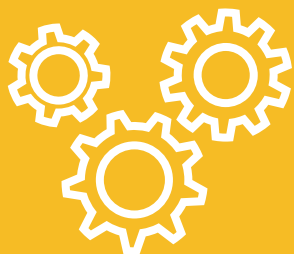
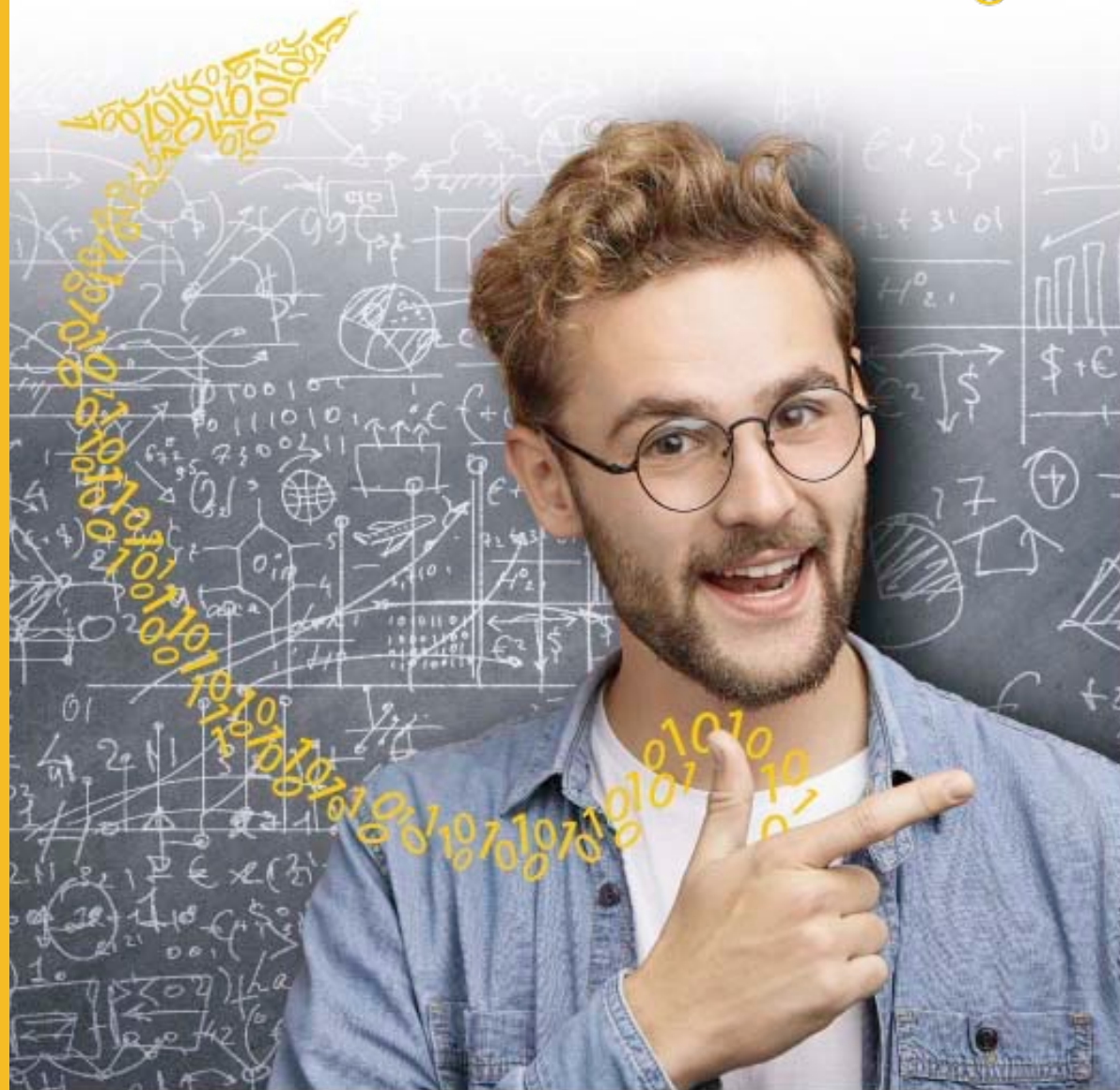


ITOM



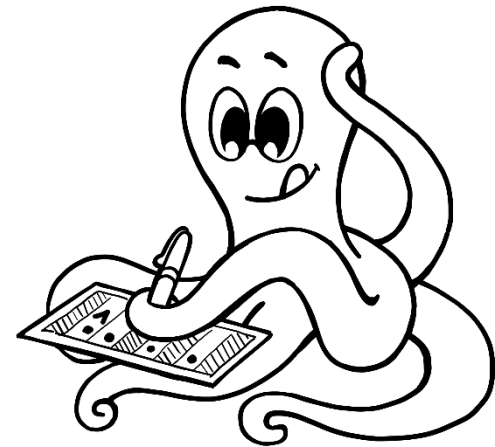
KNOW*Digital*



November 5, 2022
Lionel Pilorget

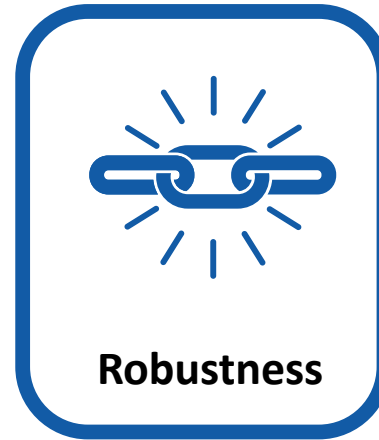
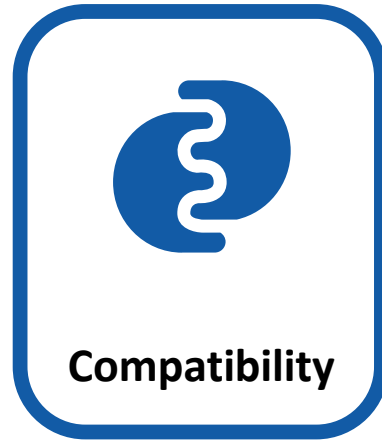
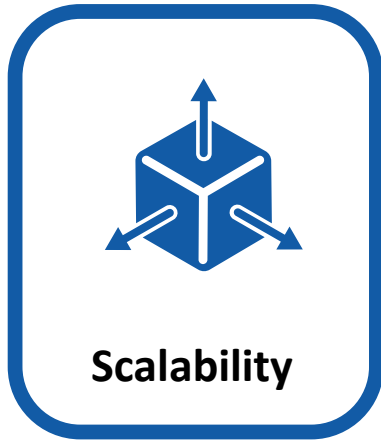


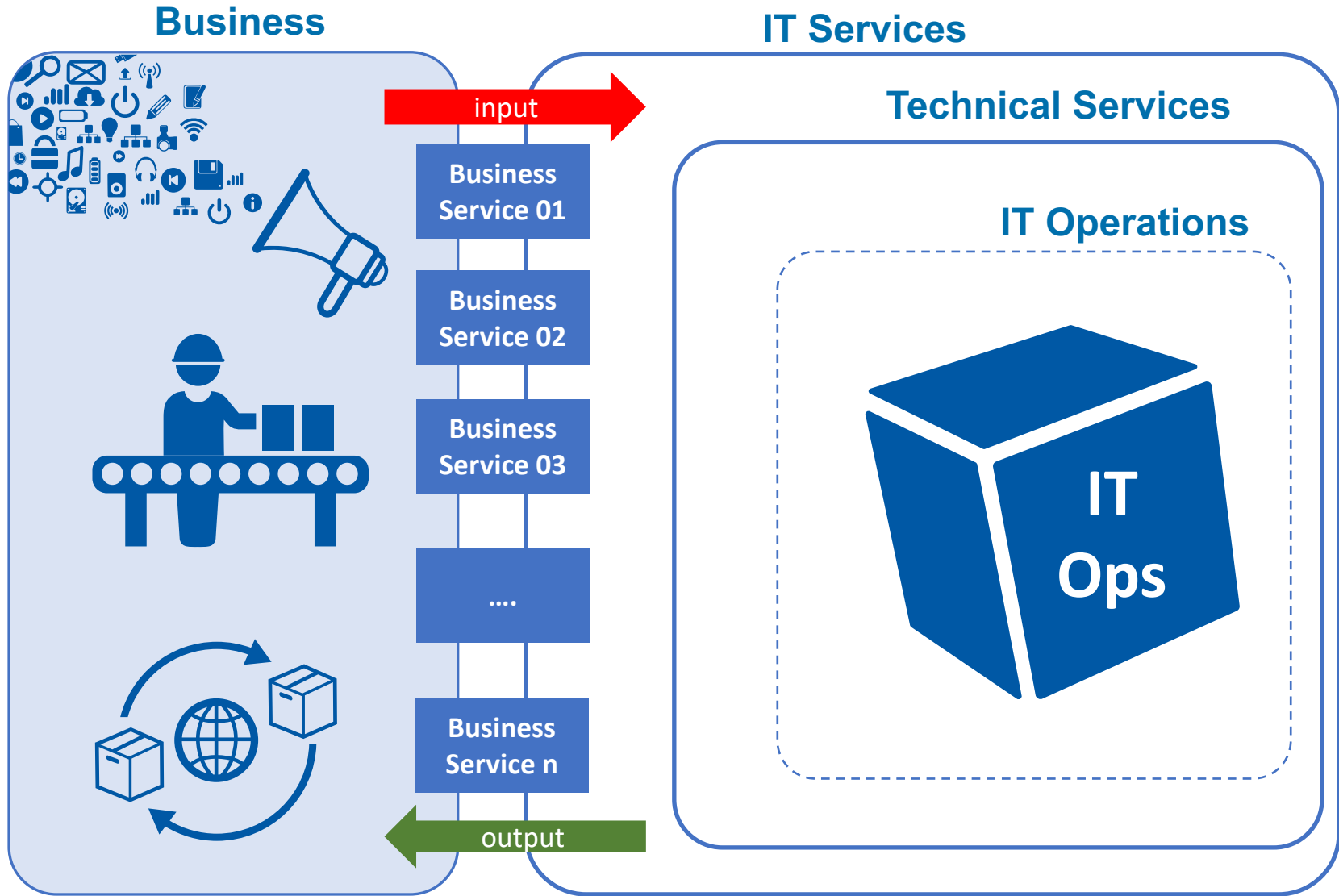
- IT Infrastructure and Operations (I&O) as Commodity
- Complexity of IT Systems
- CMDB (Configuration Management Data Base) as the answer
- Using the CMDB to enable IT Processes
- IT Operation Processes
- Trends in ITOM





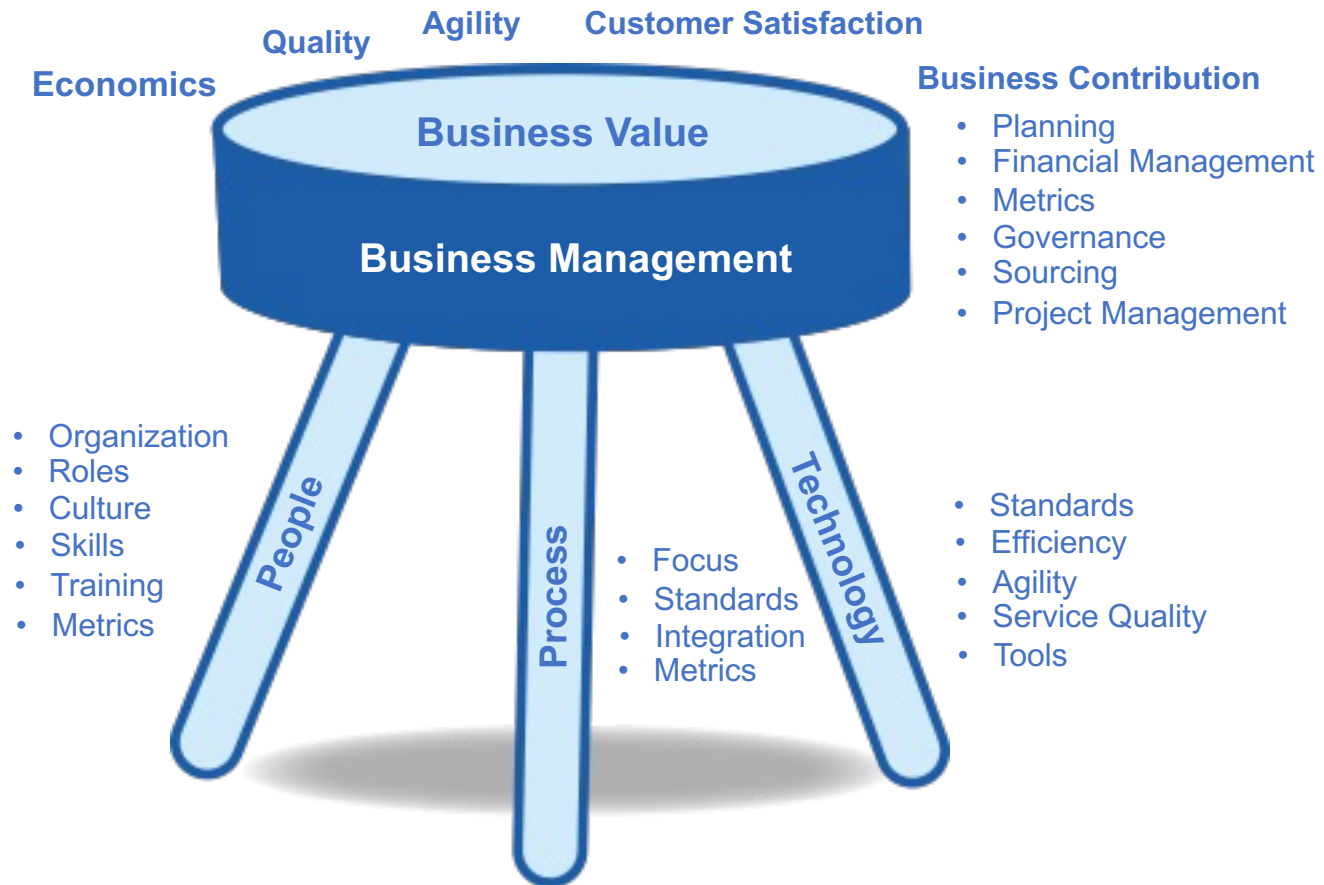
I&O: Infrastructure and Operations







I&O: Infrastructure and Operations



Source: Gartner (October 2007)

