IT Service Management System at the Leibniz Supercomputing Centre

People, Process, Technology

Dr. Michael Brenner

brenner@lrz.de

Leibniz Supercomputing Centre of the Bavarian Academy of Sciences and Humanities

Leibniz Supercomputing Centre (LRZ)

Who we are, what we do

Leibniz Supercomputing Centre (LRZ)

- Owned by the Bavarian Academy of Sciences and Humanities

- Staff: ca. 170 full time employees

  - The LRZ operates
    >10 routers; >1.000 switches; >2.000 access points; >80 dark fibers;
    >600 physical servers; a VMware ESX cluster with 512 cores;
    a supercomputer (currently 62-78 TFlop, next year ca. 3 PFlop);
    a Linux cluster with 43 TFlop; a virtual reality laboratory; archiving
   systems with >42 petabyte capacity; etc.

LRZ: Mission (our "Business")

- **National and European Supercomputing Centre**
  - Part of the Gauss Centre for Supercomputing
  - Integrated in National and European HPC and Grid projects

- **Regional Computer Centre for all Bavarian Universities**
  - Capacity computing, special equipment, backup and archiving centre (15 petabyte, more than 9 billion files)
  - Competence centre (Networks, HPC, Grid Computing, IT Management)
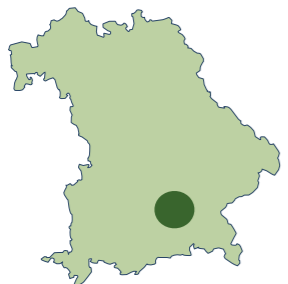
- **Computer Centre for all Munich Universities**
  - Student users: more than 90,000
  - Professional users: more than 30,000; including 8,500 scientists
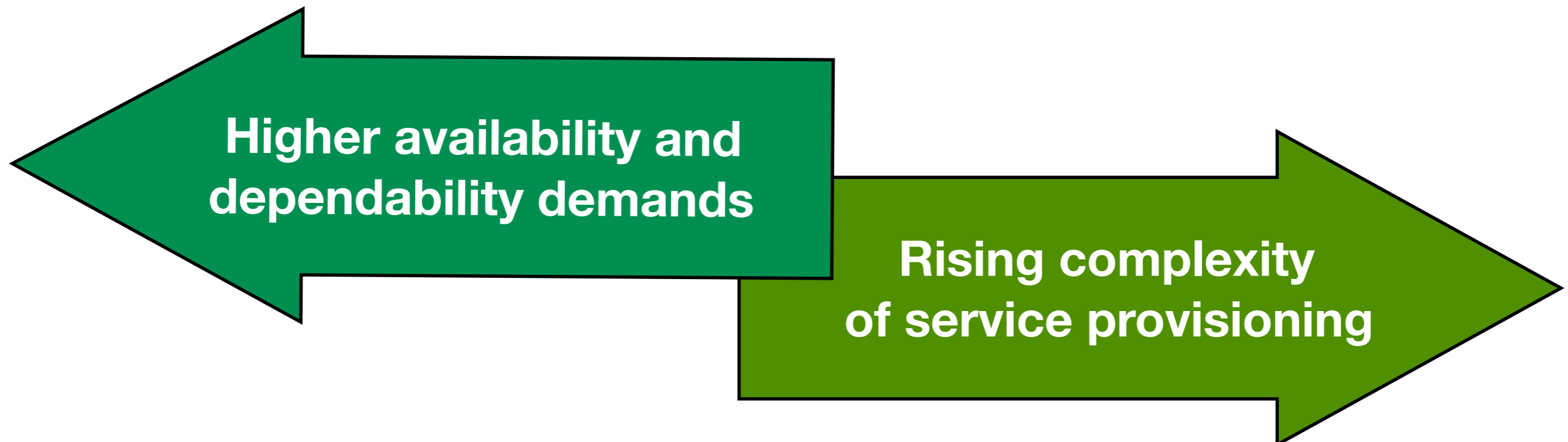
>70 Services   >100,000 potential users

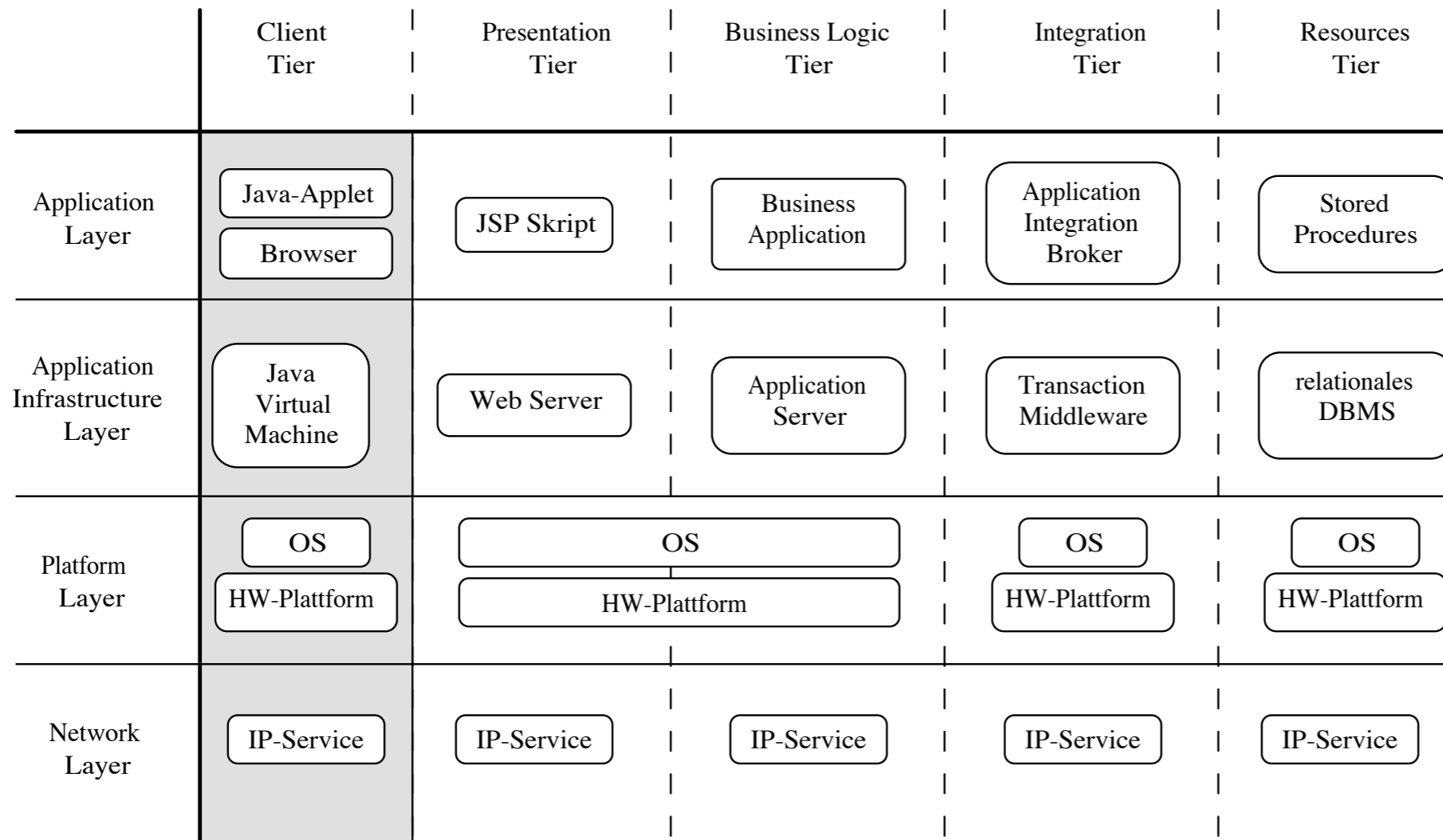# The case for an organizational / process approach

