by RWTH Aachen University in their IT concept (RWTH Aachen, 2016). It is noted that the university or the three central IT service providers will be working as service providers for other universities and research institutes.

Such collaborations have already existed rudimentarily for some time. For example the University of Paderborn has been using RWTH IT Center's backup and archive service for several years. The IT Center also runs the Exchange infrastructure at the University of Paderborn.

In a pilot project the IT Center provides the central Exchange infrastructure for the employees of the universities of the Fine Arts at the Essen location.

In this model the external institution acts as a 1st-level support entity for their users, sometimes there are also external specialist division which act as 2nd-level. Accordingly, the IT-ServiceDesk or the IT Center (specialist division) then becomes the 2nd or 3rd-level support unit. The orange arrows shows the escalation leves the queries can take. The green arrows describe answering paths. To point to the blue arrows, they describe how the communication and hence the answers are forwarded from the local to the external institution or external users. A particular variation shows the green arrow that illustrat that the specialist division IT Center comunicat to the external specialist division. For technical reasons this procedure may be helpful.

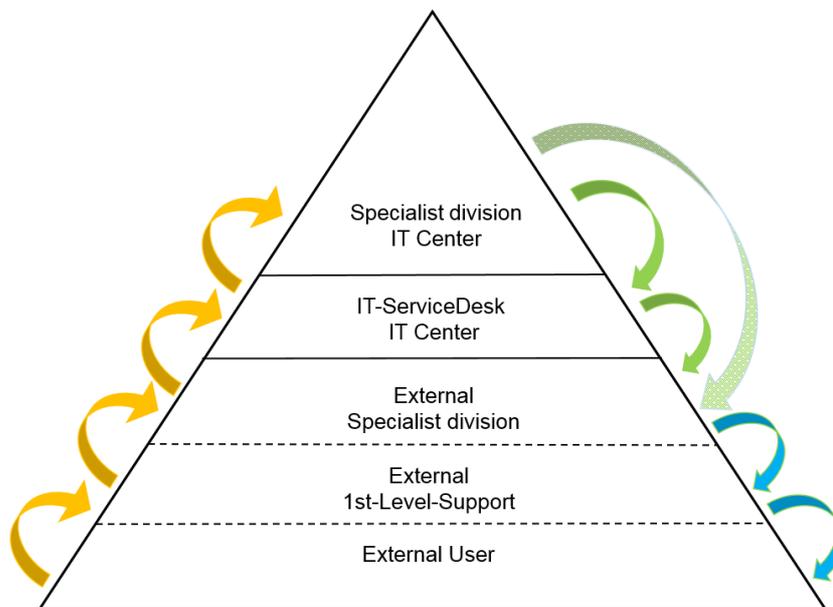


Illustration 1: Support pyramid: Exchange

In cases where the IT Center receives services from other universities or research institutions the support structure is as follows. A successful example of this kind of partnership is the service Sciebo of the University of Münster (Sync & Share NRW, 2017).

