

Research Data Centre (FDZ)
of the German Federal
Employment Agency (BA)
at the Institute for
Employment Research (IAB)



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The Research-Data-Centre in Research-Data-Centre Approach: A First Step Towards Decentralised International Data Sharing

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FDZ-Methodenreporte (FDZ method reports) deal with the methodical aspects of FDZ data and thus help users in the analysis of data. In addition, through this series users can publicise their results in a manner which is citable thus presenting them for public discussion.

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Abstract

Remote data access as defined as the possibility for a researcher to access and evaluate restricted micro data via a secure internet connection from his home desktop computer at any time has not been implemented by a German Research Data Centre (RDC) so far. Privacy regulations and especially the problem of admission control are reasons why German RDCs are not able to offer restricted data via remote data access to the research community. By initiating the “RDC-in-RDC” approach the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB) in Nuremberg, Germany, aims to bring data access in Germany closer to the ideal perception of remote access. The basic idea of this approach is to allow data access from designated institutions with comparable standards but locations other than Nuremberg. In a first step, access to BA and IAB data will be granted from four sites in Germany and one site in the US. Moreover, the RDC-in-RDC approach represents a change of paradigms in two respects. First, data access will be decentralised and the FDZ literally brings its data closer to the researchers. Second, data of the FDZ will be accessible from abroad and the dissemination of micro data will be no longer restricted to national borders. The RDC-in-RDC approach may therefore be regarded as a first step towards remote access in Germany and may also represent a blue print for an intensified international data sharing.

Keywords: micro data, remote data access, international data access

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1 Introduction

Fostered by the rapid developments in technologies and methodologies, statistical institutions and authorities experienced a growing demand for high-quality micro data by both the scientific community and policy-makers over the past years. Independently of the fact that the dissemination of micro data for scientific purposes is part of their legal mandate, the preservation of the confidentiality in the data, i.e. to prevent the disclosure of single entities, stands above all when outsiders are granted access to micro data by the statistical authorities. In order to ensure privacy for individuals and to serve the needs of the scientific community, statistical authorities usually apply a combination of different strategies (see Lane et al. 2008). These strategies may include for example the approval of projects by (statistical) authorities and/or scientific boards, the training of researchers, the anonymisation or alienation of data or the establishment of 'safe' settings for on-site use. Widely spread implementations of these strategies are for example Public Use Files for off-site use or Research Data Centres (RDCs) and secure data enclaves in order to allow on-site analyses of confidential micro data.

The most efficient and for researchers most convenient way of off-site use is remote data access. Remote data access means that an approved researcher may access restricted micro data for her approved project via a secure internet connection (see Grim et al. 2009 and Hundepool et al. 2009). She is able to do all preparations of the data and analyses off-site but the restricted micro data never leave the safe setting of the statistical authority or an RDC. After the program codes are processed with the data, the outputs are controlled and sent back. Depending on the prevailing national data protection acts, remote access systems may even allow researchers to actually see the data.

Although statistical authorities in many countries have undertaken efforts in order to make micro data accessible for the scientific community over the past years, national legal concerns and restrictions prevented an overall establishment of remote data access systems so far. While several statistical authorities in Europe, North America or Oceania already succeeded in the implementation of remote access systems, Germany for example still lags behind this development. Besides the varying stages of development with respect to the implementation of remote access systems, the diversity of national data protection legislations leads to considerable differences in the scope of performances and services provided by the particular data access systems. The systems may be limited in terms of statistical analysis tools or only provide data access to a few (parts of) certain data products. Moreover, micro data access by means of remote data access is usually restricted to national borders. As pointed out by Ahmad et al. 2009/2010, the limited enforceability of contractual terms and penalties abroad, virtually 'restricts' data access to resident researchers due to high transaction costs for non-residents.

With the Research Data Centre-in-Research-Data-Centre (RDC-in-RDC) approach the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB) in Nuremberg, Germany tries to overcome the existing legal barriers and to bring micro data access in Germany closer to the ideal perception of remote access. The basic idea of this approach is to allow data access from designated national and international institutions with comparable standards as the FDZ site in Nuremberg. By using a Citrix-thin-client solution, researchers can access the whole scope of micro data available for on-site use in Nuremberg.

