# CIOs at German Universities – a Survey by ZKI

Hartmut Hotzel[1], Ulrich Lang[2], Martin Wimmer[3], Markus von der Heyde[4]

[1]Bauhaus-University Weimar, Steubenstraße 6a, D-99425 Weimar, *hartmut.hotzel@uni-weimar.de*
[2]University of Cologne, Weyertal 121, D-50931 Köln, *lang@uni-koeln.de*
[3]University of Regensburg, Universitätsstraße 31, D-93040 Regensburg, *martin.wimmer@rz.uni-regensburg.de*
[4]InformationsTechnologe (vdH-IT), Rosenweg 7, D-99425 Weimar, *markus.von.der.heyde@vdh-it.de*

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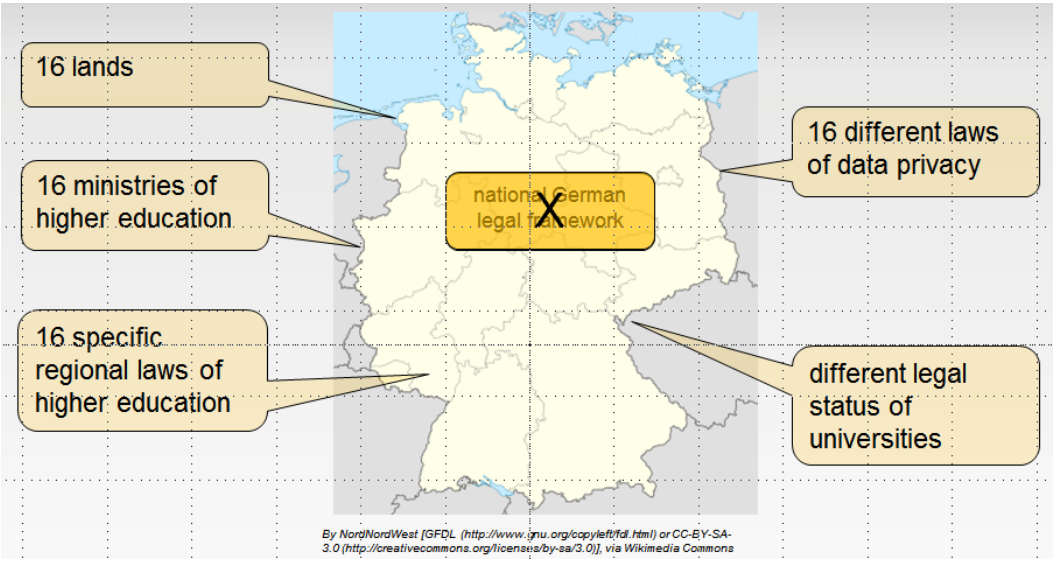
## 1. Summary

IT-Governance structures in higher educations are highly demanded by several countries and the overall government as well as funding agencies in Germany. How this general demand was implemented by the different universities remained an open question. Therefore, the ZKI conducted a survey to gain insides into the implementation and the chosen approaches. In structured interviews 28 institutions were questioned about their CIO, their Governance implementation, as well as the process towards the implementation. This report sums up first statistical results and compares them with the original recommendations.

## 2. Introduction

The ZKI e.V. (Zentren für Kommunikation und Informationsverarbeitung in Forschung und Lehre, centers for communication and information processing in research and higher education) is the German consortium of HE IT service and public funded research centers. Members of ZKI are universities, universities of applied sciences and big research facilities with public funding, represented by the directors of the IT-centers as well as companies with a high interest in HE IT.

Since 2001 the rectors‘ conference [HRK13], the „Deutsche Forschungsgemeinschaft“ (DFG, German research foundation) in [MA01, DFG 06, BK10], the ZKI [ZKI03, ZKI08, ZKI12]and others [vdH08, FL09, GPT11] recommended to establish a general manager for the ICT at universities called Chief Information Officer (CIO). Between 2005 and 2010 some of the German ministries of higher education (Germany has a different ministry of HE in each of the 16 lands) requested the designation of a university CIO.



In 2014 the ZKI planned to review these recommendations:

- How was the CIO-concept transformed into practice?
- What is good practice?
- Is it possible to measure whether the CIO's work is successful or not?

