DB Netz Fault Clearing Project - RB (Regional Division) East

DB Netz AG

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(I.NV-O-I Integrated Management System)

Munich, May 29, 2009

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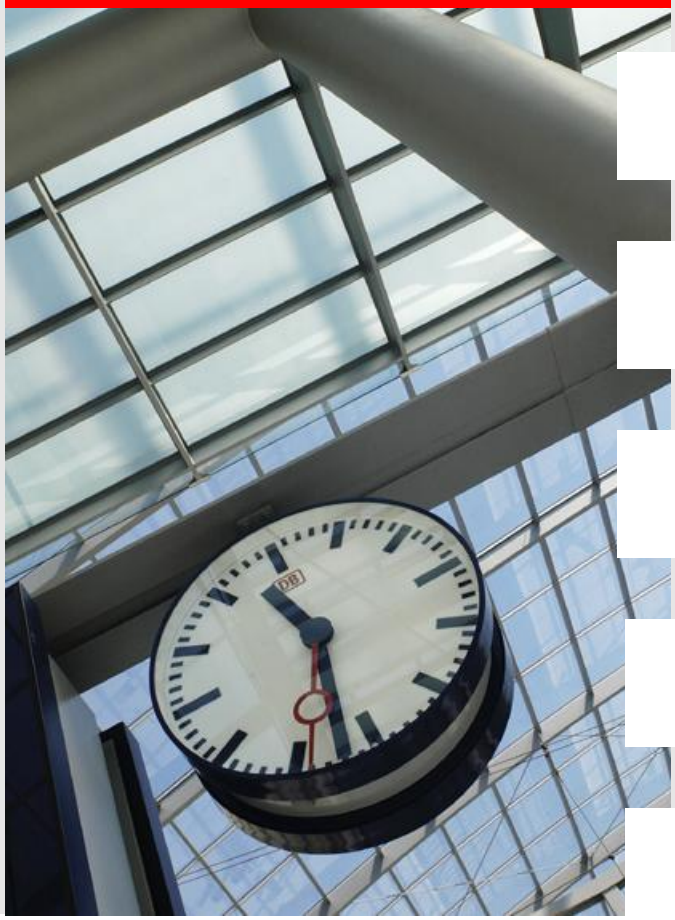
Optimisation of Fault Clearing



DB Netz AG

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DB Netz AG - Germany's railway system infrastructure provider

As a subsidiary of DB Group, DB Netz AG is responsible for the entire infrastructure of the railway system. That includes:

- The track system
- Combined freight transport facilities and terminals
- Control and safety systems
- Signal boxes
- Overhead contact lines

DB Netz AG provides the railway company with timetables and routes and operates rail transport.

Responsibilities:

- Preparation and coordination of timetables as well as network operation
- Maintenance and repairs
- Network development, planning and engineering of new and expansion construction projects (in role of main contractor)

A route network of about 34,000km forms the basis of rail transport in Germany.

Dimensions that are unmatched

Around the world by rail

The length of all tracks owned by Deutsche Bahn is equal to about 64,000 km. If you were to lay all of these tracks next to each other, they would trace the equator more than one and a half times.

Brick by brick

The world's largest brick bridge is the Göltzschtal Bridge passing over the Weisse Elster river in the Vogtland (Saxony). About 1,700 people worked on its construction from 1846 to 1851 using 26 million bricks.

Three times to the sun and back

Each year on DB's tracks trains cover over a billion kilometres. That distance would take you from the Earth to the Sun and back more than three times.

Network Division
Facts & Figures 2008

Total operating performance (in million Trkm)	1,042
Employees	40,974
Length of routes operated (in km)	33,780
Length of tracks (in km)	64,022
Track switches and junctions	69,232
Level crossings	17,981
Tunnels (Number/Length in km)	770 / 492
Railway bridges	27,094
Signal boxes (thereof IECC*)	4,474(893)

(Source: Annual Report 2008 as of 31.12.2008)

*IECC = Integrated Electronic Control Center

About 41,000 employees work to ensure high quality and smooth operations in the rail network.

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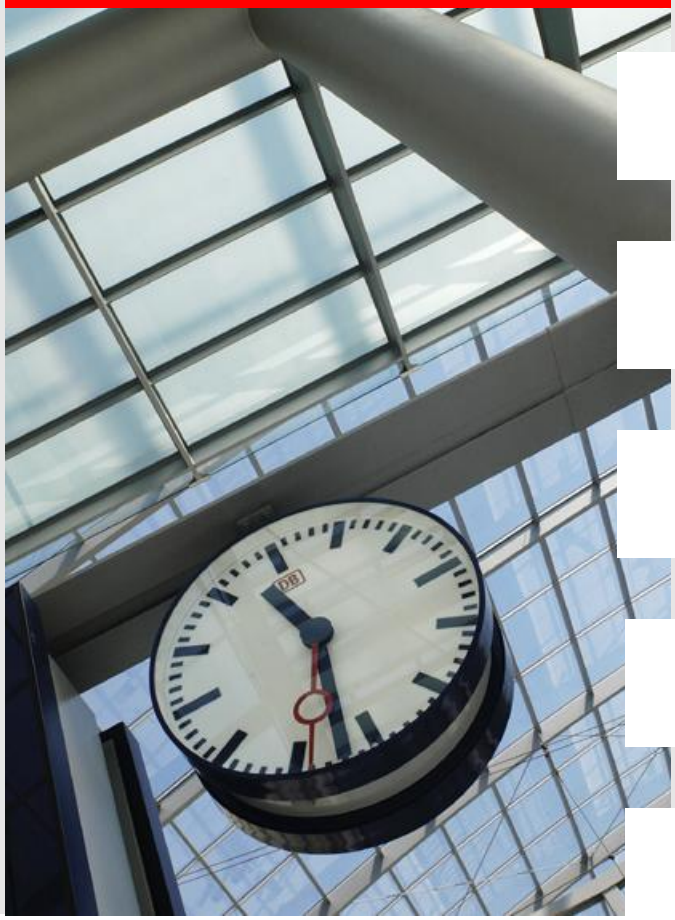