In a first step, FDZ data may be accessed from four RDC sites of the Statistical Offices of the Länder¹ in Germany. Moreover, a fifth site at the Michigan Center for the Demography of Aging (MiCDA) Enclave² at University of Michigan's Institute for Social Research (ISR) in Ann Arbor, Michigan, USA represents the international component of the RDC-in-RDC approach.

The main aim of the project is not solely restricted to the facilitation of access to FDZ data in Germany or the US. It is intended to gather experiences and by doing so, to build confidence among statistical authorities, researchers and data protection officials in decentralised ways of data. However, the RDC-in-RDC approach may not be equivalent to the establishment of remote data access. But it may serve as stepping stone, especially for countries where legal concerns are still hindering the establishment of decentralised access ways to restricted micro data. Moreover, due to its international aspect and the insights gained from it, this project may be beneficiary for statistical authorities all over the world. It may represent a blue print for data sharing beyond national borders.

The paper is organized as follows: Section 2 provides a short overview of the international state of developments with regard to remote access, as well as a brief description of both the German situation and the FDZ. The technical implementation of the RDC-in-RDC approach is sketched in section 3. Finally, section 4 concludes.

¹ A detailed description of these institutions is given in Bender et al. 2009.

² Bound 2008 provides a description of the MiCDA Enclave.

2 Applications of Remote Data Access

2.1 International developments

The German “research data centre movement” is quite a recent development (see KVI 2000 or Bender et al. 2009). Other countries, often with less stringent data protection legislation, have a longer tradition of operating RDCs and have already implemented remote data access systems or are currently working on it. Moreover, some countries also undertook first steps towards international data sharing.

One of the oldest remote data access systems for micro data is the Lissy System of the Luxembourg Income Study (LIS)³. The project began in 1983 and was extended to include the Luxembourg Employment Study (LES). The main aim of Lissy has always been to make micro data of a large number of countries available for comparative social research.

Another, old system is the IPUMS-International Project (Integrated Public Use Microdata Series)⁴, a collaboration of the Minnesota Population Center, National Statistical Offices, and international data archives. It was set up in 1999 in order to obtain frequency counts from diverse censuses that are in compliance with data protection regulations.

The Cornell Restricted Access Data Center (CRADC) was also established 1999. As part of the Cornell Institute for Social and Economic Research (CISER) in Ithaca, NY, the CRADC provides secure access to confidential research data. Researchers of the Cornell University can acquire, house, and use restricted data in CRADC's secure computing environment. After signing a CRADC data user agreement, researchers can access confidential data hosted at CRADC by using either a Windows terminal services client, a terminal services client software or a remote desktop client.⁵

Statistics Denmark first disseminated micro datasets to researchers in 1986 under an “in-house researcher arrangement”. In 2001, remote data access was introduced and 55 access points had already been set up by the end of 2003. Access is made possible via a token among other things.⁶

Statistics Netherlands, too, has a long tradition of making micro data available to researchers (since the early 1990s). After the demand by researchers for on-site access had reached a very high level, remote data access was introduced in 2006 (OnSite@Home). Researchers can access Dutch micro data by means of some special software which is installed on a regular desktop computer, located in a separate and lockable room at the researcher's institution. By 2009, this special software has been installed on 45 terminals, one even located in Italy. (see Hoeve 2009/2010).

3 <http://www.lisproject.org/>

4 <https://international.ipums.org/international/>

5 http://ciser.cornell.edu/CRADC/What_is_CRADC.shtml

6 <http://www.dst.dk/HomeDK/TilSalg/Forskningsservice.aspx> (in Danish); see also Anderson (2003), Borchsenius (2005) or Thygesen et al. (2003).

The Australian Bureau of Statistics also operates a remote data access system (RADL), which was set up in April 2003 (see Tam et al. 2009/2010). The RADL system works in three steps. Researchers submit their programs via a secure website, where they are first checked for illegal commands. If this check finds no such commands the program is run and the outcome is automatically checked. There is an additional audit process in which output is manually inspected to ensure that the analysis using the micro data does not violate any legal regulations.⁷ Since 2009, the Australian Bureau of Statistics and Statistics New Zealand are providing mutual access to anonymised micro data by using the RADL system. Australian data may be accessed in New Zealand and vice versa (see Upfold et al. 2009/2010 and Tam et al. 2009/2010).

