



Context-aware Services for UMTS-Networks*

* This project is partly financed by the government of Bavaria.

Outline

- I. Properties of current context-aware architectures
- II. Challenges when trying to realize context-aware services in UMTS

Remark:

This talk will give an overview over the problems we see when trying to realize context-aware services in UMTS-networks.
Not all of them will necessarily be addressed within the project!

I. Properties of current context-aware architectures

- **Scenario spans only one domain**
 - No roaming
 - Application owner has in general full control over and complete knowledge of the sensors
 - Accounting and privacy are no issues
- **Limited scope (regional scope, complexity)**
 - Resource discovery is often relatively easy (sometimes a central component manages the sensors)
 - Limited scenario = limited storage requirements (system can have one policy which historical context to store)
- **Service tailored to a specific scenario**
 - Interoperability is automatically given (common protocols, common semantics)
 - Sensors are already known in design-time
 - no customization resp. personalization necessary

What are the challenges
when trying to realize
context-aware services
in UMTS-Networks?

II. Challenges

1. Multiple Players in Value Chain

Value Chain of Context-Awareness:



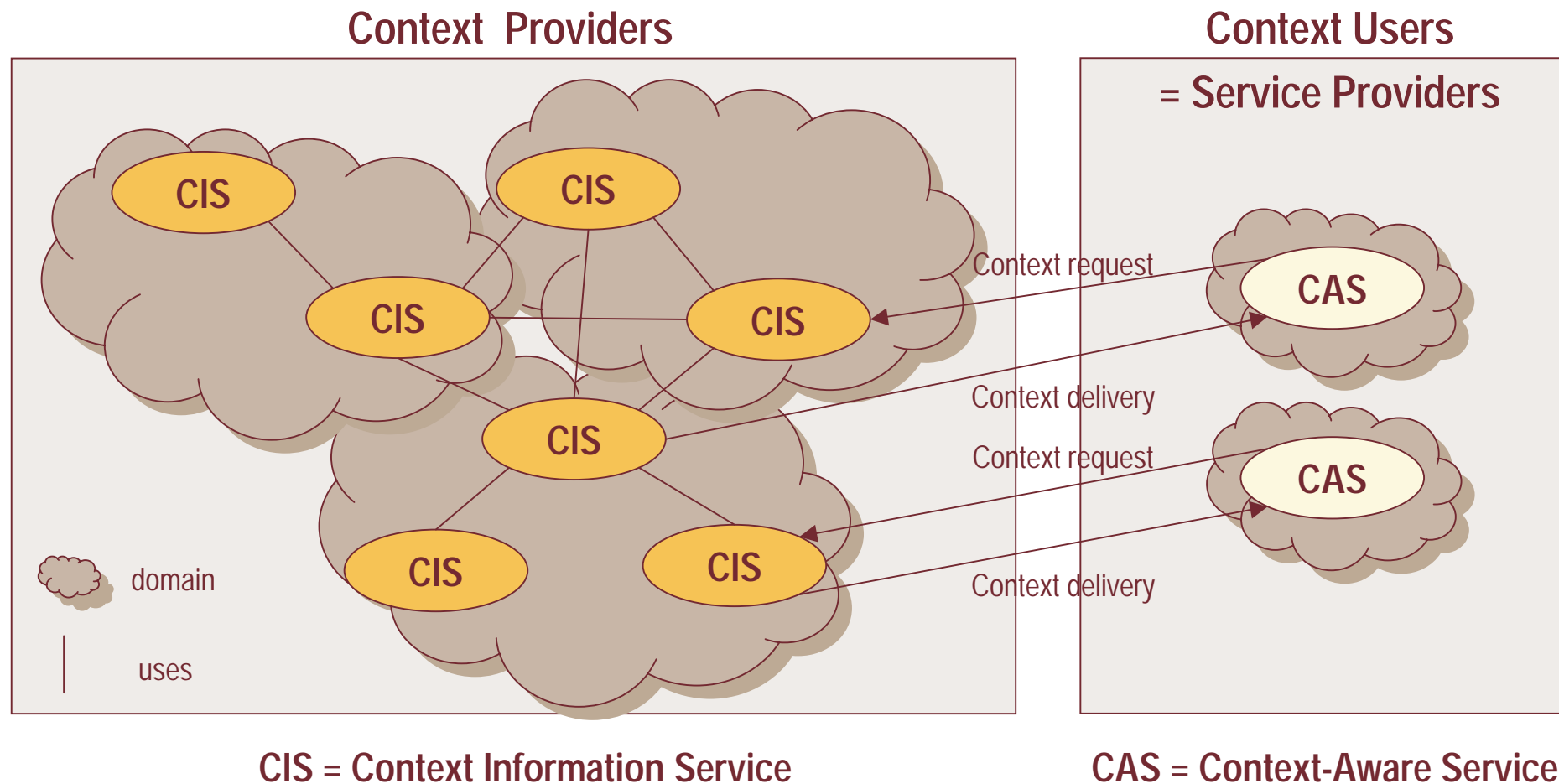
Operators of context-aware services will often not be able to create the complete required context information on their own →

