

Network Documentation and Resource Management - A Project Report

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„Network Databases“

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„Mobilität in IP-basierten Netzen“



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- 1. Network Databases**
- 2. Functionality of NETBASE**
- 3. Database Requirements**
- 4. Software Architecture**
- 5. Time Related Data Storage**
- 6. Network Planning and Inventory – A Comparison**

Network Documentation and Resource Management

Comprehensive documentation of the network and efficient resource management is essential for providing reliable quality of service.

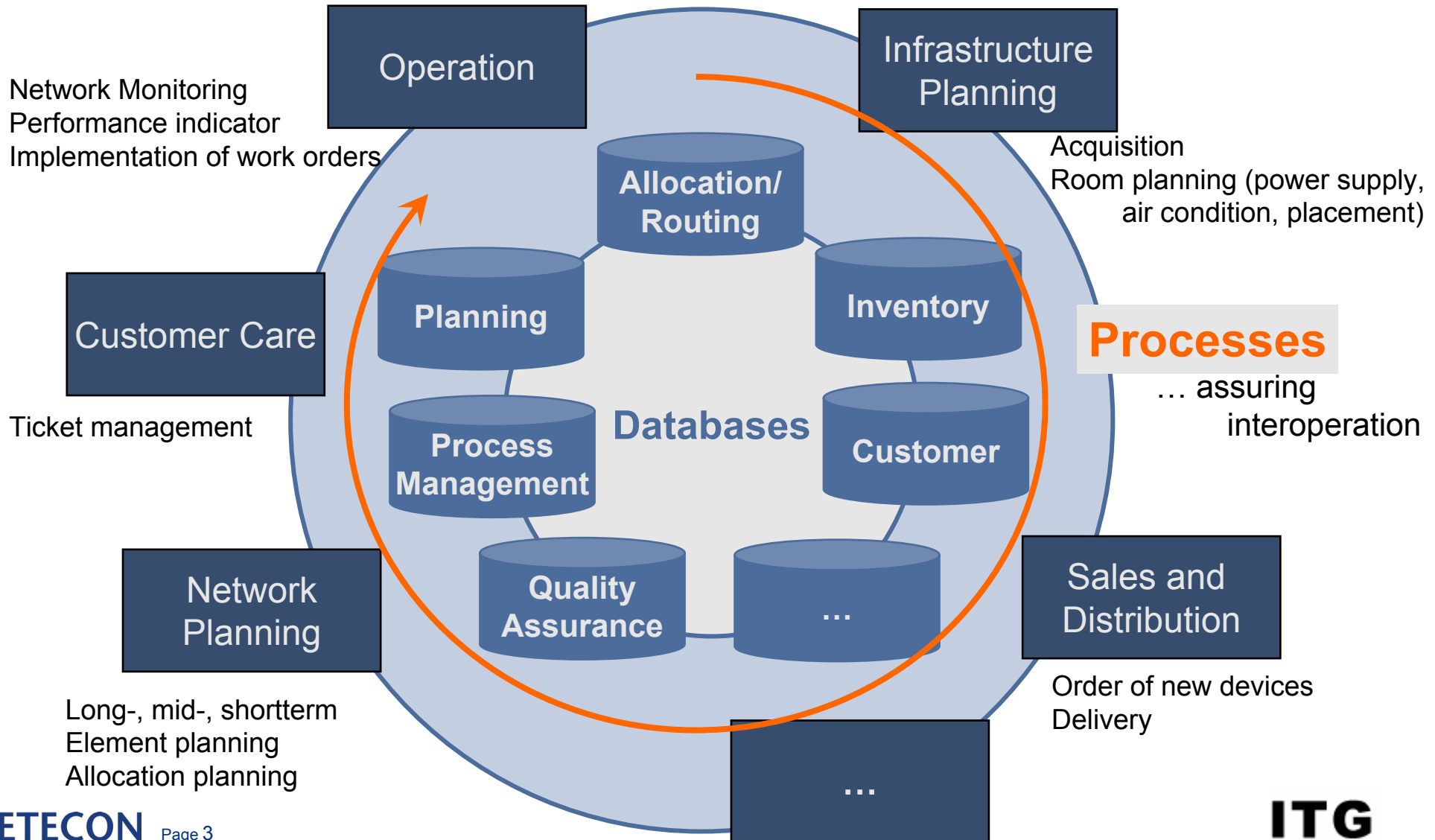
Documentation of

- Physical data
 - Locations, devices, serial numbers
- Administrative data
 - Contact persons, access rights
- Logical data
 - Routing of traffic demands, allocation of links