## 3. What is a CIO?

German DFG specifies four different types of CIOs (see [MA01]):

- CIO as a member of the executive committee with strategic tasks
- CIO allocated to executive committee with strategic tasks
- CIO with operative tasks, such as a director of an IT-service center
- a CIO-panel

Blueprint for the CIO's of the universities was the way industrial enterprises establishes a powerful IT-Governance headed by a CIO in the early 1990ies. The assumption was that CIOs are responsible for or at least part of all decisions concerning IT within an organization. Only rarely all powers are transferred to a CIO at universities, we only found four examples in our survey.

A CIO should have the decision-making authority or be at least part of the decision making for most of the IT-domains even in non-profit organizations or government bodies [WR04, Chapter 7]:

- IT principles
- infrastructure strategy
- IT architecture
- business applications
- IT priorities and investment

Within the survey we included all persons which are publicly documented as "CIO".

## 4. The ZKI-survey

Looking for CIOs at German universities, we examined official announcements of universities like the websites. Unofficial or unpublished structures within the university were not part of this survey. We contacted everyone mentioned as CIO asking to participate in the ZKI-survey by 60 to 120 minutes interviews via phone. The managing board of ZKI and Markus von der Heyde, who had been appointed to render the survey, prepared a list of questions.

Interview guidelines:

- IT-Governance
    - CIO-model
    - self-concept
    - effectivity of CIO implementation
- inauguration of a CIO
    - reasons for implementing a CIO
    - changes and activities
    - operative criteria
    - challenges
    - recommendation
- strategy

    - institutional strategy
    - contents
    - CIO's input to strategy
    - cooperation between HE institutions
    - research and synergies
- IT costs
    - awareness
    - trend
- communication
    - standard communication channels
    - external networking
- concepts in decision making
    - transparency
    - handling of decisions / CIO's role
    - what would have failed without a CIO
    - awareness of IT-domains
- awareness of IT
- future development of CIO (implementation)

Markus von der Heyde also did the complete analysis and offered basic interpretations. Ulrich Lang, Martin Wimmer and Hartmut Hotzel, being representatives of ZKI, interpreted the results.

## 5. Results

Most of the German HE institutions did not yet implement the recommendations of DFG, ZKI and others. The ZKI-survey did not involve questions like „why not", since only CIOs participated. However, the different HE types show a very distinct pattern, indicating that universities are further on the track of implementation (see Table 1).

| type of HE institution | owned by churches | private schools | government funded | total sum |
|---|---|---|---|---|
| universities of applied science | 22 | 97 (0 of 1) | 104 (6 of 14) | 223 (6 of 15) |
| art and music colleges | 8 | 3 | 46 | 57 |
| universities | 11 | 12 | 88 (22 of 41) | 111 (22 of 41) |
| total sums | 41 | 112 (0 of 1) | 238 (28 of 55) | 391 (28 of 56) |

Table 1: HE institutions in Germany (from HRK-compass). The number of participating institutions is given in brackets; first, the number of participants and second the total number of known institutions with a CIO in the specific category.

## 6. Types of CIOs

Only 16 out of 28 CIOs correspond to the four types of CIO described by [MA01]. The other 12 do not correspond and often present a mix of types.

- CIOs as a member of an executive committee with strategic tasks:
  Only three CIOS are responsible for decisions in IT-domains.
  Four are vice presidents for administration (US: provost, Germany: Kanzler).
  All these CIOs assigned the interviews to the directors of their IT-centers.
- CIOs allocated to executive committees with strategic tasks:
  Four CIOs are allocated to executive committee.
  There are also seven CIOs with a professorship and part-time CIO tasks.
  Two CIOs are chairmen of a CIO-panel (see below).
- CIOs with operative tasks:
  Nine CIOs are directors of an IT-unit (IT-center).
- CIO-panel:
  Eight universities established a CIO-panel, but all of these are missing the essential parts of the recommendations, because they are not held responsible of any decisions.

## 7. Relationship between CIO and director of the IT service center

In nearly every university there is an IT service center providing ICT services for the university. The head of this institution may be called "director of the IT service center", "head of the computing center" or similar. The person managing the ICT unit of a university is in our context called "director IT".

| **number of universities** | **hierarchical relationship between CIO and director** | | | |
|---|---|---|---|---|
| **type of CIO** | **equals*** | **subordinate*** | **one person*** | **sum** |
| CIO panel | 2 | | 6 | 8 |
| individual CIO | 7 | 7 | 6 | 20 |
| sum | 9 | 7 | 12 | 28 |

Table 2: Hierarchical relationship and type of CIO

* Additional definitions of terms:

equals CIO and director IT are on the same level

subordinate the director IT is subordinate to the CIO

one person CIO and director IT are one person.