Why managing the infrastructure is not enough

Why we need (better) Service Management

- LRZ services become more 'business critical'

  - University administration processes more time-critical and IT-dependent

  - University institutions act as (semi-)commercial service providers

  - New services for state libraries, for the office for the central allocation of study places, etc.

- Interest of many customers is shifting from the performance to the availability and dependability of LRZ's services

Higher availability and dependability demands

Rising complexity of service provisioning

Architectural view of IT service provisioning

	Client Tier	Presentation Tier	Business Logic Tier	Integration Tier	Resources Tier
Application Layer	Java-Applet / Browser	JSP Skript	Business Application	Application Integration Broker	Stored Procedures
Application Infrastructure Layer	Java Virtual Machine	Web Server	Application Server	Transaction Middleware	relationales DBMS
Platform Layer	OS / HW-Plattform	OS / HW-Plattform		OS / HW-Plattform	OS / HW-Plattform
Network Layer	IP-Service	IP-Service	IP-Service	IP-Service	IP-Service

Example, based on Sun 3-D Architectural Framework

- Manyfold dependencies across architecture layers and tiers

- Additional dependencies through centralized infrastructure services (identity management, load balancing, ...)

Where do IT service incidents originate?

Sources of downtime, according to Gartner (1999):

Software Engineering ⊖ →

IT Service Management ⊖ →

80% People & Process Issues

20% Technology

← ⊖ Infrastructure improvements

← ⊖ Network and systems management
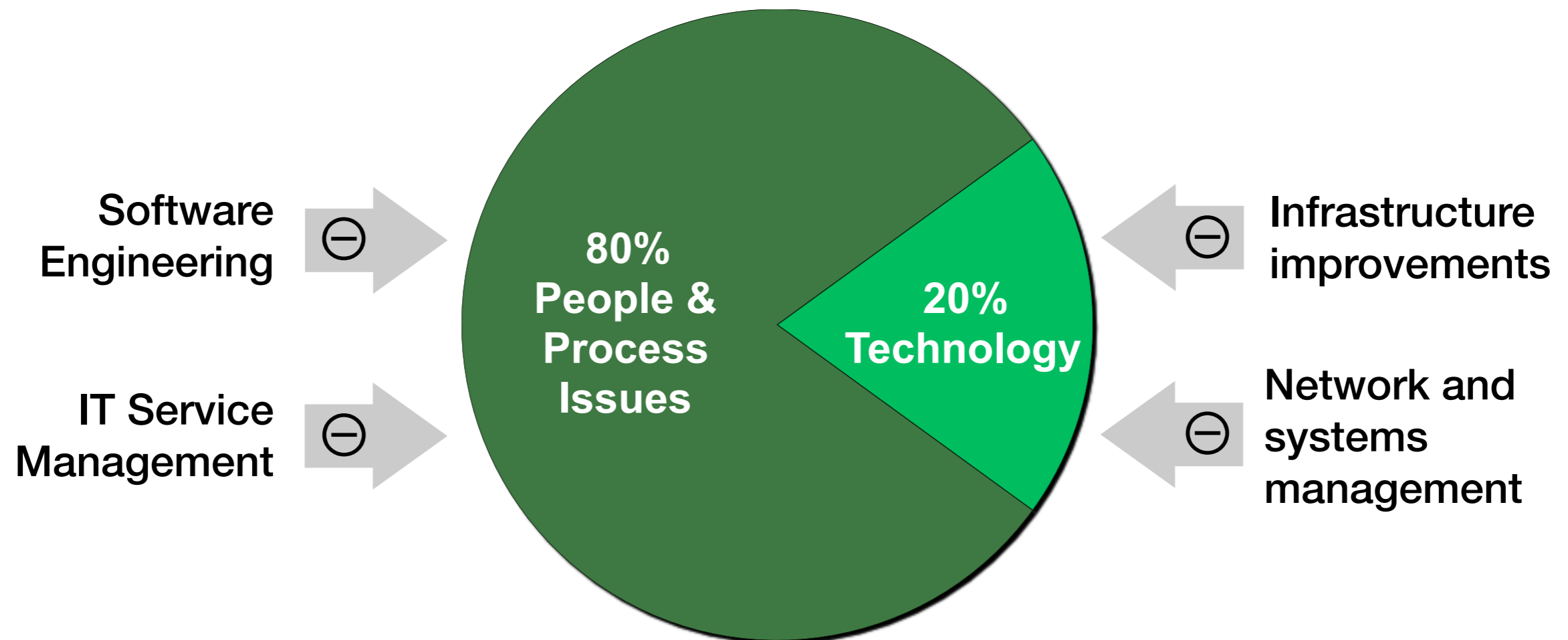
- Technology issues are not the main source of service downtime
- Main source of downtime is "somebody has tinkered with the configuration"

