IN:SIGHT – Supporting Situation-Awareness in Mobile Applications

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Outline

Introduction
- WIND – Weather Information on Demand
- modeling situations

IN:SIGHT
- application
- basic idea

Situation algebra
- situation sequences
- operators

Back to IN:SIGHT
- general procedure
- walk-through

Conclusion

WIND –
a location-based service in practice

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WIND – Weather Information on Demand

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VERSICHERUNGSKAMMER BAYERN

Finanzgruppe

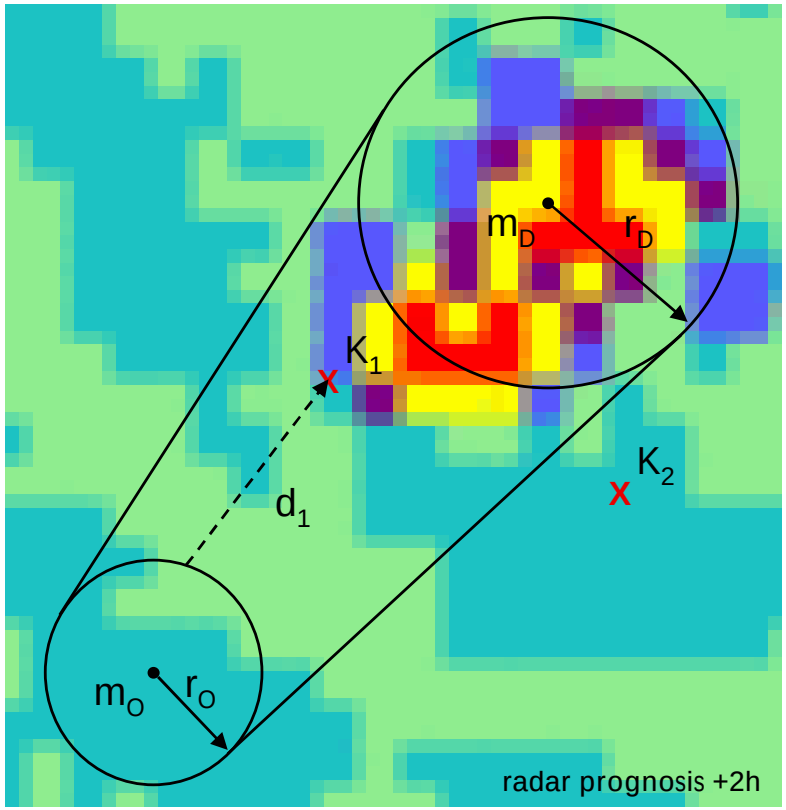
meteomedia ag

Verband öffentlicher Versicherer

UNIQA

May 2002	first demonstrator with 5.000 users of an insurance company
January 2003	start as a commercial service in Germany
March 2003	WIND gained the Innovation Award of the insurance sector in Germany
October 2004	start of WIND in Austria
2005 – 2007	establishing the service in Sweden, Switzerland and Italy

WIND – Precise radar-based warnings



K_1: geographic location inside the storm prognosis

K_2: geographic location outside the storm prognosis

d_1: distance of position K_1 to the storm front

further development

⇨ WIND for mobile users

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Situation model

Situations

Context- or situation-aware applications require a model of a user‘s environment

characteristics Situations model *characteristics* of the environment.

time and dynamics Situations model *changes* of the environment.