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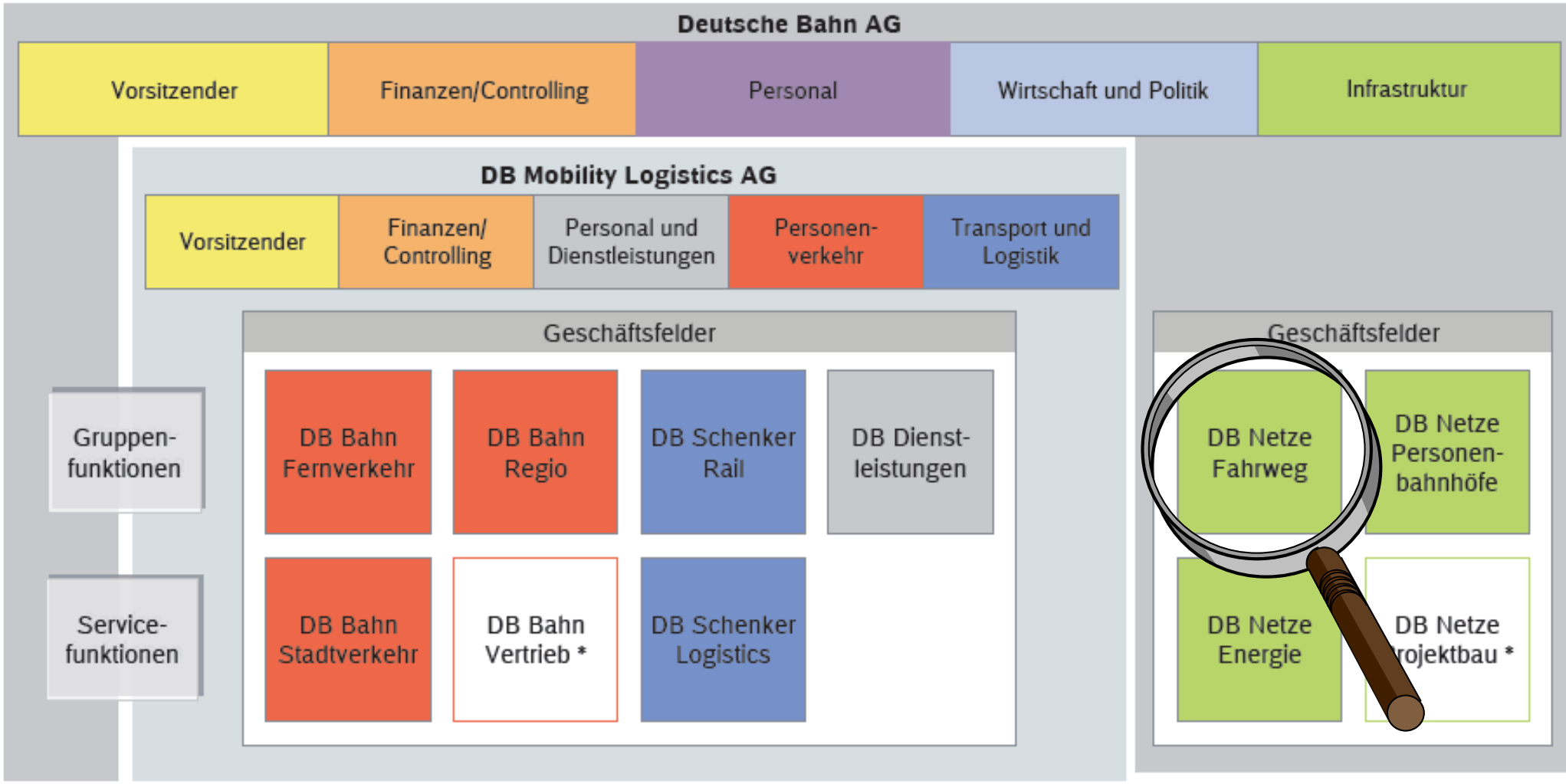
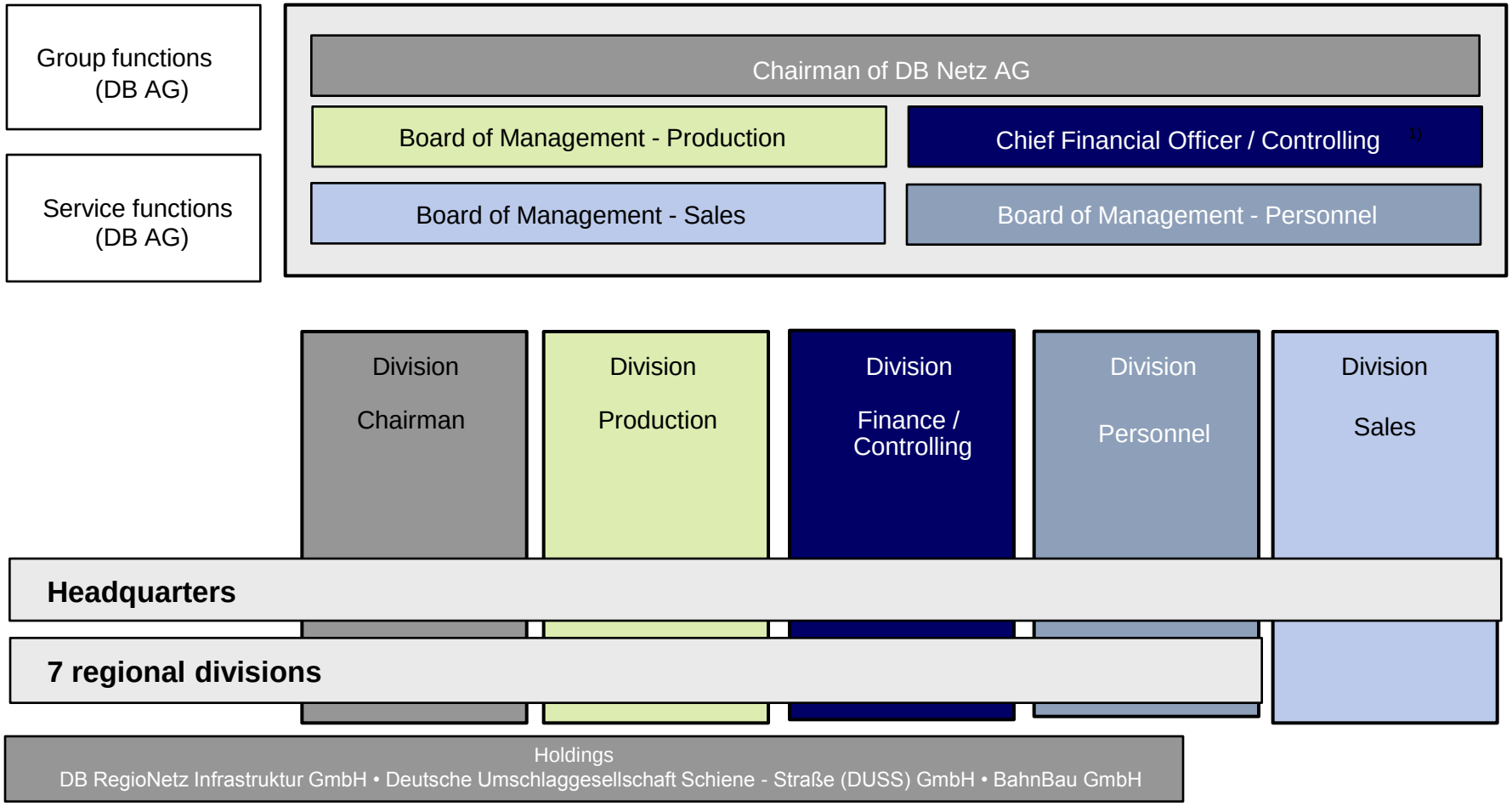
DB Netz AG within DB Group