How are IT service incidents resolved?
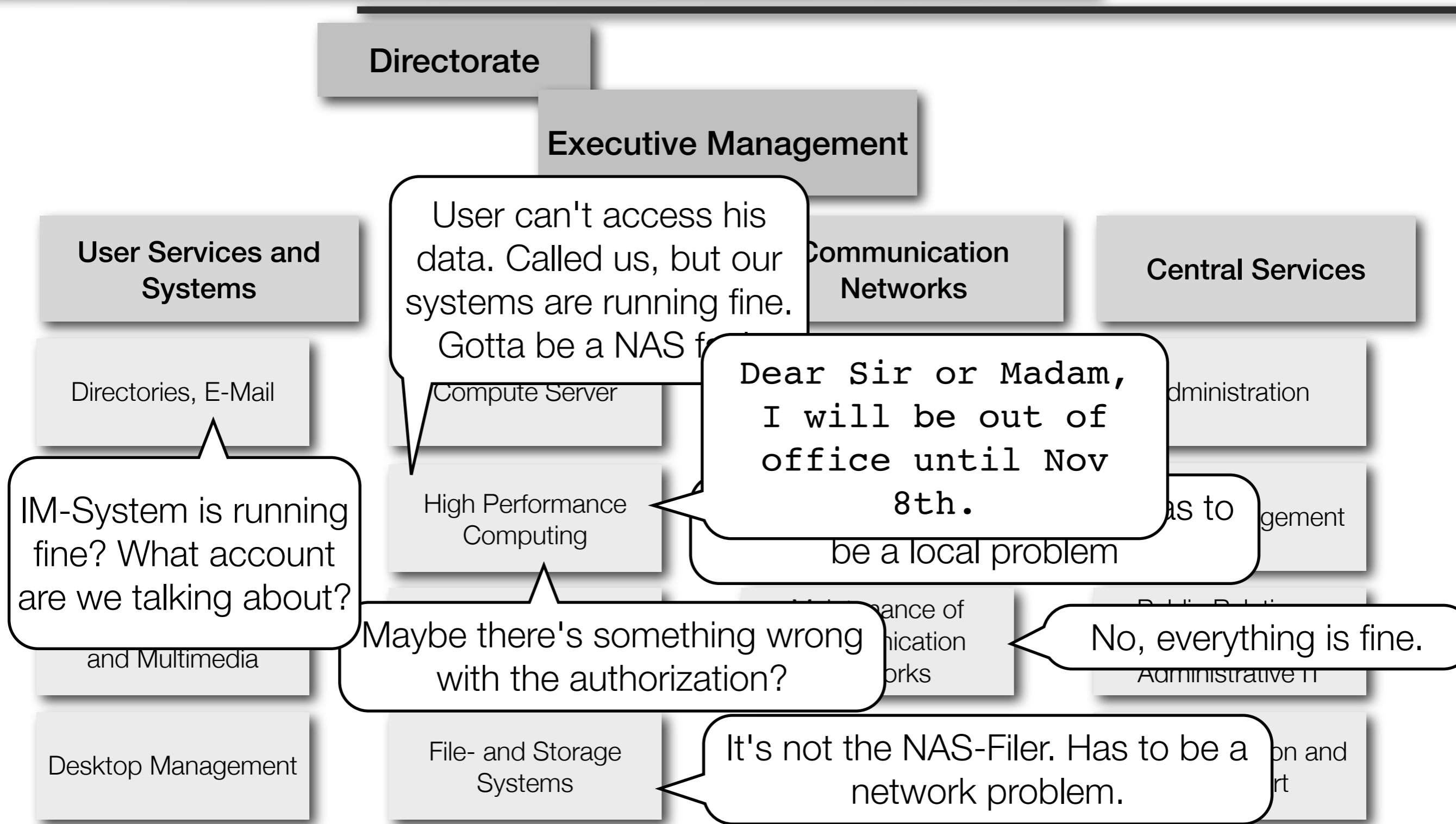
Organizational Structure of the LRZ

Why we need IT Service Management

- Traditional organiational structures of IT service providers divide functions along infrastructure layers and tiers (or technical specialties)

- But today, most IT services are multi-layered and multi-tiered
  - Resolution of IT failures needs to be coordinated across specialties and parts of the infrastructure
  - Effects of changes do not respect organizational boundaries
  - ...

➡ We need

  - Better cross-functional coordination of activities

  - Repeatable, predictable outcomes of activities

  - Better cross-functional documentation of infrastructure interdependencies

➡ **We need IT Service Management processes**

Introducing IT Service Management (ITSM) as a project

Why it's about more than defining processes

What kind of a project is introducing ITSM?

- This is a process improvement project, because
  - Without defined process, workflow remains ad-hoc and results won't be repeatable and reliable.
  - Processes need to be defined, established, measured and improved (Continuous improvement, "PDCA cycle").

Process

- This is a technology project, because
  - Tools enable process coordination, reporting and continuos improvement.
  - A good tool can make staff accept change more readily, a bad tool will make everything worse.