There is an additional way to classify CIO's role referring to the role within the university:

research CIO is a part of the research staff of the university

IT director CIO is the IT director of the central IT service unit

staff position CIO is attached to the executive committee (German: Stabsstelle).

| **number of participants** | **CIO's role** | | | |
|---|---|---|---|---|
| **hierarchical relationship between CIO and director IT** | **research** | **IT director** | **staff position** | **sum** |
| equals | 5 | | 4 | 9 |
| subordinate | 6 | 1 | | 7 |
| one person | | 12 | | 12 |
| sum | 11 | 13 | 4 | 28 |

Table 3: CIO's role within the university and relationship to the director of IT services

## 8. Individual CIO vs. CIO panel

We asked what percentage of a full time equivalent (FTE) is spent for CIO tasks. There are noteworthy differences.

| CIO | number of universities | average time (FTE) for CIO tasks | average time (FTE) for CIO tasks of the participants |
|---|---|---|---|
| CIO panel | 8 | 0.26 | 0.13 |
| individual CIO | 20 | 1.03 | 0.53 |
| statistical test * | | 25.5 | 16.5 |
| sum / average | 28 | 0.81 | 0.41 |

Table 4: Labor Intensity for CIO tasks

The interviewed CIOs who are members of a CIO panel only spend 13% of a full time equivalent for CIO-tasks. The sum of FTE for all members of a CIO panel also is about ¼ FTE. Individual CIOs spend more the 50% of a FTE for CIO tasks. The value of 1.03 FTE means that on average more than one person is working on CIO tasks.

## 8.1. * A word about statistics

As there were only 28 participants in this survey, we had to be very careful with statistics. We applied for all tests the Wilcoxon-Mann-Whitney rank-sum test (U-test), which does not require a minimum number of participants or a Gaussian distribution of the entity.

The test shows for example in the table above that there is a significant difference between the percentages of FTE for an individual CIO compared to a CIO panel.

We applied this test successfully to all reported differences in this paper (with an error rate below 5%) but prefer for simplicity to present the absolute values. More statistical results are provided in the study itself [ZKI14].

## 9. Reporting

To whom does the CIO report? The person or the board to whom reports are addressed is often responsible for decisions about IT topics. Most CIOs report to a board of directors i.e. executive committee.

| | report addressed to | | | | |
|---|---|---|---|---|---|
| CIO's organizational role | no report | vice president | president / rector | executive committee | sum |
| research | 2 | 1 | 3 | 5 | 11 |
| IT director | | | 1 | 12 | 13 |
| staff position | | 1 | 2 | 1 | 4 |
| sum | 2 | 2 | 6 | 18 | 28 |

Table 5: Addressee of CIO's reports in relation to CIO's organizational role

## 10. Universities vs. Universities of Applied Sciences

There are only few differences between CIOs at research universities and CIOs at universities of applied sciences. The universities had established a CIO on an average 6.86 years ago, universities of applied sciences only 3.67 years ago. On average, universities of applied sciences started about three years later to implement CIO structures.

Research universities more often (82%) defined CIOs tasks in written form, but only 17% of the universities of applied sciences did so.

## 11. Other Criteria

Comparing “big” and “small” universities, i.e. dividing the participating universities in half (14 with more and 14 with less students), there are only few differences. “Big” universities bear larger costs and on the other hand have more absolute third party funds. Whether a CIO is a full time CIO or a part time CIO does not correlate with the size of the university. There is no evidence that only a “big” university can afford a CIO.

There is even no evidence that a professorship or a PhD is useful for a CIO. There is no evidence that the gender of a CIO is of any effect.

Further there is no evidence that a CIO should be part of the executive committee or should even attend the meetings of the executive committee. The DFG stressed the importance of a steady exchange of information between the CIO and the executive committee. This essential factor was also emphasized by participants in the survey but not evaluated statistically.

## 12. Effectiveness of CIO’s Work

It is very hard to find any measure for the effectiveness of a CIO’s work. Many of the participants in this survey were skeptical and did not suggest useful indicators.

Looking for possible indicators within the data of this survey we found that universities with a CIO structure in place that allowed for a better visibility of the IT personal across the institutions also had on average a 9% higher ratio of third party funds. There is an ongoing discussion among the authors whether this might be an indicator. An alternative explanation is that these institutions may have developed a high skill in focusing on the right decisions – and therefore have both: a different CIO structure and more research funds.

