Information Technology
Modern Infrastructure and Organization in a University

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I. Why this lecture?

Advances in Physics and Astrophysics
and
IT-Infrastructure and -Organization

Why these different themes in the same conference?

My theme is not important for Physics,
but it is for Physicists.

- So I hope that on one side
  you have recreation in the concentrated series of Physics sessions

- But on the other side
  you gain some information for real life or business
  and from there it may be of interest to you
• **Physicists**
  - need IT for their job
  - work in IT-industry and computing centers of universities
  - have an important know-how in IT
  - have understanding and insight in IT-necessities
  - can transfer this understanding into the whole university
Physicists can help

- to avoid the mistakes of the IT-development in Western-Europe
- to avoid the chaos in IT often to be found in universities
- to introduce an adequate organization for reliable services
- to introduce secure services
- to avoid a to expensive IT

There is no better chance to inform than in such a conference.
IT-Infrastructure and -Organization

No simple job to introduce good IT organization

- It is not only a technical problem
- But it needs vehement discussions and convictions
- Abilities and characters not always to be found with scientists

- All scientists have to be egoistic for success in their job
- But IT is used in the whole university
- IT needs efficient and economic services
- And non egoistic service providers
IT-Infrastructure and Organization

IT- self services in faculties

- Binds personal capacity
- Are semi or not professional in most faculties
- Don’t bring progress to the research in the discipline
  (Networking, system administration, standard applications, ...)

- Organizational understanding is often not present
- Men who did local IT-services as yet don’t want to loose this

On the other hand the problems are not only in the faculties:

- Computing centers sometimes don’t take into consideration
  the interests and needs of the faculties
- They are not free of egoism
Nevertheless:

- IT is very expensive
- Universities have to save money
- They should use synergies whenever possible

Therefore my lecture with appeals to you

- It is possible to organize IT
  - In advantage of the whole university
  - Without disadvantages for individuals
IT-Infrastructure and -Organization

University of Münster
Germany, Northrhine Westfalia
University of Muenster

- 39,000 students (8,000 start every year)
- 7,000 employees, with
  - 600 professors
  - 4,600 scientists
- 15 faculties
- 120 disciplines
- University hospital complex
  - 7,000 employees
Center of Information Processing or Computing center (ZIV)

- Staff 43 or 50: 50 % scientists, 50 % non academic
- Scientists:
  - 50 % Physicists
  - 42 % Mathematicians
  - 4 % Information scientists
  - 4 % Teacher

- Our Services
  - Networking
  - Servers of general interest
  - Special servers (compute cluster)
  - PC-Pools for students and own staff
  - Software and some applications of general interest
  - Security
  - Background for IT expert groups in faculties (later)
  - IT teaching, IT consulting
  - Development/introduction of new technologies, no basic research
## IT budget and the budget of the university

<table>
<thead>
<tr>
<th></th>
<th>Investments, repair, consumptions (paper, etc)</th>
<th>37 %</th>
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<tbody>
<tr>
<td>2</td>
<td>IT Personal</td>
<td>~2%</td>
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Demonstrates the importance of IT
IT-Infrastructure and -Organization

IT-Infrastructure in Muenster

- Networking
- Computers and Software
- Applications
- Services
Networking

1. Technology and Design
   • German Research Network, Internet, LAN, WLAN, remote access (ISDN, Modem, DSL, VPN)
   • Design, building, rebuilding
2. Operation
   • Network operation and network information center (NOC and NIC)
   • Management software
   • Database for documentation, operations support and users selfcare

   From the beginning of networking:
   • Service 24 * 7 hours
   • Maintenance, spares store
   • Service level: restore operation within 1 hour

3. Developments
   • Convergence of telephone and LAN
   • IPv6
   • Network security
   • ...
4. **Responsibility**
   - Networking is the job of the computing center up just to the outlets
   - And not the job of faculties
     - Cost expensive
     - Incompatibilities
     - A lot of negative experiences in other universities
     - Difficult to reorganize later

5. **Requirements for the job**
   - Dominant technical orientation
   - Fulfilled by Physicists better than by Information scientists
Computers and Software