Techno-logy

- This is a change (organizational change, "people") project, because
  - A process organization is laid over the existing structure
  - Roles, authorities and responsibilities need to be defined and established

People
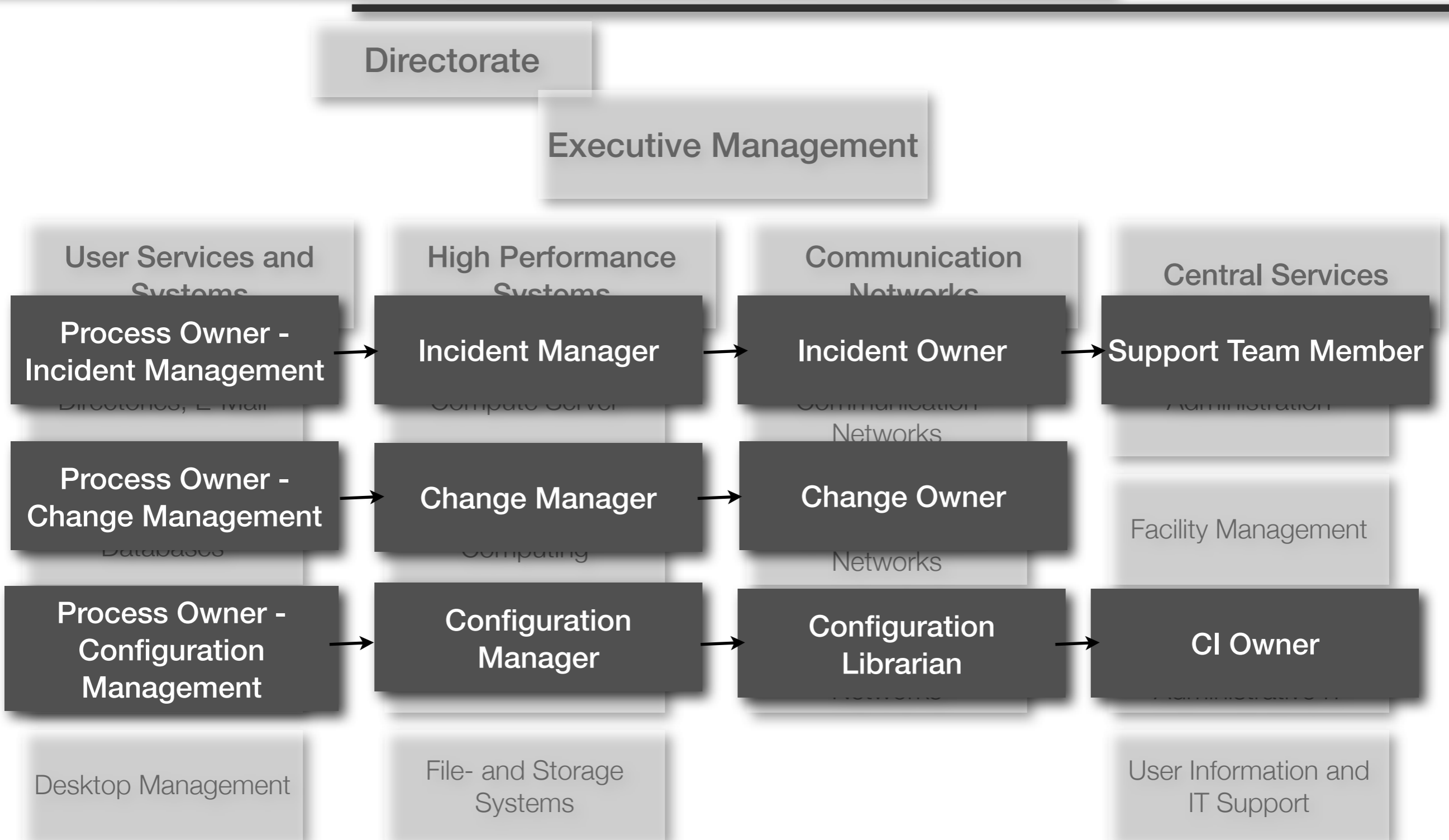
Introducing ITSM as a "Technochange"

- Introducing IT Service Management should be seen as a "Technochange" project (organizational change with a strong tech-component)
  - Technochange projects are high risk, historic failure rate ca. 75%
  - Biggest source of risk: people's negative reaction to change
    - IT people do not easily get excited about user support, change control, documentation etc.
    - An ITSM system introduces a level of bureaucracy that is usually uncomfortable for IT people
- "Best practices" on organizational just as important as those on ITSM processes
- If staff resistance is too high, your ITSM project is doomed.

Techno-logy
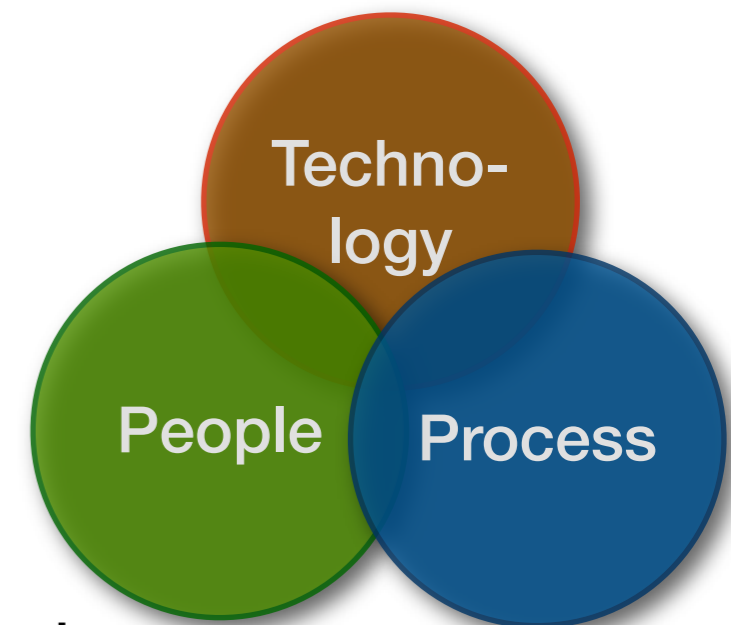
People   Process

ITSM at the LRZ

People, Process and Technology

New Roles and Responsibilities

Directorate

Executive Management

User Services and Systems	High Performance Systems	Communication Networks	Central Services
Process Owner - Incident Management →	**Incident Manager** →	**Incident Owner** →	**Support Team Member**
Process Owner - Change Management →	**Change Manager** →	**Change Owner**	Facility Management
Process Owner - Configuration Management →	**Configuration Manager** →	**Configuration Librarian** →	**CI Owner**
Desktop Management	File- and Storage Systems		User Information and IT Support