We also tried to analyze whether there is a correlation between the authority to decide and a resulting effectiveness:

| CIO and director of IT center | Number of universities | FTE of CIO for CIO’s tasks | Sum of all FTE for CIO’s tasks | CIO’s authority to decide about IT domains |
|---|---|---|---|---|
| one person | 12 | 0.27 | 0.46 | 0.00 |
| Hierarchical equal or subordinate | 16 | 0.53 | 1.08 | 2.50 |
| Sum | 28 | | | |

Table 6: CIO’s authority to decide

ZKI and DFG claimed to delegate the decision making authority directly to the CIO. Wherever the director IT holds the role of the CIO, the university never granted the CIO the authority to decide about IT domains. That means the executive committee is responsible for decisions of all IT domains. The other CIOs have the authority to decide on average for half of the IT domains defined by Weill and Ross [WR04, ISO08].

## 13. Decision making authority and hierarchy

The next table compares universities that gave decision making authority to the CIO at different levels. “None” means that the CIO has nothing to decide and primary is a consultant for the executive committee.

| Responsibility for IT-domains | Number of universities | Hierarchy: director IT is subordinate to CIO | CIO with operational |
|---|---|---|---|
| None | 18 | 6% | 67% |

| | | | |
|---|---|---|---|
| 1-5 | 10 | 60% | 10% |
| Sum | 28 | | |

Table 7: Number of it domains a CIO is responsible for, correlated to institutional hierarchy

## 14. Conclusion

The most striking result of the present survey is that nearly half (see Table 1) of all German research oriented universities implemented an official CIO structure, but they rarely implemented the recommendations of DFG, ZKI and others. The percentage of CIO structures within the universities of applied science is much lower.

Is it possible to transfer the IT-Governance from industry to a German university that is managed by professors elected for president or rector for a limited period? Will there be parallel IT frameworks if a CIO has only loose coupling to the director IT?

There is a growing discussion within ZKI: Today most CIOs do not feel represented by ZKI – when ZKI was founded in 1994 there were no CIOs at German universities. The question is whether and how to include CIOs or other CxOs with IT strategic interest into the ZKI.

ZKI will continue discussing the "CIO topic" in summer 2015.

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## 16. Authors' biographies

**Hartmut Hotzel** is the current managing director of the ITC Department of the Bauhaus-University of Weimar. He also is current vice president of the ZKI. See further details on **https://de.linkedin.com/in/hartmut-hotzel-587b8290**.

**Martin Wimmer** is the executive director of Computer Center of the University of Regensburg. Managing the Computer Center providing services for the University and the University Hospital of Regensburg, overall responsibility for the budget, ICT Strategy, representing the University in boards and committees. Martin Wimmer also is current president of the ZKI. See further details on https://de.linkedin.com/in/martinwimmer.

**Prof. Dr. Ulrich Lang** is the director of the Regional Computing Center (RRZK) of the University of Cologne. The RRZK provides IT services for the University of Cologne, operates the campus network, consults scientists in IT usage for research and education, collaborates in scientific projects, operates a High Performance Computing Facility, represents the University of Cologne in the Gauss Alliance (national HPC centers). Prof. Lang research and development activities of the Chair of Computer Science are focused on improving computer based problem solving processes. They include optimization of simulations, efficient use of high performance computers, parallelization of codes, improvement of data management processes, data life cycle management and problem solving environments. A special focus is on computer graphics and scientific visualization as well as on the usage of virtual reality techniques to support human comprehension processes. See further details on **https://de.linkedin.com/in/ulrich-lang-47b97318**.

**Dr. Markus von der Heyde** received his PhD from the University of Bielefeld and the Max Planck Institute for Biological Cybernetics Tübingen in Computer Sciences in 2000. His approach is to adopt biological principles into distributed computer applications in order to enhance stability and robustness. With his design of multimodal VR simulators he joined multidisciplinary research teams in order to investigate embodied and intuitive human spatial cognition, orientation and behavior as well as presence and immersion. Until 2011 he was ICT director of Bauhaus-University in Weimar. Today, he is management consultant specialized on IT topics in higher education. In cooperation with the University of Bremen (ifib) he continues to conduct the German CIO studies. See further details on **https://de.linkedin.com/in/mvdh42**.