
Context- and Situation-Awareness in Information Logistics

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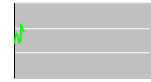
Fraunhofer Institute for
Software and Systems Engineering

March 2004

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From context to situations



situation-based information supply

- information logistics
- motivation

situation model

- context
- characteristics
- situations

reasoning about situations

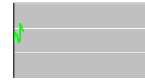
- aggregation levels
- operators

perspectives

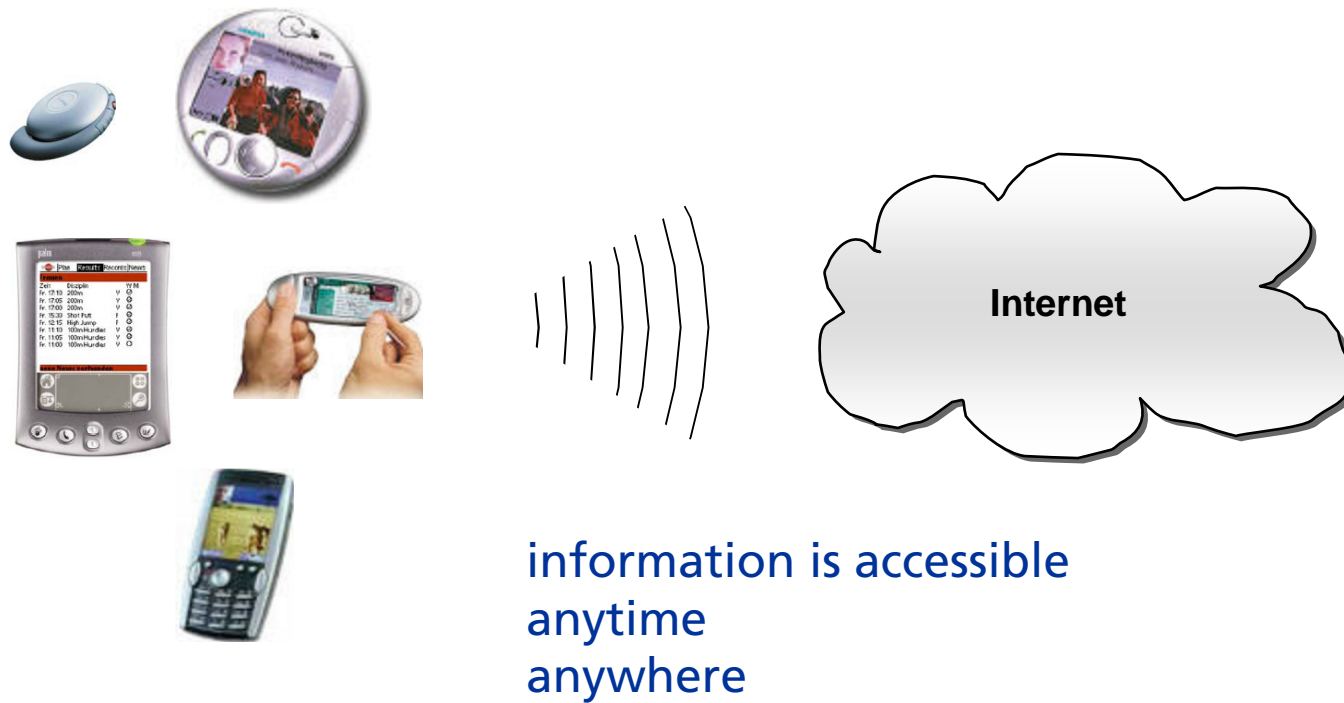
further research



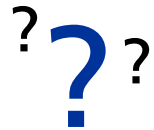
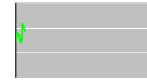
Situation-based information supply



ubiquitous computing



Situation-based information supply



Do we need every piece of information?
Do we need a piece of information anywhere?
Do we need a piece of information anytime?

information logistics

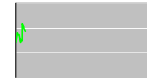
demand-driven, situation-aware
just-in-time information concept

ubiquitous computing +
situation-awareness

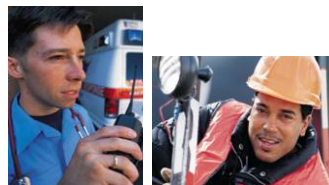
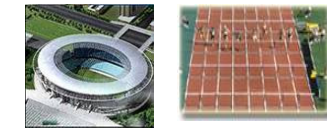
⇒ applicable model of the users environment!



FLAME 2008 - ILOG for the Olympic Games



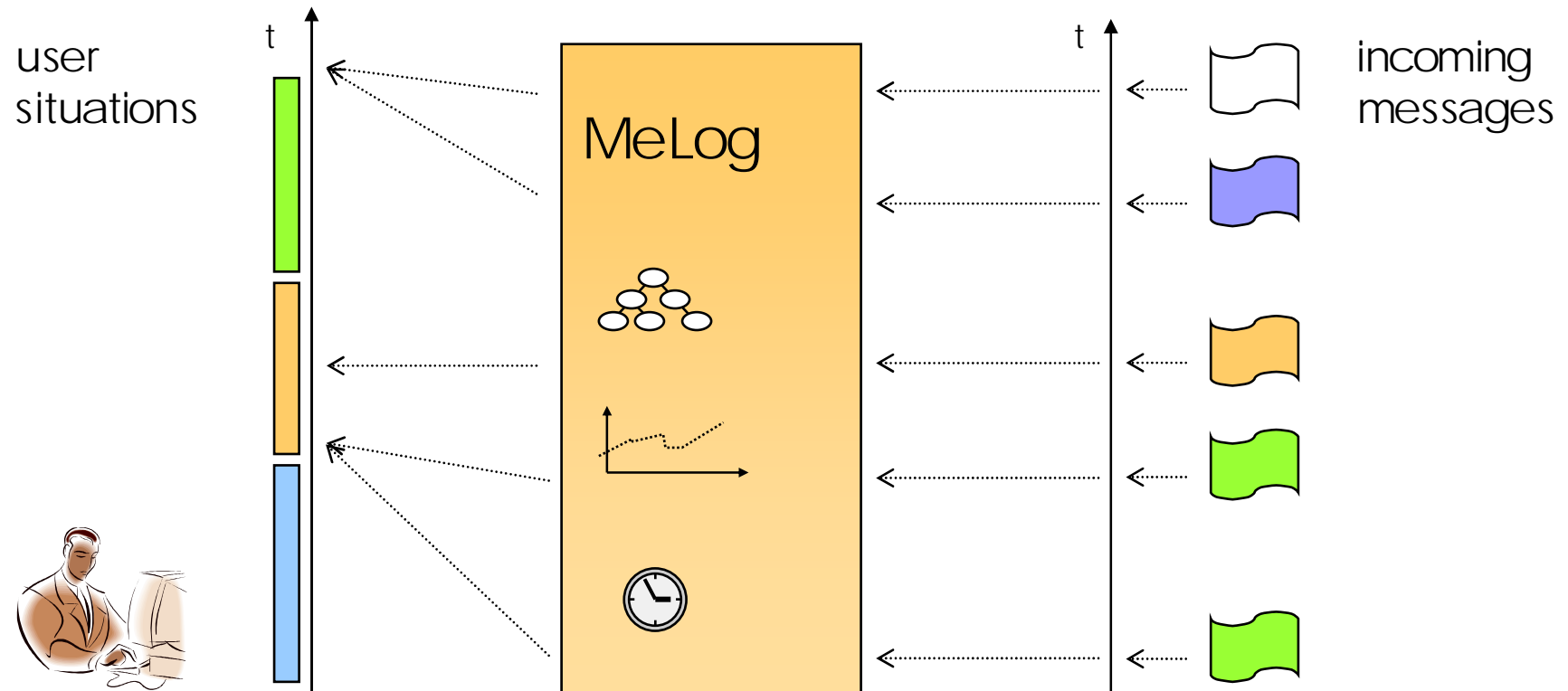
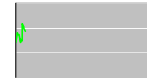
personalized, situation-aware
service supply