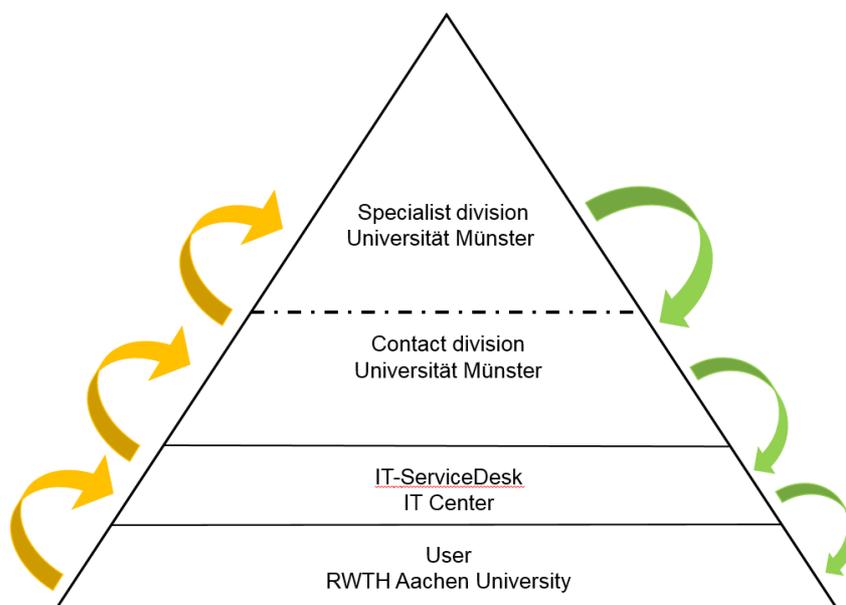


Illustration 2: Support pyramid: Sciebo

Here, the local computing center (IT Center) offers its users the Sync and Share service ‘Sciebo’ which is provided and further developed by the University of Münster. This service can be used by all members of RWTH Aachen University. The 1st-level support for members of RWTH Aachen University is provided by the IT-ServiceDesk of the IT Center. Inquiries which go beyond the defined 1st-level support are forwarded to the 2nd-level Sciebo-support. The replies by the 2nd-level support will be passed on to the users by the 1st-level support of the IT Center.

#### 4. FUTURE SUPPORT STRUCTURES

The new collaborative orientations of the computing centers imply that the support structures introduced so far have to be transformed in order to be able to continue providing high-quality support. Within this context, it is important not only to take into account the fact that external institutions of higher education and research may use services, but also that different services within the university may be provided by different institutions and/or external partners. For example, at RWTH Aachen University, the new Campus Management system was conceived jointly by all institutions involved in the university (faculties, ZHV, UB and the IT Center) and launched together with the implementing external partner.

Another example is the research data management (Wissenschaftsrat, 2015b) which is required by a new legal framework. This is provided jointly by the UB, the Research and Career Department, as well as the IT Center of RWTH Aachen University.

Noteworthy is a cooperation with the Forschungszentrum Jülich where the Eduroam device management system is being designed.

These three examples are presented below in regard to their challenges for the support structures.

##### 4.1. New scenarios in IT support

As already described, it is necessary to transform the existing support structures in order to ensure high-quality and customer-oriented support in light of new requirements. In the following, new support scenarios are described using three short case studies.

###### 1. Interdisciplinary service for coordinating and organizing student lifecycle and teaching (example Campus Management System)

Within the context of the establishment of a new Campus Management System (RWTH Aachen PuL-Projekt, 2017) for the organization of the student lifecycle and teaching the

existing support structures must also be adapted to accommodate the large number of institutions involved (Student Office, Central Examination Office, IT Center, Departmental Student Adviser etc.). Until now, users had to address their queries directly to one of the above-mentioned institutions but it was not always clear which institution could answer the question. As a result, they were often referred from one institution to another. In order to avoid this in the future, all queries relating to the new campus management system are to be directed to one central address. All participating institutions can access these requests, for example via a common ticket tool. The challenge here is introducing the ticket tool to all institutions that have not used it so far. They may be skeptical and lacking expertise in using it.

## 2. Interdisciplinary service for the scientific community (example: research data management)

These services are provided not only by the local computing center but also in cooperation with other institutions of a university. At RWTH Aachen University, for example, the research data management is collaboratively provided by UB, the Research and Career Department and the IT Center (RWTH Aachen Forschungsdatenmanagement, 2017). The IT-ServiceDesk serves as a single point of contact for all inquiries regarding research data management. Accordingly the IT-ServiceDesk is responsible for answering defined standard requests. More sophisticated inquiries are forwarded to the appropriate institution. Currently, users are receiving a solution from the responsible institution at RWTH Aachen University directly, rather than via the IT-ServiceDesk.