Project Marketing and Training

- General Project Marketing (there is never enough communication)
- Training Program
  - All staff eligible to receive in-house foundation training and certification
  - Cooperation with German TÜV Süd (developer of ITSM qualification scheme)
  - More than 150 staff members achieved "ISO/IEC 20000 Foundation" or higher certification since 2007

Participants of the worldwide first pilot exams for new ISO/IEC 20000 personell certification scheme at LRZ, November 2007

About the ITSM Frameworks

ITSM frameworks provide overall process structure, best practices for the defined processes and common terminology

- ITIL V3
    - Most popular ITSM framework, describes ca. 25 processes.
    - 5 books, more than 1500 pages (about 1000 pages net content).
    - Comprehensive, but verbose and badly edited: Abundant contradictions, inconsistencies and obscurities. (2011 edition might be somewhat improved.)
      Could probably be abridged to 250 pages without losing much useful content.
- ISO/IEC 20000
    - The "certifiable" standard for ITSM. Defines requirements for 13 processes. About half as popular as ITIL V3.
    - Core parts (20000-1 and 20000-2) less than 100 pages in total.
    - Concise to a fault. Too short to be useful as ITSM guidance by itself.
- MOF
    - Could be called "Microsoft's ITIL adaption", describes 16 "Service Management Functions". About half as popular as ISO/IEC 20000.
    - Large number of documents available at microsoft.com/MOF at no cost.
    - Somewhat complex structure, but contains a lot of useful and well-edited content.

ISO/IEC 20000 as basic framework

- Selected at the LRZ for its relative simplicity, clarity and consistency
- Includes a "separation of cross-cutting concerns" in the process framework
- Includes requirements for individual processes as well as for general management practices (similar to those in ISO 9000)

Service Delivery Processes

Capacity Management

Service Level Management

Information Security Management ◔

Service Reporting ◔

Service Continuity & Availability Management

Budgeting & Accounting for IT Services

Control Processes

Configuration Management ◔

Release and Deployment Management ◔

Resolution Processes

Change Management ◔

Relationship Processes

Incident Management ✔

Business Relationship Management

Problem Management ◔

Supplier Management

Defining Processes

- **Prerequisites**
  - Process framework (goals and interfaces of each process)
  - Document control
  - Policy and templates for process definitions

- **E.g.: Defining LRZ "Incident Management"**
  - Objective
  - Workflow: activities, control flow
  - Roles and responsibilities
  - Information to be recorded
  - Tools used
  - Control parameters, "key performance indicators"
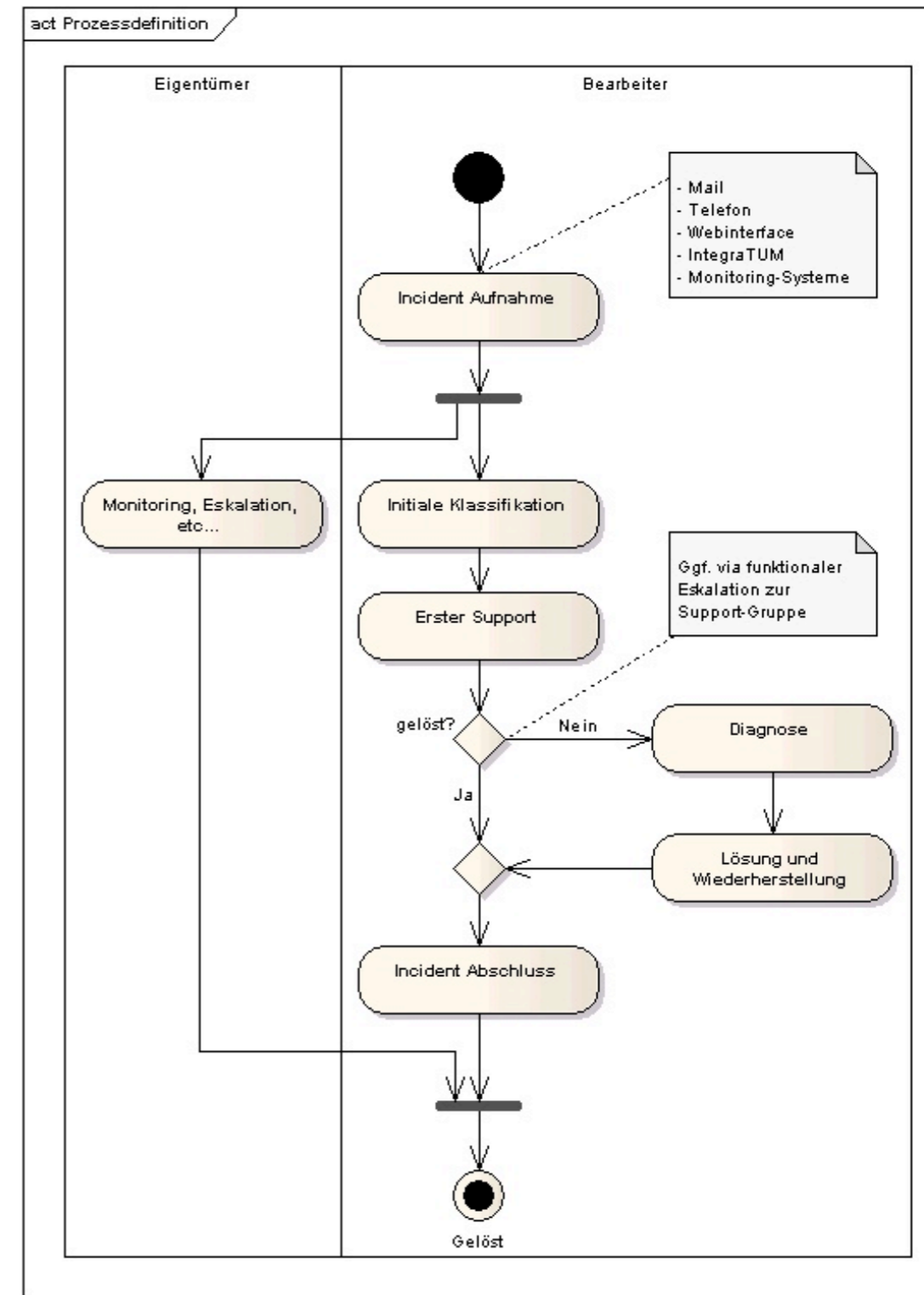
ITSM Suites