* Servicecenter

DB Netz AG is organised into five Board of Management divisions that are supported by service and Group functions



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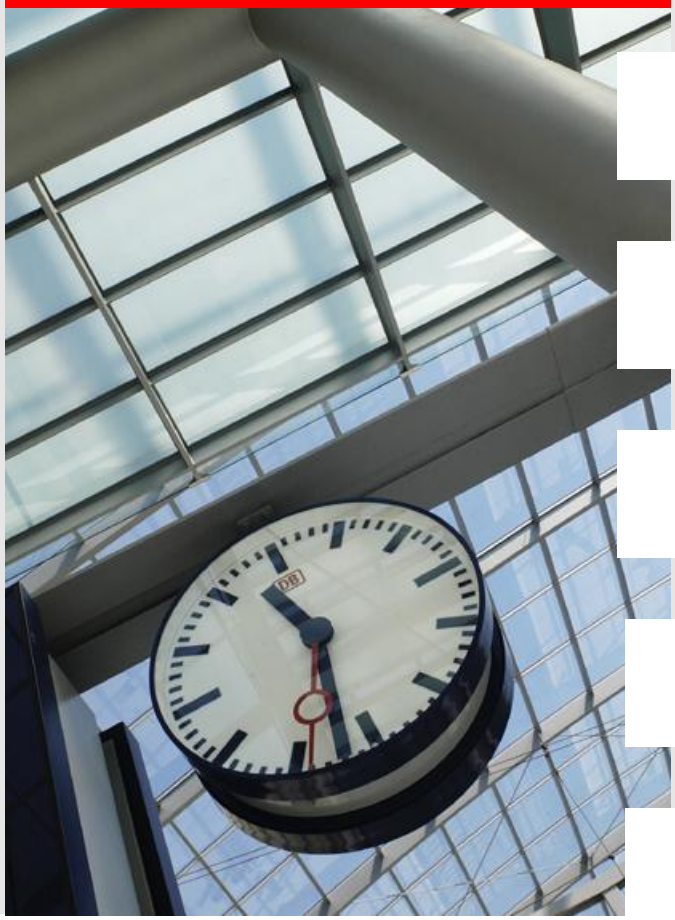

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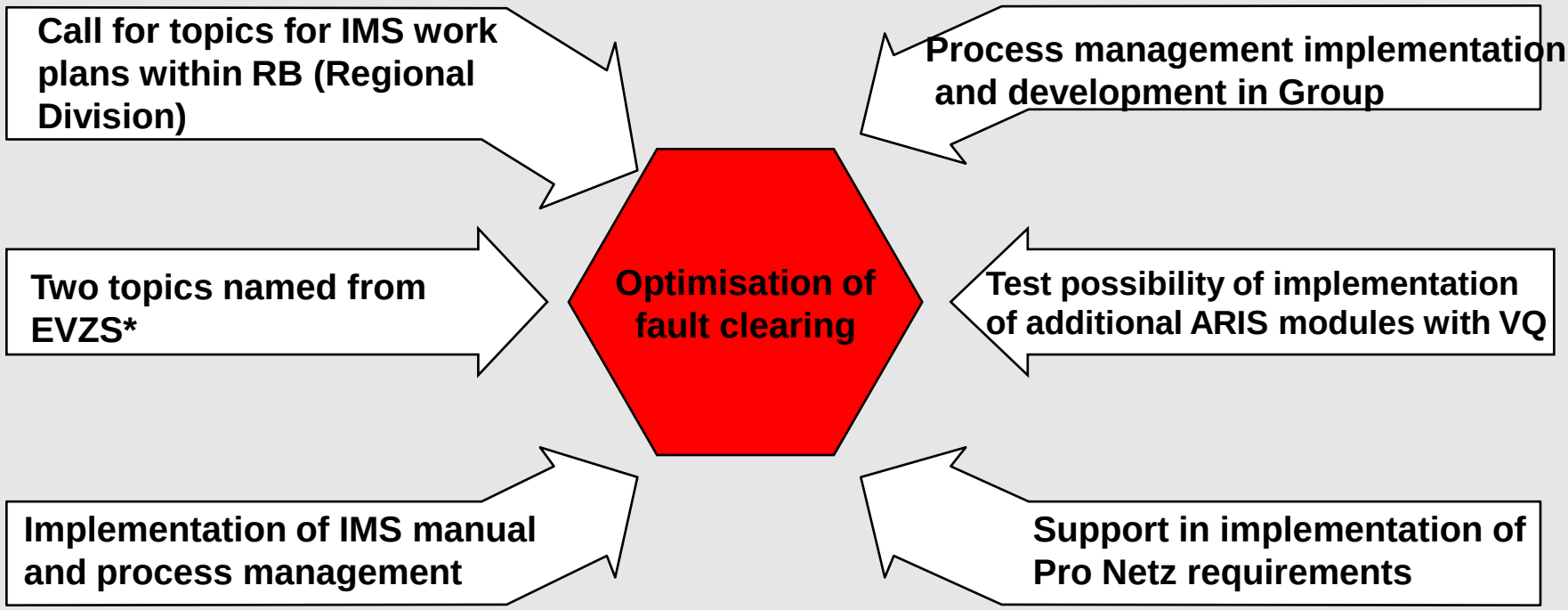
What led to this project?



*EVZS = Fault Clearing and Reporting Centre

ARIS simulations will optimise the fault clearing process at Regional Divison RB East and increase train punctuality

Optimisation of Fault Clearing Project

1 The initial situation

- Availability of EVZS occasionally unsatisfactory
- Application of existing processes and those to be newly defined impractical
- Definition and publication of measuring points relevant to performance indicators of fault interference periods inconsistent

2 The project order

- Monitor current process
- Analyse points of weakness
- Clear faults from process goals
- Define and implement target process
- Develop and implement monitoring concept
- Test practicality of the ARIS module for simulation

3 The goal

- Increase punctuality by minimising fault interference periods
- Increase customer satisfaction for DB Netz AG customers and external customers
- Increase employee satisfaction with clearly structured processes
- Shorten wait periods when faults occur

4 What does the project aim to achieve?

- Stabilise process by defining and co-ordinating interfaces and identifying process deviations early on
- Recognise peak loads through ongoing process monitoring
- Use resources ideally
- Implement ProNetz requirements in process

What benefits does the project offer?