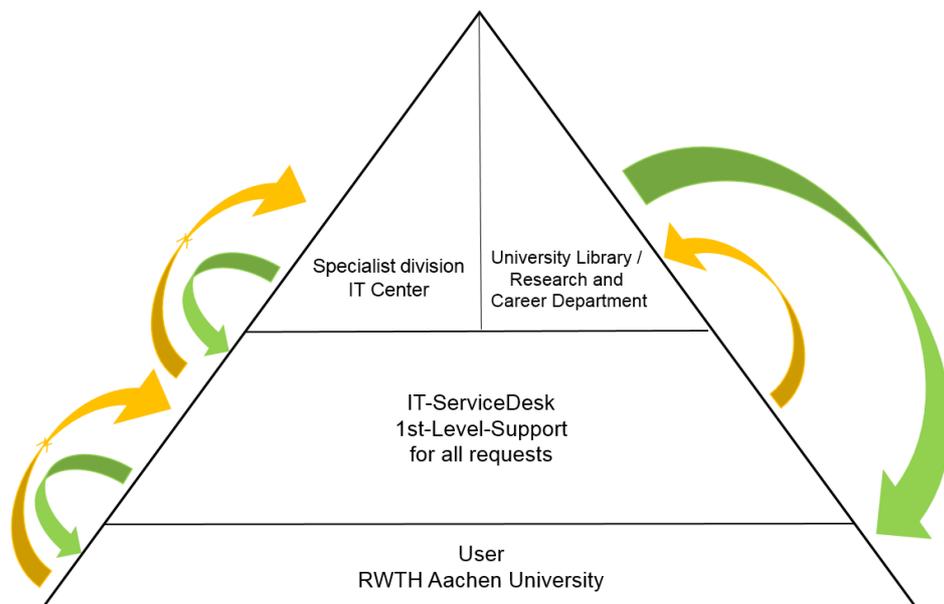


Illustration 3: Support pyramid structure: research data management

## 3. Joint conceptualization and development of a service between two mutually independent institutions (example: Eduroam Device Management)

The local computing center and an external research-oriented partner organization are designing and developing a service (both technically and organizationally). This is then provided and operated by the local computing center. Further development of the service would happen in collaboration with the other institution. If the service was to be offered to additional institutions they might become involved in the further development as well.

One example is the Eduroam Device Management which was developed by the IT Center and Forschungszentrum Jülich. This is an application to create and manage device-specific Eduroam identifiers. Before the introduction of this application, users often chose the same

password for their Wi-Fi/VPN account and other RWTH accounts. The new Eduroam Device Management generates individual Wi-Fi credentials for each device (Decker, Politze, 2017).

This increases the security of other RWTH service accounts because they would not be affected if Eduroam access data were compromised by a identity theft. Furthermore, existing Eduroam login credentials can be deactivated individually and immediately if a device is lost.

The idea for the Eduroam Device Management was developed at the IT Center. It also carried out a first implementation for the members of RWTH Aachen University. In discussions with Forschungszentrum Jülich, the research center expressed its own need for such an application. To ensure that it would not have to invest its own resources in the development of such a system, the service was collaboratively developed. Now, other external institutions could use this service as well. The service and thus the support concept are currently still under development but probably it will be guided by illustration 4.

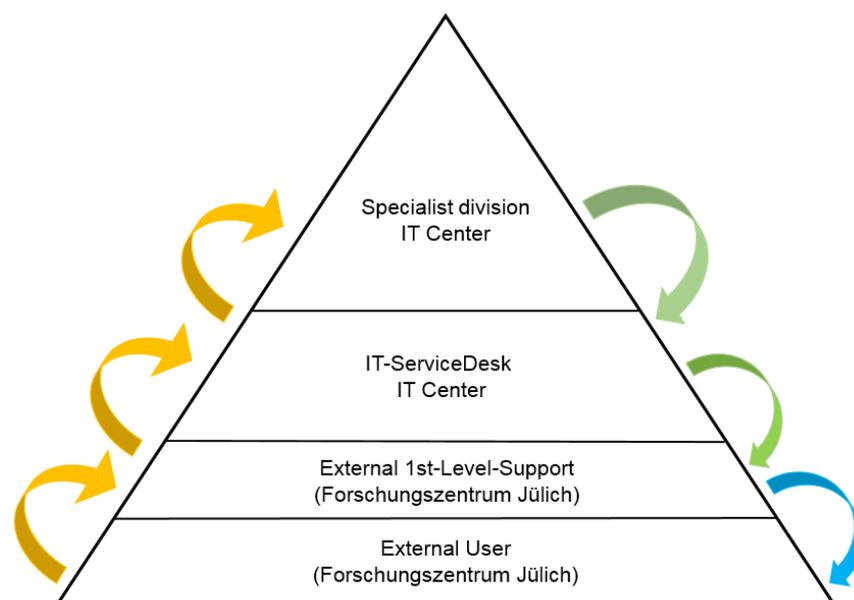


Illustration 4: Support pyramid Eduroam Device Management

## 4.2. Challenges of the new support scenarios

The aforementioned scenarios present several new challenges to the 1st-level support. These can be classified as follows:

1. Formal challenges
2. Work organization and communicative challenges
3. Technical challenges

### Formal challenges:

For all three scenarios it is necessary to establish in addition to default servicelevel agreements (SLAs) service description and special support agreements between the participating institutions in which the following points are taken into account.