- Over 100 self-proclaimed "ITSM-tools" in a very in-transparent market
- An "ITSM suite" commonly integrates applications for several ITSM processes with each other and with a Configuration Management Database (CMDB)

IT Personnel | Developers / Admins | Users / Customers | *e.g. Monitoring, external ticketing* | other Systems

Client | **Developer Tool** | **Self Help** | **...**

| Workflows | Forms | ITSM Objects | ... |

ITSM Application

Technology Platform

Database

Tool: Incident form (user client)

Tool: Incident form (user client)

italic: automatically (pre-)filled

type and status

contact info (from LRZ-SIM)
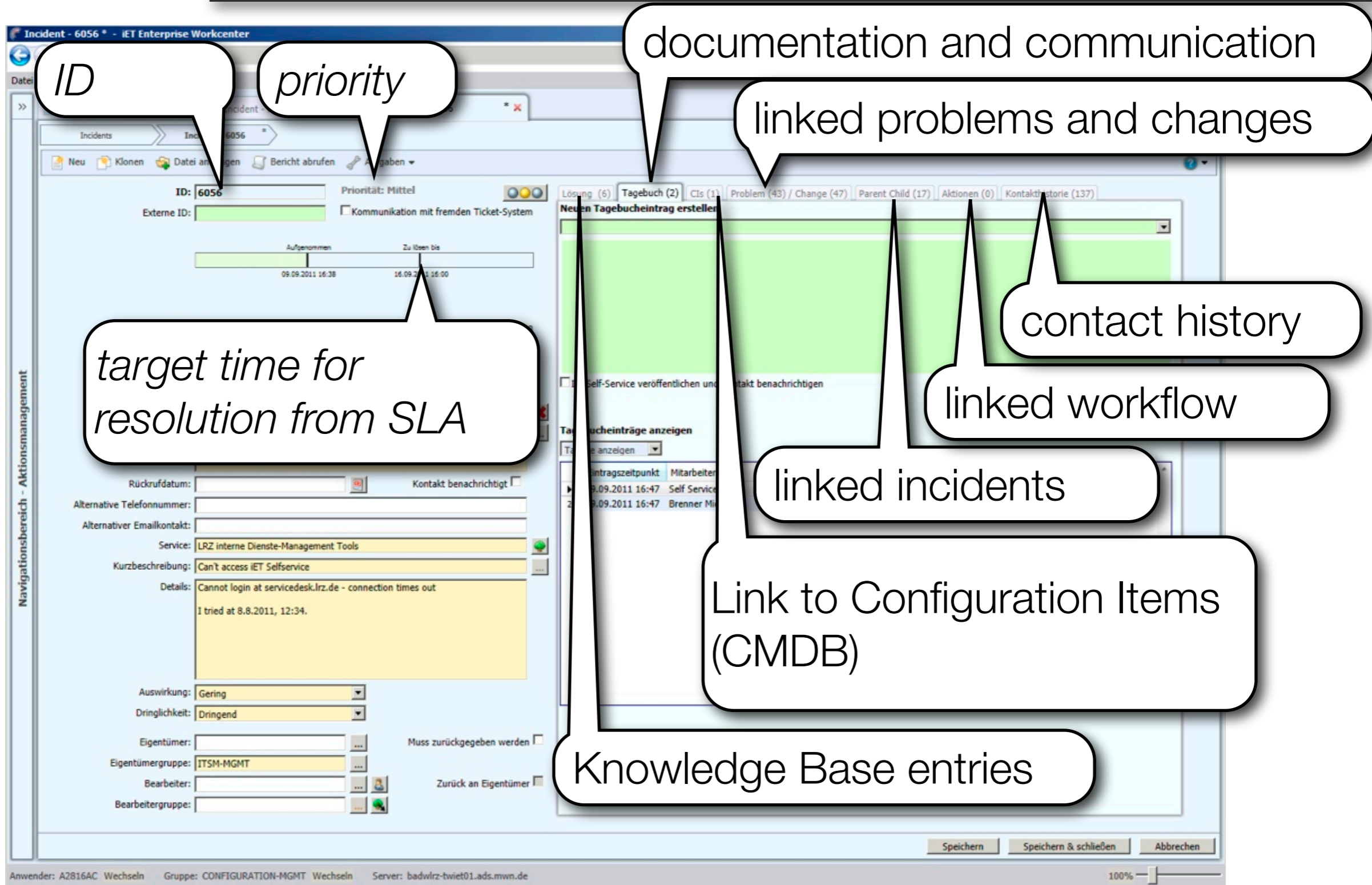
impacted service

description of incident

impact and urgency

assigned staff (owner and expert/admin)

Tool: Incident form (user client)