1. Workstations, PCs
   - In the university and at home
     - For students and employees
     - Automatic software distribution (being built)
   - Special security problems with PCs at home

2. Servers and developments
   - Thin servers (one application per server)
   - Linux and Windows
   - Special Servers in faculties
   - Compute cluster for high performance computing
   - Highest performance computing outside of Muenster
   - System Management Software
   - Identity Management (with other universities in NRW)
   - Redundancy
   - GRID-Computing

3. Requirements for the job
   - Physicists, Mathematicians and Information scientists
IT-Infrastructure and -Organization

IT-Organization

1. Without Organization
   - Chaotic circumstances
   - Very expensive (personal and investment)
   - Reorganization (from chaos) is extremely difficult

2. Successfull IT-Organization
   - CIO or small CIO-committee
     CIO-committee more appropriate in universities!
   - Near to or better integrated into the rectorship
     Rector and chancellor should be members of CIO-committee
     But rectors don’t like this responsibility!
   - Vertical and horizontal organization

Therefore physicists should help
IT-Infrastructure and -Organization

- Vertical organization
  - Two levels -

Rectorship

IVL

IVK

ZIV

IVV 1
IVV 2
...
IVV 8

15 Faculties

IVV 9
IVV 10

Libr.
Admin

IT-Services
- End user
- Specific problems of the faculty

IVL = CIO committee
IVK = Commission of the senate
ZIV = Center of IT/Comp. center
IVV = IT expert groups
IT-Infrastructure and -Organization

- Vertical organization
  - One level -

Rectorship

IVL

IVK

ZIV

IVV 1  IVV 2  ...  IVV

Faculties

Smaller universities

IVL = CIO committee
IVK = Commission of the senate
ZIV = Center of IT/Comp. center
IVV = IT expert groups
Horizontal Organization

Information is of special importance for research and education

- Processing
- Delivery
- Owner (students, staff, money, ...)

But these three institutions have many non overlapping jobs, too

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Computing center
Library
Administration
IT-Infrastructure and -Organization

Horizontal Organization

Rektorship

IKM = Information, Communication, Media

IVL

IVK

ZIV

ULB

IKM

UniV

Faculties 1 – 15

Cooperation or integration: Large or small universities

IVL = CIO committee
IVK = Commission of the senate
ZIV = Center of IT/Comp. Center
ULB = Library
UniV = Administration
IVV = IT expert groups
IT-Infrastructure and -Organization

• Advantages of a vertically and horizontally IT-structure
  - More economic than flat or centralized
  - IT Competence in services
  - Stable, reliable
  - Efficient and economical
  - Flexible
  - Secure

  }  IT-services

  - Two levels for taking the interests of the faculties into account
  - Major decisions in consent with faculties and by agreement of the CIO

  - Confrontation between different service providers hinders efficiency
  - Consent is an important value in universities
  - We have reached this in Muenster

Faculties profit from this structure:
  They have less work, but get needed services, because of the 2-level support (IVV and ZIV)
• We have best experiences since more than 10 years with vertical and more than 2 years with horizontal structures.

• So in my university it is a well accepted structure, but not only there

• Some weeks ago we have won an important competition of the German Research Society (Deutsche Forschungsgemeinschaft)

• They named this *Centers of Excellence*

• Only 4 universities get such an award
IT-Infrastructure and -Organization

- We get award for our vertical and horizontal structure of organization
- And we have to demonstrate that especially the younger horizontal structure works well in an important project

*Information Management this in a Great University*
- Scientific and organizational Information Managing and administration of the university
- Analyse the processes for information flows
- Categories and metadata
- Rules and rights and profiles for access to the information
- We need the identity management for controlling the access
- Modern retrieval machines with newest linguistic methods
- Some portals for different groups
- ...

But this is another lecture
The task or mission of the Physicists in a university
- Who has a better understanding from the problems in IT?
- Physicists, Mathematicians and Information scientists
- Please support your university!

- Introduce an efficient structure now!
- Later is much more expensive!

In Muenster Physicists help to introduce a modern IT-infrastructure and organization.

They were much more pragmatic than other scientists and now they have good profit and advantages.