- Decoupling of service provisioning and context provisioning
- New business role: Context Provider?
- Architecture is overlaid with business model
- Accounting and privacy become important issues
- The context information receiver must be able to assess the quality of the context information
→ Quality of Context Parameters are needed

II. Challenges

1. Multiple Players in Value Chain

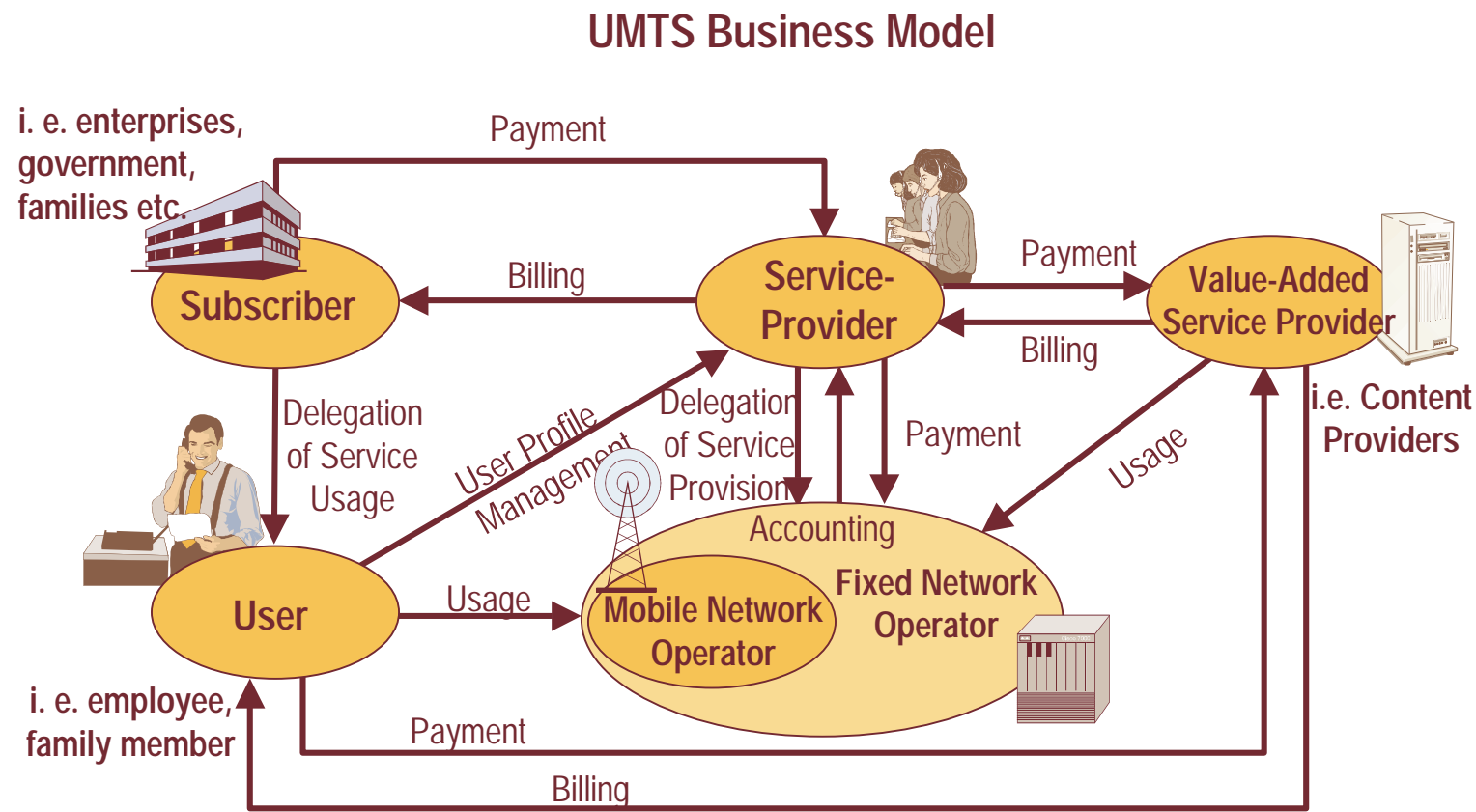
What could the cooperation between context providers and context users look like?