The goal

The benefit

- Greater track availability
- Increased customer and employee satisfaction from clearly structured processes
- Increased efficiency of operations by using all resources available
- Shorter processing times in planning when faults occur

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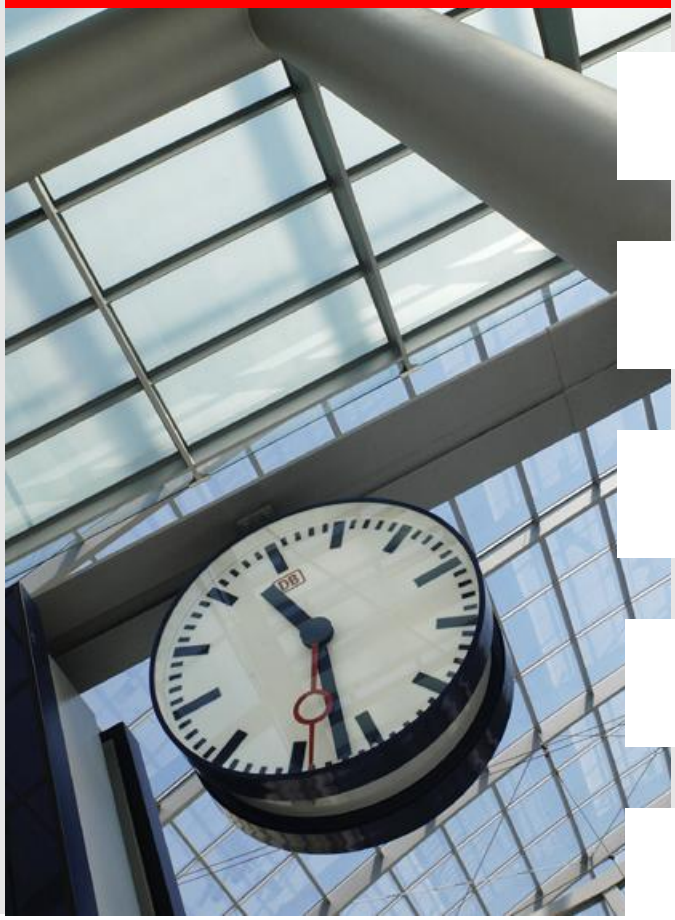

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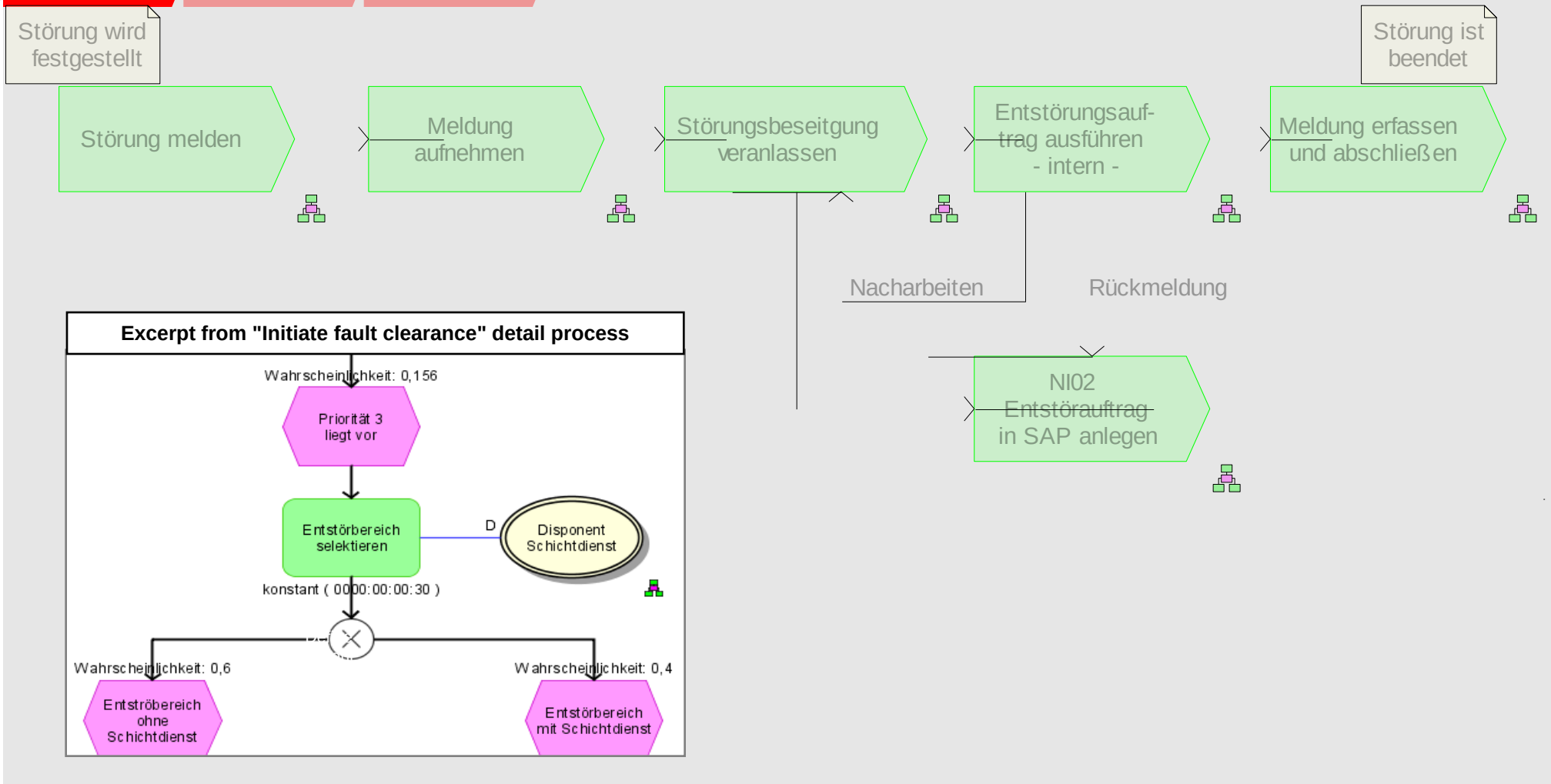
Analysis/simulation of current processes forms the basis for development of target process alternatives that are later simulated and evaluated in turn