The agreements must indicate at which institution which level of support is located or whether a division of support will take place. For example it would be possible that the 1st-level support is located at the utilizing institution and only requests which go beyond previously defined 1st-level support are passed on to the providing institution. In this case it would become necessary to define precise limits between the 1st and 2nd level support.

In general, it must be determined whether support requests which are passed on to the university providing services are billed individually or whether they are charged at a flat rate. If billing was defined according to the number of requests a reliable and transparent reporting would have to be put into place for accurate billing. Furthermore reporting is also required for documentation and quality assurance.

In addition to the precise definition of support responsibilities it is necessary to define contact persons. It should be noted who is entitled to make inquiries to the service provider. It is also important to determine the ways in which requests are exchanged between the institutions and how they are documented. The use of a ticket system is a particularly big challenge here.

To ensure that all requests are processed in a timely manner, appropriate escalation times and procedures must be negotiated between the participating institutions.

Further formal challenges is the consideration of data protection. Especially when full support is provided by the service provider, it might be necessary to access users' personal data in order to guarantee high-quality support. The responsible data protection officers are to be involved here and it needs to be clarified whether and which data can be used and provided for the support.

At the organizational level it is necessary that quality management or quality assurance is incorporated. This can be ensured through regular exchange and review deadlines as well as coordinated reporting. If quality management and assurance processes already exist it is essential to expand these accordingly. In the context of quality management it must also be ensured that maintenance (for example deployment of hotfixes and patches) and changes are communicated at an early stage. Essentially for updates it is necessary to create a release management and fixed release plans which are coordinated in advance. The one-time negotiation of the support framework conditions is not useful as a review and adjustment must take place at regular intervals in order to ensure a high quality.

### **Organizational and communicative challenges**

In addition to the formal challenges, work organization and communication challenges arise. For example, it must be taken into account that there is an increased workload for support staff since now not only the local users make inquiries but also users or defined contact persons from other institutions. In this case, the staff has to know or understand who is eligible for support from the external facility. This can only be achieved by keeping the process documentation up-to-date. Furthermore it is absolutely necessary to design a model oriented training program for the local and also the external institution.

It must also be agreed how the support documentation is maintained - whether a central documentation platform for all participating institutions or individual documentation for each institution is kept.

In addition to the documentation, marketing must also be coordinated. The following questions need to be clarified:

1. Is there any central marketing by the service provider?
2. Through which channels will the service be advertised?
3. Are marketing documents provided centrally?
4. Is a corporate design required for the service?

Furthermore participating institutions may have different support times. These times might, for example, be restricted by internal organizational factors (such as events, meetings, etc.). Such restrictions must be appropriately communicated and discussed ahead of time and might be part of support agreements.

The greatest communication challenge, however, is to highlight the benefits of such collaborative services to staff and users. It must be clear to everyone involved that rather than taking something away from someone, a high quality of IT services can only be achieved by close collaboration. It is therefore necessary to create a common understanding for the importance of working together.

## Technical challenges

The technical challenges can be divided into two themes. Technical solutions must be created that allow interactions between the participating institutions to be exchanged without media breaks. Only in this way a high quality of support and its documentation is possible. The experience with the service 'Sciebo' has shown that it is not ideal to forward support requests from the 1st-level support via emails sent through the ticket tool to the 2nd-level support as this causes media breaks.