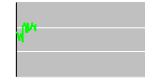
different user groups
different information services
different communication
technologies



MeLog: message logistics

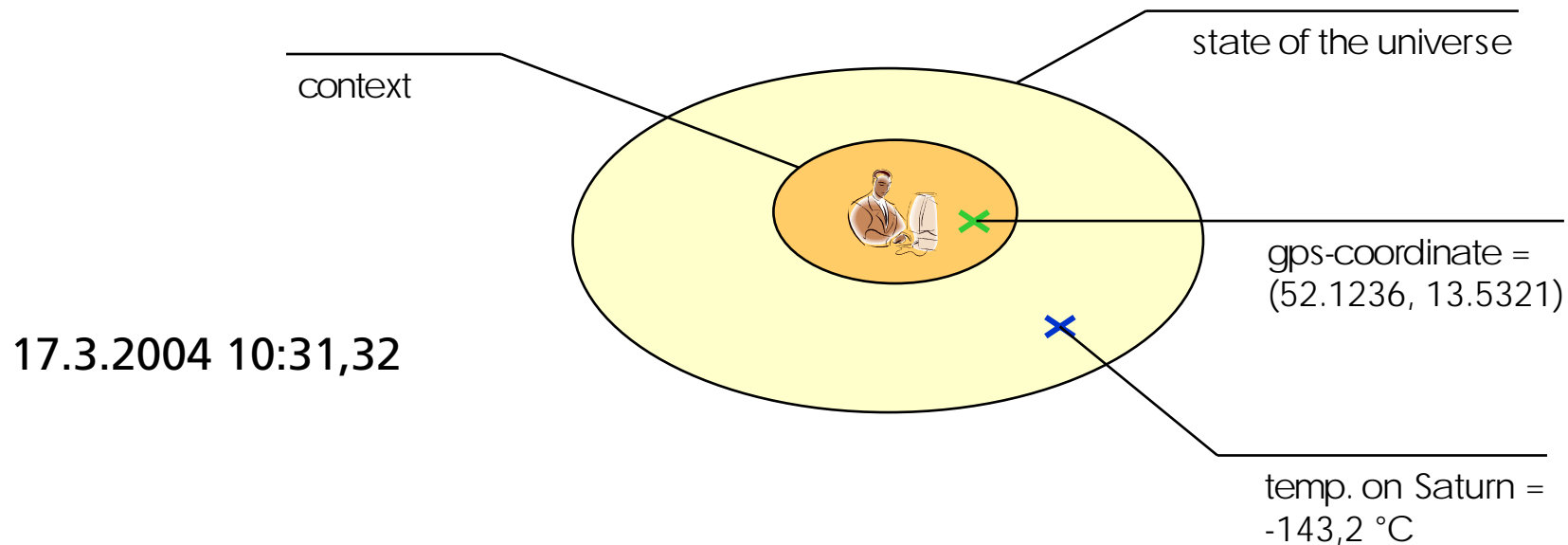


Modeling the user's environment



**context/
situation**

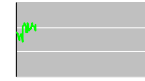
(subset of the) state of the universe
at an instant of time (cf. McCarthy, Dey)