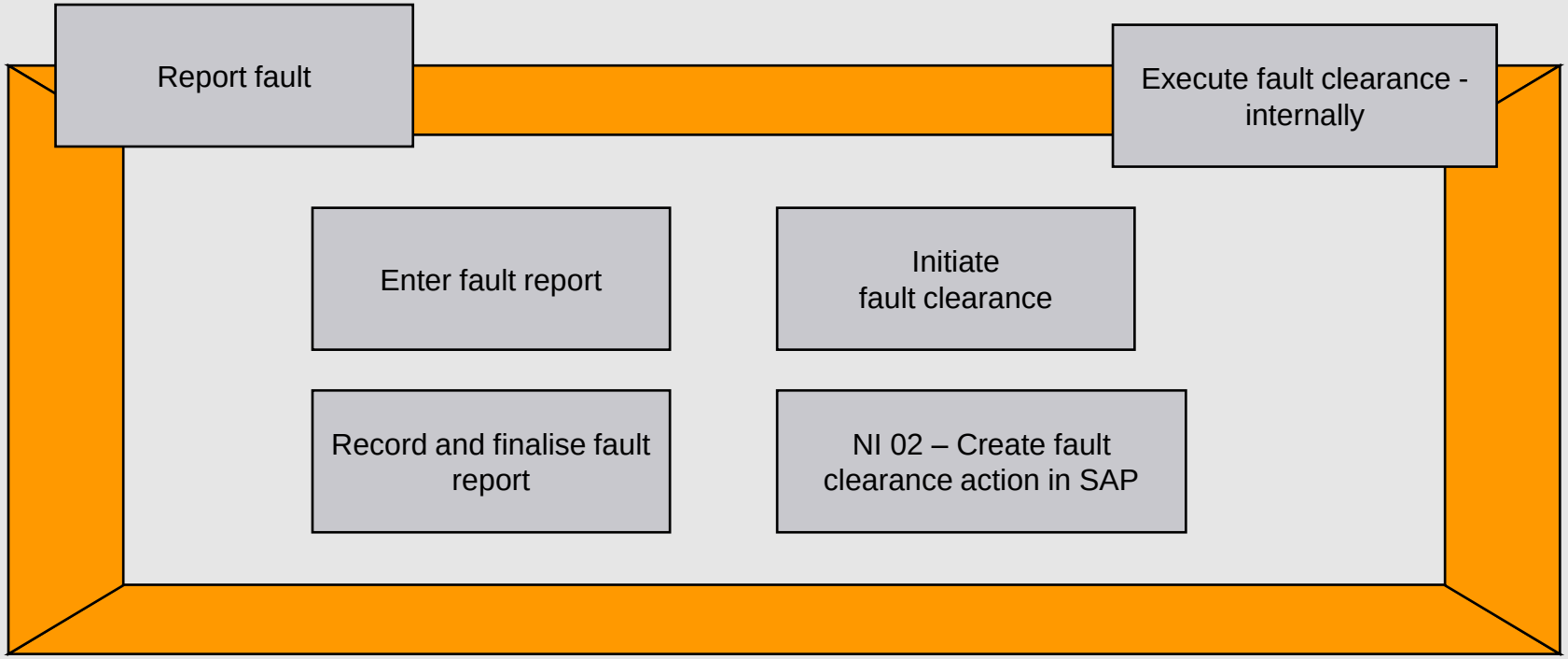
	define current processes I	analyse weak spots II	define target processes III
Simulation steps	■ monitor data ■ describe process ■ improve the process	■ simulate current process (database for comparison with target process alternatives)	Target process alternatives ■ developed together with the specialist unit ■ simulate ■ contrast with one another and evaluate
Types of results relevant to simulation	■ processing times (current) and frequency/probability	■ level of capacity (current) - personnel - technical resources ■ process bottlenecks (required wait times)	■ level of capacity per target process variant ■ compare current vs. target

The current process was defined in fault clearing management and stored in the detail process with values measured

define current process | analyse weak spots | define target process



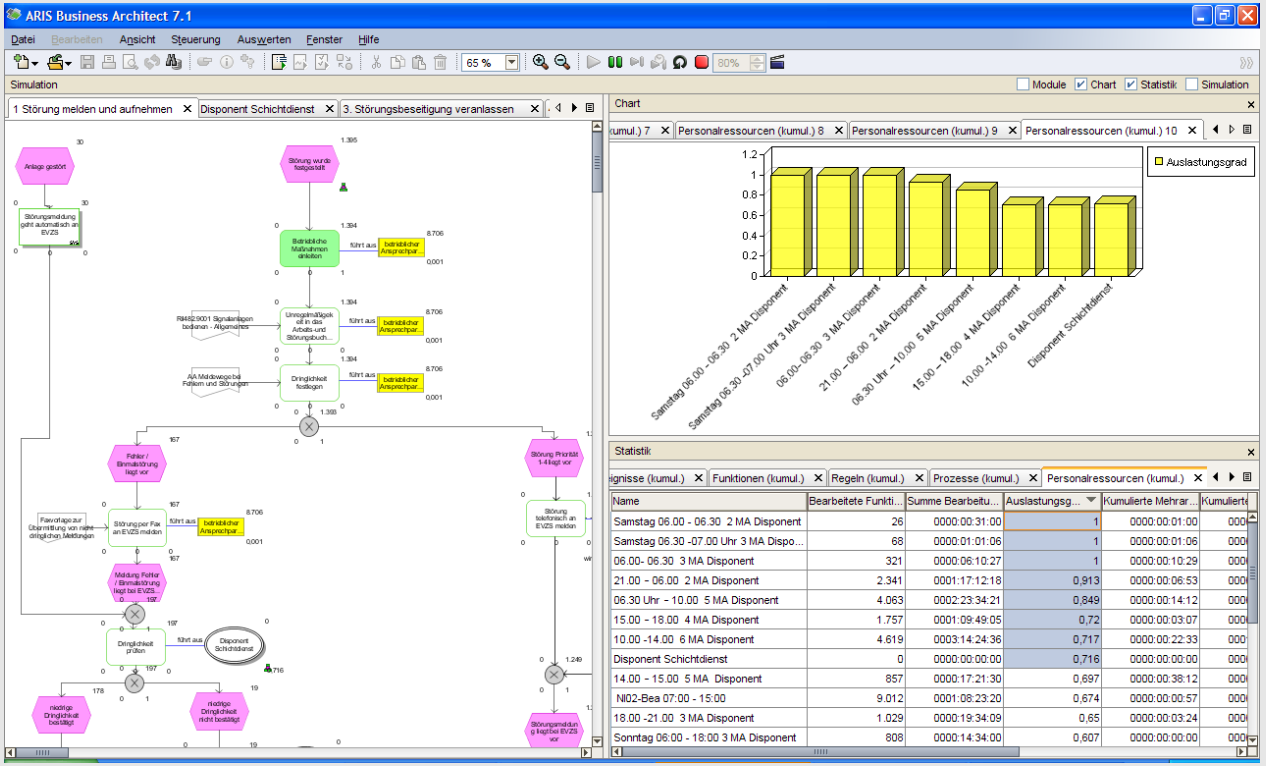
The framework for process description was set up



The processes represented within the frame form the basis for the pilot implementation of the ARIS simulation and ARIS PPM in the EVZS (Fault Clearing and Reporting Centre). The processes lying at the edges of the frame have only been described for this implementation to the extent that they represent the effects of the EVZS on fault interference periods.