Statistics Sweden has had a remote data access system (MONA) since 2005. This system provides researchers with the possibility of remote access from any computer with Internet access.⁸

The National Opinion Research Center (NORC)⁹ located at the University of Chicago runs a remote data access system, which mainly provides access to firm data. The NORC data enclave has not only created data access but has also introduced communication possibilities for the users (e.g. program-sharing, data-wikis). The implementation of a remote access system is currently also considered by the US Census Bureau. In collaboration with external experts from academia the so called Microdata Analysis System (MAS) is planned, offering access for limited statistical analyses on full Census micro data sets (see Foster et al. 2009/2010).

In the United Kingdom, two remote data access applications are currently operated (see Ritchie 2009/2010). The Virtual Microdata Laboratory (VML) by the Office of National Statistics (ONS) allows ONS and governmental staff access to micro data through their desktop computers. Researchers from other institutions use designated 'thin terminals' at government offices instead. To overcome this disadvantage for non-ONS and non-governmental staff, the Secure Data Service (SDS) hosted by the UK Data Archive has become fully operational in 2010. The SDS enables safe and secure remote access for approved researchers to the data of the British Household Panel Survey. The SDS operates using thin-client and Citrix technologies, whereby data are available only via a controlled network (see Wright 2009).

Statistics Canada introduced the so called „Real-Time Remote Access“ (RTRA) in 2010. RTRA is partially based on the RADL model developed by the Australian Bureau of Statistics. Researchers will submit their requests through a secure portal to a protected server located on the secure Statistics Canada network. After a check for forbidden commands, the syntax will be processed with the data. Disclosure control will be automated as well as notifications to the submitting researcher (see Goldmann 2009/2010).

7 [http://www.abs.gov.au/websitedbs/D3310114.nsf/home/CURF:+Remote+Access+Data+Laboratory+\(RADL\)](http://www.abs.gov.au/websitedbs/D3310114.nsf/home/CURF:+Remote+Access+Data+Laboratory+(RADL))

8 http://www.scb.se/Pages/List___257147.aspx (in Swedish); see also Söderberg (2005).

9 <http://www.norc.org/DataEnclave>

Also in 2010, the French remote access centre CASD (Centre d'Accès Sécurisé Distant aux données) has become operative. Designed and developed by the National Institute of Statistics and Economic Studies (INSEE), CASD provides access to household data in France. The CASD system is exceptional since it is a hardware-based solution using the so-called SD-Box (patent pending). After being installed in the researcher's institution, the SD-Box provides a secure biometric access between the researcher and a secure server hosting confidential data. About thirty research projects in France and one project in the United Kingdom have already used CASD (see Gadouche 2011).

The implementation and operation of remote access systems is not limited to national authorities or organisations. Comparable developments are also taking place on the transnational level. To access micro data sets of the European Union (EU)/Eurostat researchers still have to visit the safe centre of Eurostat in Luxembourg. In order to facilitate data access the Essnet-project "Decentralised Access to EU Microdata Sets"¹⁰ was established. The idea is to develop a decentralised access by which a researcher from a certain EU member state can use European datasets in his member state. The concept of research data centres which has been already realized in some European countries as well as (the concept of) the safe centre of Eurostat could be examples for a decentralised access to European micro data sets.

The Essnet-project has showed first results of an access to European micro data in safe centres (on site). It included the methodology, guidelines and requirements which are essential to implement an access to European micro data in safe centres in the member states. A follow-up project is planned. For an overview of all these activities on the European level see Bujnowska et al. 2009/2010.

Another initiative on the transnational or European level to mention in this context is the Data without Boundaries (DWB) project which will start in May 2011 and is funded by the 7th Framework Programme for Research and Technological Development (FP7) of the European Commission. The project gathers data archives, national statistical institutions and universities. The objective of DWB is to develop an integrated model where the best solutions for micro data access are available irrespective of national boundaries but flexible enough to fit national arrangements. Hence, DWB aims to achieve a standardization and harmonization of micro data access ways as a concerted effort on a European scale.