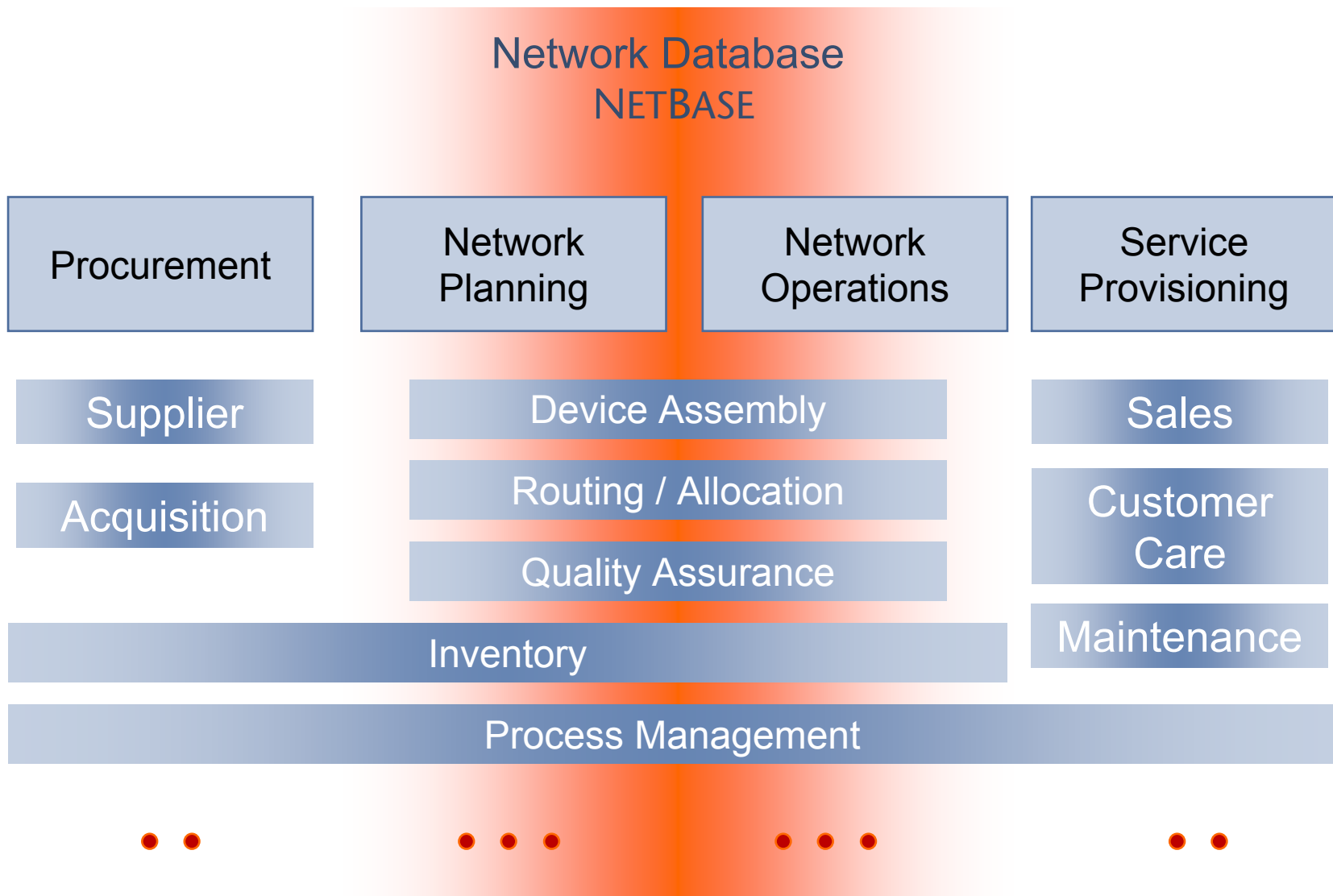
- Consistent network view
 - All departments (planning, operations) use the same naming space
 - Network planning can use information on actual state for further extensions
- Access to information in a comfortable way using a single data source
 - No need to look for information in multiple files/departments
- Fast response times for trouble shooting
 - Information on affected devices/locations/customers
 - Contact information for administrators/ technicians

Information Storage and Processes

Network data is typically distributed within departments. Processes assure the cooperation between different department with singular data sources.