Levels of Gartner's I&O Maturity Model

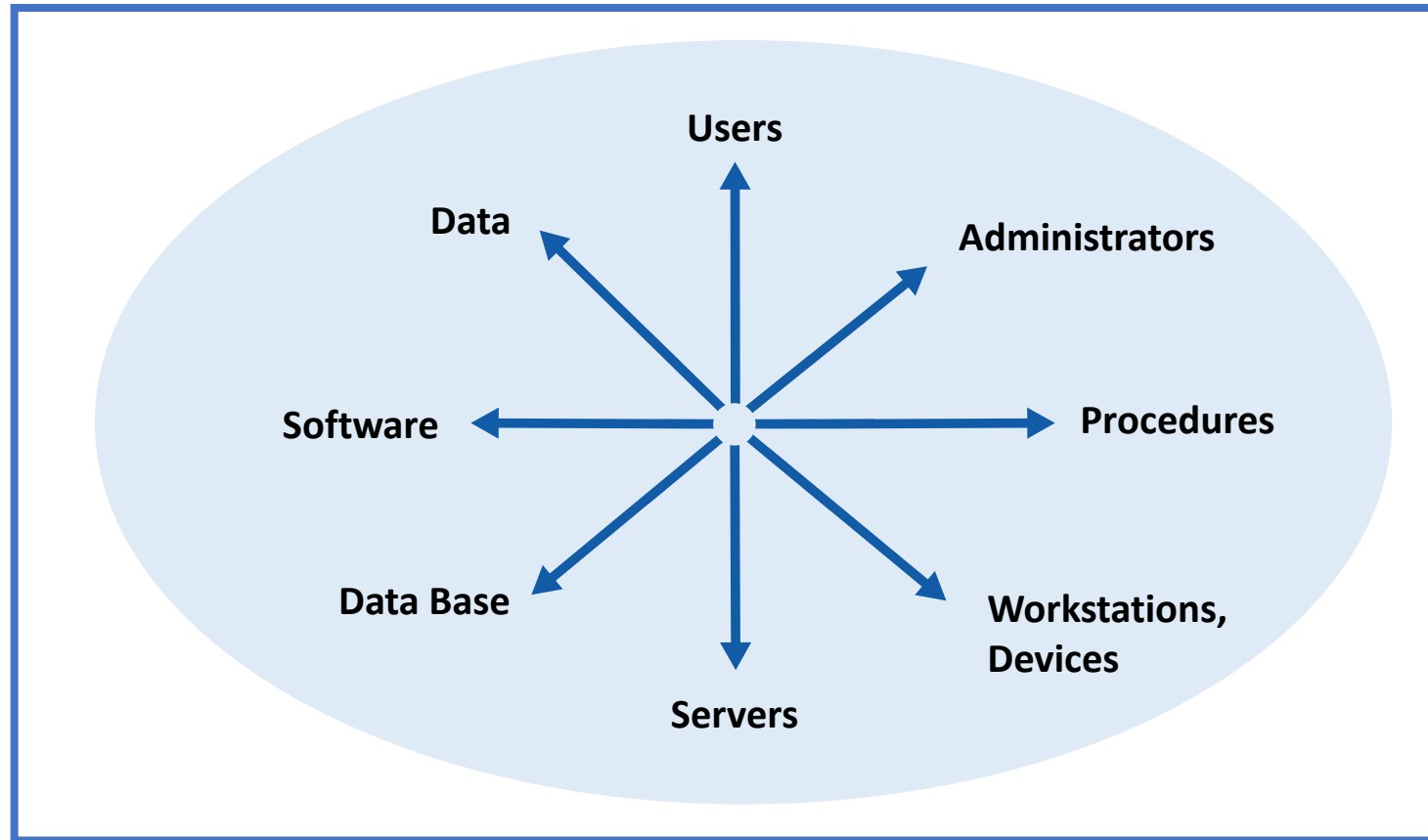


	Survival	Awareness	Committed	Proactive	Service-Aligned	Business Partnership
People	No organizational focus on IT infrastructure and operations	Defined, technology-centric organization for IT infrastructure and operations	Technology-centric organization; investment in IT service desk function and staff	Process-centric organization, defined governance structure	Customer- and business-focused, IT service and delivery centric organization, formal governance	Business optimization and entrepreneurial focused culture
Process	No formal IT processes for IT infrastructure and operations	Ad hoc, but aware that processes are necessary; dependent on tools to implement de facto processes	Defined processes for IT service support and project management	Repeatable and individually automated; focus on IT service delivery-related IT processes	Integrated, automated and extended beyond I&O; focus on all service and business management processes	Dynamic optimization of IT services, implement processes fostering business innovation
Technology	No formal strategy or execution on technology investments	Basic management tools; no formal infrastructure hardware or software standards	IT support and project-related management tools; desktop hardware/ software standards defined; begin infrastructure standardization/ rationalization	Formal infrastructure standards and policies; process and domain-centric management tools; virtualization foundation in place	Formal IT management process/tools architecture; shared services; aggregated capacity management	Proactively promoting new technologies and impact to business; real-time infrastructure
Business Management	No formal IT business management functions	Very little outside of budgeting	Project management office	Financial management, formal key performance indicators	IT service cost metrics, competitiveness	Business contribution metrics
Level:	0	1	2	3	4	5

source: Gartner (October 2007)



An IT System is used to generate and process information needed to support users in one organization





Clients & devices



Database & Applications



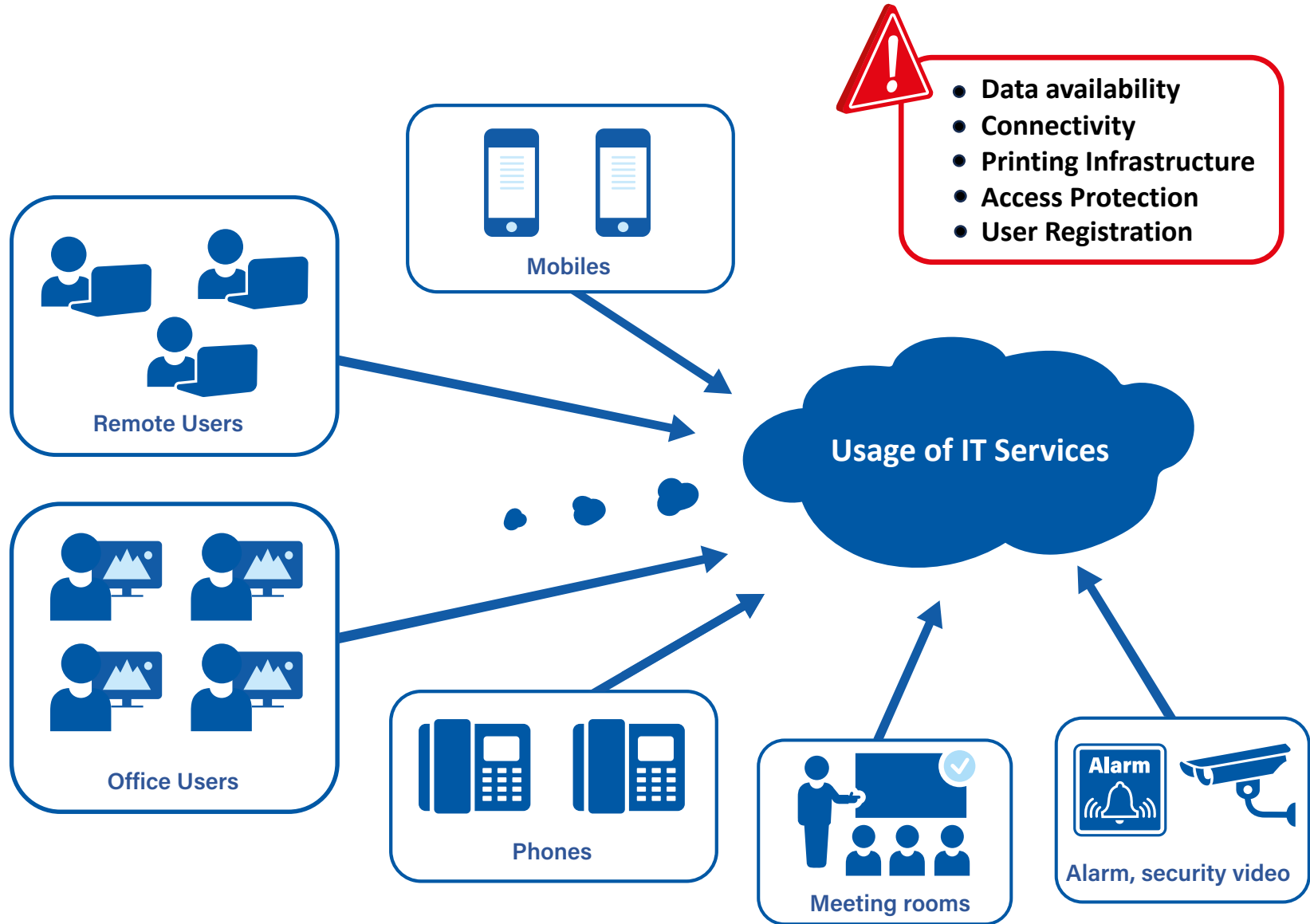
Servers



Network

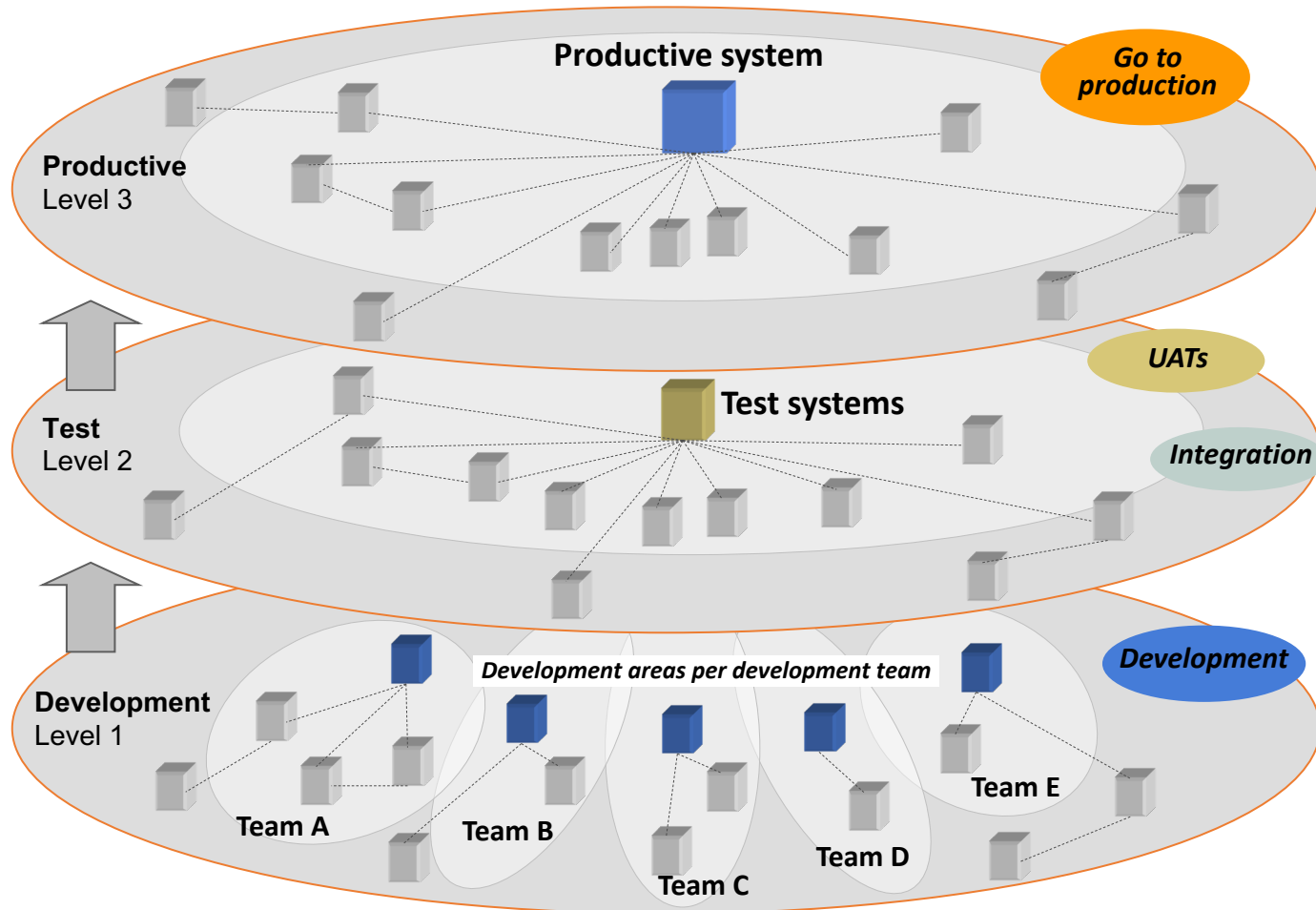


Complexity of the Client Infrastructure



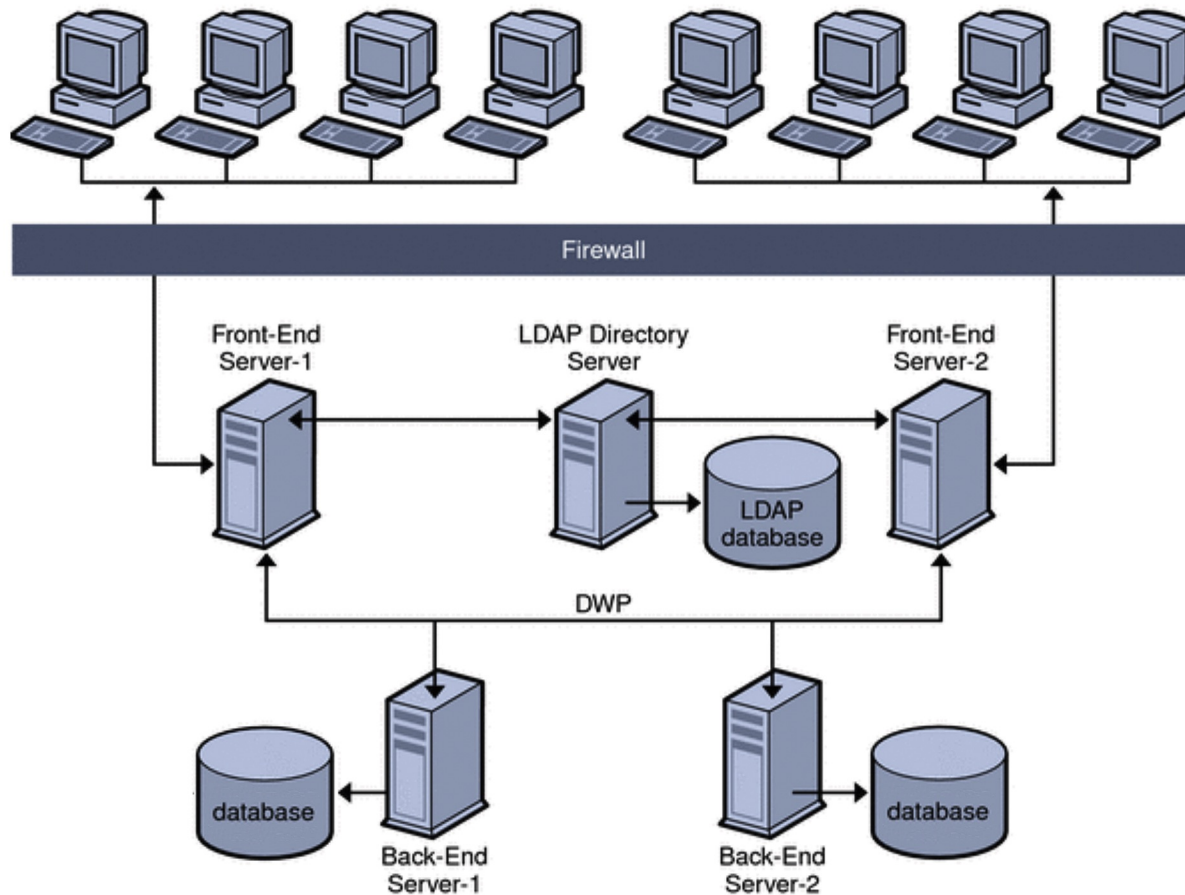


- Consistency between different environments
- Data anonymization
- Compatibility between components



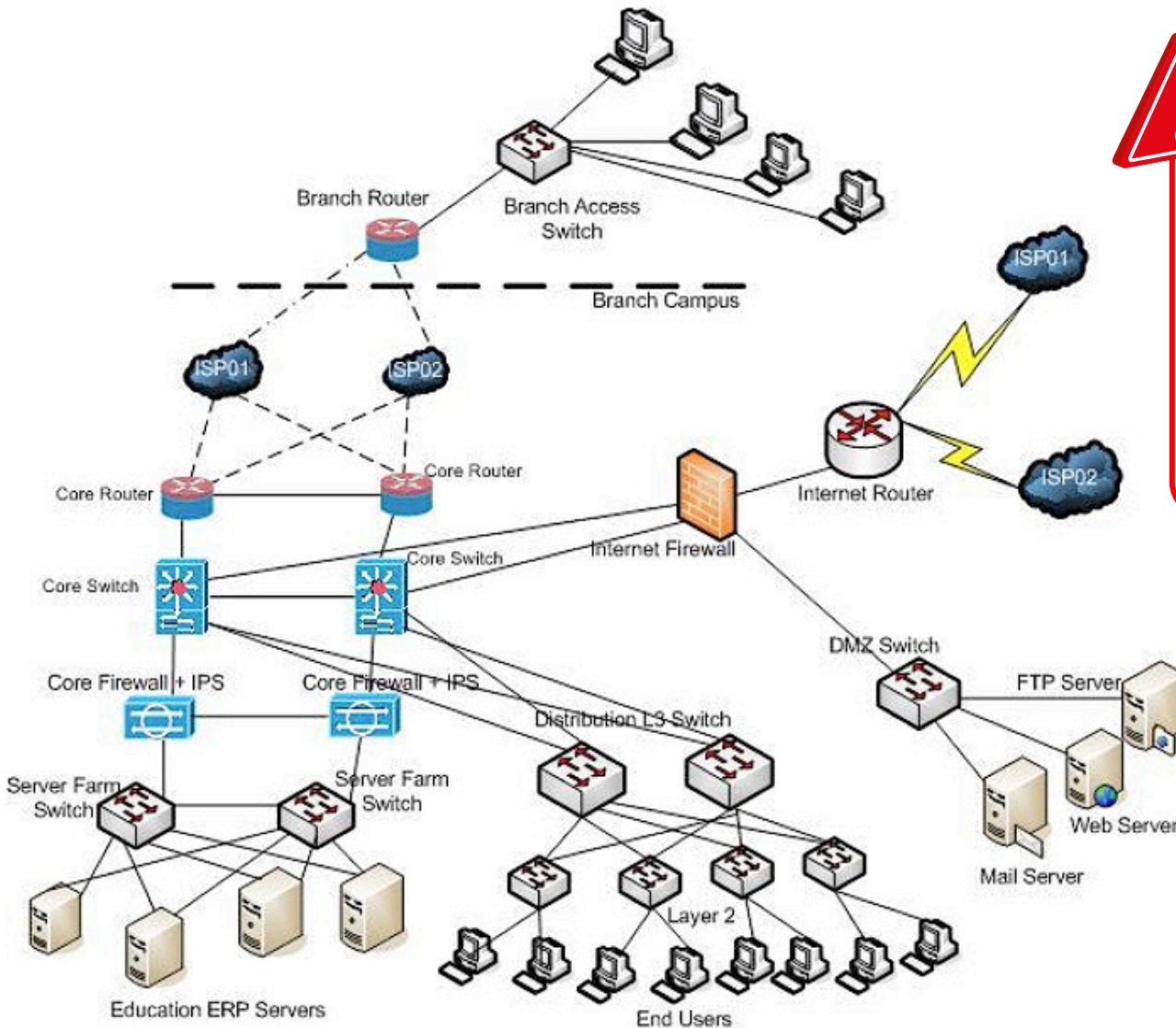


Multiple Front-End Servers with Multiple Back-End Servers



- Data availability
- Increased complexity because of micro services
- Shared infrastructure (Database, Front-end, Storage)
- Compatibility between systems
- Load between servers
- Authentication (Admin Users)
- Synchronization
- Backup