The current process is simulated and analysed

define current process | analyse weak spots | define target process



Name	Bearbeitete Funkti...	Summe Bearbeitu...	Auslastungsg...	Kumulierte Mehrar...	Kumuliert
Samstag 06.00 - 06.30 2 MA Disponent	26	0000:00:31:00	1	0000:00:01:00	000
Samstag 06.30 -07.00 Uhr 3 MA Dispo...	68	0000:01:01:06	1	0000:00:01:06	000
06.00- 06.30 3 MA Disponent	321	0000:06:10:27	1	0000:00:10:29	000
21.00 - 06.00 2 MA Disponent	2.341	0001:17:12:18	0,913	0000:00:06:53	000
06.30 Uhr - 10.00 5 MA Disponent	4.063	0002:23:34:21	0,849	0000:00:14:12	000
15.00 - 18.00 4 MA Disponent	1.757	0001:09:49:05	0,72	0000:00:03:07	000
10.00 -14.00 6 MA Disponent	4.619	0003:14:24:36	0,717	0000:00:22:33	000
Disponent Schichtdienst	0	0000:00:00:00	0,716	0000:00:00:00	000
14.00 - 15.00 5 MA Disponent	857	0000:17:21:30	0,697	0000:00:38:12	000
NI02-Bea 07:00 - 15:00	9.012	0001:08:23:20	0,674	0000:00:00:57	000
18.00 -21.00 3 MA Disponent	1.029	0000:19:34:09	0,65	0000:00:03:24	000
Sonntag 06:00 - 18:00 3 MA Disponent	808	0000:14:34:00	0,607	0000:00:00:00	000

The ARIS-Simulation offers convenient representation of the analysis factors as

- process graphics
- separate tables
- charts

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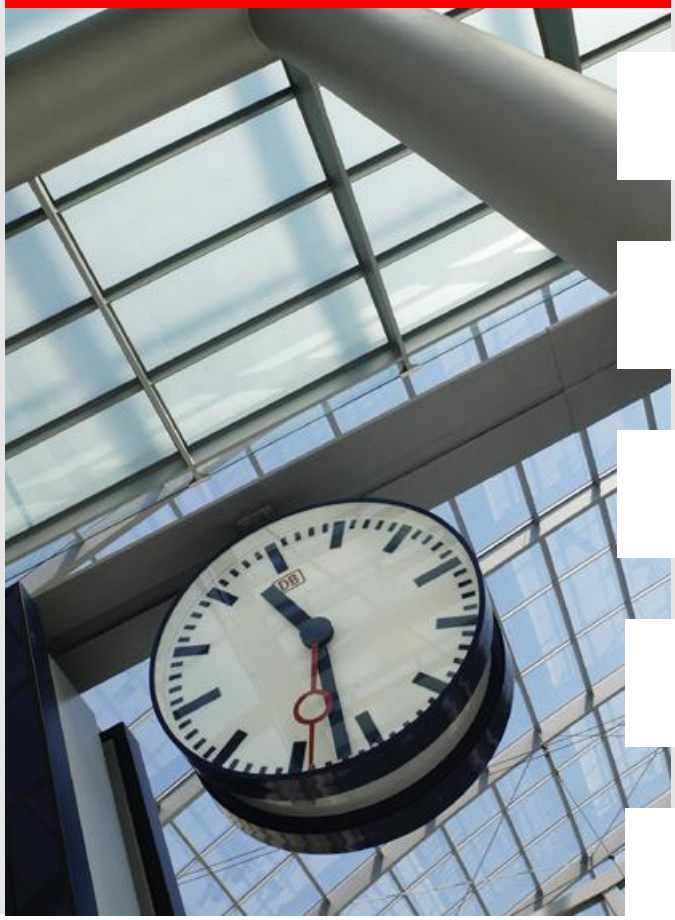

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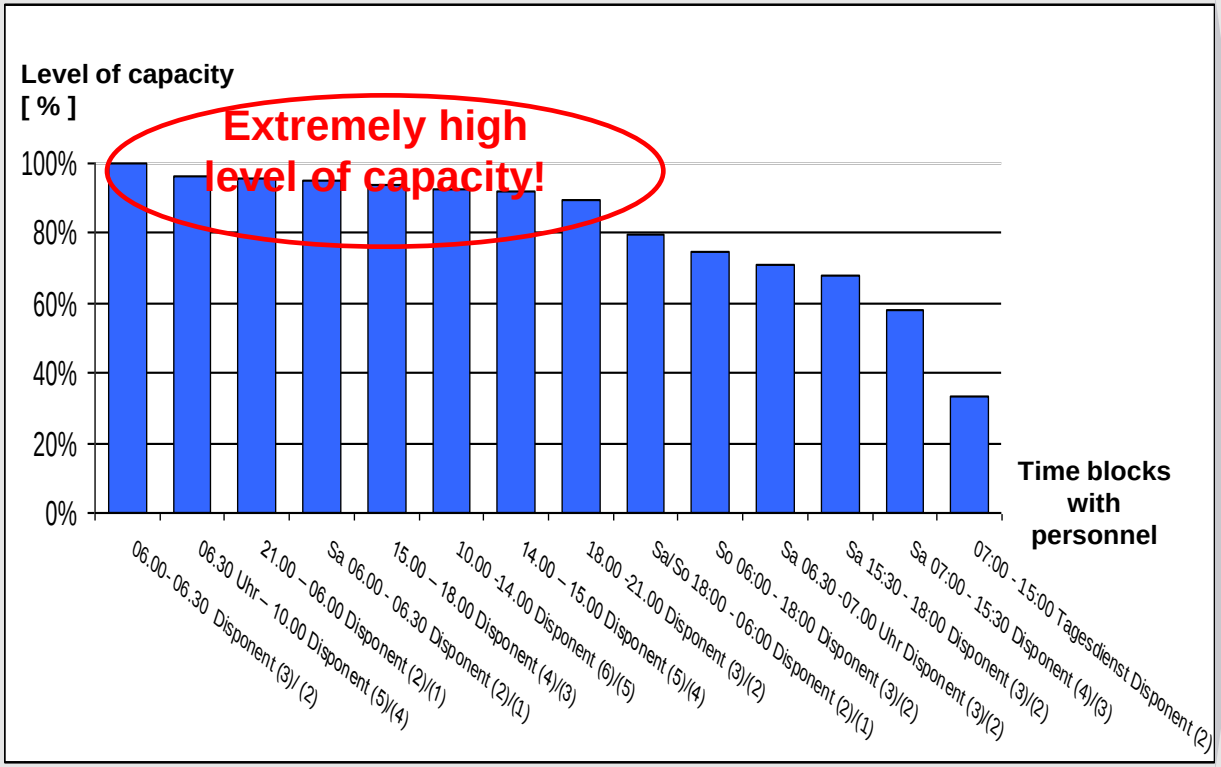
The simulation of the current process indicates highly dynamic required wait periods due to resource bottlenecks

define current process | analyse weak spots | define target process



Values as of 03.12.2008

- Simulation period of 8 weeks -

ARIS simulations allow for

- Mathematical verification of resource bottlenecks "sensed"
- Detailed representation of individual time blocks ⇨concrete effects of varying working loads are understood immediately