used for

- proactively infering information need
- situation-based message rating

⇨ need-oriented information supply

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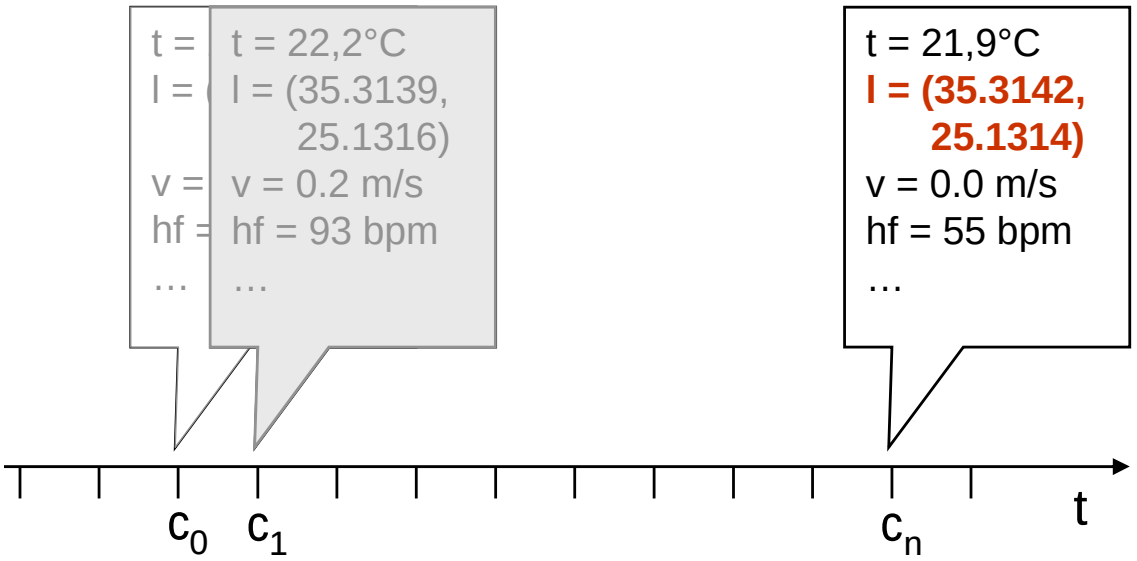
Contexts and characteristics

contexts are snapshots

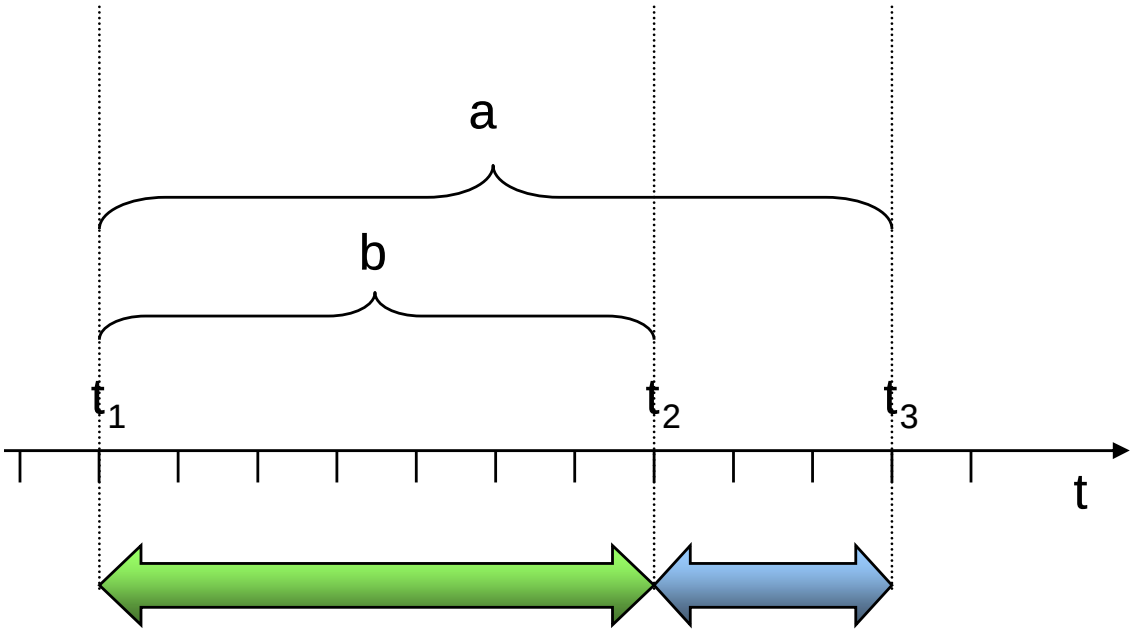


characteristic features

tl (warm)
loc (lounge)

Contexts sequences and situations

context sequences



situations

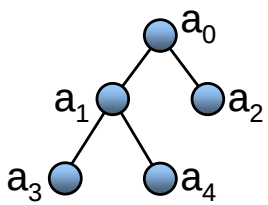
$s_1=(t_1, t_2,\{a,b\})$ $s_2=(t_2, t_3,\{a\})$