LDAP: Lightweight Directory Access Protocol

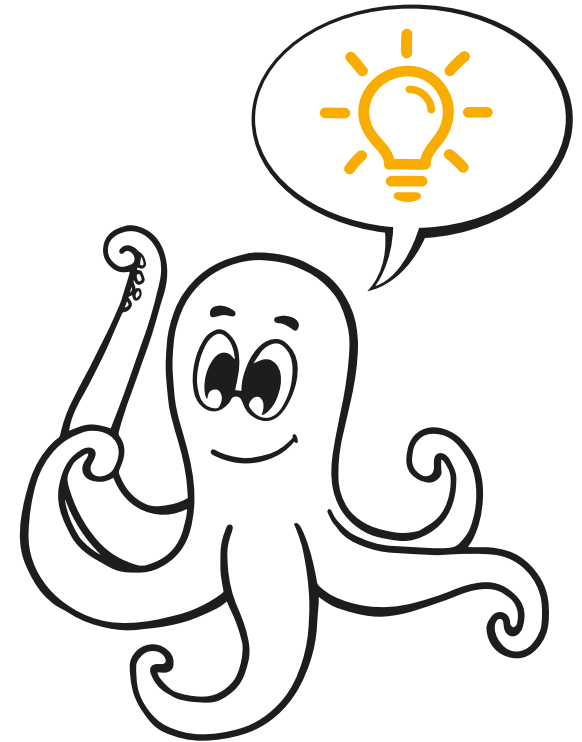
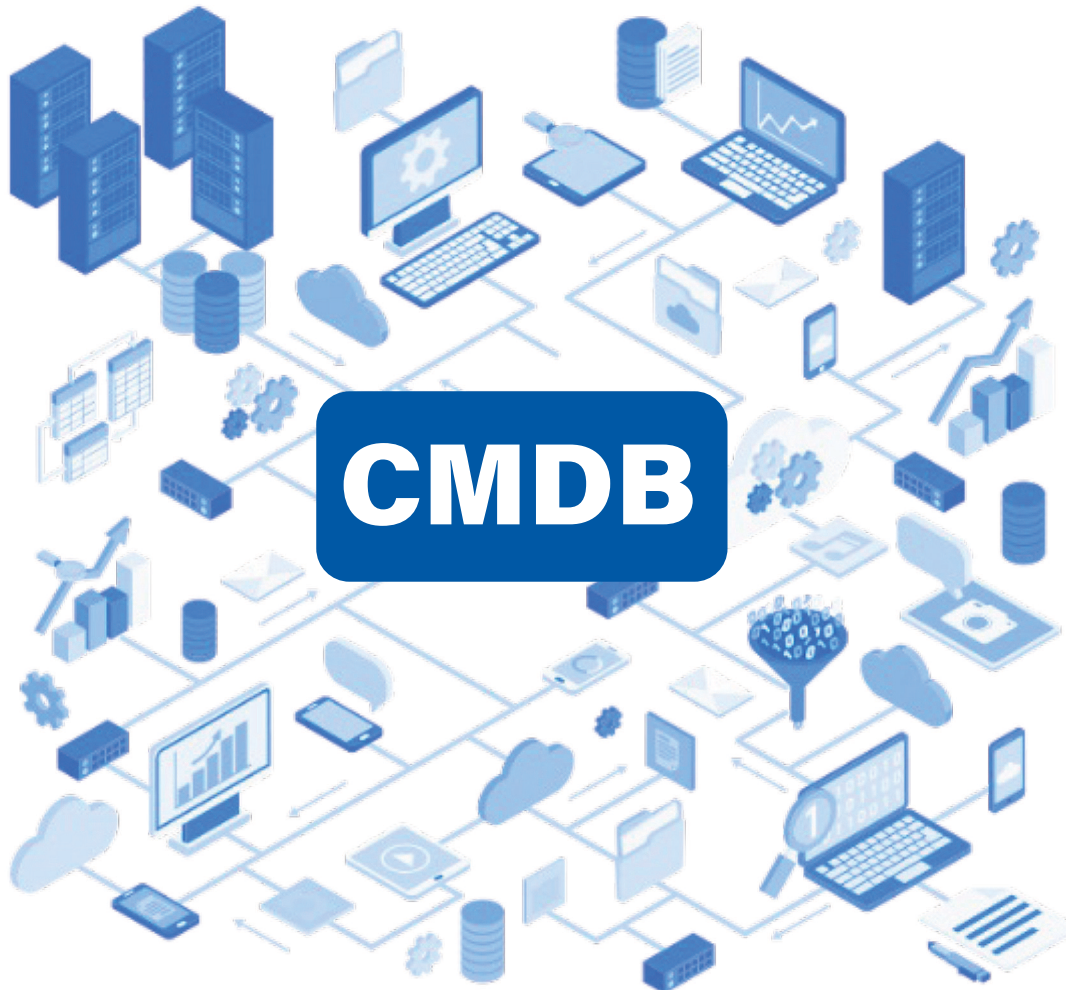


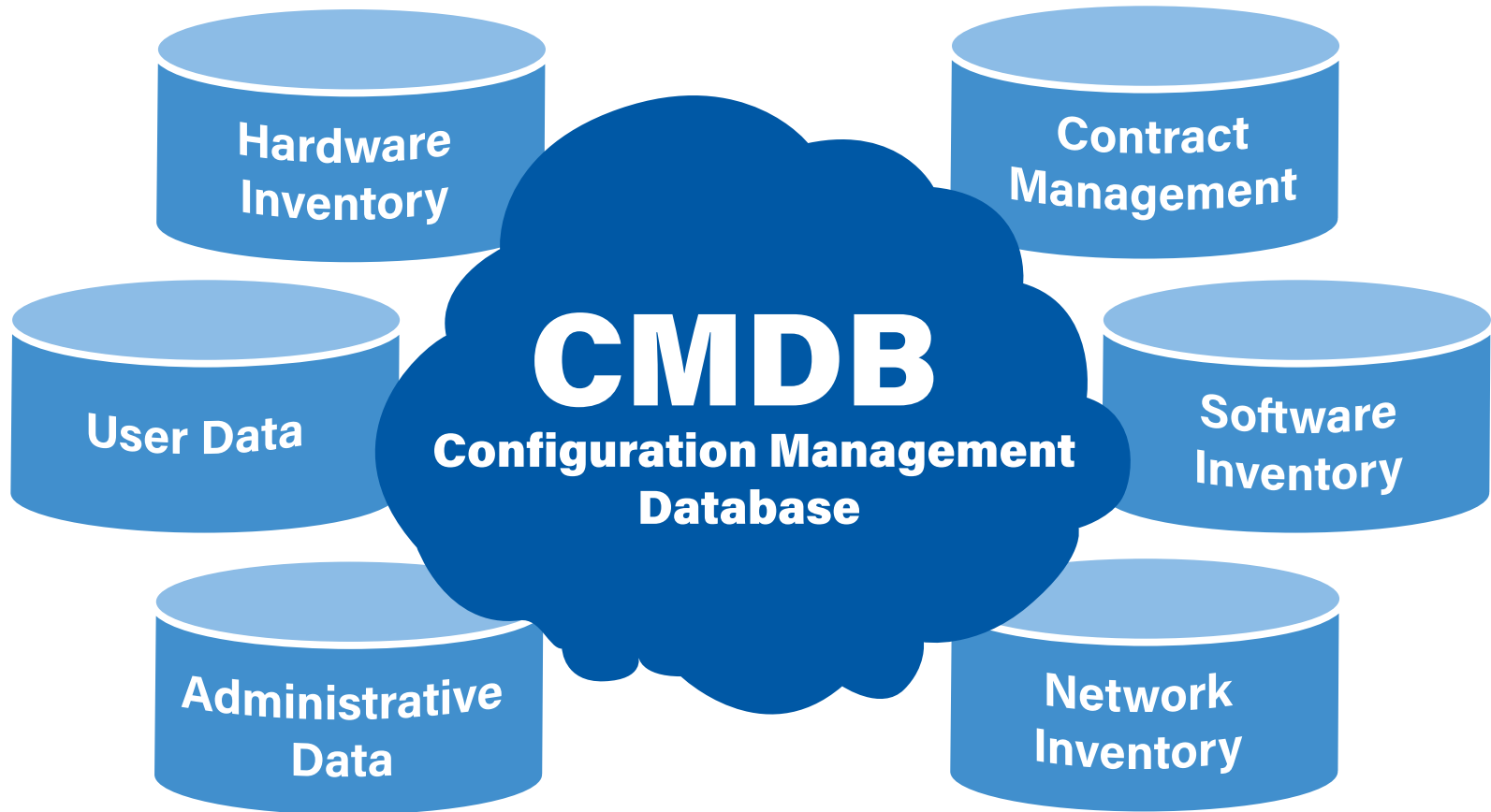
- **Cyber Attacks**
- **Firewall Rules**
- **Capacity Management (missing specifications for bandwidth for instance)**
- **Data connections with 3rd parties**