context := values of all context variables



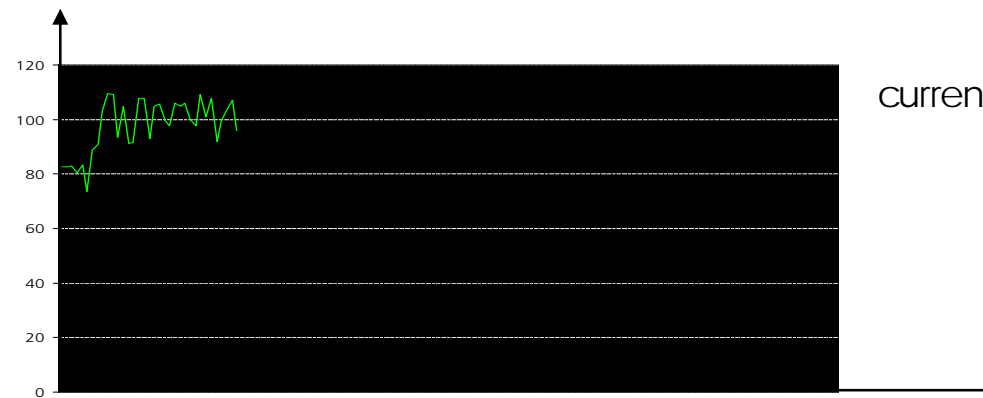
Context variables and sensors



variable

observable real world parameter
usually measured by sensors

heart rate



current value = **97** bpm

characteristic

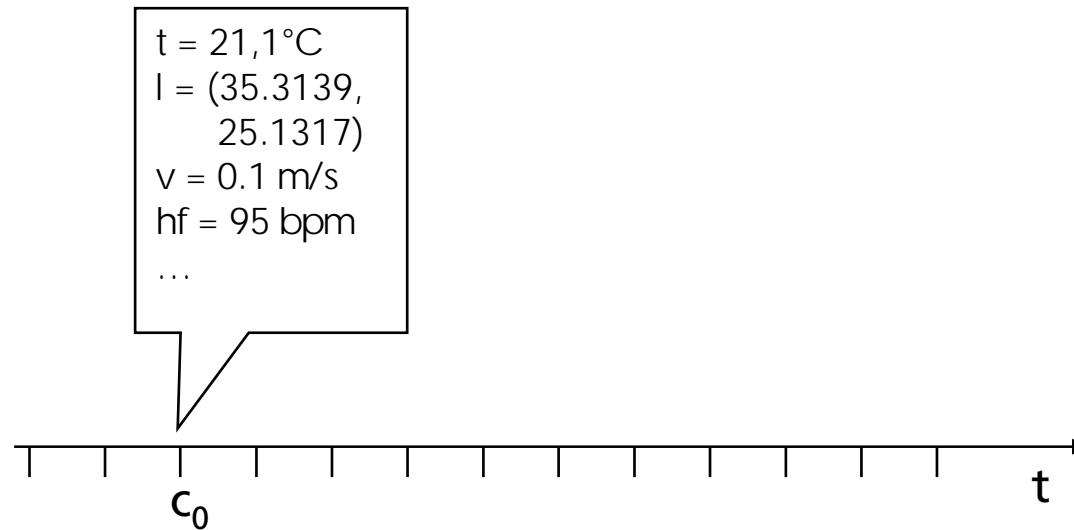
range = [90,110] bpm



Contexts and characteristics



**contexts are
snapshots**



**characteristic
features**

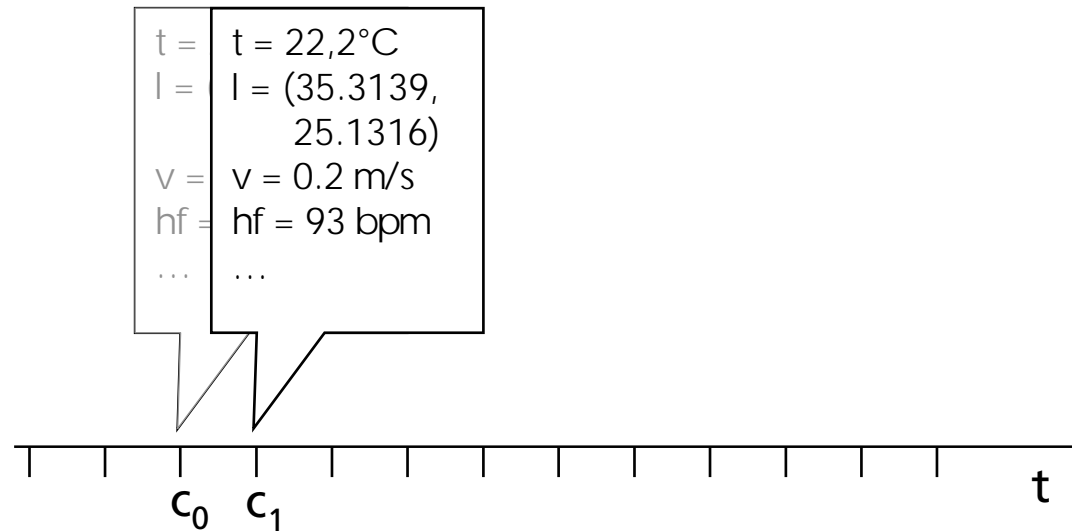
t_l (warm)
 loc (conf.-room)



Contexts and characteristics



contexts are snapshots



characteristic features

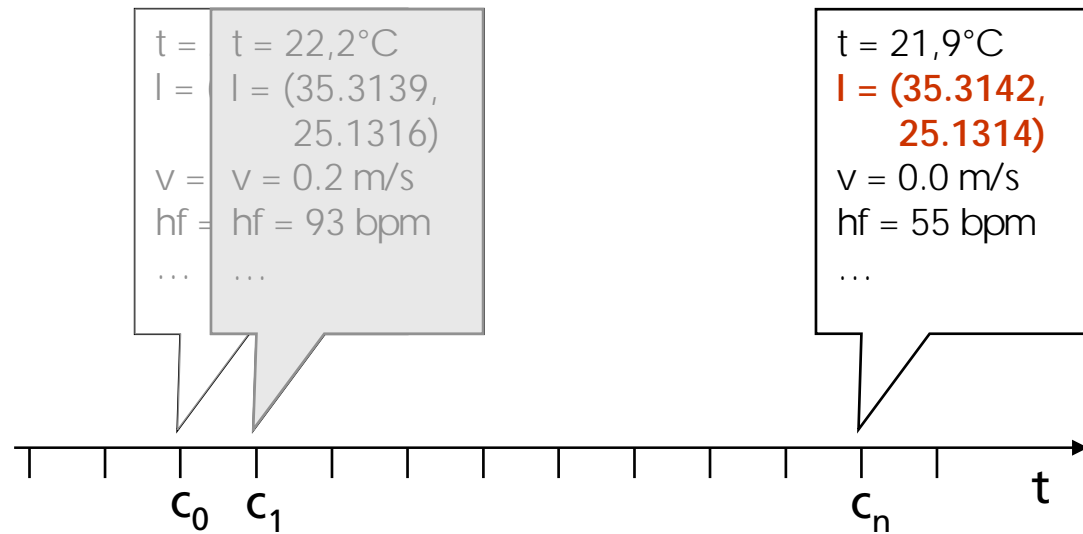
tl (warm)
loc (conf.-room)



Contexts and characteristics



contexts are snapshots



characteristic features

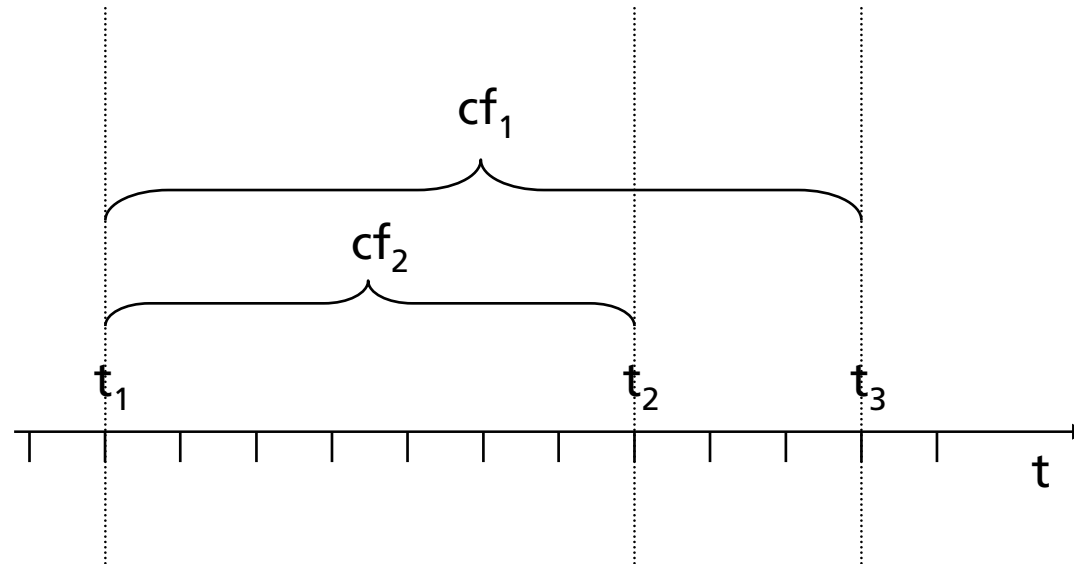
tl (warm)
loc (lounge)