Due to the use of two different ticket tools in the local 1st-level support and the external 2nd-level support incidences occurred in which a second inquiry from the 1st-level support to the 2nd-level ticket system could no longer be assigned to the original request. This happened because the 1st-level support ticket system removed the ticket number of the 2nd-level ticket system from the subject of the email. So far no automated technical solution could be implemented to fix this. As a result only a manual workaround is possible:

If the 2nd-level support answers a request by email the latter must include the ticket number of the ticket system in the email text. When the 1st-level support responds to this request the ticket number from the email text must be entered into the subject of the email to the 2nd-level support. This is currently the best available way for the 2nd level support to track the history of a request.

This example shows that the exchange of inquiries between two institutions can be quite challenging. Due to the large number of different ticket systems it is necessary to clarify in advance whether a smooth interaction between them is possible. If this is not the case it becomes necessary to provide appropriate technical solutions. Generally, the usage of as limited a number of different tools as possible should be sought.

In addition to the described technical interaction, administration and monitoring tools must be provided for the 1st-level support depending on the specific nature of the support. In the case of the Sciebo service an administrative interface is provided to the 1st-level support units of the participating institutions through which simple activities, e.g. the creation of project boxes can be carried out. To simplify authorization management this interface is linked to the identity management of the participating institutions.

For the service Eduroam Device Management which is operated by the IT Center of RWTH Aachen University and will be made available to other institutions in addition to Forschungszentrum Jülich, administration and monitoring tools will be provided for every 1st level division of these institutions.

## 5. CONCLUSION AND OUTLOOK

Due to the service provision for external institutions as well as for collaboratively provided services within the university the existing support structures have to be adapted under formal, organizational and technical aspects. Organizationally the existing processes must be modified in such a way that the external users are also taken into account and clear responsibilities are defined. At the IT Center and the IT-ServiceDesk lots of innovations regarding the 'formal challenges' have already been implemented internally e.g. support agreements. This means that support agreements between the IT-ServiceDesk and the specialist division have been drawn up and are being reviewed at regular intervals by the quality management of the IT-ServiceDesk. In other computer centers that also work in a process-oriented manner similar processes or procedures should exist. Extending these processes to external customers requires only minor adjustments to the processes and, if necessary, professionalization.

The adjustments in the field of billing become more complex if support requests are billed individually. In this case it is necessary to develop corresponding billing models that take into account how the 1st-level support and the 2nd-level support of the service provider is calculated. The development of a transparent billing model by the IT-ServiceDesk is ongoing. So far, transforming the support structures has been prioritized.

Regarding technical aspects, the necessary adjustments also have to be taken into account (among others) because appropriate administration and monitoring tools must be provided for each service that is to be provided externally. These have to be linked with the identity management of the utilizing institution. It should be borne in mind that not only tools for support are provided but also for the users' self-service applications.

The IT-ServiceDesk of the IT Center at RWTH Aachen University addresses the challenges described above. However, in order to face the challenges laid out in this article in the best way possible close cooperation between all participating institutions is crucial. Only through intensive communication between all parties involved can a transparent and quality-assured support with a high service quality for users be ensured.

In addition to the cooperation with the external institutions the IT-ServiceDesk also needs support from the specialist departments within the IT Center to implement technical solutions for the support itself as well as for the services.

Thanks to the work done so far by the IT-ServiceDesk it has been able to meet these challenges and develop itself further in order to support cooperative and collaborating IT services. However, this is associated with major changes that cannot be implemented quickly but must be introduced step by step in order to keep the burden on all parties involved low.

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## 7. AUTHORS' BIOGRAPHIES



Sarah Grzemeski studied Economic Geography, Economics and Geography. She received her Master's degree from RWTH Aachen University in 2002. Until 2007, she worked as a research assistant in the Department of Economic Geography of Services. Her main research focus were employees in call and service centers. Since 2007 she has been working for the IT Center of RWTH Aachen University. Initially, she worked for the division of Process IT Support. In 2010 she was made division head of the IT-ServiceDesk. In this role, she assumes responsibility for the staff and strategic development of the IT-ServiceDesk, particularly with regard to customer support and service to the present day.



Ingo Hengstebeck studied Technical Communication. He received his Master's degree from RWTH Aachen University in 2009. Until 2009, he worked as an employee at the IT Center. Since 2014 he has been the deputy division head of the IT-ServiceDesk. His work is focused on quality management, process management and communication in the field of user support.