CMDB: Configuration Management Data Base

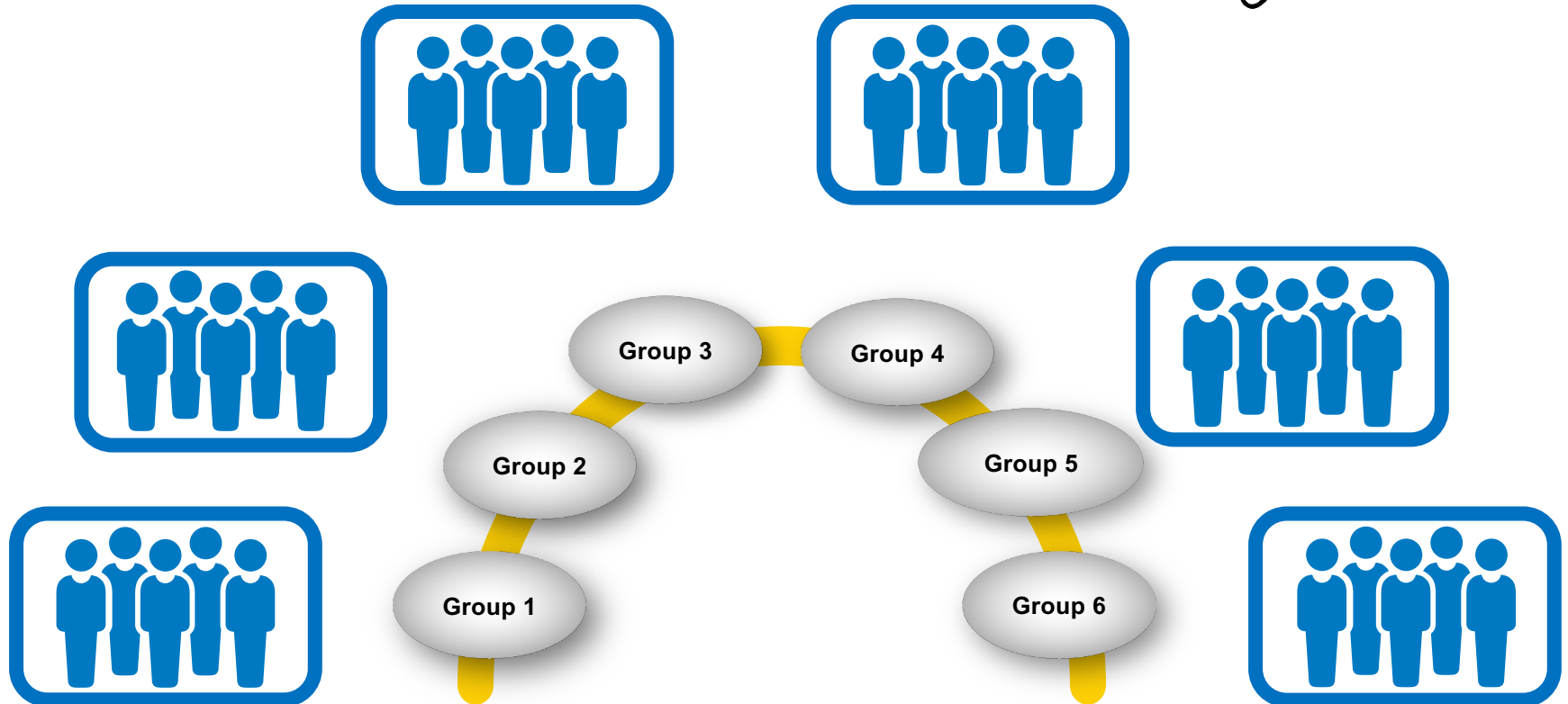




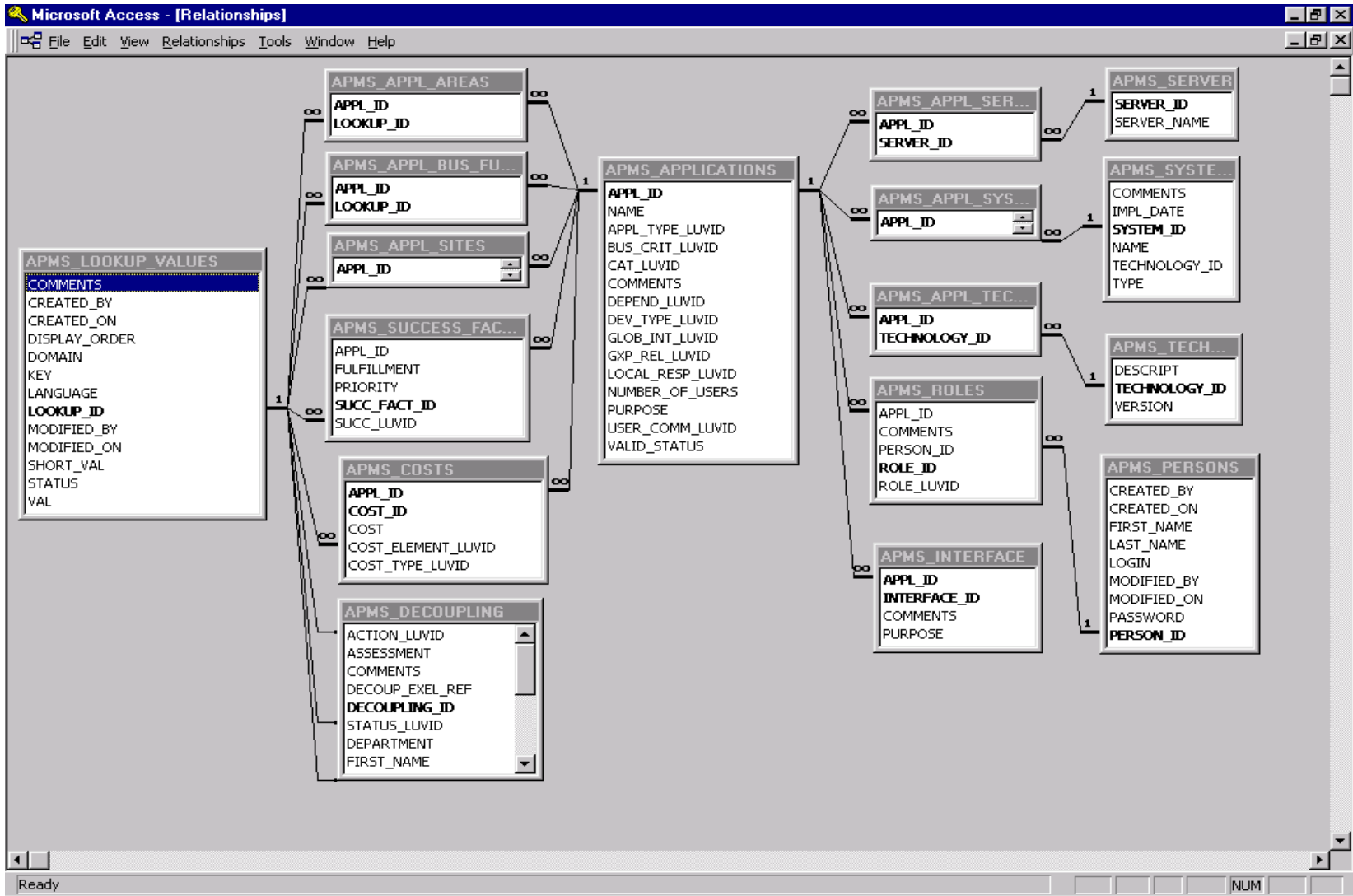


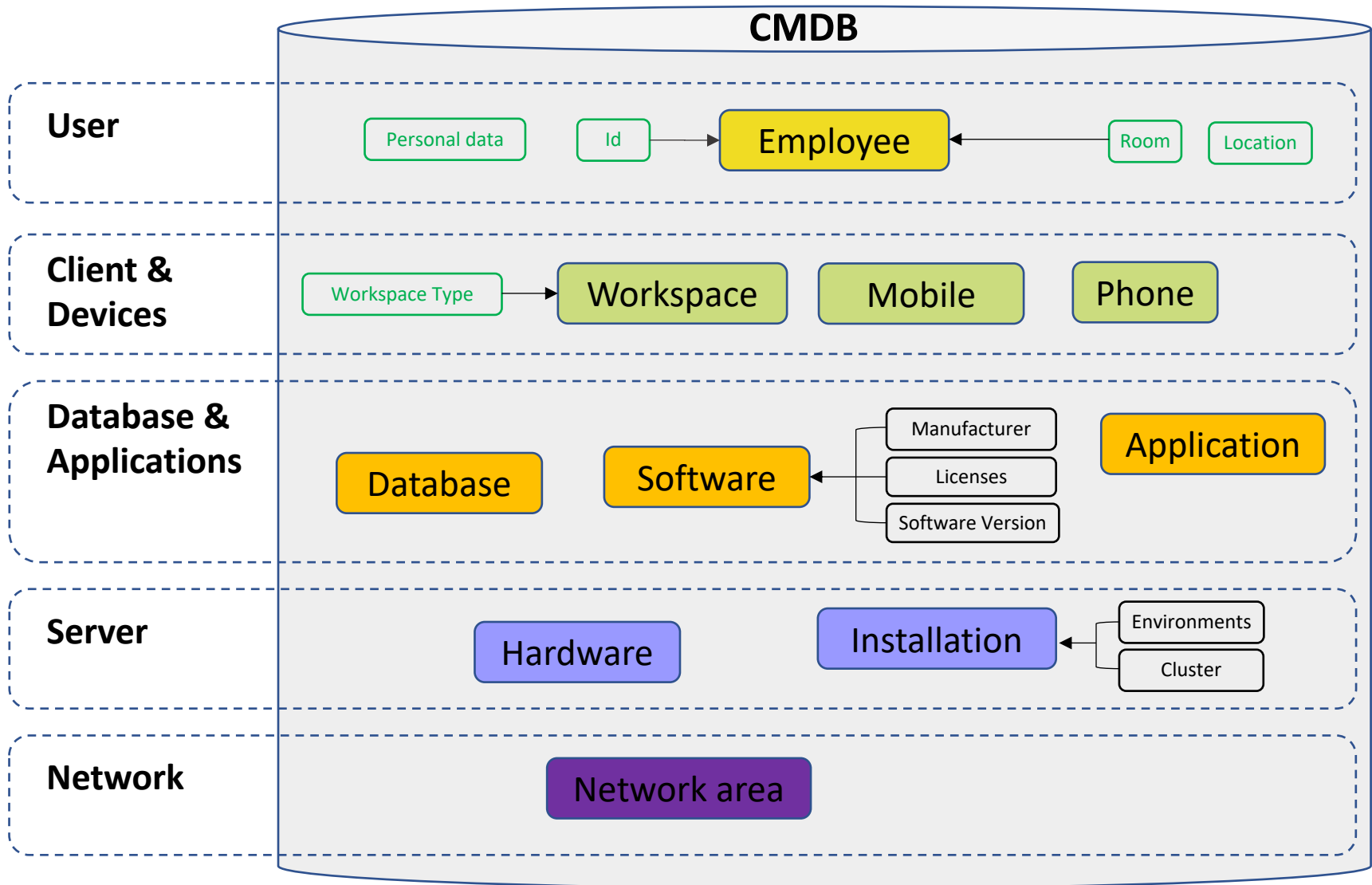
Define the Configuration Items (CI) for the following items

1. Workstation
2. Smart Phone
3. Laptop
4. Client Application
5. Application Server
6. Printer



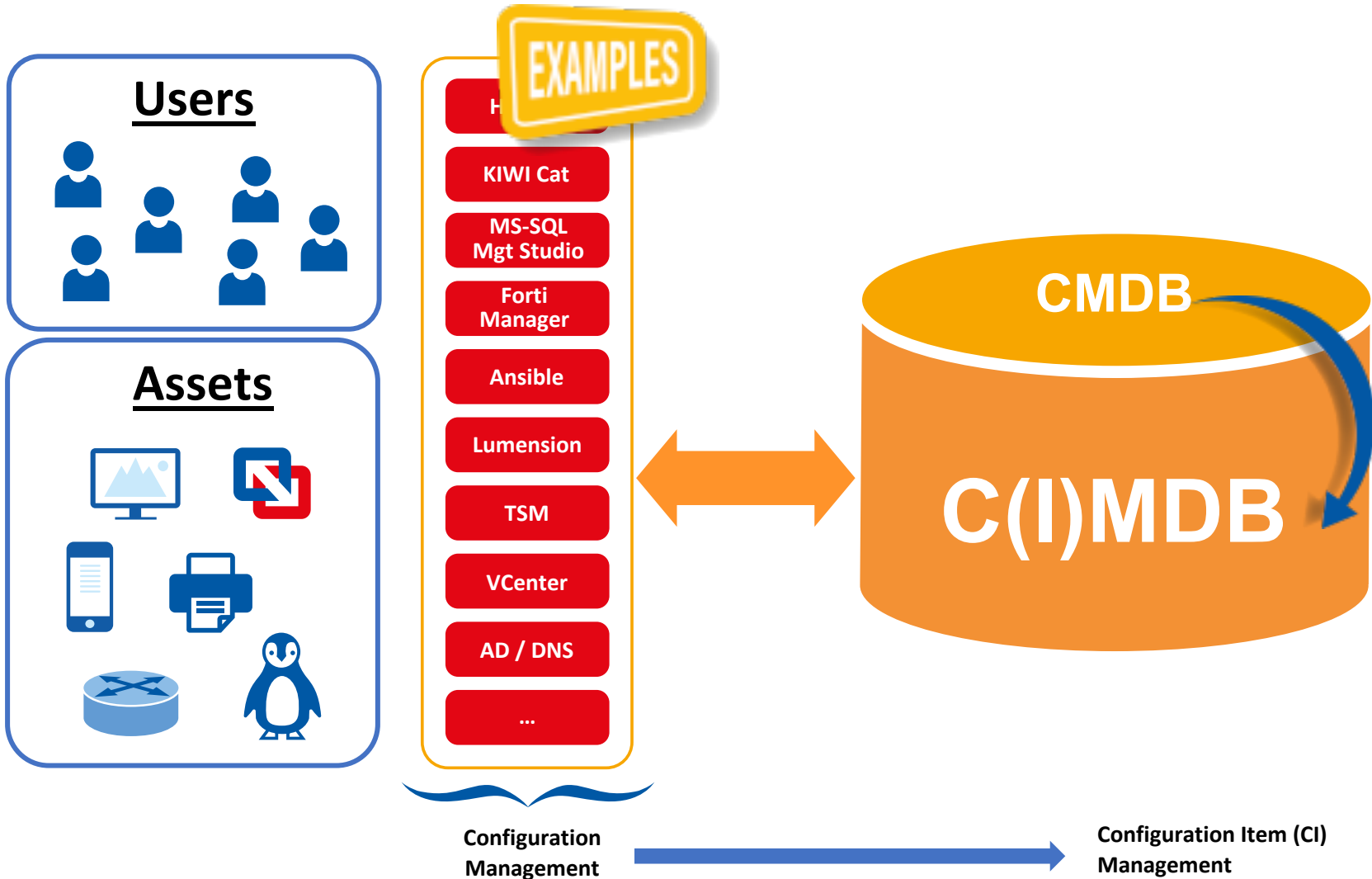
Example of a CMDB Database Model



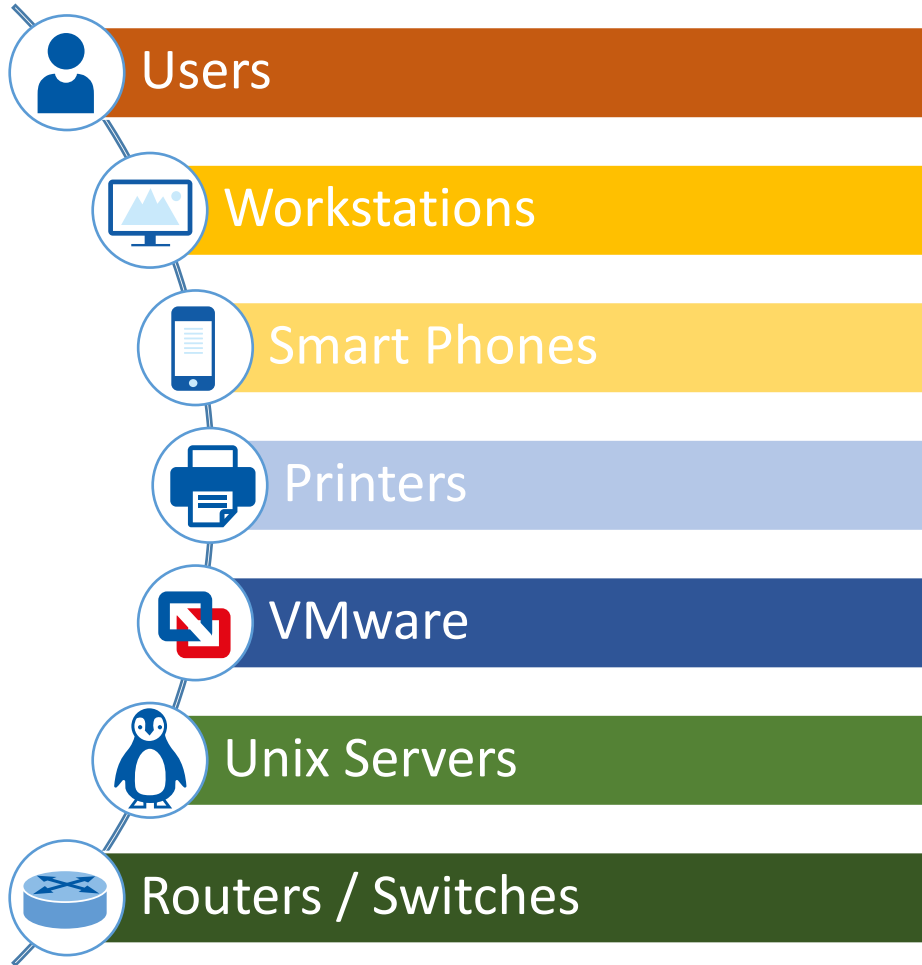




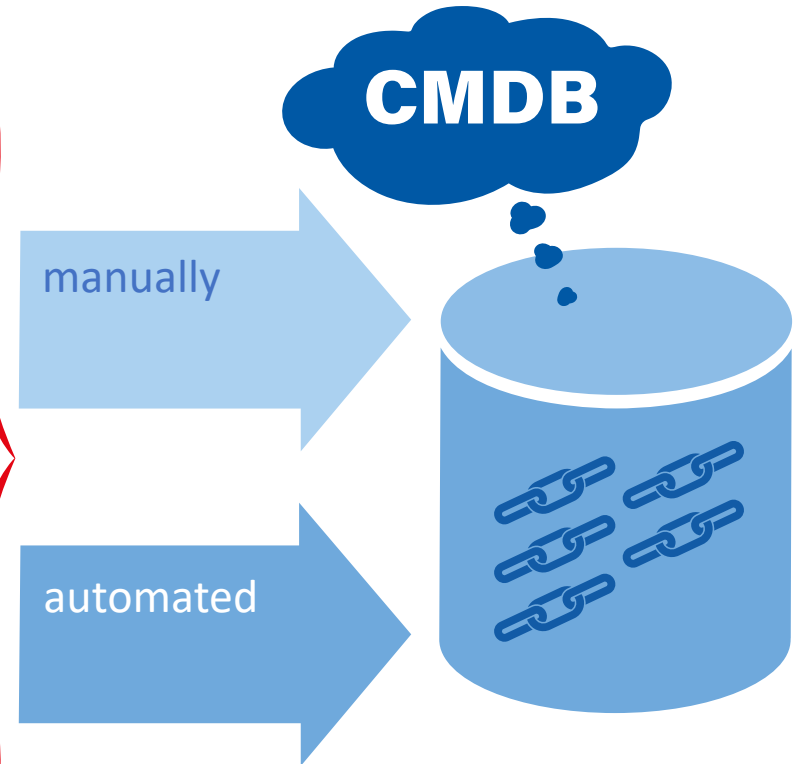
“CMDB” consolidates different Configuration Management Sources CMDB -> Configuration Item Data Base (CIMDB)



Challenges for a CMDB solution



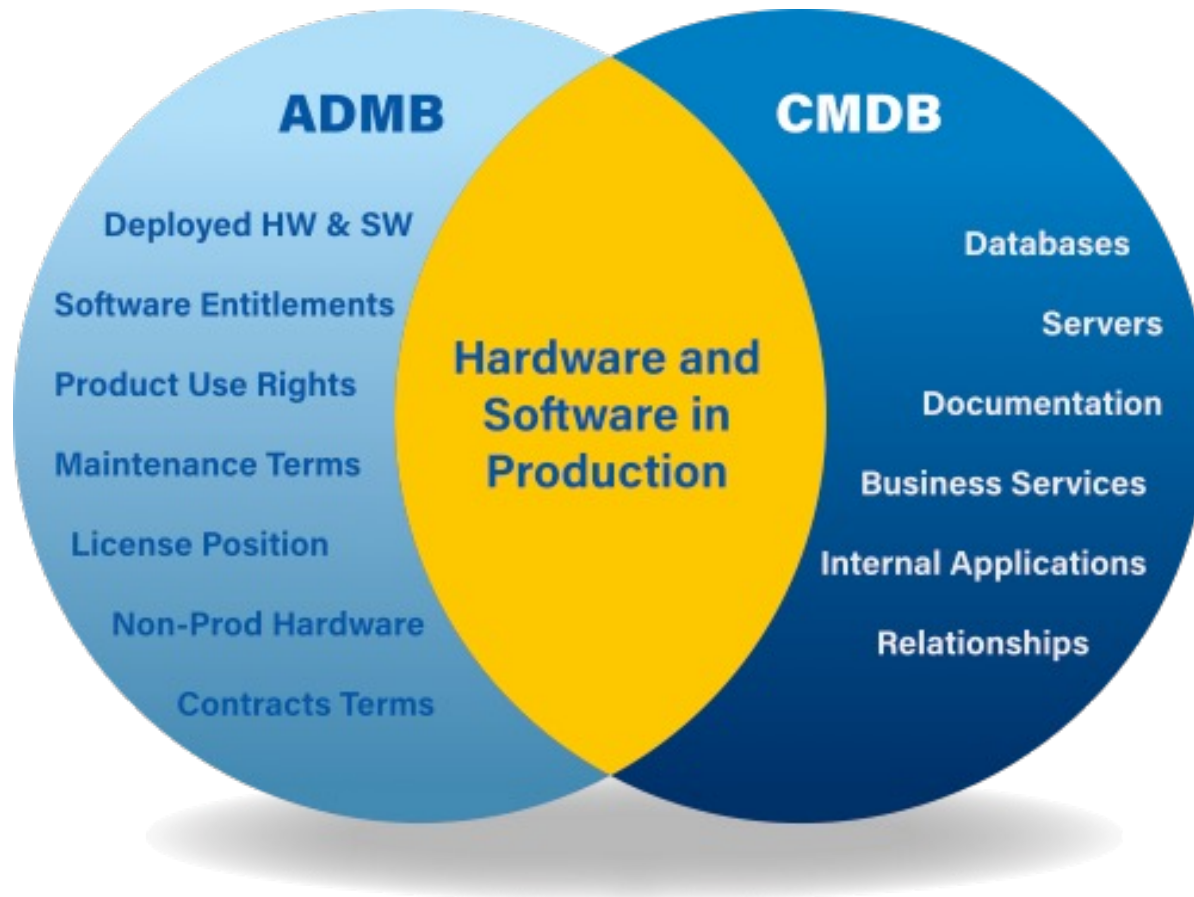
- Systems are different
- Data integration missing
- Relationships not clearly defined