NETBASE - Network Documentation and Management



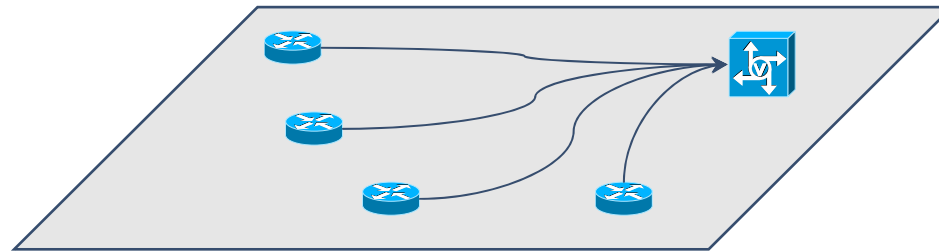
Network Technologies Managed by NETBASE

Starting point of the introduction are passive network components. Active components are introduced in further steps.

Passive Network Components

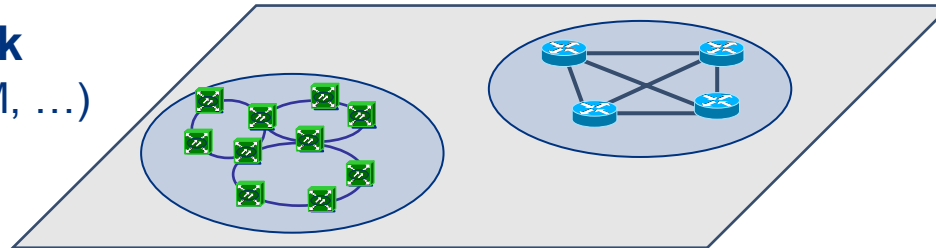
Services

(VPN, Container, Wavelength, ...)



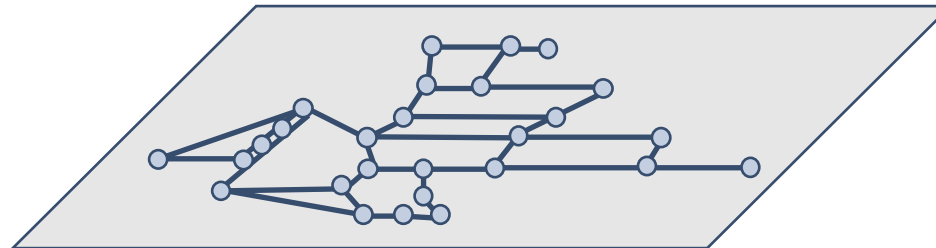
Transport Network

(SDH, WDM, IP, ATM, ...)