Contexts sequences and situations



**context
sequences**



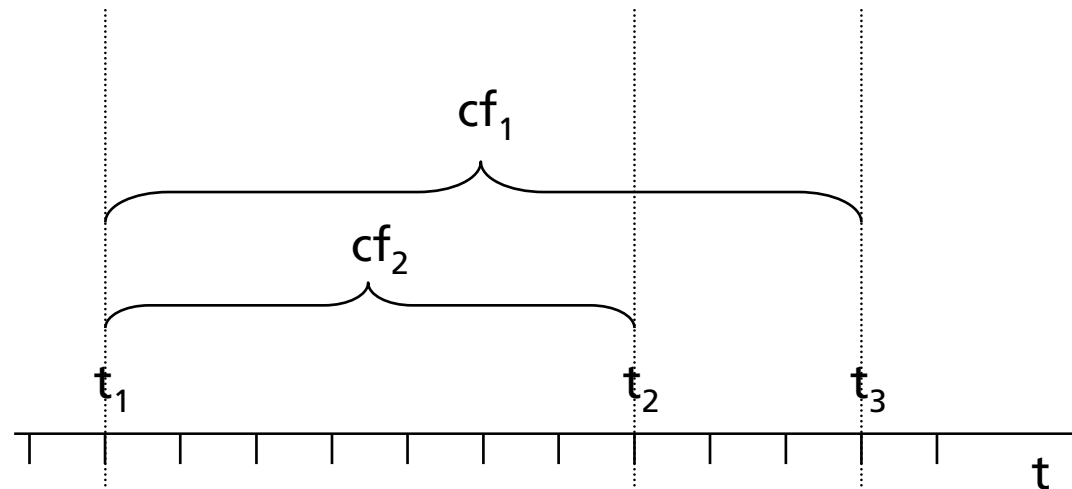
situations



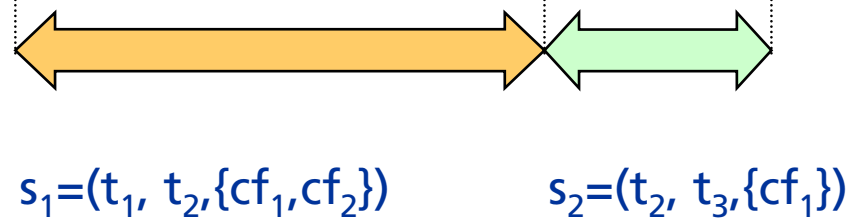
Contexts sequences and situations



**context
sequences**



situations



Modeling characteristics



dimensions

separate handling of characteristic features

examples

location,
movement,
action,
transportation,
communication, ...

location (conf.-room)
movement (slow)
action (talking)
transportation (none)

selection is application-specific

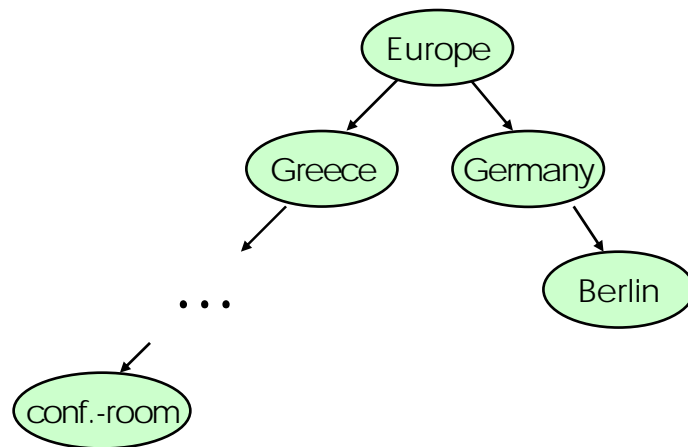


Dimension structures

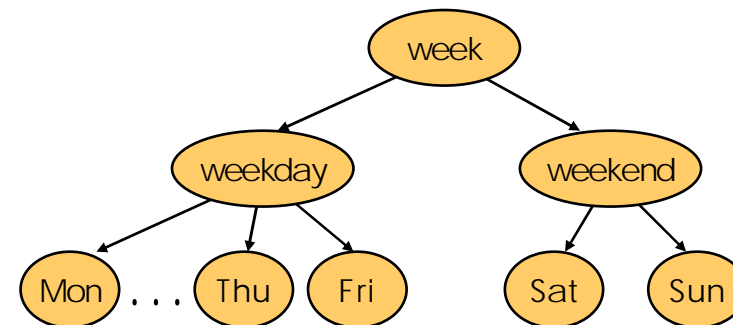


generalization/specialization

location taxonomy

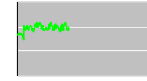


calendar taxonomy

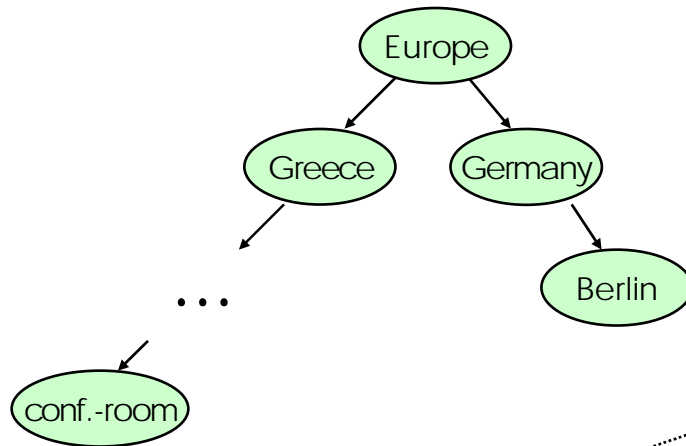


dimension := (predicate, dimension structure)

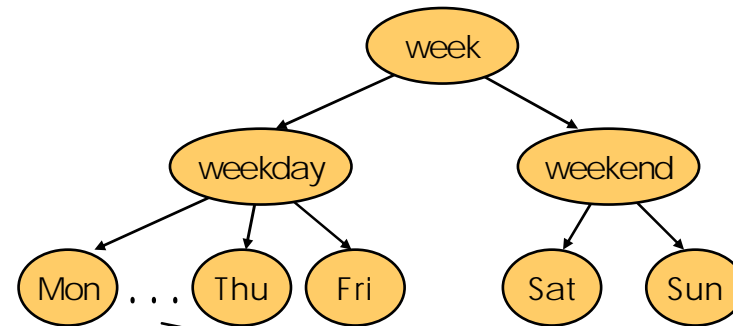
Modeling characteristics using dimension structures