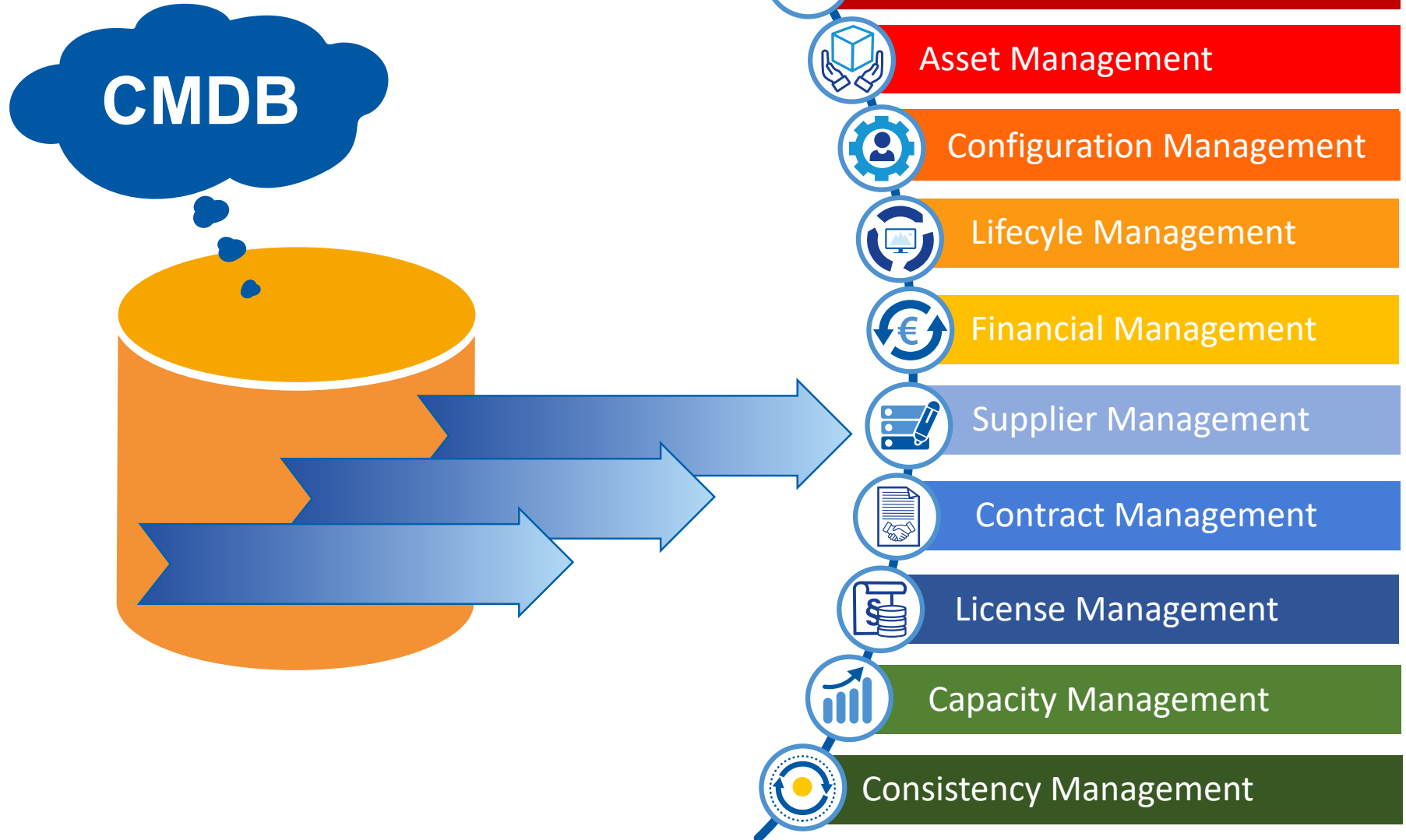
AMDB: Asset Management Data Base

CMDB: Configuration Management Data Base





One Source of Truth



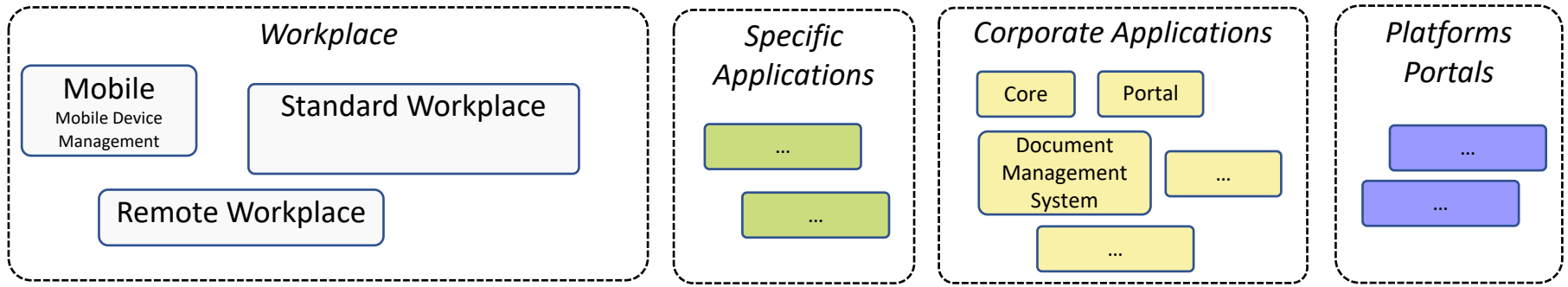


IT Process	CMDB Key Items/Functions	Common Practices	Best Practices "CMDB"
<p>Service Management</p> <p>A service is set of specialized organizational capabilities for providing value to customers in the form of services Service Management is the implementation and management of IT services that meet the needs of the business.</p>	<ul style="list-style-type: none"> • Service description • Internal SLAs • RTO / RPO 	<p>"stand-alone" Service Catalogue</p>	
<p>Asset Management</p> <p>IT asset management is the set of business practices that support life cycle management and strategic decision making for the IT environment. IT assets include all software and hardware contained in your organization's IT environment.</p>	<ul style="list-style-type: none"> • Asset Type • Technical features 	<p>Fragmented inventories</p>	
<p>Configuration Management</p> <p>Process for establishing and maintaining consistency of a product's performance, functional, and physical attributes with its requirements, design, and operational information throughout its life.</p>	<ul style="list-style-type: none"> • Security items (patch level for instance) • Bespoke developments • Interfacing feature 	<p>Configurations not documented</p>	
<p>Lifecycle Management</p> <p>systematic approach to managing a product's lifecycle from inception to disposal to decommissioning</p>	<ul style="list-style-type: none"> • Maintenance period • Release policy (multi-releases) 	<p>Last minute and ad hoc renewals</p>	
<p>Financial Management</p> <p>Oversight of expenditures required to deliver IT products and services</p>	<ul style="list-style-type: none"> • Initial price • Market value • Amortization 	<p>Inconsistent and non-transparent financial information</p>	

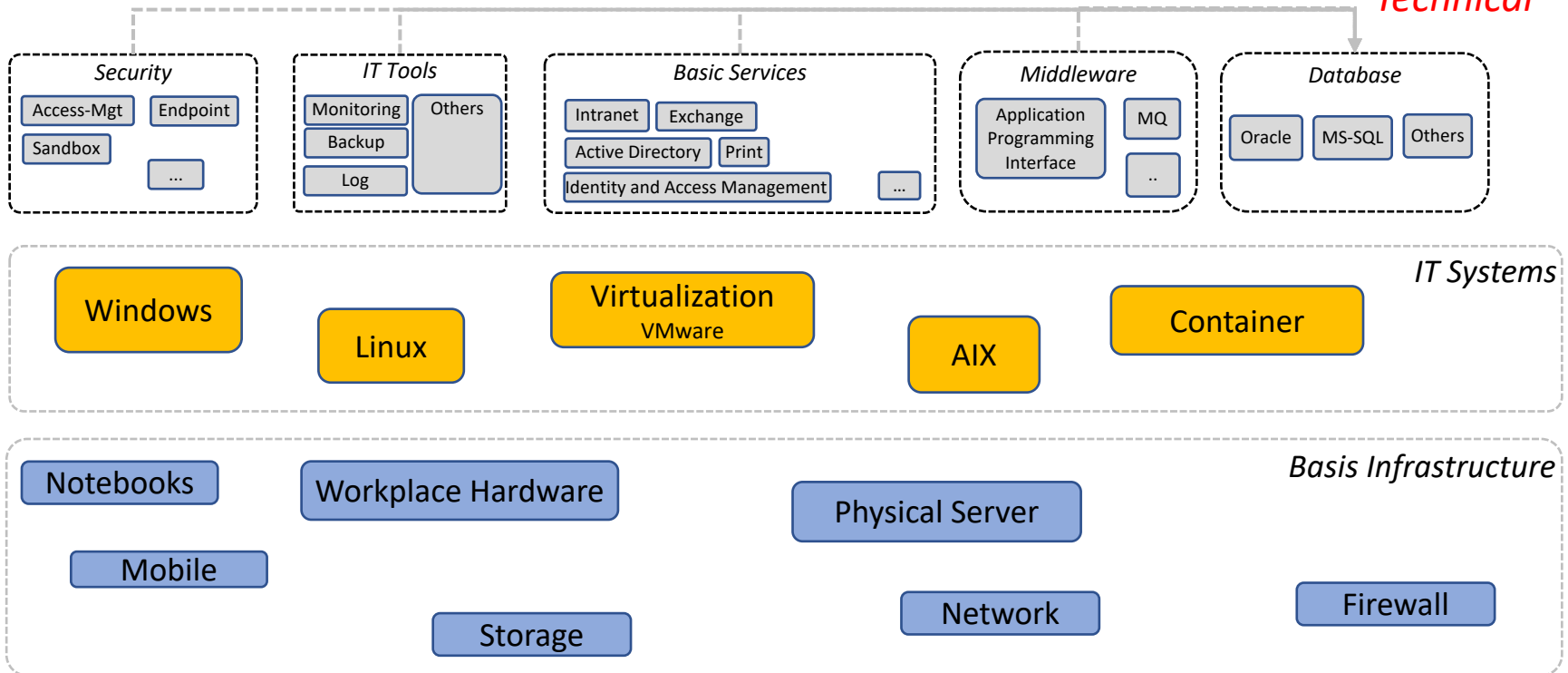


IT Process	CMDB Key Items/Functions	Common Practices	Best Practices "CMDB"
<p>Supplier Management Process that ensures that value is received for the money that an organization spends with its suppliers. Effective supplier management makes sure that several activities occur, including:</p> <ul style="list-style-type: none"> ✓ Establishing policies to govern suppliers ✓ Negotiating and agreeing upon legal contracts between the purchasing organizations and its suppliers ✓ Suppliers produce goods and services in line with agreed expectations ✓ Contracts with suppliers match business needs ✓ Targets in contracts with suppliers align with targets set by the purchasing organization ✓ Managing relationships with suppliers as well as overall supplier performance ✓ Managing supplier performance and keeping accurate supplier records and information 	<ul style="list-style-type: none"> • Contact persons • Escalation procedures • Communication procedures 	High dependency and "dictatorship" of big players	
<p>Contract Management Process of managing contract creation, execution, and analysis to maximize operational and financial performance at an organization, all while reducing financial risk</p>	<ul style="list-style-type: none"> • Validity • Period of validity and resignation • External SLAs 	paper contracts in a binder	
<p>License Management Process of monitoring, maintaining, reducing, documenting and controlling all the organization's various software licenses</p>	<ul style="list-style-type: none"> • Licensing method • Licensing scalability • True-up conditions 	License pool defined at the beginning of the project	
<p>Capacity Management Act of ensuring a business maximizes its potential activities and production output—at all times, under all conditions</p>	<ul style="list-style-type: none"> • Estimated usage • Alert threshold 	Extra disk space just when needed	
<p>Consistency Management Process which guarantees that any given database transaction must change affected data only in allowed ways</p>	<ul style="list-style-type: none"> • Definition of the dependencies • Specific reporting 	What does it mean?	

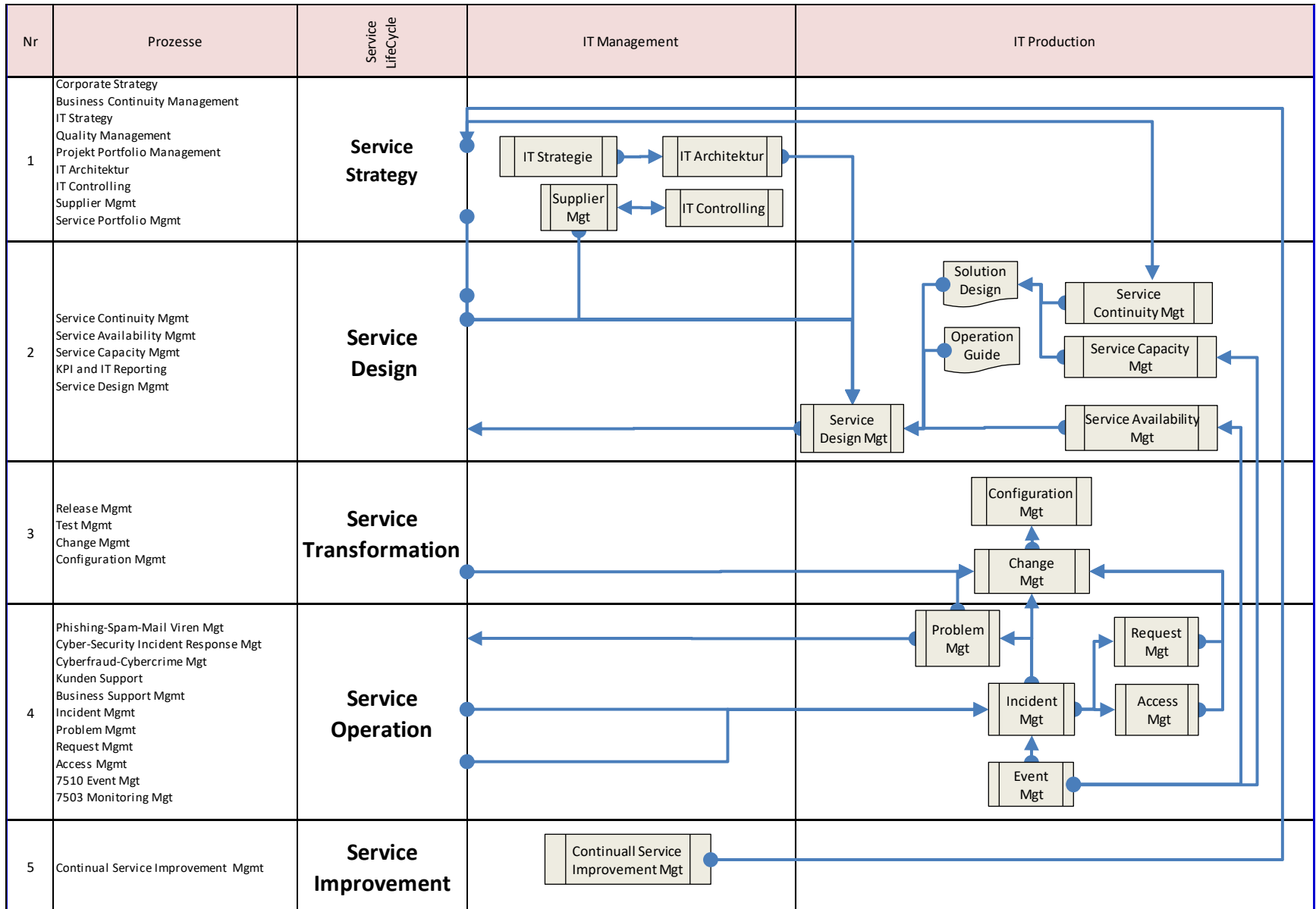
Business and Technical Services are included in the CMDD