Results

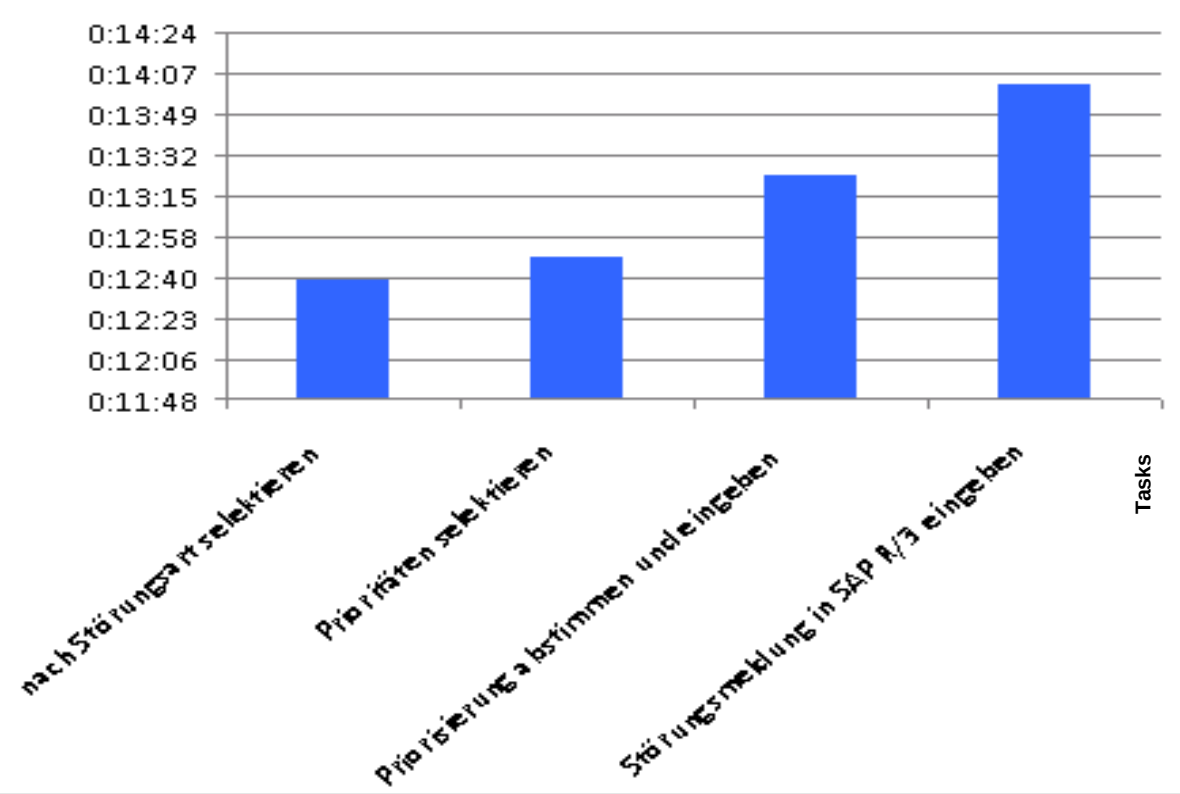
- Starting point for allocation of tasks in division, other service scheduling
- High working load means longer required wait periods
- Working load over 80% in the long-term not recommended from an ergonomic perspective

Furthermore the simulation of the current process showed high required wait periods where there are tasks that directly affect fault interference periods

define current process | analyse weak spots | define target process

Tasks with long required wait periods

Required wait periods in minutes per task



Aim:

- Minimise required wait periods at prioritised tasks
- This leads to minimised fault interference periods

In a close collaboration, IMS Region East , Specialist Division and VQ have developed proposed solutions together and simulated them in ARIS

define current process | analyse weak spots | define target process

Simulating target process variants

Based on the current general requirements (number of reports per day, distribution, time blocks, etc.), each target process variant is simulated:

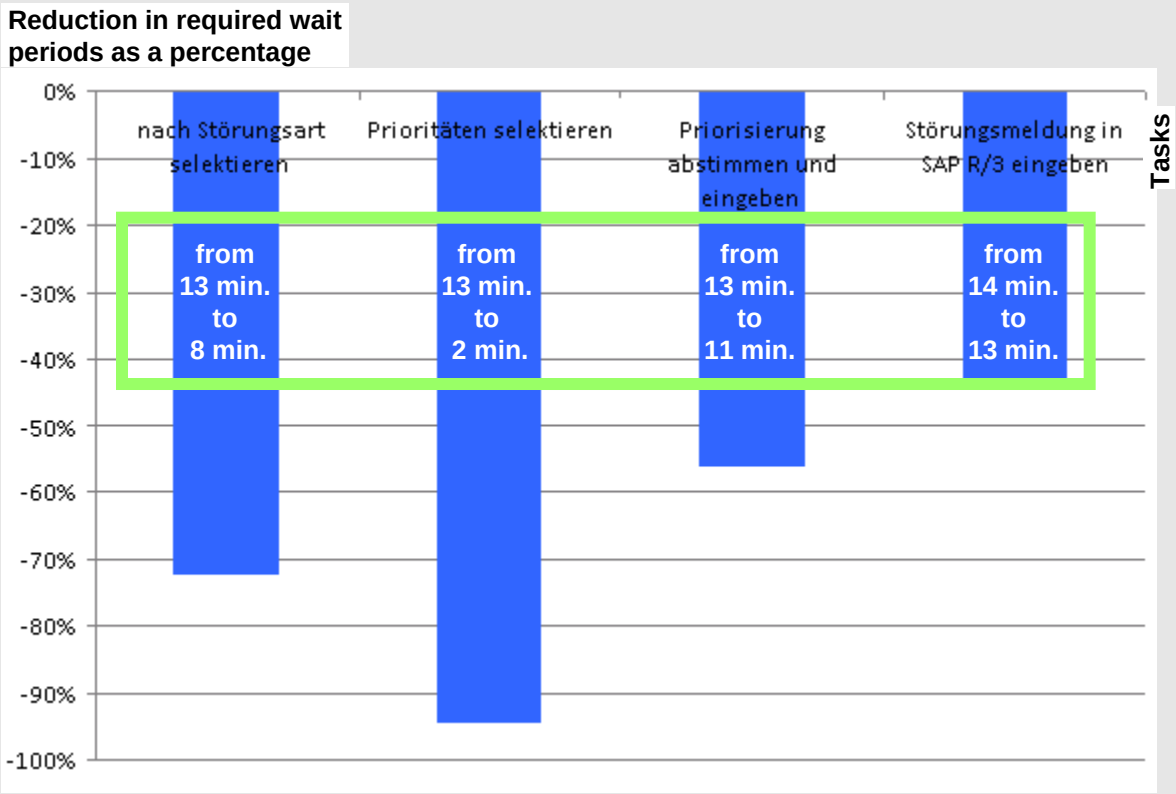
- Scheduler works through faults prio. 5-6 individually – information transferred via SAP
- Scheduler works through prio. 5-6 individually and additionally prio. 3+4 during normal working hours – information transferred via SAP
- NI02 actions processed separately - Mo-Fr by early shift workers
- Feedback personnel is prepared (only to accept and process feedback; using shift worker resources for each shift)
- Feedback personnel only during normal working hours (using shift worker resources)
- Introduce NI02 and feedback personnel → Combined variant*

* = Most promising variant for success from perspective of specialist division

The simulation of the target process combined variant shows a significant decrease in required wait periods at prioritised tasks

define current process | analyse weak spots | define target process

Reduction in required wait periods with implementation of combined variant



Goal achieved!