Physical Layer

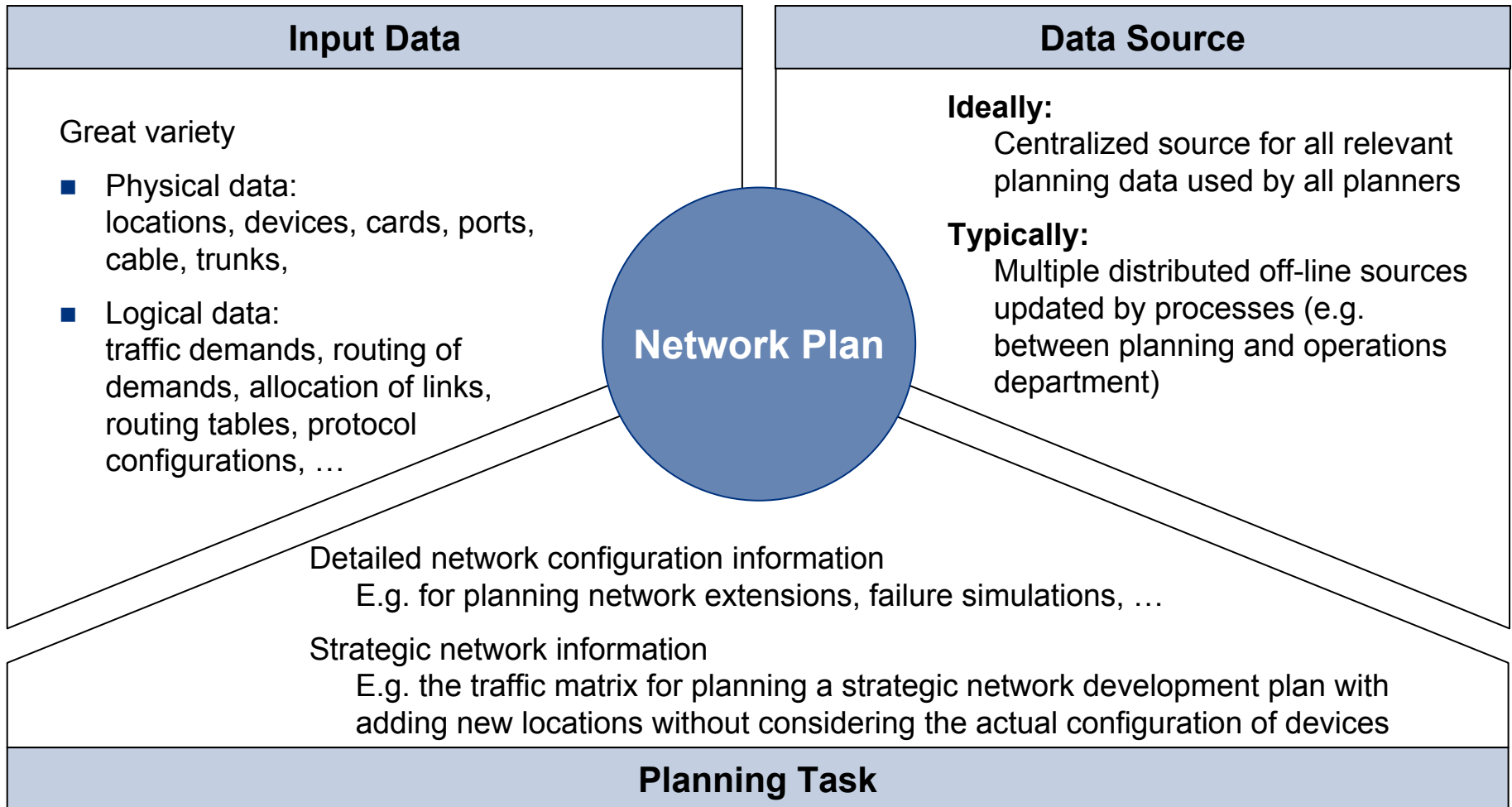
(Cable, Duct, Splice Points, ...)



Active Network Components

Database for Network Planning?!

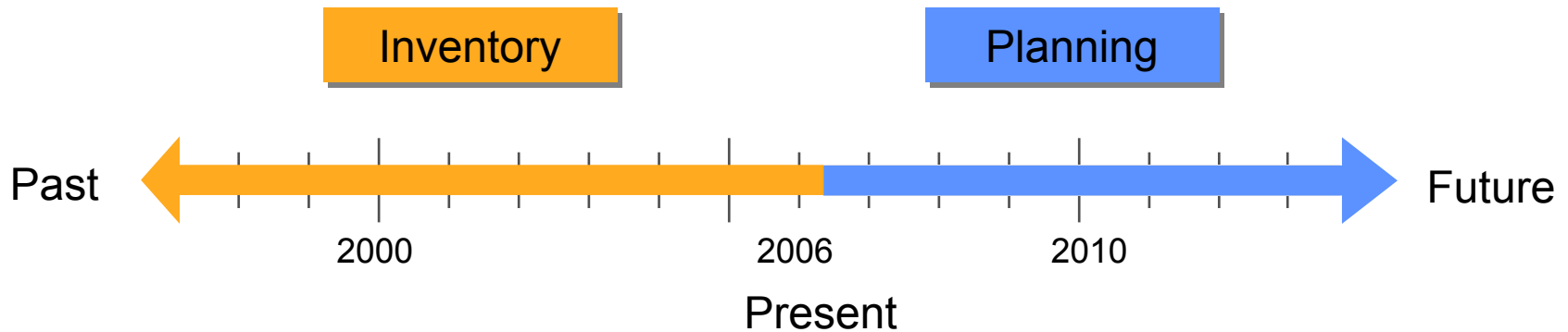
A plan can't be better than its input data! Network planning relies on consistent and up-to-date information.