Business
Technical

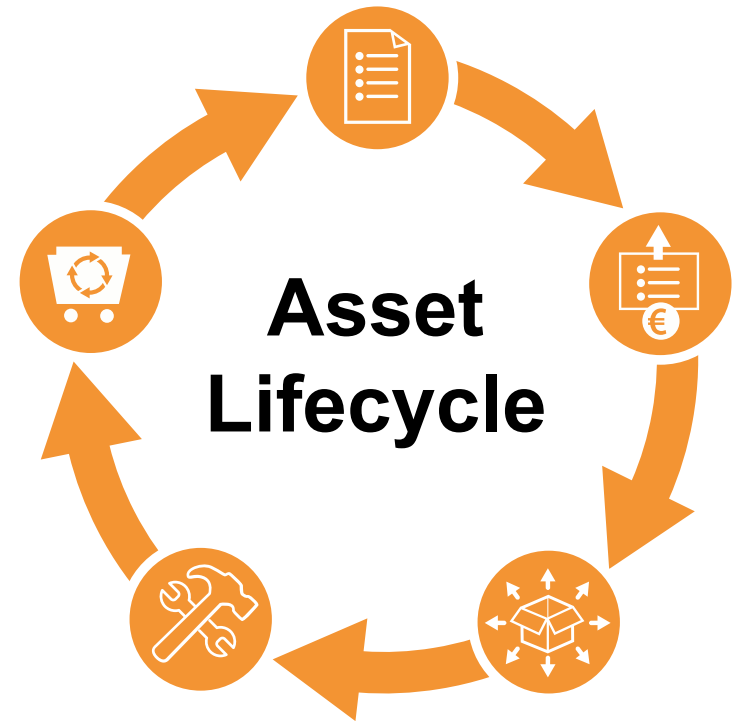


CMDB supports IT Service Management





- Purchasing
- Hardware Delivery
- Staging (OS* ready)
- Installation (application ready)
- Software Update
- Moves
- Decommissioning
- Disposal of IT devices














**OS: Operating System*

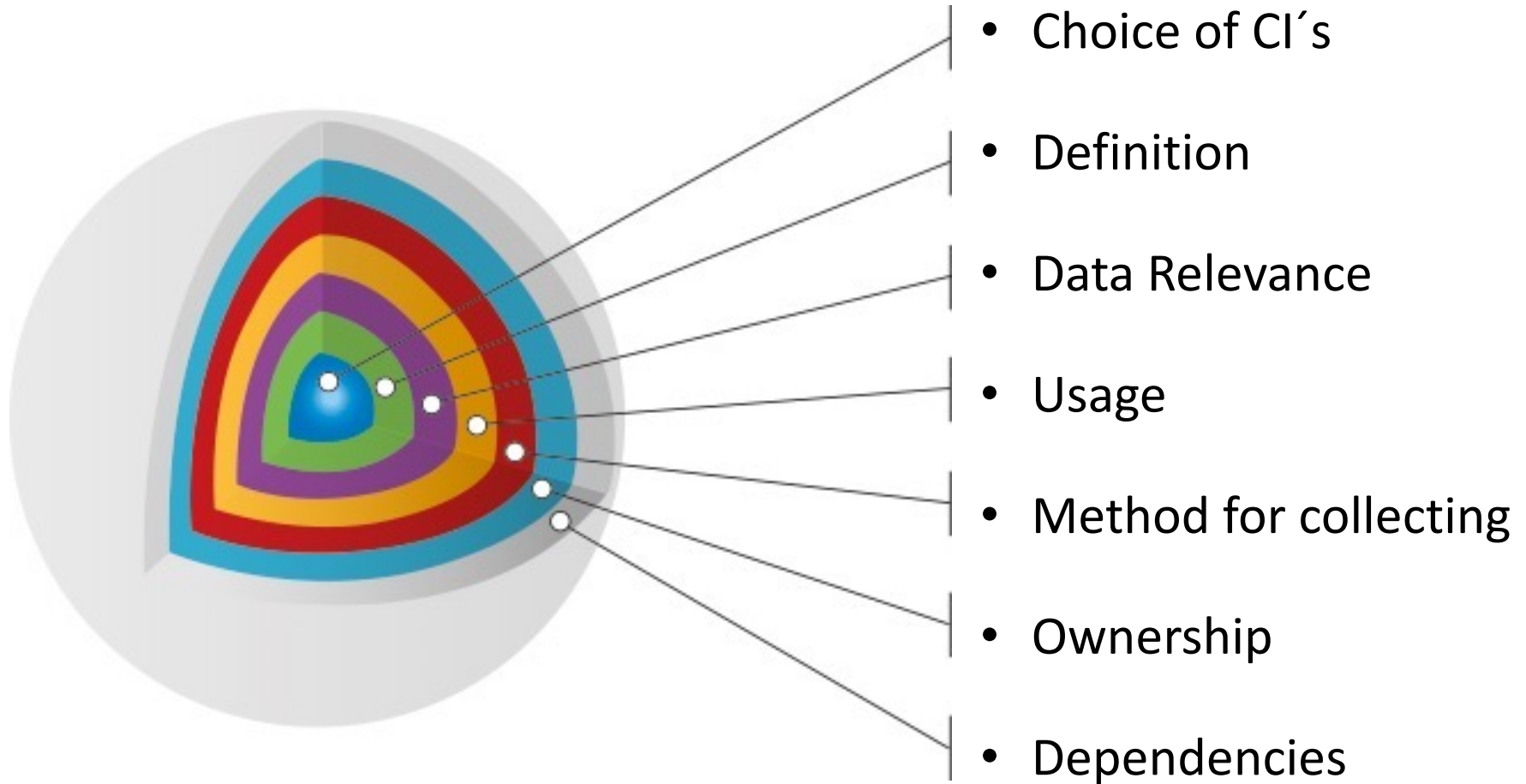
Configuration Management Process

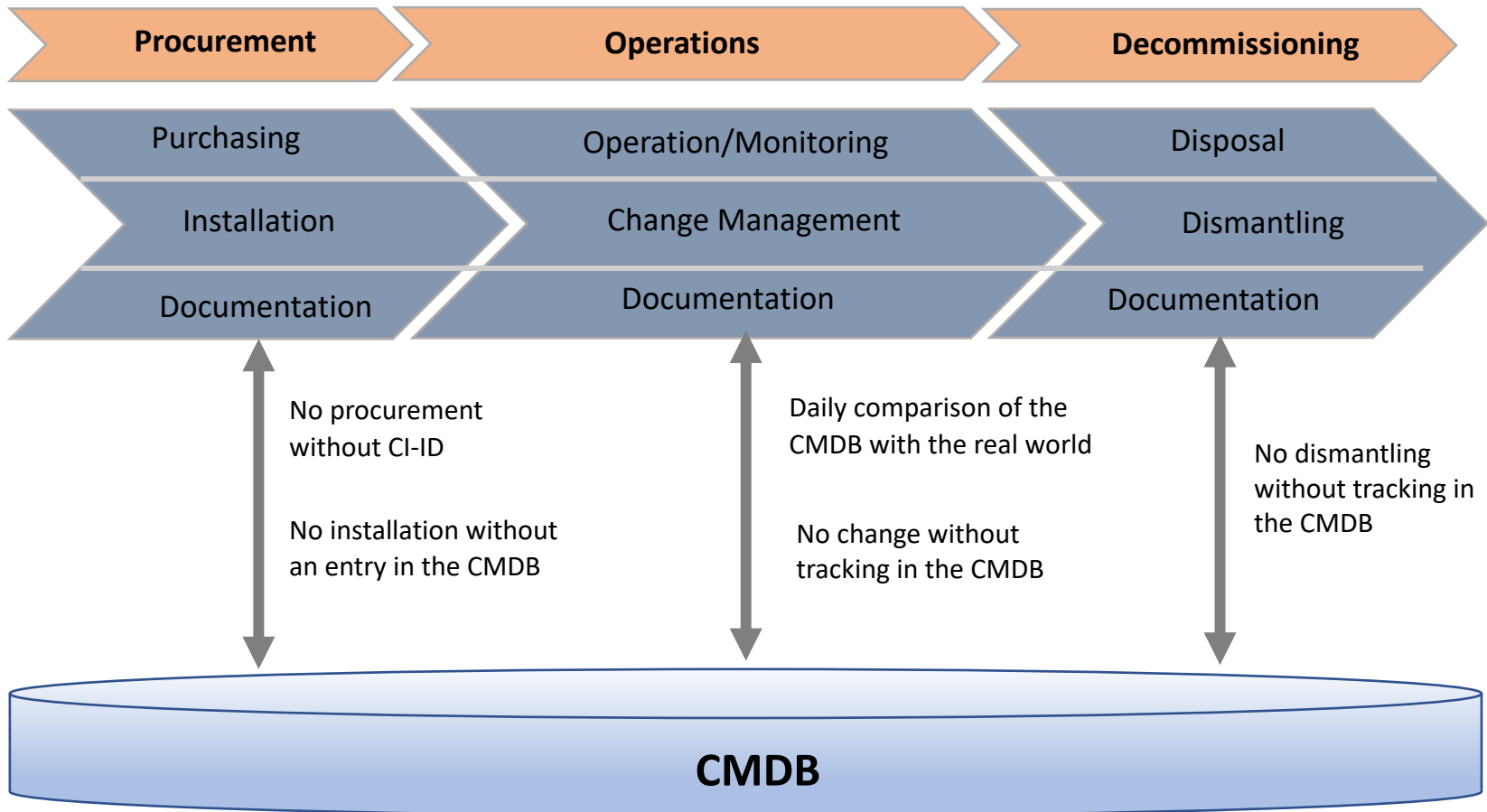


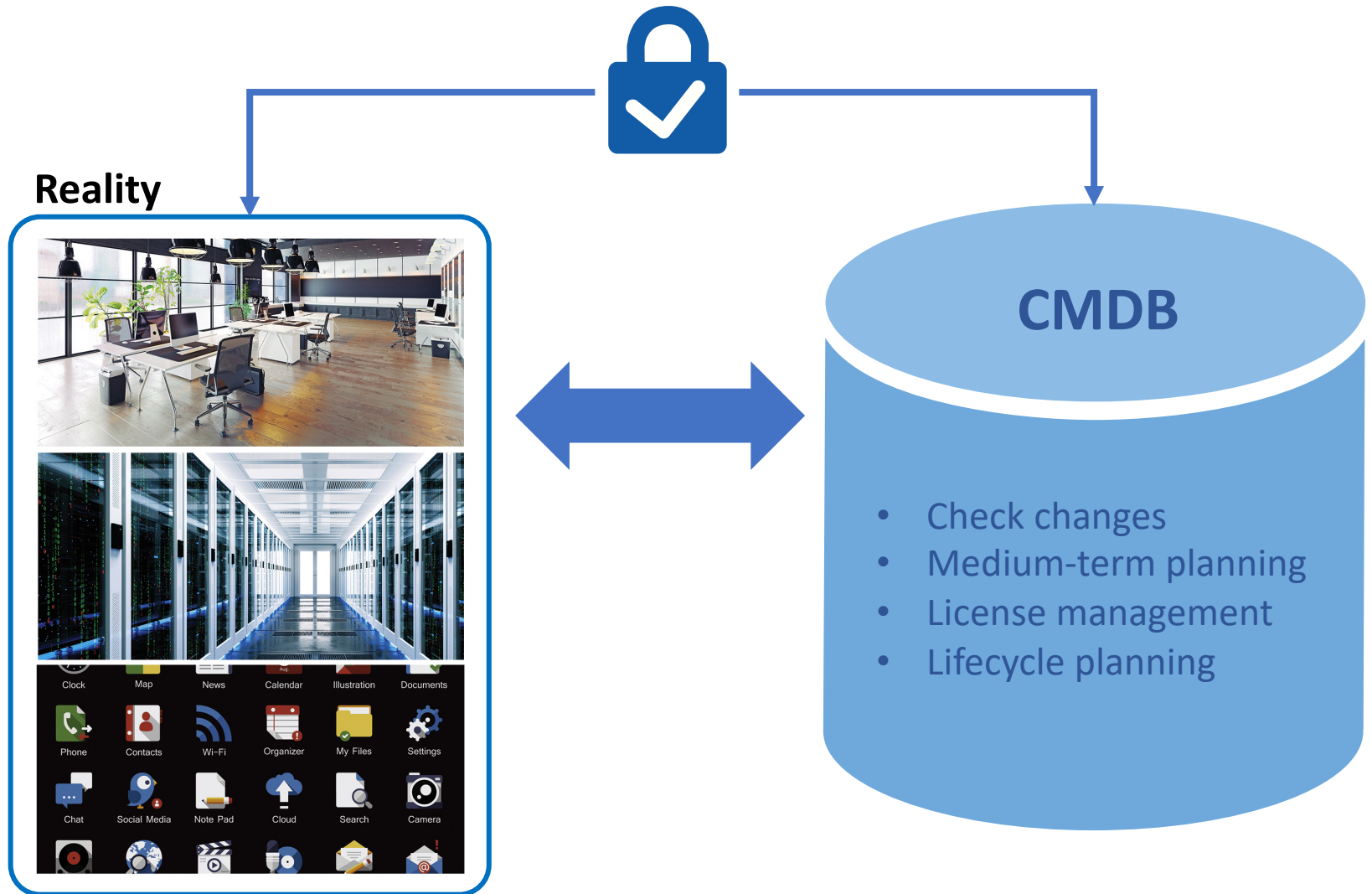
Example

-  Hardware Asset
-  Workplace Asset
-  Employee Asset
-  Service
-  Product
-  Manufacturer
-  Cluster
-  Asset Role
-  Operating System Asset
-  Software Asset
-  Database Asset

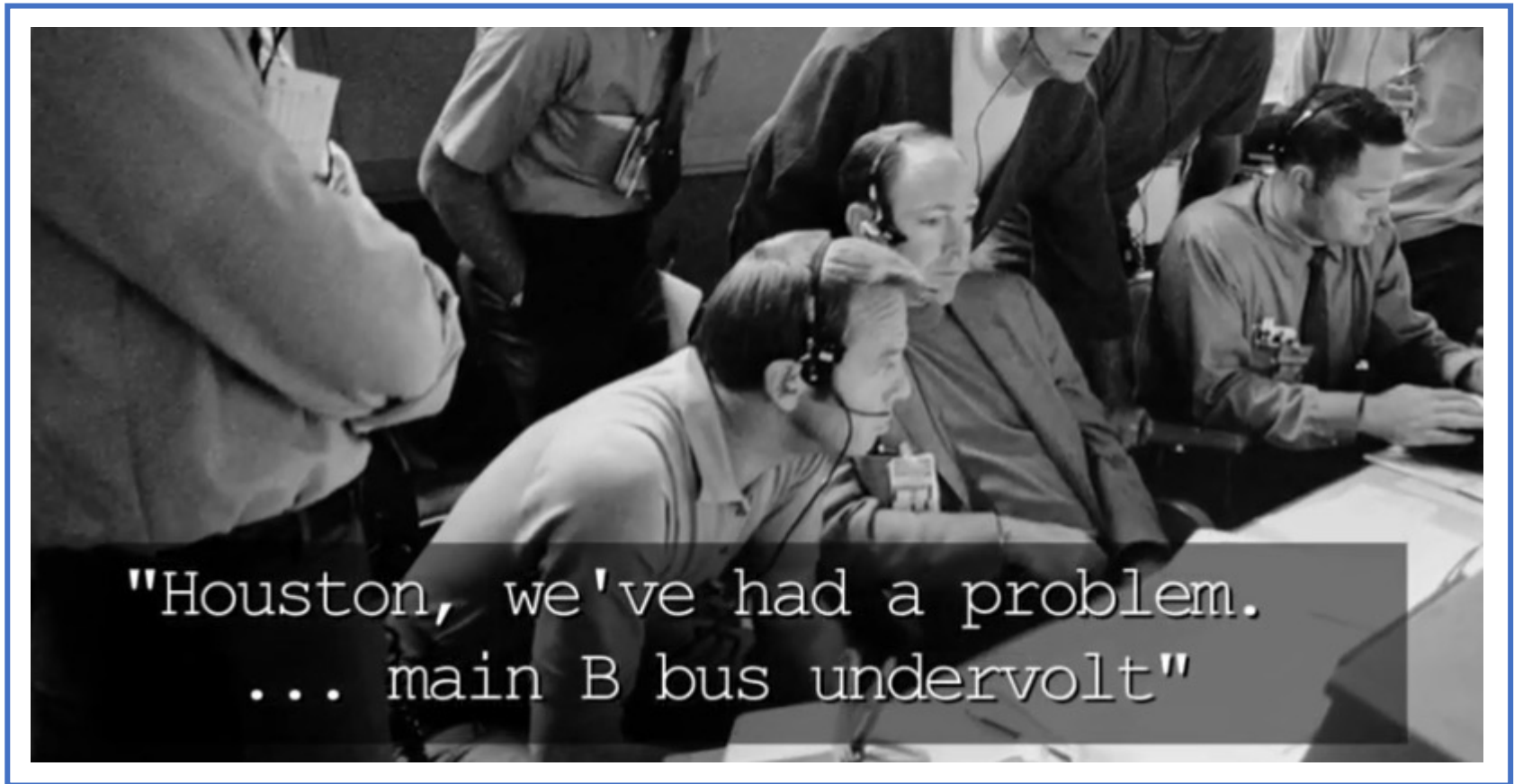
Nr	Task	Workflow	Assets
1	Purchasing	B	
2	Delivery (Hardware-ready)	L Decision: only HW? ja/nein	
3	Staging (OS-Ready)	Decision: Virtual? ja/nein S	
4	Installation (Application-Ready)	I	
5	Moves (Workplace, Server)	M	
6	Update Software	U	
7	Decommissioning	D	
8	Disposal	E	