location taxonomy



calendar taxonomy



location

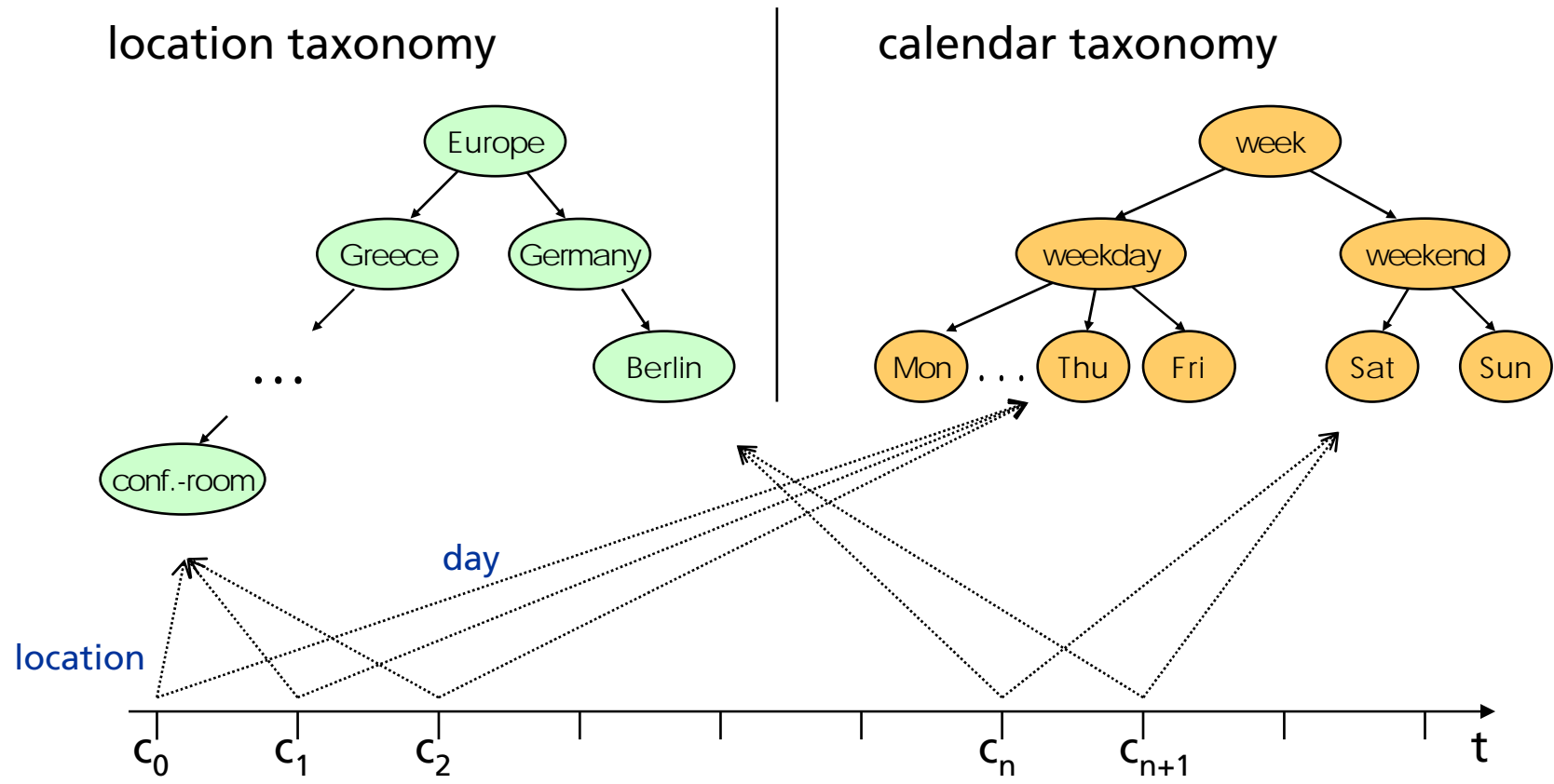
c_0

day

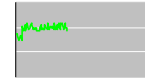
t



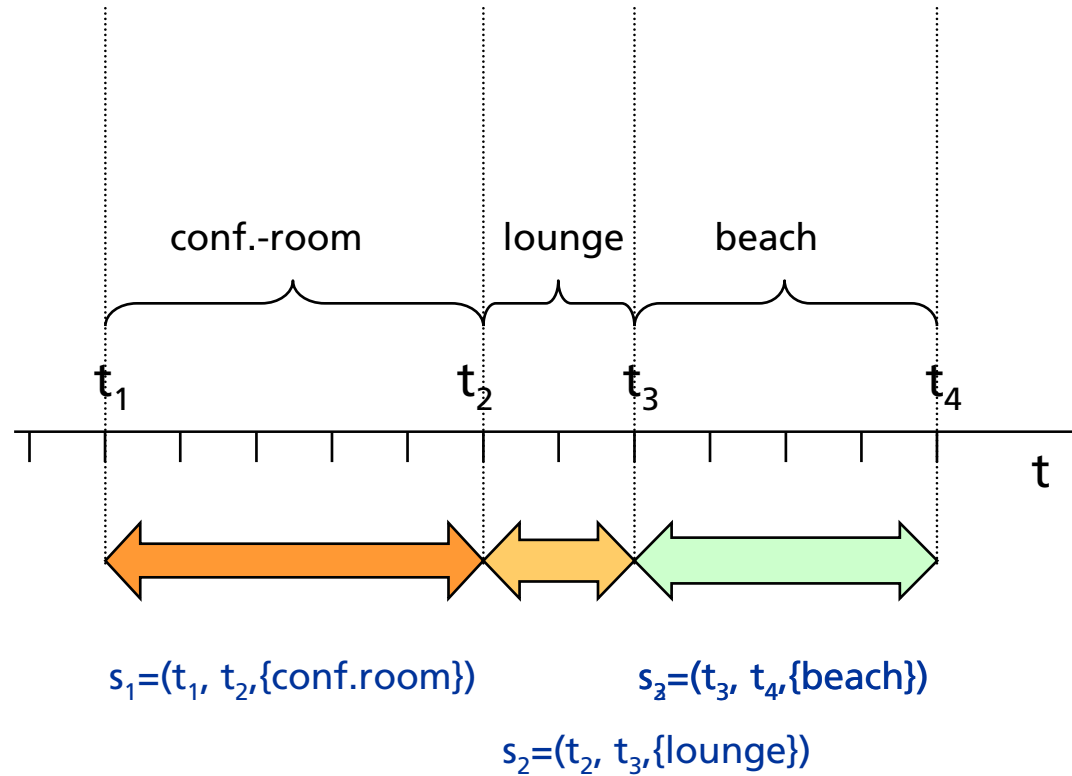
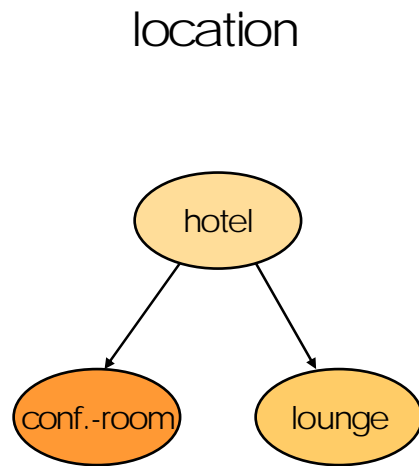
Modeling characteristics using dimension structures