Callout labels on the incident form:
- *ID*
- *priority*
- documentation and communication
- linked problems and changes
- contact history
- *target time for resolution from SLA*
- linked workflow
- linked incidents
- Link to Configuration Items (CMDB)
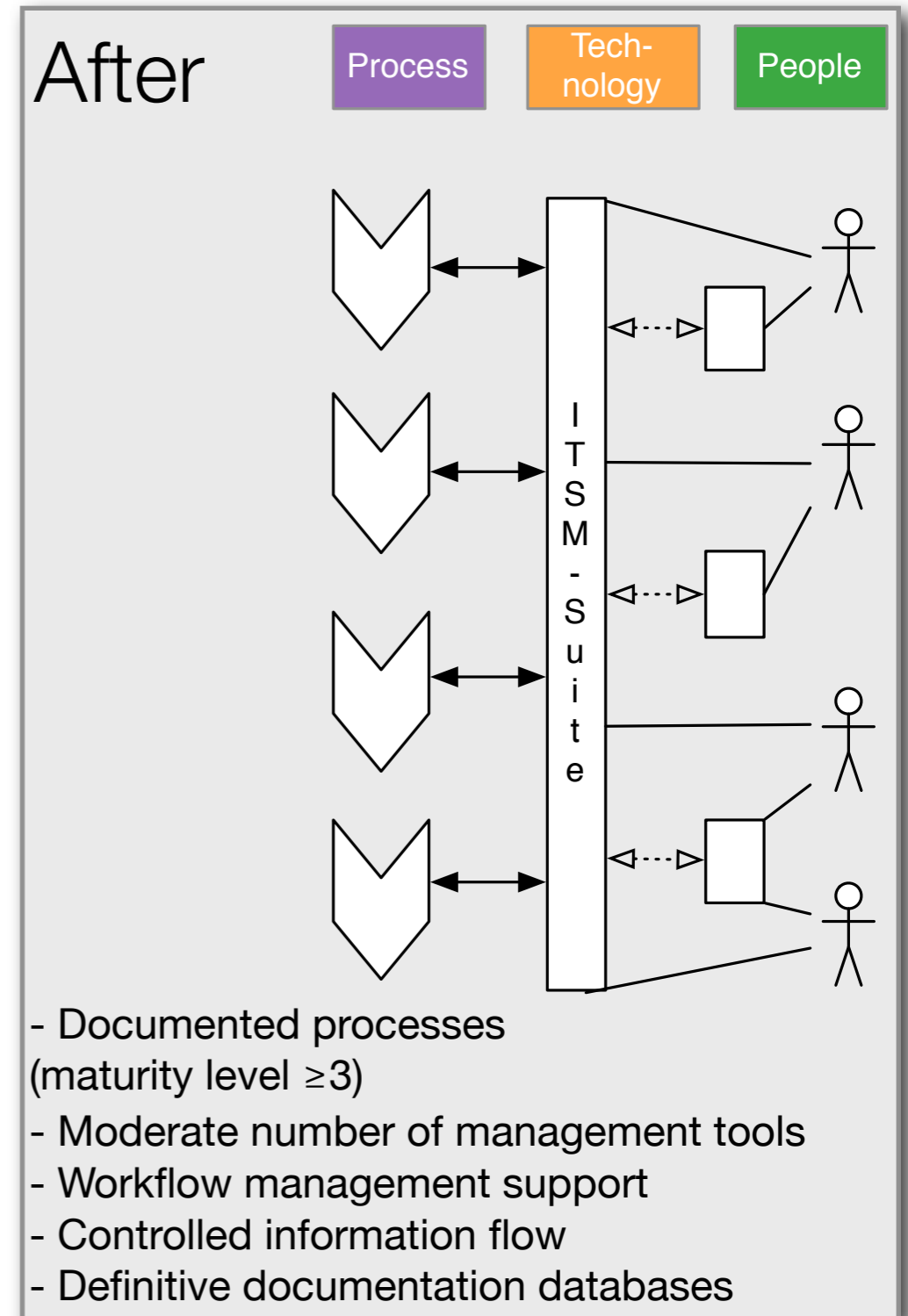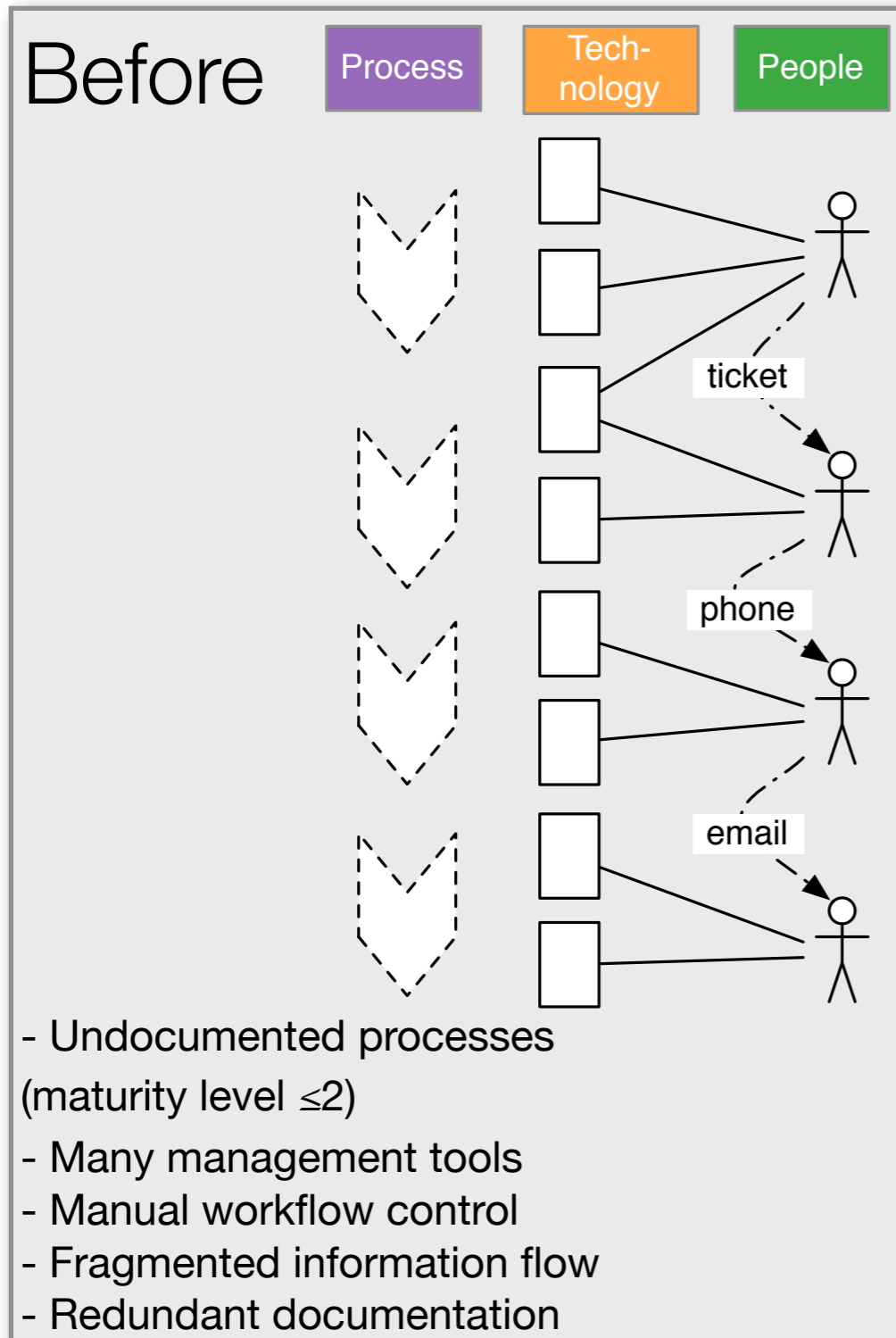- Knowledge Base entries