Requirements for a Network Database

1. Reflect the network (elements, state, customers) in a computer model

- Inventory → Show the network in the past up to the present
- Planning → Show the network in the future (planned state)



▶ ▶ ▶ **Timeline support**

Requirements for a Network Database

1. Reflect the real network (elements, state, customers) → Timeline

2. Adaptable to different customer requirements

- Various network types (passive optical, active optical, SDH, ATM, IP, ...)
- Various network elements (cross connects, routers, switches, splices, cables, ducts, ...)
- Various services (optical ~, IP ~, Ethernet ~, ...)

Requirements for a Network Database

1. Reflect the real network (elements, state, customers) → Timeline
2. Adaptable to different customer requirements
3. Handling of complex logical coherences
 - User support (wizards, assistants)
 - Logical verifications (checks, correction)
 - Concurrent multi-user input for the same objects

Requirements for a Network Database

1. Reflect the real network (elements, state, customers) → Timeline
2. Adaptable to different customer requirements
3. Handling of complex logical coherences
4. IT integration, Administration, Maintenance
 - Usage of existing database licenses
 - Support of different database storage systems (SQL Server, Oracle, MySQL, MS Access, etc.)
 - Centralized administration
 - Access from distant locations
 - Integration into an existing ICT environment

Requirements for a Network Database

1. Reflect the real network (elements, state, customers) → Timeline
2. Adaptable to different customer requirements
3. Handling of complex logical coherences
4. IT integration, Administration, Maintenance
5. High Performance, High Availability
 - Multithreading technology
 - Multiple cache system for network load reduction
 - Distributed system, load sharing
 - Backup technologies