Aggregation levels



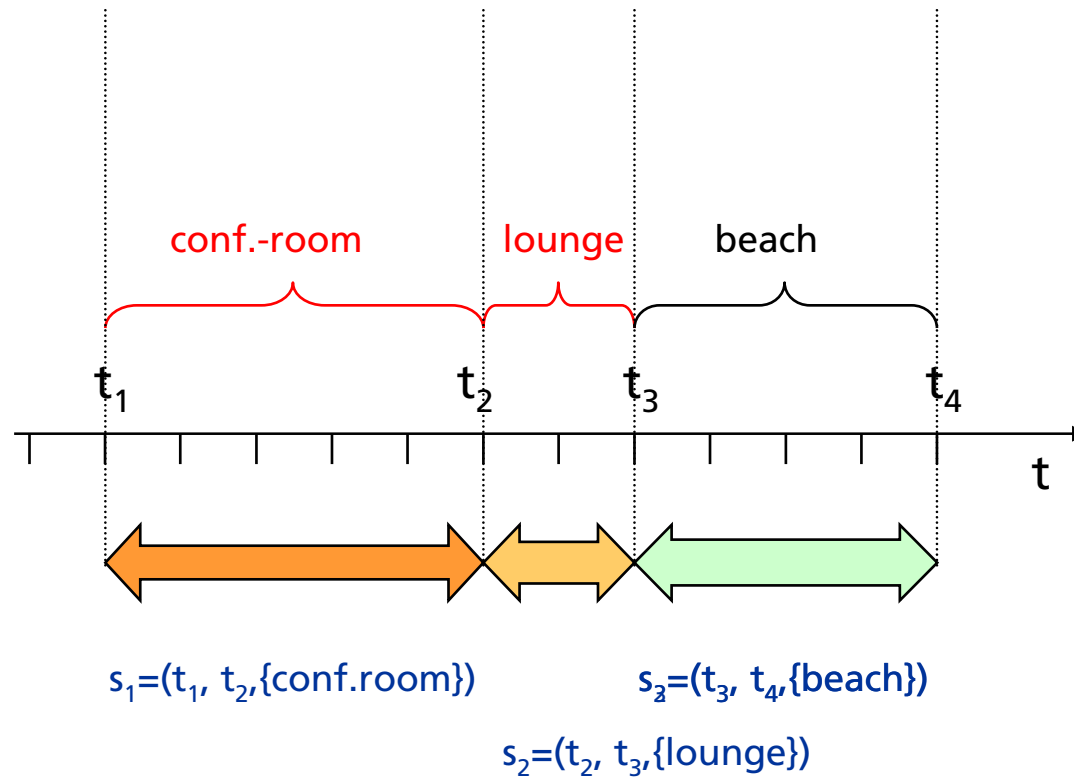
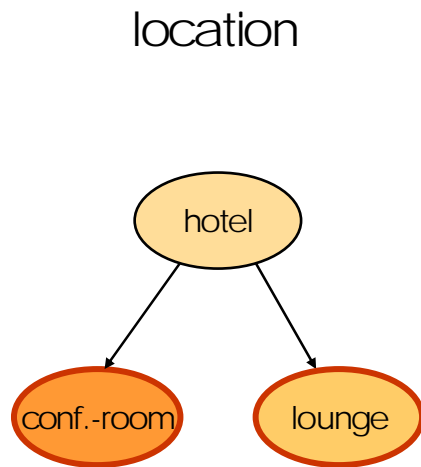
generalization/ specialization



Aggregation levels



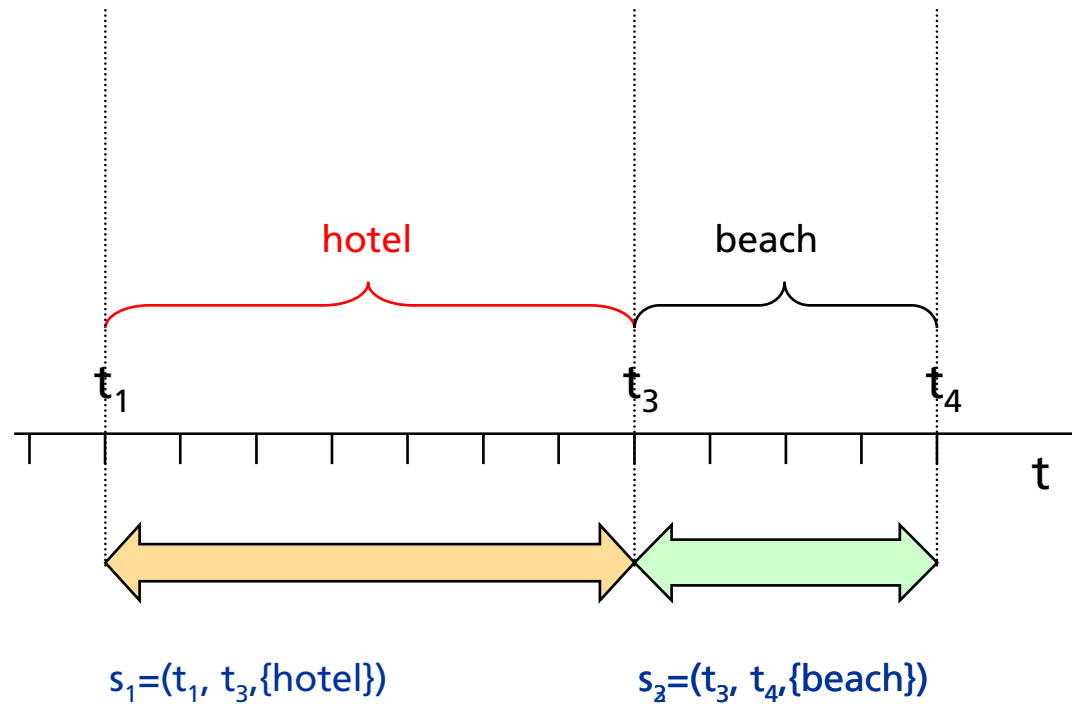
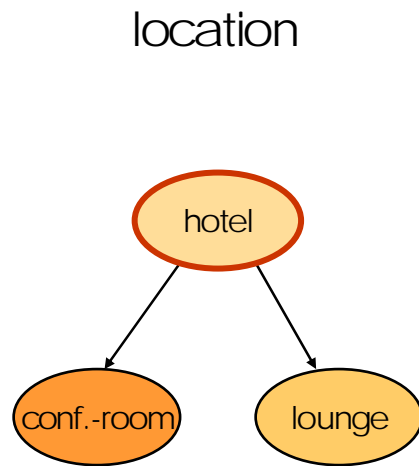
generalization/ specialization