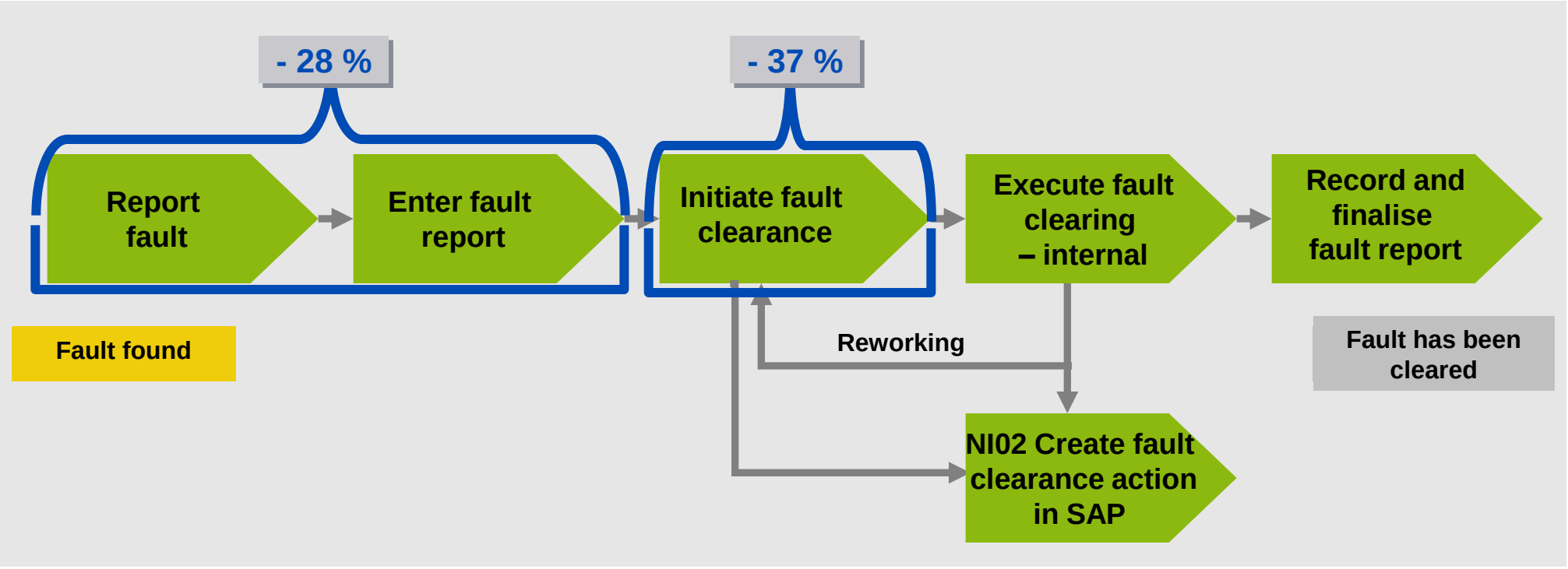
- Predicted decrease in required wait periods at prioritised tasks with the implementation of combined variant
- Decrease in fault interference periods (which is only affected up to10 percent by EVZS!) resulted

The implementation of the combined variant significantly accelerates workflow in the first three steps of the process chain

define current process | analyse weak spots | define target process

Predicted decrease in required wait periods with the implementation of combined variant

- approx. 28% in the "Report fault" and “Enter fault report" steps
- approx. 37% in the “Initiate fault clearance" step



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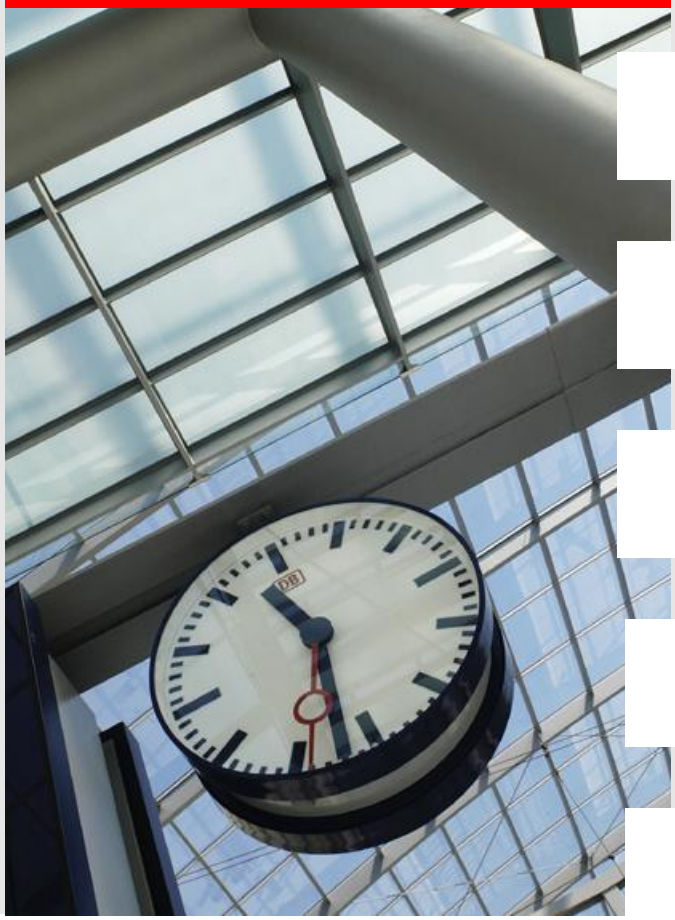

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The simulation tool ARIS proved itself in the pilot and has contributed substantially to identifying the solution

Advantages of ARIS tool

- No test phase required for target processes in ongoing operations
- Thereby saving time and costs
- The tool's precision analysis methods deliver crucial information and results fast
- ARIS tool is user-friendly and convenient

Benefits to DB Netz AG

- Process management put into action in the organisation
- Systematic process development creates acceptance of process management implementation
- Coordination of interfaces initiated – process-oriented thinking above and beyond the division
- Target process scenarios discussed and effects reported in simulation

Lessons learned

- Resilient values required for simulation of current processes
- Develop and expand on methodological expertise in application and interpretation of simulation results in business areas
- 1 database (local) per process variant – reorganise databases
- Save functions, results (except start and end results) as defined objects (not occurrence copy)

Feedback: The use of the ARIS tool in the “Optimisation of Fault Clearing” project made the EVZS’s work processes more efficient and transparent

Manfred Brauer, I.NP-O-D BLN(E), contractor:

- A reorganisation of resources – particularly reallocating work tasks to day shifts and changing reporting channels – allowed us to optimise our operating capacity
- This improved the availability of the EVZS and reduced fault interference periods
- The additional time required for surveying and transmitting the values was worth it!
- The simulation results were widely accepted by employees involved
- The project increased transparency of work processes in the EVZS and helped prevent us from being stuck in a rut
- We would like to continuously monitor process performance using ARIS-PPM

Thank you for your attention!