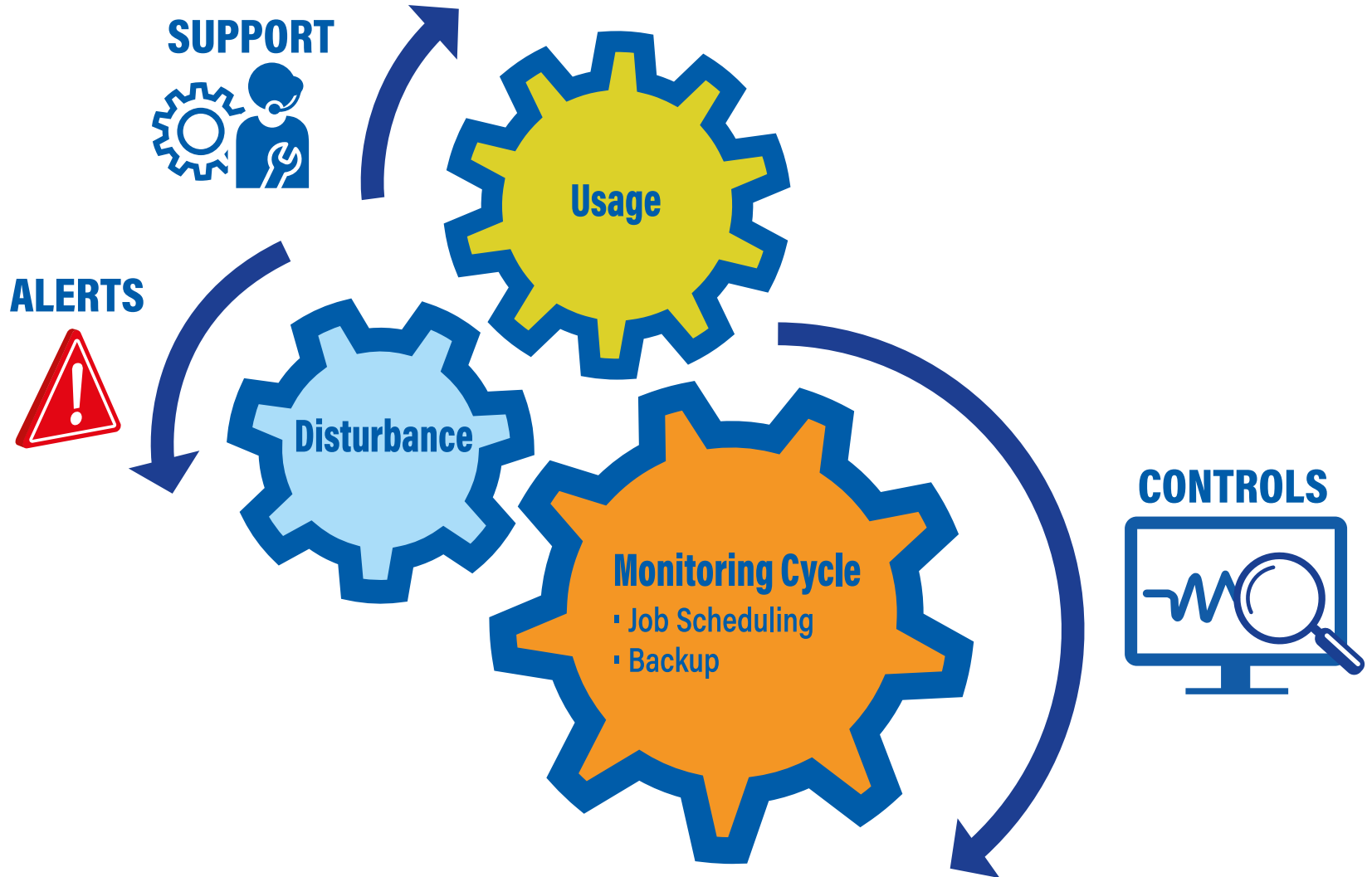




"Houston, we've had a problem"



HOUSTON, Texas -- It was April 13, 1970, that the now famous words were spoken from Apollo 13, "Houston, we've had a problem."





Support Level 0: Self Service & User-Retrieved Information

- Documentation (FAQ: Frequently Asked Questions) + Training
- Key Users may provide support

Support Level 1: Service Desk

- Password resets
- Infrastructure degradation
- Simple Operating System errors



Support Level 2: Advanced Support

- Complex problems derived from possible issues with servers or hardware that a level 1 specialist cannot solve like system performance
- Back-end issues only solvable with a sizable knowledge of the company's ins and outs in terms of software, hardware, and network functioning



Support Level 3: Expert / External Support



Elementary monitoring activities



Server Monitoring

Ensure peak performance for your server infrastructure. No more late nights or weekend emergencies.



Application Monitoring

Detect scalability issues, resource hogs or other performance-related issues and fix them proactively.



Network Monitoring

Gain visibility into your entire network and discover hidden issues impacting the performance of your network.



Cloud Monitoring

Track workloads, bottlenecks, availability and performance for your public, private or hybrid cloud infrastructure.



Storage Monitoring

Prevent running out of capacity or equipment failure by monitoring the hardware and software aspects of your storage systems.



Database Monitoring

Monitor database directly on the servers they run or from the outside. Use preconfigured thresholds for minimal setup time.



Environment Monitoring

Prevent downtime of your hardware by keeping track of all potential hazards in your IT rooms and data centers.



Container Monitoring

Get reliable insights into your container and container orchestration platforms' performance and resource usage.

Identify trends based on historical data



Define alerts based on rules



example.com:443_http... - Settings

General

Thresholds

Alert Rules

Aggregation Methods

Share Module

Alert Rules

Alert rules define how and who should be alerted in case of failures.

[Add Alert Rule](#)

Alert	Alert Upon	Conti...	Alert ...		
All Contacts	If for 1 consecuti...	Off	On	●	
Demo Email2	If for 5 consecuti...	Off	On	●	

example.com:443_https@demo_linux - New Alert Rule

Send alert to:

Alert upon monitor's condition changed to:

Alert when fixed ?

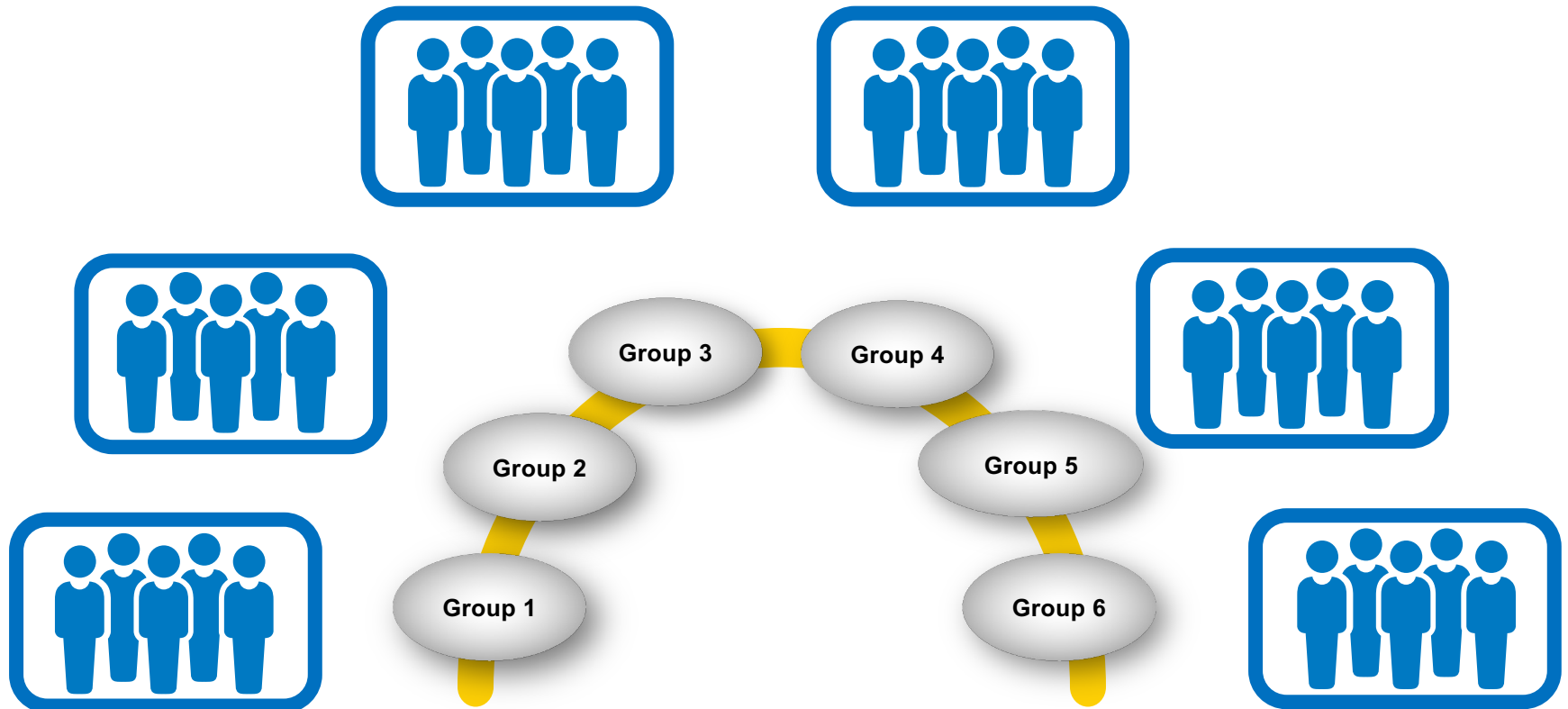
Receive continuous alerts ?

[Show advanced options...](#)