Aggregation levels



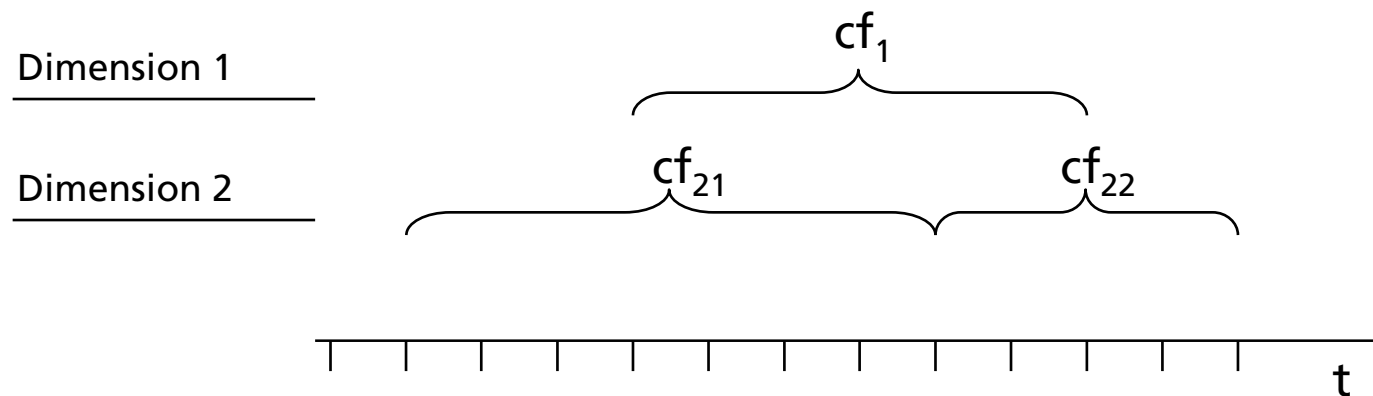
generalization/ specialization



Aggregation levels



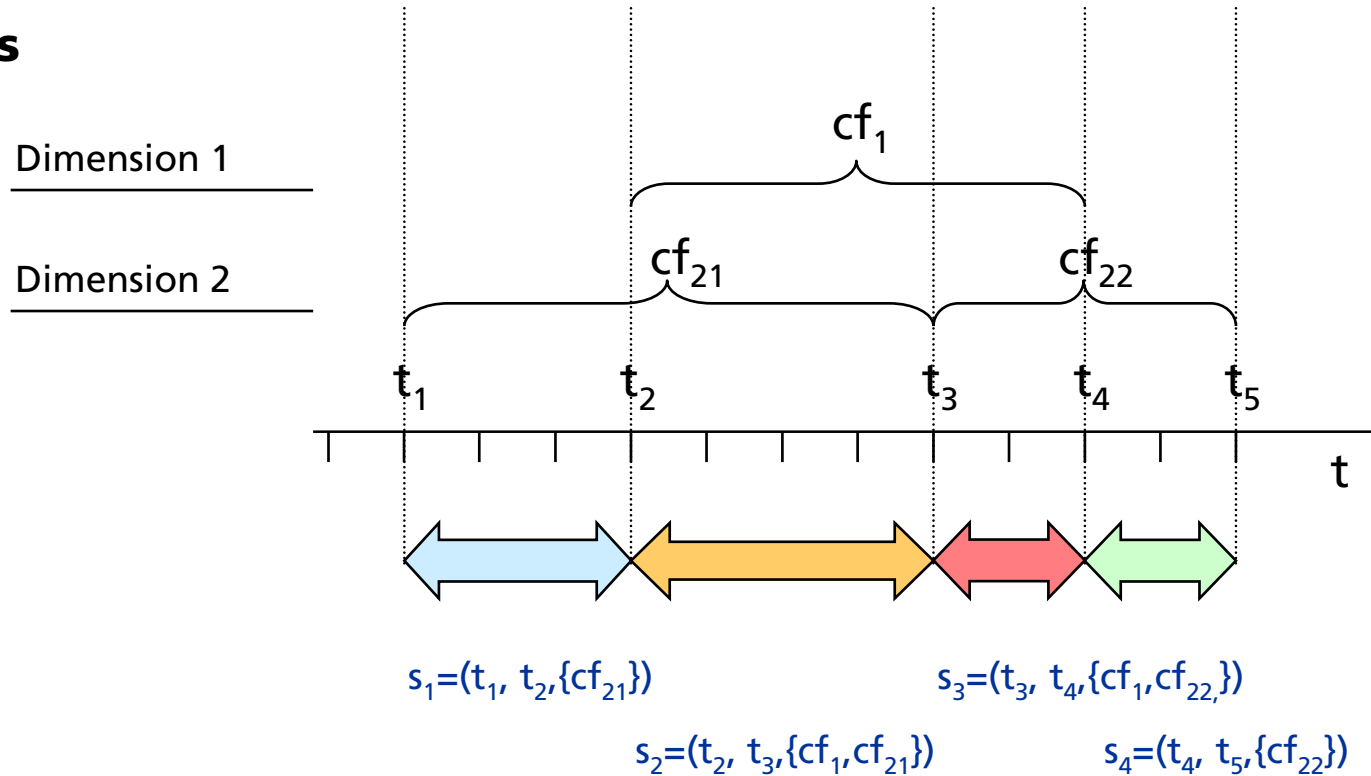
choice of dimensions



Aggregation levels



choice of dimensions



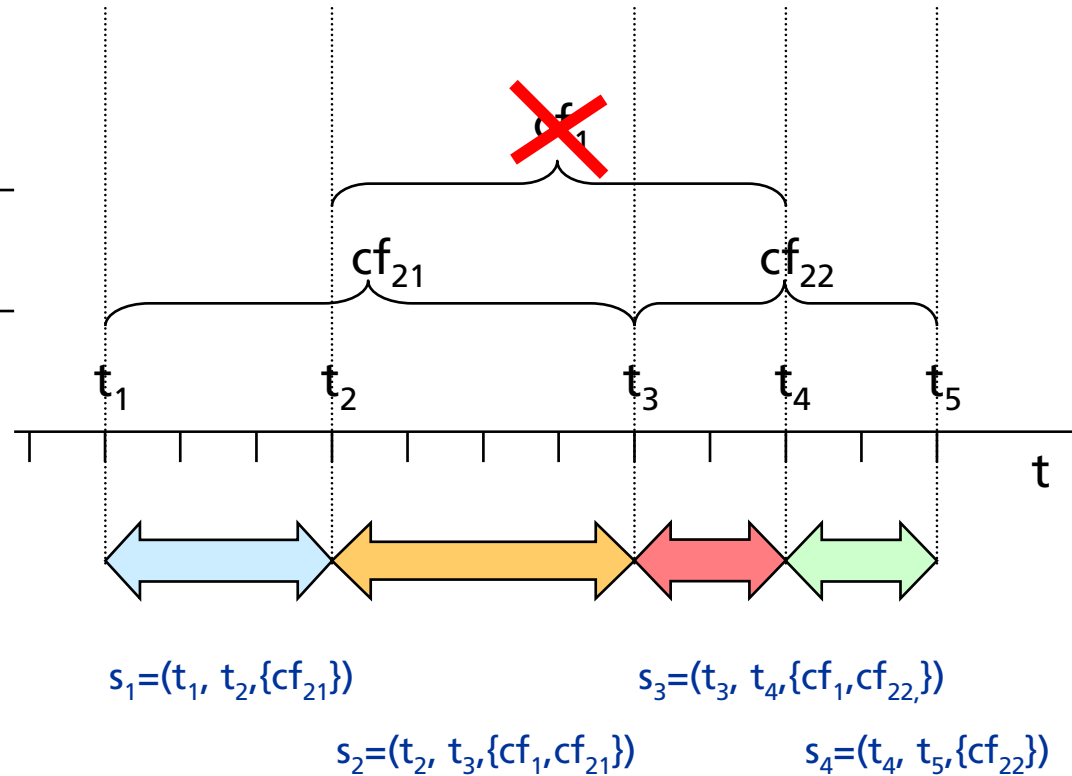
Aggregation levels



choice of dimensions

~~Dimension 1~~

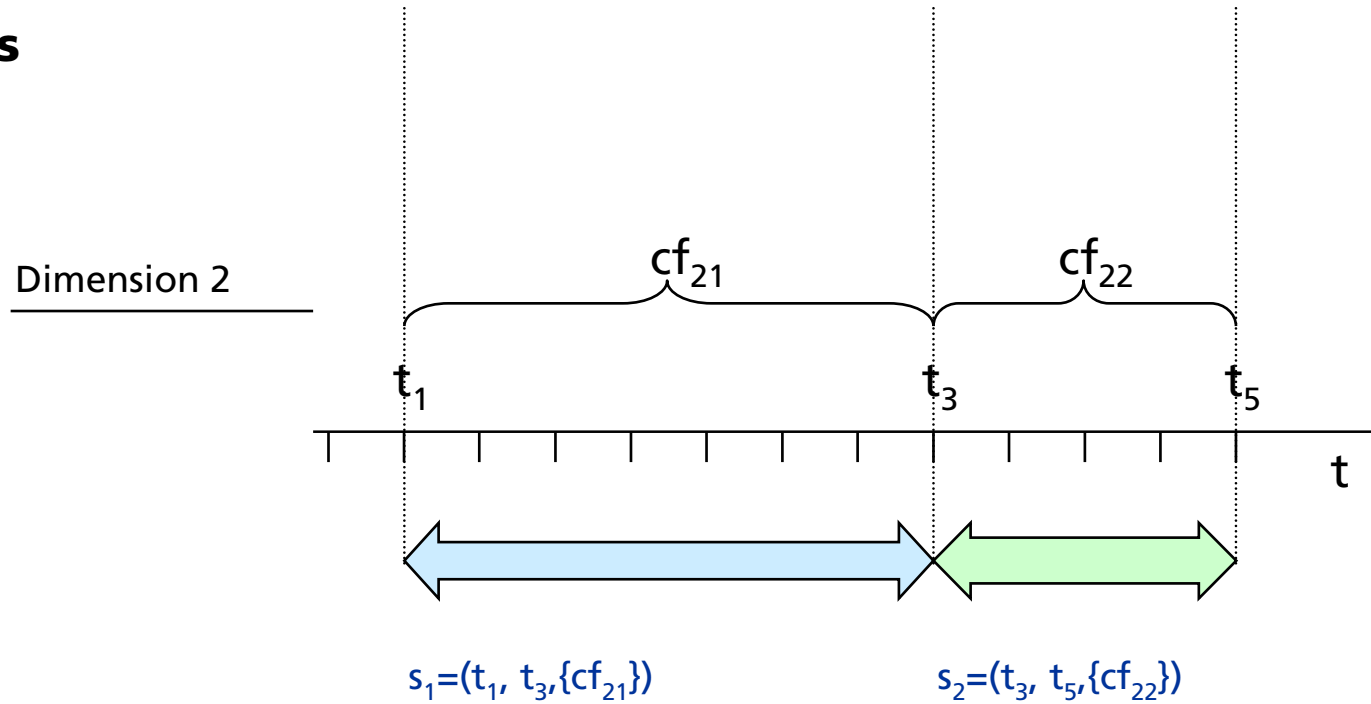
Dimension 2



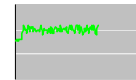
Aggregation levels



choice of dimensions



Reasoning about situations



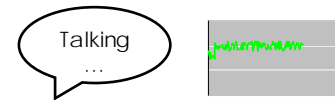
operators on characteristics

- $\text{generalize}(cs_1, cs_2) \rightarrow cs_r$
- $\text{fulfills}(cs, p) \rightarrow \{ \text{true}, \text{false} \}$