¹⁰ <http://www.safe-centre.eu/>

2.2 Situation in Germany

Access to restricted micro data stemming both from administrative process and surveys was rather limited in Germany until ten years ago. In 2001, the Commission to improve the informational infrastructure by cooperation of the scientific community and official statistics (Kommission zur Verbesserung der informationellen Infrastruktur zwischen Wissenschaft und Statistik, KVI) finally recommended the foundation of so called research data centres to public producers of micro data in Germany (KVI 2001).

The establishment of RDCs at the Statistical Offices, the German Pension Insurance Fund and the Federal Employment Agency (Bundesagentur für Arbeit, BA) resulted in standardised access ways to restricted data collected by the Federal Statistical Office, its regional offices and by the labour and social security administration (see Bender et al. 2009).

German RDCs currently provide two methods of access to restricted, i.e. weakly anonymous micro data. First, by controlled remote execution and second, in the context of on-site use at the premises of the RDC. Controlled remote execution is a limited mode of remote data access. It means that external researchers send evaluation programs to the RDC, where RDC employees conduct the evaluations, check the results for compliance with data protection regulations and send the tested results to the researcher. This procedure is inefficient in two respects. First, as the researchers have no direct contact with the data, they sometimes program “blindly”. As a consequence, programs have to run several times until the desired evaluation is obtained. Second, the level of support required from the RDC staff is high. Research visits for on-site use at special separate workplaces for guest researchers at the RDC avoids this loss of efficiency as the researcher has direct access to the data. However, the main disadvantage with on-site use is obvious: the researchers have to travel to the RDC, a growing number of them even from abroad. This often entails high travel and accommodation expenses.

As already mentioned above, legal concerns hindered the implementation of true remote data access systems which provide access to weakly anonymised micro data in Germany so far. Data protection officers' main concerns focus on the additional information available from the internet. Since remote access systems allow data access from outside a safe environment like an RDC, the usage of additional information cannot be controlled. Nowadays, a vast amount of (additional) information is easily accessible via the internet for everyone. Because of its mere magnitude it is almost impossible to judge which kind of information from the internet and to what extent may be useful to an intruder in order to disclose a single entity in the data. As a consequence, only absolutely anonymised data may be accessed by remote access systems in Germany (see Schaar 2009).

2.3 The Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB)

The FDZ was founded in December 2003, as there had been no systematic access to social data up until that point. Following a positive evaluation by the German Council for Social and Economic Data in April 2006, the FDZ was permanently established as an independent research data centre of the BA at the IAB. An evaluation by the German Council of Science and Humanities in 2007 confirmed that the FDZ was an internationally unique institution: “The Research Data Centre (focusing on methods and data access) is an internationally visible, indispensable service institution, unique in Europe and a prime example to other institutions, possessing large datasets of scientific importance.” (Wissenschaftsrat (German Council of Science and Humanities) 2007, p.55)

The FDZ prepares individual datasets developed in the sphere of social security and in employment research and makes them available for research purposes – primarily for external researchers. With its website (<http://fdz.iab.de>), the documentation and working tools available online, and its workshops and users’ conferences, the FDZ makes it easier for external researchers to work with the datasets.

The micro datasets available at the FDZ include the IAB Establishment Panel, the Sample of Integrated Labour Market Biographies (SIAB), the BA Employment Panel (BAP), the Establishment History Panel (BHP), the Linked-Employer-Employee Data from the IAB (LIAB) and the panel study “Labour Market and Social Security” (PASS) among others.

The FDZ serves not only the national but also the international market. One important step towards internationalisation in 2007 was releasing web pages in English and having almost all of the data documentation translated (see Bender et al. 2009).