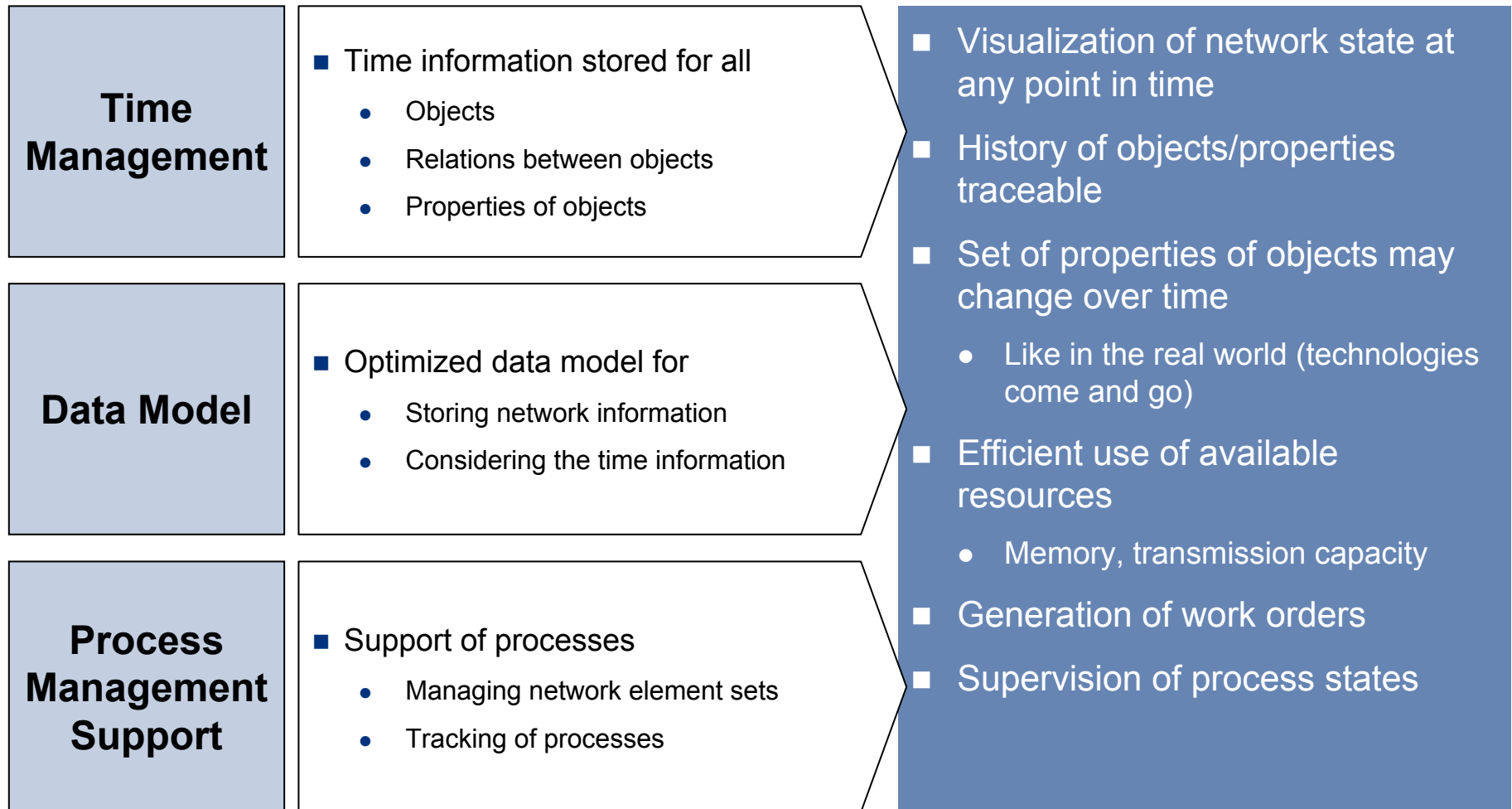
Requirements for a Network Database

1. Reflect the real network (elements, state, customers) → Timeline
2. Adaptable to different customer requirements
3. Handling of complex logical coherences
4. IT integration, Administration, Maintenance
5. High Performance, High Availability
6. Intuitively operated GUI
 - Localized to national languages
 - Customization to end user requirements
 - Adaptation to company internal processes
 - Storage of customized application settings in the database

Requirements for a Network Database

1. Reflect the real network (elements, state, customers) → Timeline
2. Adaptable to different customer requirements
3. Handling of complex logical coherences
4. IT integration, Administration, Maintenance
5. High Performance, High Availability
6. Intuitively operated GUI
7. Future Adaptability and Extensibility
 - Latest technologies (data model, logical test modules)
 - Adaptability to network extensions, new technologies