- $\text{compare}(cs_1, cs_2) \rightarrow [0,1] \subseteq \mathbb{R}$

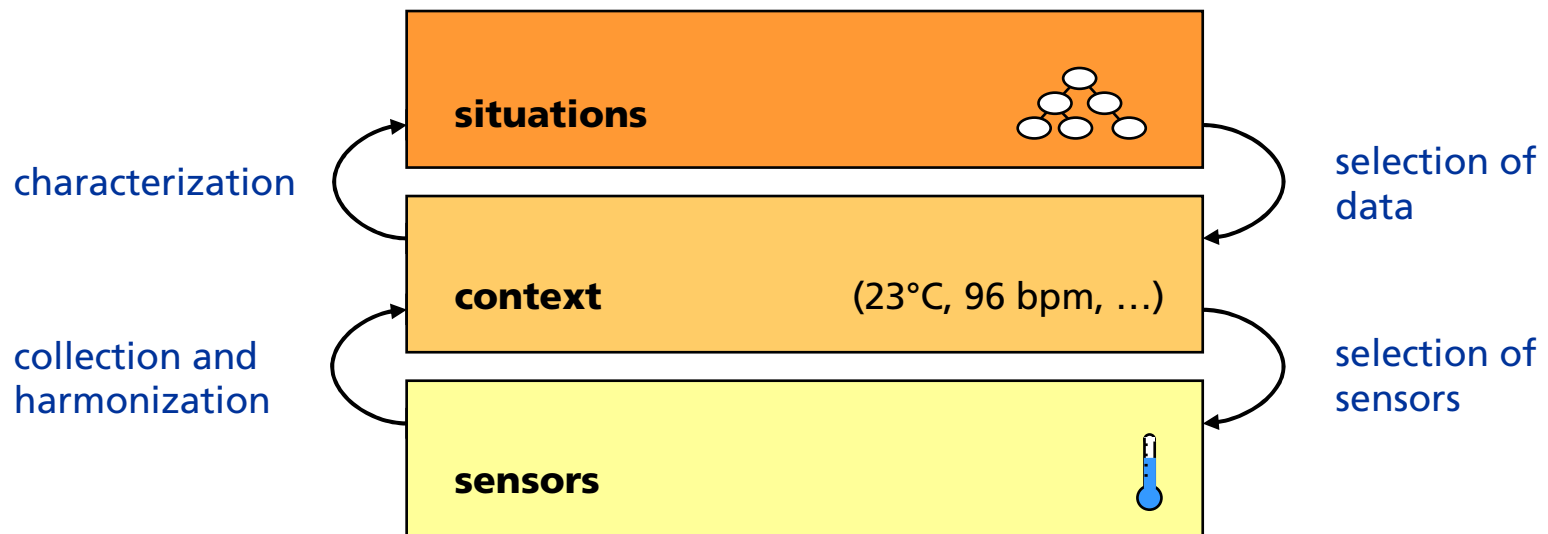
operators on situation

- $\text{previous}(s) \rightarrow s_n$
- $\text{next}(s) \rightarrow s_s$
- $\text{combine}(\text{seq}) \rightarrow s_r$

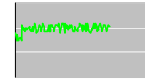
Summary



layered structure of the framework



Ongoing and future research



**situation
prediction**

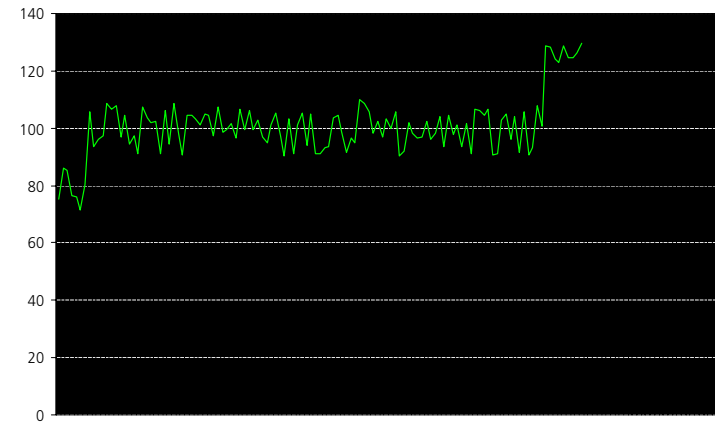
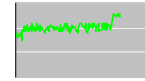
inference of future information demand

**application
design**

description and analysis of scenarios



Thank you very much!



Thank you very much!