3 Implementation of RDC-in-RDC

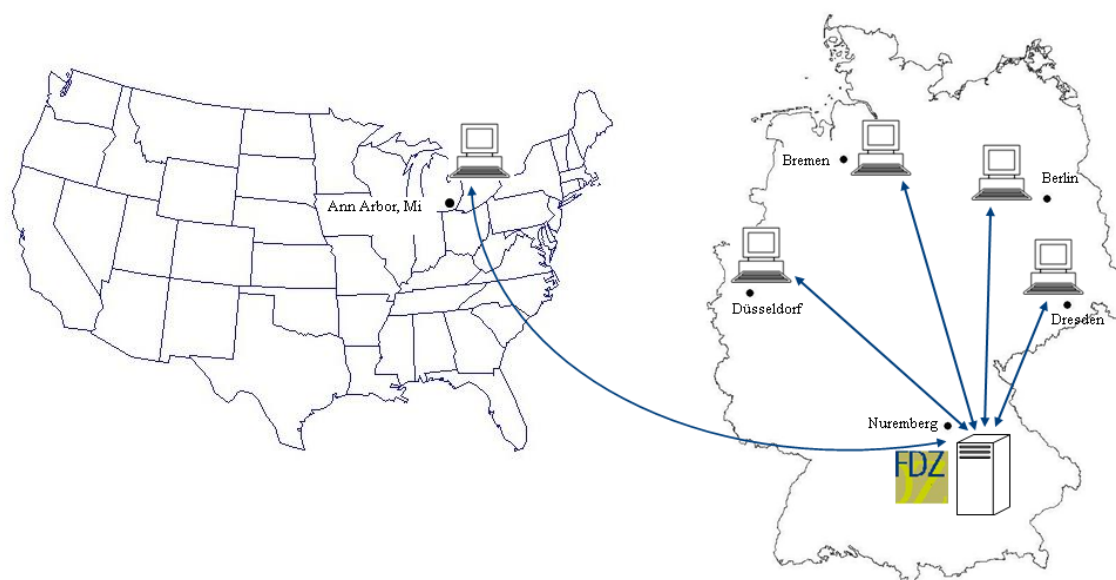
The central idea of RDC-in-RDC approach is to enable data access from other RDCs or institutions (called “guest-RDC” in the following) which share comparable standards as the RDC (called “data-RDC” in the following) where the data are actually stored, but which are located at different sites. In doing so it does not matter whether the guest-RDCs are located in Germany or abroad. The data are accessed in a similar way to that practised so far in on-site use at the RDCs. The only difference is that the guest researcher’s room is not at the local (data-)RDC (for instance in Nuremberg) but at another (guest-)RDC. In the pilot project the FDZ is the data-RDC. The guest-RDCs can be institutions which fulfil the security requirements of the FDZ. These include all German RDCs¹¹ as well as comparable institutions in other countries.

In order to improve access to the data of the BA and the IAB in Germany, the RDC of the German Statistical Offices of the Länder and the FDZ are working together on this project.

¹¹ An overview of the German RDCs is given on the website of the German Data Forum (<http://www.ratswd.de/eng/dat/fdz.html>).

The Statistical Offices of the Länder in the federal states of Berlin/Brandenburg, Bremen, North-Rhine Westphalia and Saxony are participating in the project as pilot locations. Data access for researchers abroad is to be improved by means of cooperation between FDZ and the MiCDA data enclave at University of Michigan's Institute for Social Research (ISR) (see figure 1).

Figure 1: Sites of the RDC-in-RDC approach



In the following sections various aspects regarding the “RDC-in-RDC” mode of data access are explained in more detail, in particular the division of tasks between the data-RDCs and the guest-RDCs and issues concerning the technical implementation.

3.1 Applying for data access

The work of the German RDCs is influenced by different legal framework conditions (Social Code and Federal Statistics Act). For instance, the RDC of the BA at the IAB makes its data available on the basis of the Social Code (Sozialgesetzbuch - SGB), whilst data from the Statistical Offices are made available on the basis of the Federal Statistics Act (Bundesstatistikgesetz - BStatG). It will therefore be very difficult to standardise the respective access mechanisms or to transfer these different regulations between the RDCs. As a consequence it is necessary for users to continue to submit their applications for data access to the data-RDC.