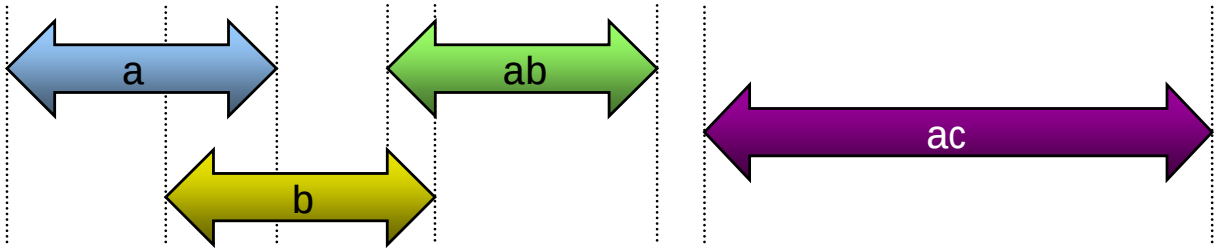
Situation

A situation consists of a set of characteristic features associated with a time interval.

symbolically $(t_\mathrm{b}, t_\mathrm{e}, C)$

characteristic features:





a = A(a_1) b = B(b_1) c = C(c_1)

IN:SIGHT

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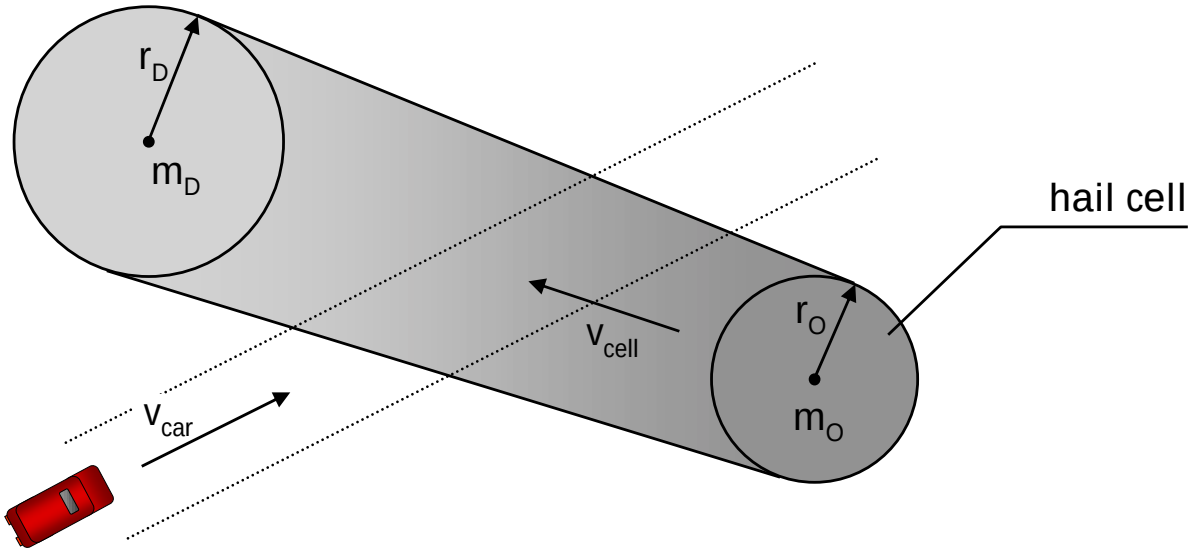
IN:SIGHT

Integrated
Situation-based
Guidance and
Hazard Detection



objectives:

supporting situation-awareness
predicting situations, informing the driver

IN:SIGHT – General idea

two basic ideas

1. predicting (dangerous) situations

2. matching the system knowledge against expectations of a user

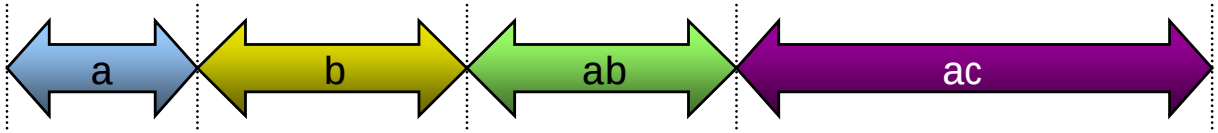
⇨ **identifying information to deliver**