NETBASE Fundamentals

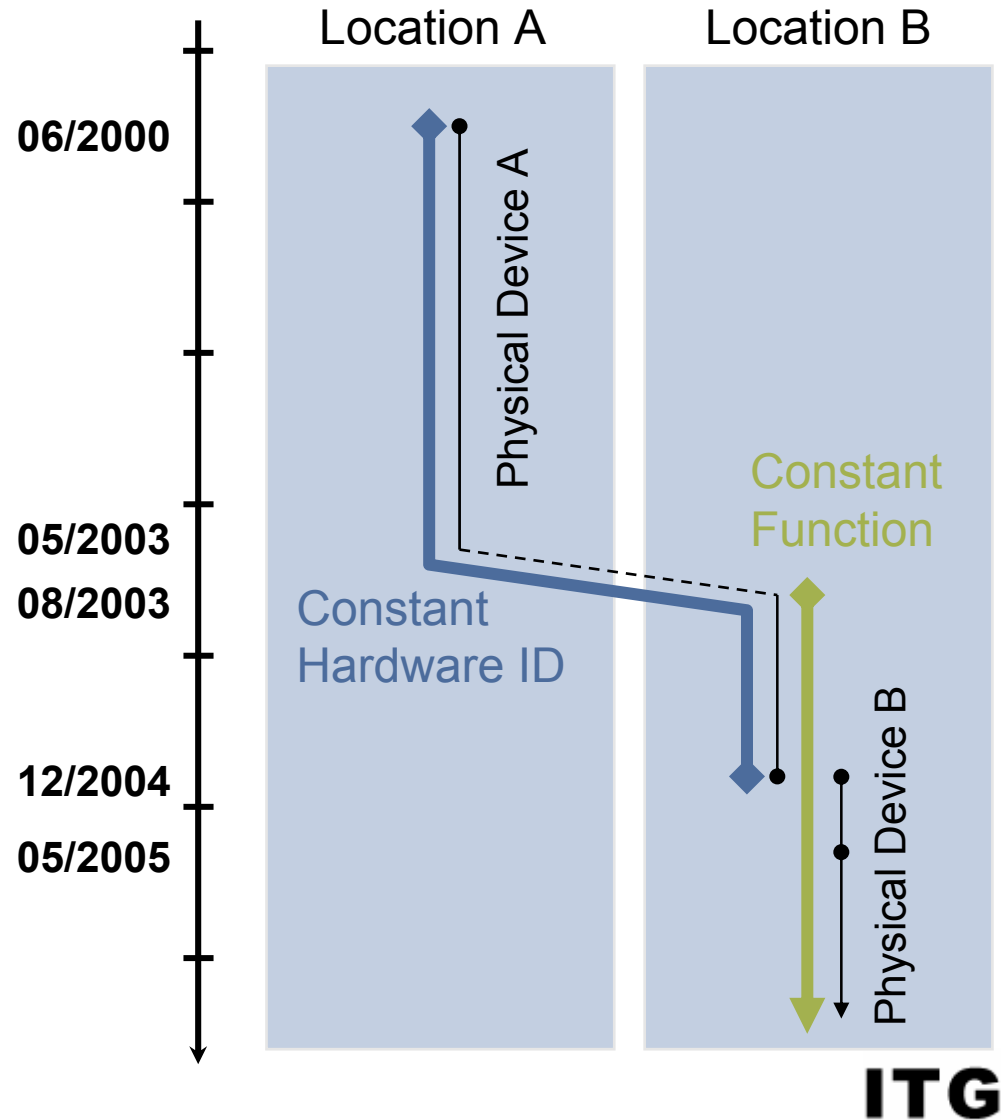


Time Related Data Storage: An Example

Tracking of equipment over the full life cycle with full information on changes.

Live-Cycle of a Router

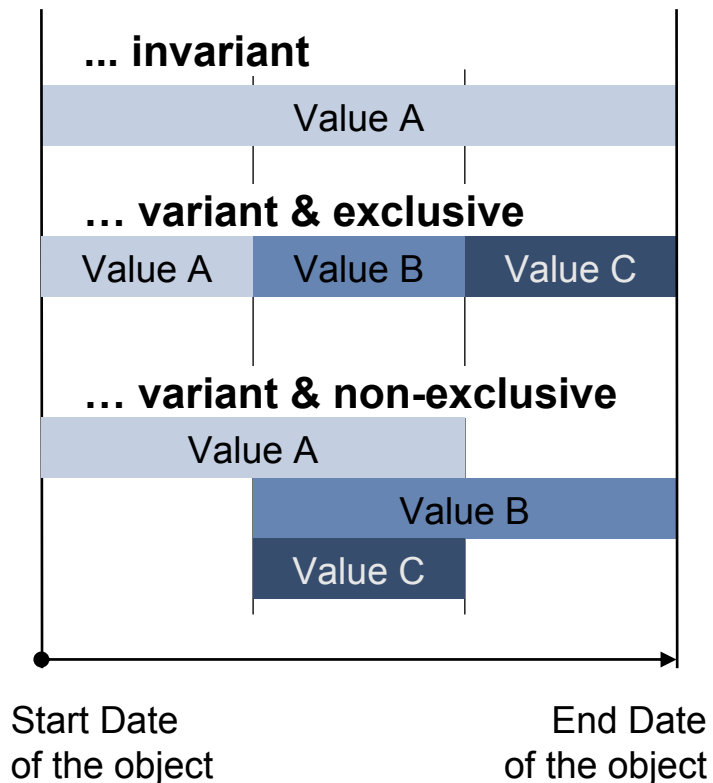
- June 2000
 - Installed in Location A
- May 2003
 - Replaced by an upgraded model
 - Moved to the internal „warehouse“
- August 2003
 - Installed at location B
- December 2004
 - Critical hardware defect
 - Replaced by another device
- June 2005
 - Software update



Time Response

Timeline support can be achieved by introduction of a limited number of time response schemes.