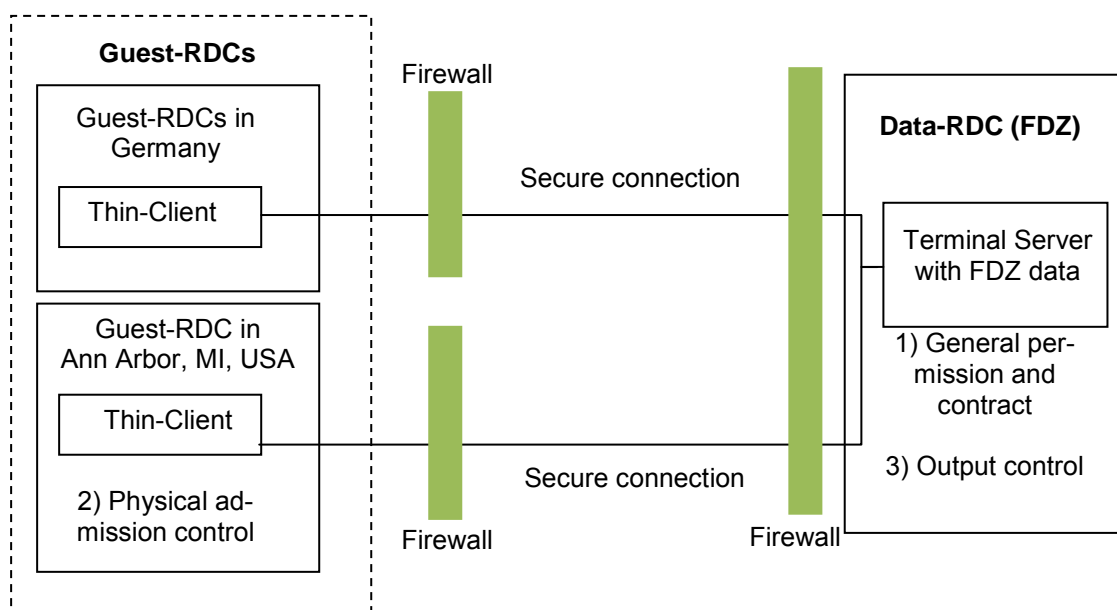
At the FDZ all external researchers continue to submit an application for data access in accordance with § 75 Social Code Book X. After the application has been approved by the German Federal Ministry for Labour and Social Affairs (Bundesministerium für Arbeit und Soziales - BMAS), the FDZ concludes a data access agreement with the institution of the user and the user itself. In this agreement the user undertakes to comply with the data protection regulations recorded in the agreement and to bear the consequences stipulated by German law if the agreement is breached.

3.2 Access to the authorised data

In order to enable access to the requested data from a guest-RDC it is necessary to develop a new technical concept. The plan is that the requested data should be accessed from dedicated workstations at the guest-RDCs (see also Figure 2). For this, the same security criteria must be fulfilled at the guest-RDC as apply at the data-RDC. The data access should occur via a secure data line. From the dedicated workstation at the guest-RDC, the researcher logs onto a server of the data-RDC using the remote desktop function and a password. A researcher working at the guest-RDC has the same access rights as the researchers conducting analyses at guest workstations in the data-RDC. In concrete terms, in the case of the FDZ of the BA at the IAB the researcher obtains access to certain servers and to certain directories within the local guest network on these servers. He or she is thus not given the opportunity to intrude into the network of the institution of the data-RDC. Similar to a research visit at the data-RDC, the researcher at the guest-RDC can only look at results on the computer screen. He or she may only print results or transmit them electronically after validation by a member of staff of the data-RDC.

It must be guaranteed that only authorised users work with the data at the guest-RDC. At the guest-RDCs located in Germany, the supervision is to be performed by employees of the guest-RDC whose competence with regard to data protection is regarded as equivalent to that of the staff at the data-RDC. The task of the staff at a guest-RDC is essentially data access control, i.e. they ensure that only the individuals named by the data-RDC gain access to the data. For data protection reasons the employees of the guest-RDC themselves do not gain access to the data, nor may they access the guest researchers' directories.

Figure 2: Scheme of the RDC-in-RDC approach. While the conclusion of the use agreement and the output control take place at the data-RDC, physical admission control is necessary at the guest-RDC abroad.