Tool: CMDB representation
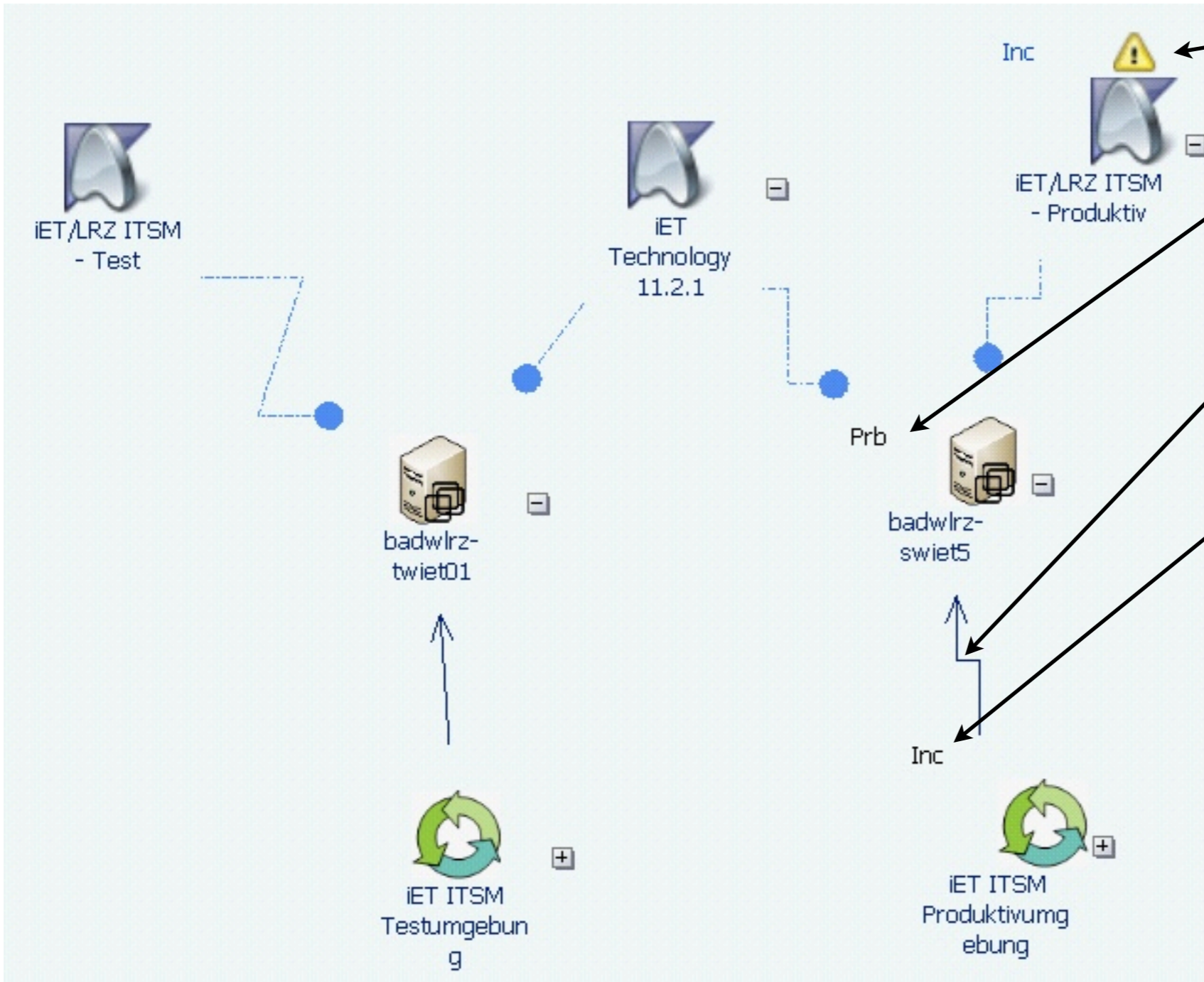
This CI is marked as "down"

At least one active problem linked to this "VM"-CI

The "Service Building Block"'s function depends on the VM's function

At least one active incident linked to this "Service Building Block" CI

Overall Goal

Before

| Process | Technology | People |

- Undocumented processes (maturity level ≤2)
- Many management tools
- Manual workflow control
- Fragmented information flow
- Redundant documentation

After

| Process | Technology | People |

- Documented processes (maturity level ≥3)
- Moderate number of management tools
- Workflow management support
- Controlled information flow
- Definitive documentation databases

Summary and Conclusion

- Highly available and reliable services require systematic and process-oriented ITSM

- Establishing an ITSM system and achieving ISO/IEC 20000 certification is an on-going project at the LRZ

- Introducing ITSM is labor and cost intensive

- ITSM projects need to be consider not just process, but also people and technology aspects