Define monitoring alerts for

1. Network
2. A Mobile Application
3. A Server
4. A SIEM functionality
5. A Corporate Application
6. Storage

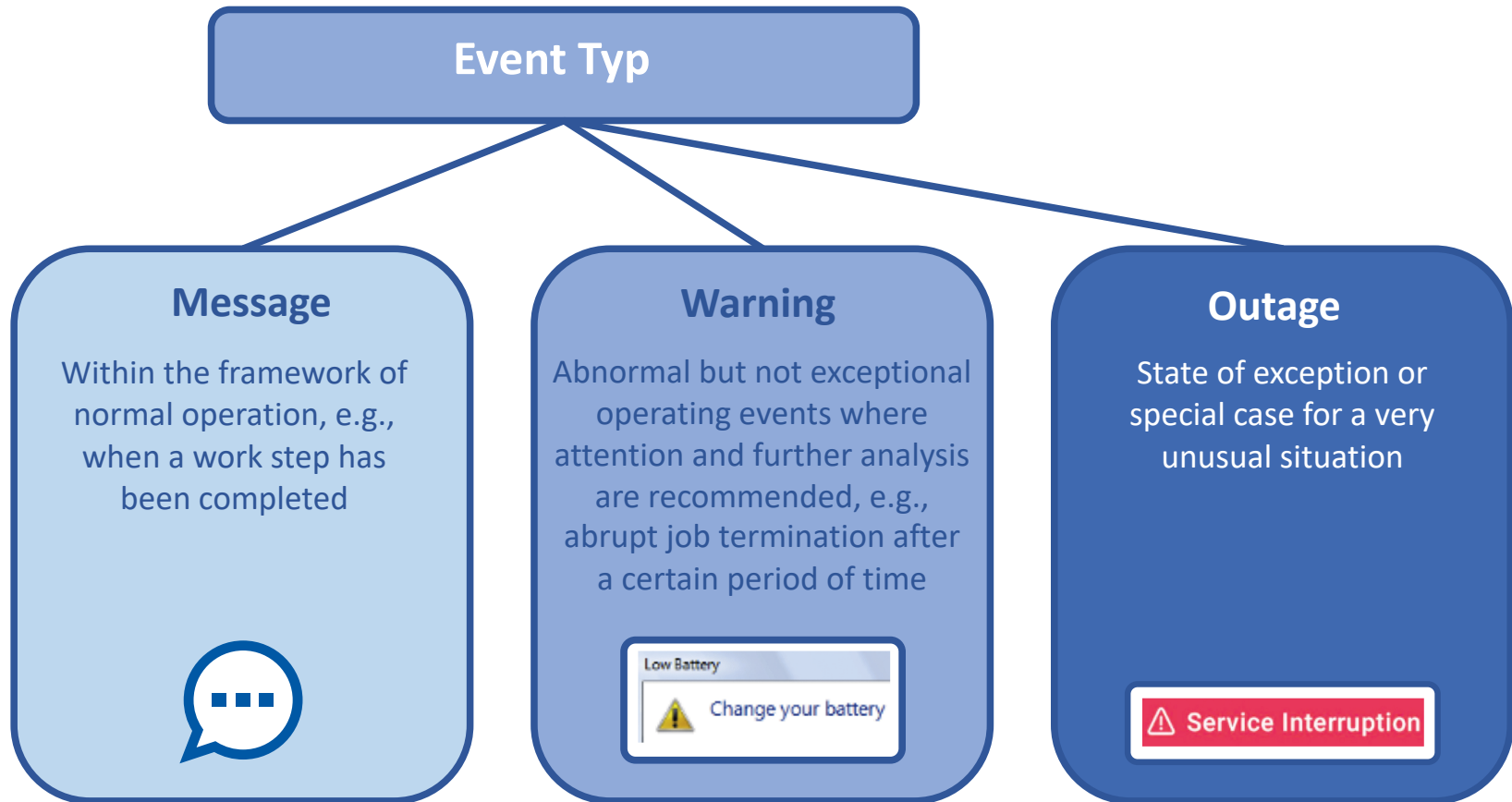


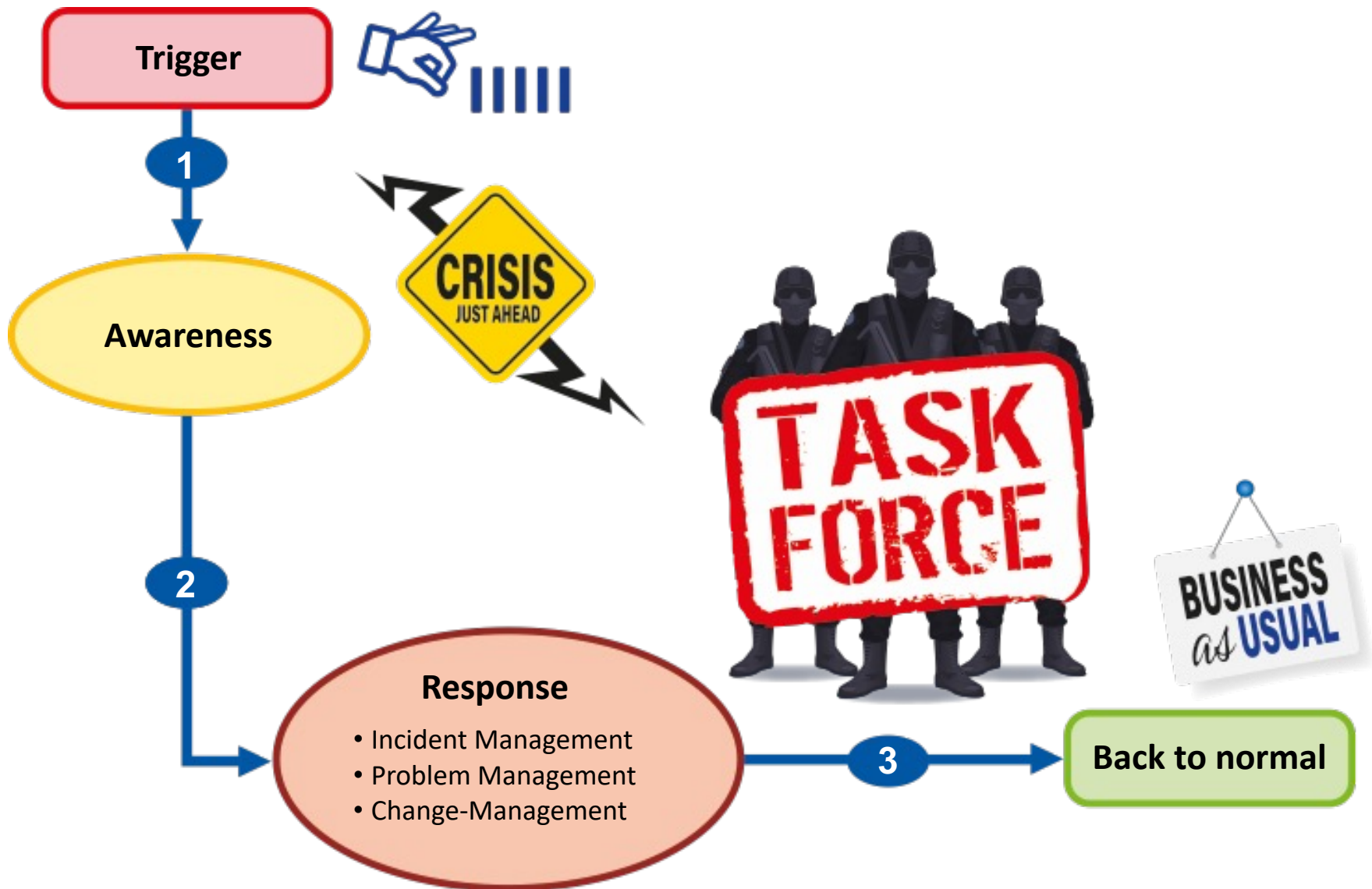


1. Plan and configure alerts that work for you
2. Set Priorities! Classify your systems based on importance
3. Never allow a single point of failure
4. Know your audience
5. Test your monitoring tool and alert system
6. Never set up an email filter for your alerts
7. If everything is quiet, something is wrong...
8. Create a process for how alerts are resolved
9. Ask for help
10. Document everything



Event: relevant occurrence or event for the management of the IT infrastructure







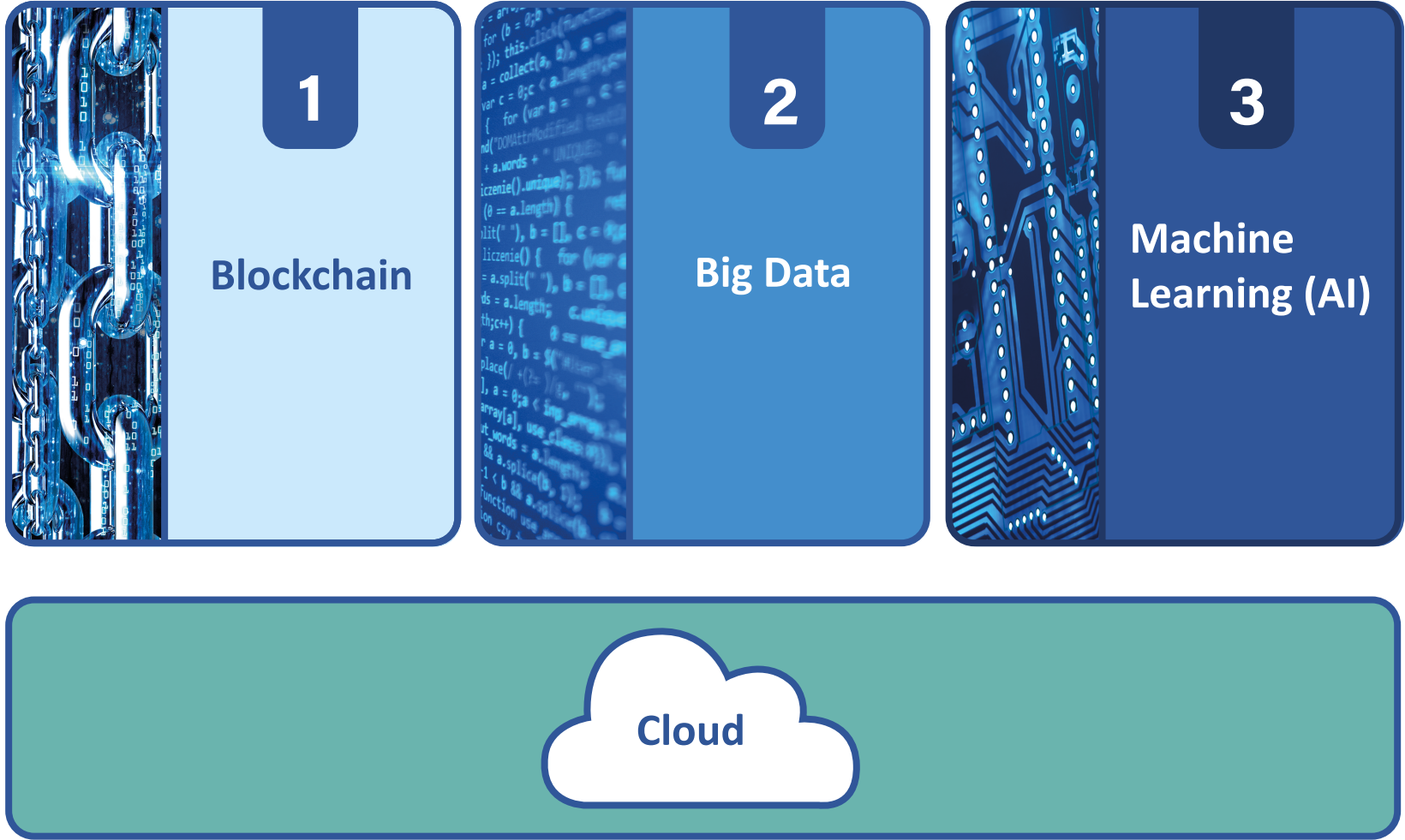
Normal Change

**OUR WEBSITE
HAS CHANGED**

Standard Change



Emergency





Expectations

- **Smart contracts**
store, verify, and execute code on a blockchain
- **High-performance**
due to the decentralized nature of blockchain
- **File storage**
More efficient download protocol
- **Communication**
New standards for communication between blockchain-based applications



Current Situation

- **No evidence**
- **Specific Knowledge**
- **No proven technology**





Expectations

- **SIEM for incident detection and response**

Big data may improve the incident detection rates by being able to collect much more data and crunch it to find the patterns of attacks within it

- **IT Operations Analytics (ITOA)**

eradicate traditional data siloes using Big Data principles, especially for Root Cause Analysis, Proactive Control of Service Performance and Availability, Problem Resolution, Service Impact Analysis, Dynamically Baselines Threshold



Current Situation

- Use of very large data
- Results may be difficult to analyze and interpret due to the high level of changes
- Specific competencies required

- Maybe for larger organizations





Expectations

- **Diagnostic**

For anomaly detection, event correlation and root cause analysis

- **Predictive Failure Analysis**

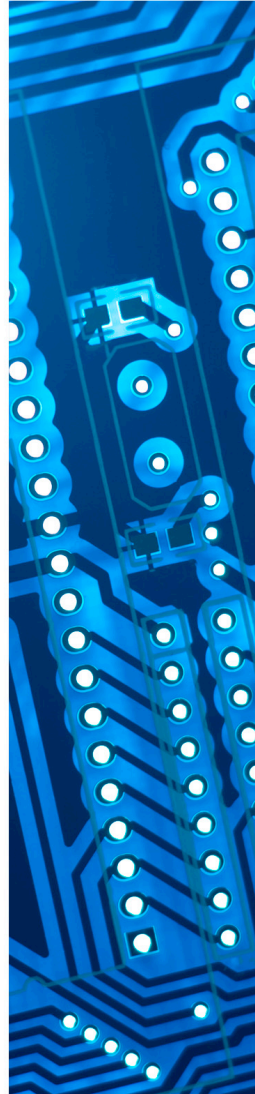
- **Intelligent Automation**

- **Chat bot**

Good acceptance by users

Use of different languages

History is saved and available



Current Situation

- **Need of a large data range**
- **Time needed to be put in place**
- **Difficult to small organizations with a specific IT production landscape**

- **Maybe for larger organizations**





Cloud automation

use of automated tools and processes to execute workflows that would otherwise have to be performed manually by your engineers, like configuring servers or setting up a network

Application deployment

automatically handling the application deployment process, which can be a time-consuming task if performed by hand. Public cloud vendors themselves also offer automated application deployment solutions

Data discovery and classification

automated discovery and classification of data in the cloud and possibility to identify situations where data is improperly secured; for instance, they could alert admins to an AWS S3 bucket that contains private address data and can be accessed by anyone on the Internet

Monitoring and remediation

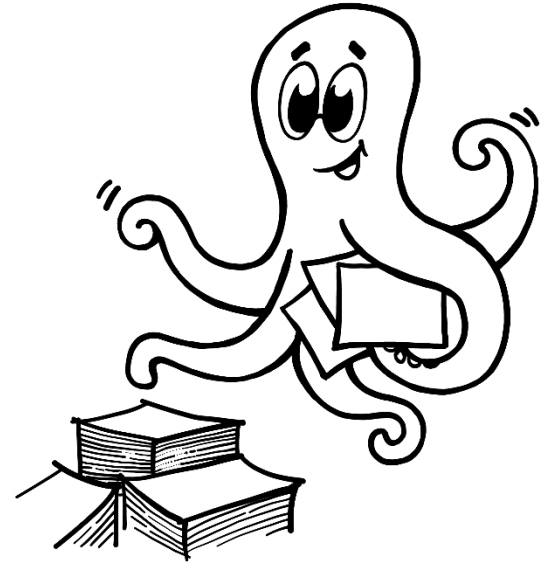
built-in monitoring solutions, such as AWS CloudWatch, that automatically collect metrics and allow to configure alerts that will be triggered when certain predefined thresholds are met, such as a cloud server running out of memory or a cloud database that has become unresponsive

NoOps -> Maybe one day!





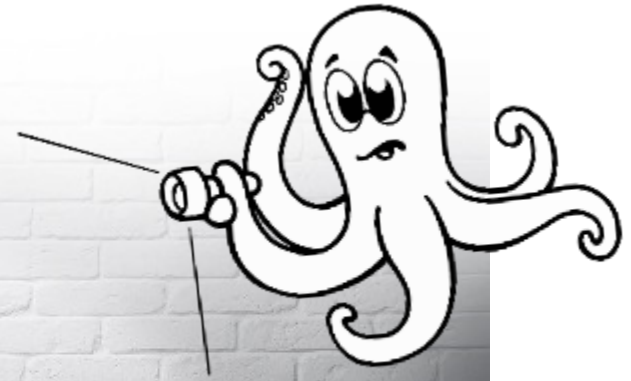
- Understand the complexity of IT systems
- Understand what a CMDB is and the use of it
- Define Configuration Items
- Define relevant alerts by disturbance





- Nadin Ebel (2008) ITIL V3-Basiswissen, Addison-Wesley
- Donna Scott, Jay E. Pultz, Ed Holub, Thomas J. Bittman, Paul McGuckin (2007), Introducing the Gartner IT Infrastructure and Operations Maturity Model. Gartner Research





Some CIs and their Attributes



Field Name	Discoverable	Status "ordered"	Status "ready delivery"	Status "productive"	Field Type	Field Content
Node name/Host name	X			C	Field	
Function				C	Text	• Short description
Type				C	Field	• Virtual • Physical
IP Address(es)	X			C	Field	• IP-Address fields
Product	X	C	C	C	List	<ul style="list-style-type: none"> • Manufacturer Name • Manufacturer ID • Model No. • Device name • CPU • RAM • Local disk capacity • Network card(s) • SAN connection
Manufacturer	X	C	C	C	List	
Supplier		C	C	C	List	
Delivery Date			C	C	Field	
Purchasing Price		C	C	C	Field	• Purchase value/purchase price
End of Guarantee		C	C	C	Field	• Date Guarantee End
Maintenance contract						• Link to Supply Management
Location			C	C	List	
Building			C	C	List	
Room			C	C	List	
Rack-No.				C	List	
Lifecycle Status		C	C	C	List	
Max. Weight			C	C	Field	in kg
Height			C	C	Field	Height in m
Thermal output			C	C	Field	
Power consumption			C	C	Field	
Operating temperature			C	C	Field	



Field Name	Discoverable	Status "ordered"	Status stock "ready delivery"	Status "productive"	Field Type	Field Content
Node name/Host name	X			C	Field	
Function				C	Text	<ul style="list-style-type: none"> • Short description
IP Address(es)	X			C	Field	<ul style="list-style-type: none"> • IP-Address fields
Manufacturer	X	C	C	C	List	
Supplier		C	C	C	List	
Delivery Date			C	C	Field	
Purchasing Price		C	C	C	Field	<ul style="list-style-type: none"> • Purchase value/purchase price
End of Guarantee		C	C	C	Field	<ul style="list-style-type: none"> • Date Guarantee End
Maintenance contract						<ul style="list-style-type: none"> • Link to Supply Management
CPU	X					
RAM	X					
Disk capacity	X					
VLAN					Field	
Floor box					Field	
Lifecycle Status		C	C	C	List	
Max. Weight			C	C	Field	in kg
Height			C	C	Field	Height in m
Thermal output			C	C	Field	
Power consumption			C	C	Field	

C: to Complete



Field Name	Discoverable	Status "ordered"	Status "stock" Status "ready delivery"	Status "productive"	Field Type	Field Content
Node name/Host name	X			C	Field	
Function				C	Text	• Short description
IP Address(es)	X			C	Field	• IP-Address fields
User-ID	X			C	List	User code
First Name				C		
Last Name				C	List	
Account				C	List	
Manufacturer	X	C	C	C	List	
Supplier		C	C	C	List	
Delivery Date			C	C	Field	
Purchasing Price		C	C	C	Field	• Purchase value/purchase price
End of Guarantee		C	C	C	Field	• Date Guarantee End
Network Card	X					
WWAN	X					
WWAN IMEI						
CPU	X					
RAM	X					
Disk capacity	X					
VLAN					Field	
Max. Weight			C	C	Field	in kg
Thermal output			C	C	Field	
Power consumption			C	C	Field	



Field Name	Discoverable	Status "ordered"	Status stock" Status "ready delivery"	Status "productive"	Field Type	Field Content
Asset PIN			C	C	Field	
Product	X	C	C	C	List	<ul style="list-style-type: none"> • Manufacturer Name • Manufacturer ID • Model No. • Device name
Manufacturer		C	C	C	List	
Supplier		C	C	C	List	
Delivery Date			C	C	Field	
Purchasing Price		C	C	C	Field	
End of Guarantee		C	C	C	Field	
User-ID				C	List	
First Name				C	List	
Last Name				C	List	
Phone Number			C	C	Field	
PIN 1			C	C	Field	
PUK 1			C	C	Field	
Activating Date			C		Field	
Cancelling of Contract			C		Field	

C: to Complete



Field Name	Discoverable	Status "ordered"	Status stock "ready delivery"	Status "productive"	Field Type	Field Content
Product	C	C	C	C	Field	e.g. Adobe Reader 9
Version				C	Field	e.g. 12.0.6425.1000
Installation date				C	Field	
Installation location				C	Field	Fat/Citrix application
Installation source				C	Field	
Manufacturer				C	Field	
Supplier	C	C	C	C	Field	
Purchasing Info	C	C	C	C	Field	date/price/assurance
Business Owner	C	C	C	C	Field	
S/N Number				C	Field	
Product Key				C	Field	
Licence Type				C	Field	Single, concurrent, agreement,...
Kind of installation				C	Field	Image, manual, installation, SW package, SW package snapshot, SW package silent, link,...
Lifecycle Status	C	C	C	C	List	Ordered, on stock / ready delivery, engineering, testing, productive, end of life
SW Responsible	C	C	C	C	Field	

C: to Complete



KNOWLEDGE