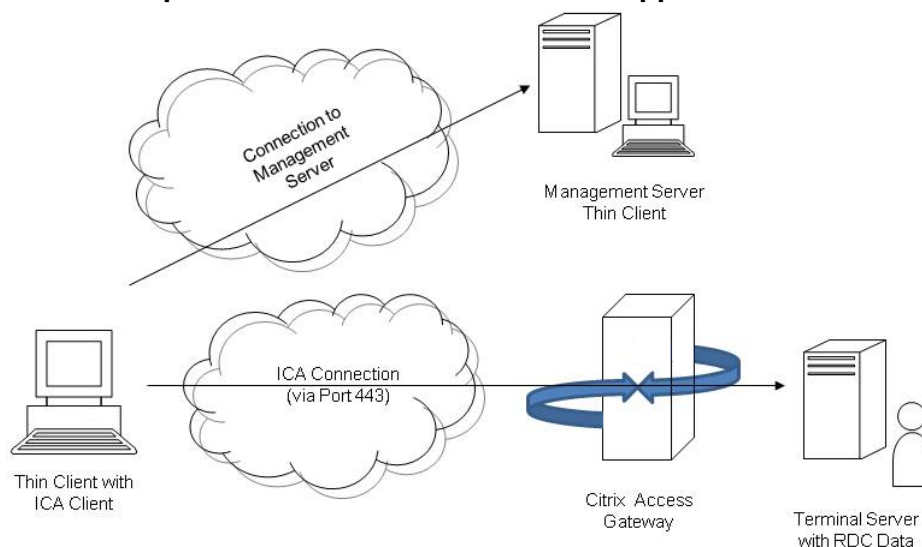
A different solution for data access control has to be found for the guest-RDCs which are located for example in the US. According to the recommendations made by the data protection experts at the BA/IAB, the US site should be supervised by trained FDZ employees. The hours of work in an US site differ considerably from the local office hours in Nuremberg, so in this case there must be local support. For this, too, trained employees of the FDZ with administrator rights are required in order to maintain regular operation.

3.3 Technical implementation for data access control

In the context of the RDC-in-RDC approach a thin client solution using Citrix software will be used for data access control and data access restrictions (see Figure 3). Other methods, for example biometric authentication, webcam monitoring or hardware authentication are possible and used internationally (on this issue see also Grim et al. 2009 or Rowland 2003), but bear either technical disadvantages or – in case of webcam monitoring - are not compatible with German law.

Within this technical solution, normal PCs are turned into so-called thin clients¹² and are then only able to perform limited tasks. Thus, for instance, all possibilities for external copying (onto USB, CD-ROM, DVD), for Internet access (including wireless access) or for printing are deactivated, the existing software is restricted and access to data is also limited. The thin client guarantees that a user only uses the approved drives and directories and also prevents him/her from being able to install additional programs. This is a component of the common solution for remote data access in other countries.

Figure 3: Technical implementation of the RDC-in-RDC approach.



¹² http://en.wikipedia.org/wiki/Thin_client

3.4 Output control and transmission

Output control continues to be performed at the data-RDCs as the employees of the guest-RDC have no access to the data for reasons associated with data protection legislation. An additional aspect is that different legal framework conditions apply for the different RDCs, which influence the monitoring of output for statistical confidentiality. The regulations for monitoring statistical confidentiality can therefore not easily be standardised. Hence the only sensible solution at the moment is that output control remains at the data-RDC and the data-RDC transmits the monitored output to the respective researcher.

4 Conclusion

Remote access is regarded as an efficient and convenient way of data access which already has been implemented in several countries, for example the United States, Sweden or the Netherlands. Due to legal restrictions, Germany still lags behind this development.

By initiating the “RDC-in-RDC” approach the FDZ aims to bring data access in Germany closer to the ideal perception of remote access. The basic idea of this approach is to allow data access from designated institutions with comparable standards but locations other than Nuremberg. In a first step, access to BA and IAB data will be granted from four sites in Germany and one site in the US.

Moreover, the RDC-in-RDC approach represents also a change of paradigms in two respects. First, before the implementation of the RDC-in-RDC approach, researchers had to come or connect to a RDC in order to access sensitive micro data. Now, “access is distributed rather than data” (Ritchie 2009/2010, p. 113). By establishing a decentralised way of data access the FDZ literally brings its data to the researchers. Second, data access will also be possible for non-resident researchers. Thus, the dissemination of micro data will be no longer restricted to national borders.

The successful implementation of the RDC-in-RDC approach may not only serve as a stepping stone for statistical authorities in Germany on their way to remote data access. It may also serve as a role model for other countries with a comparable state of development in terms of micro data access. Even countries with well-established remote data access procedures may benefit from the experiences gained by the RDC-in-RDC approach. Because of its international dimension, it may represent a blue print for shifting data access beyond national borders leading to intensified international data sharing.

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