Properties can be time ...

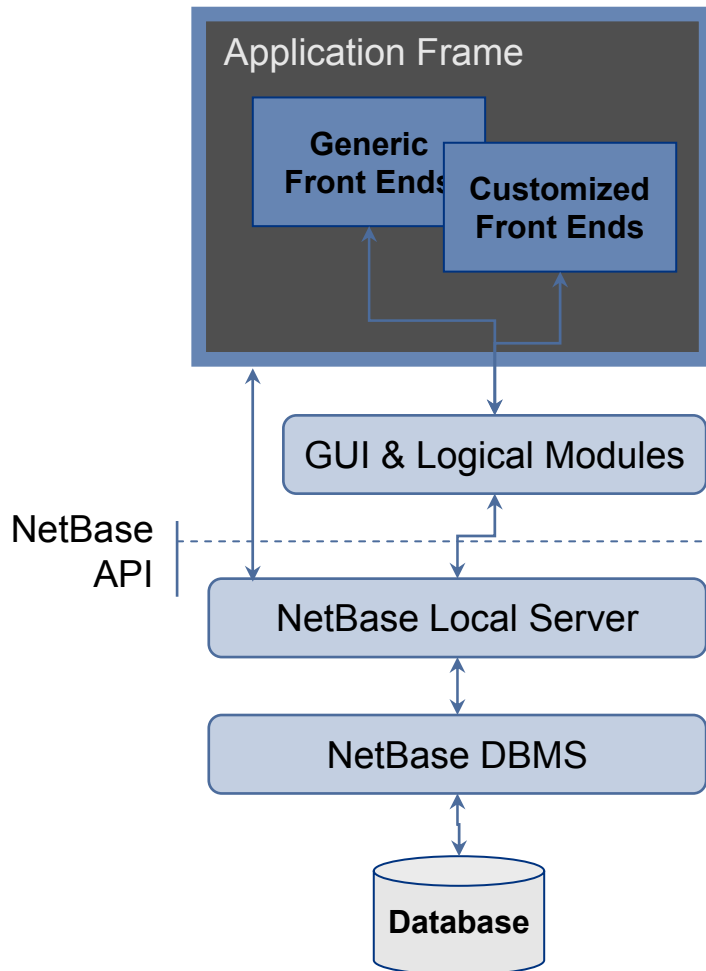


Examples

- Time invariant property
 - One value, no gaps in time
 - Examples
 - Serial number of a device (74145DA1019, SCA032500KM)
- Time variant exclusive property
 - Always only one values per point in time, no gaps in time
 - Examples:
 - Location of a device, address of a contact person, logical identifiers, installed software versions
- Time variant non-exclusive property
 - Arbitrary number of values per point in time
 - Example:
 - Contact persons

Software Architecture

Flexible architecture to ensure scalability and adaptability.



- **Generic Front-End**
 - Data access: create, delete, change data
 - No logical tests, useful for administrative tasks
- **Customized Front-End**
 - Adaptation to customer requirements
 - Implementation of logical tests
- **Logical Modules**
 - Specific implementation of tests
- **Local Server**
 - Reduction of network load
 - Distribution of computational load
- **NetBase Database Management System**
 - Interface to database and distributed local servers
- **Database**
 - Usage of existing database licenses
 - Possibility to connect to existing databases

Network Planning and Documentation – A Comparison



Network Planning and Optimization Software

- Plan network variants at one point in time
 - Status information of one point in time
 - Comparison several variants for one point in time
 - Single user system
- Comprehensive calculations
 - Supports users in doing complex calculations for designing the network
- Network state can be “invalid”
 - Special planning problems require a violation of network design rules



Network Documentation and Management Software

- Document network over time
 - Full network documentation: past, present, future
 - One timeline only
 - Multi-user database system
- Process management for implementing changes
 - Tracing of processes
 - Inform by actively sending messages
- Validation of network state
 - Database reflects the current network state
 - Detected violations of network design rules require actions (reconfiguration, replacement)

Thank you for your attention!

Consulting
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