II. Challenges

1. Multiple Players in Value Chain

Who will own and offer context information?



Additional Options

??

Context
Provider

Sensor
Network
Operator

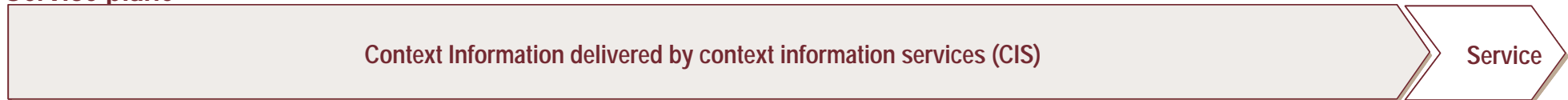
Profile
Repository

II. Challenges

1. Multiple Players in Value Chain

The described high-level cooperation model and the value chain need to be mapped on lower, technical planes:

Service plane



Descriptive plane



Component plane



Physical plane



II. Challenges

2. Scaling Problems

The plethora of service and context offers makes the coordination between the parties difficult →

Resource discovery is a problem:

- Query routing vs. Yellow Pages
- How to describe context offers and queries?
- How to advertise services?

II. Challenges

3. Interoperability

In spite of heterogeneous, independent service and context providers, the parties must be able to communicate with each other →

Interoperability can only be provided through standardization:

Major problems are:

- Service description
- Context description (for query purposes)
- Context presentation (for transmission and interpretation purposes)

II. Challenges

4. Roaming

The users will be highly mobile →

- Roaming between different network operators must be permitted
- Service portability is necessary
- A seamless deployment of services must be possible, even if the user changes the communication device (the user becomes the communication end-point)

II. Challenges

5. Mass Customization

Context-aware services will be developed for a wide audience →

- Customization and Personalization will become an issue
- Diverse preferences
- Diverse handheld capabilities
- Diverse networks
- Diverse platforms

Thank you for your attention!

Any Questions?

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Underlying understanding of important terms (1)

- **Setting:** All possibly relevant entities and relations between them in semantic proximity to a reference entity
- **Context:** Part of the Setting that is relevant for the concrete use case
- **Context Information:** Interpreted, aggregated results of a measurement of the attributes of entities within the Context and the relations between these entities

Resulting Context Paradigm →

- Context is not just there, something „becomes“ context in light of a use case
- Context information is being *created, provided and used*
- Context information is relative to a „reference entity“
- Context information has a quality

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Underlying understanding of important terms (2)

- **Context Information Service (CIS):**

A CIS is a service that finds, measures, interprets and aggregates the relations between entities and the attributes of entities, that are relevant parts of the setting in light of the concrete use case, to supply the desired context information.

- **Context-Aware Service (CAS):**

A CAS is a service that possesses the ability to subscribe to a CIS, to use the CIS-results to trigger customized actions or adaptations, and to eventually unsubscribe from the CIS.