Parenthesis: Situation algebra

Situation sequence

A situation sequence is a well-ordered set of not overlapping situations. The order is given by the time intervals.

symbolically $(S, \prec:)$

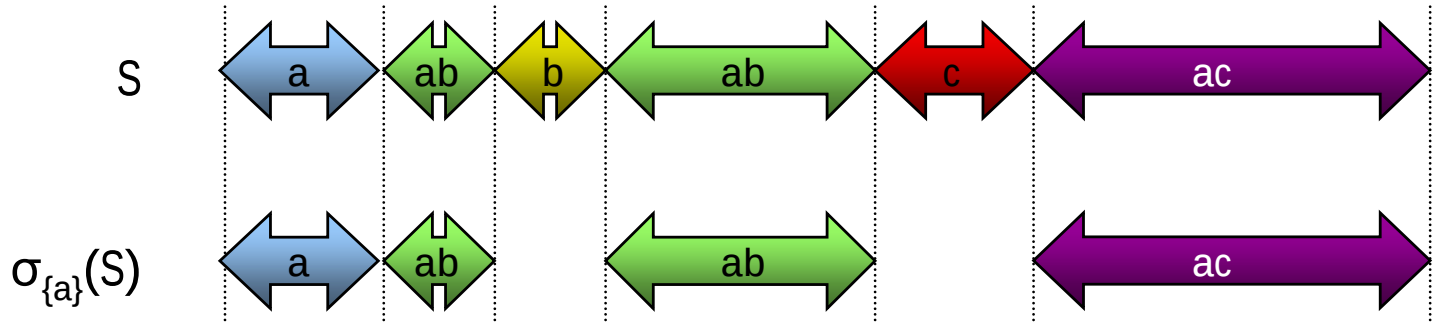


Situation sequences: relations

Predecessor	s_p is called predecessor of s if all situations following s_p (except s) are also following s
Successor	s_s is called successor of s if all situations following s (except s_s itself) are also following s_s
Completeness	a situation sequence is considered complete if for any situation s the following is true: If there is a predecessor s_p to s then s_p meets s and if there is a successor s_s to s then s_s is met by s
Normality	a situation sequence S is called normalized if all neighboring situations do have different characteristics

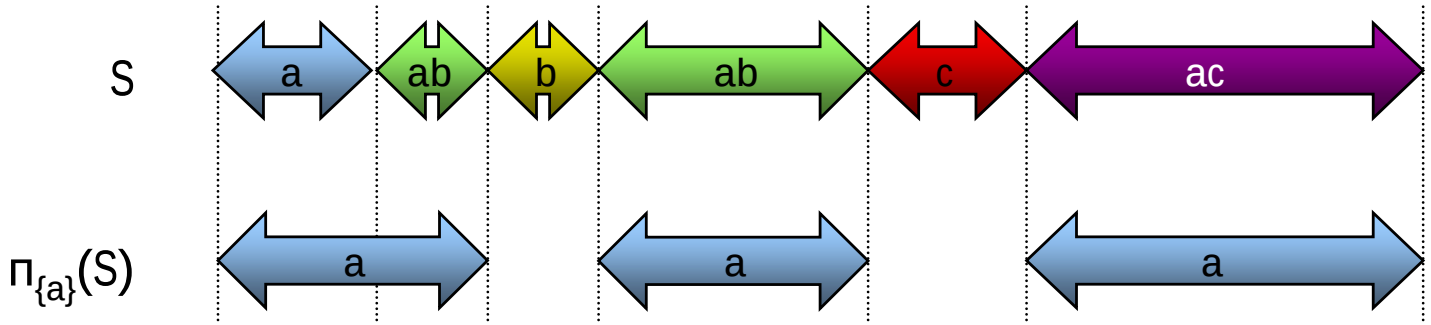
Selection: $\sigma : \mathcal{S} \times \mathcal{P} \rightarrow \mathcal{S}$

Extracts all situations from a sequence satisfying a certain pattern.



Extraction: $\pi : \mathcal{S} \times \mathcal{P} \rightarrow \mathcal{S}$

Extracts those parts of situations from a sequence defined by a certain pattern.



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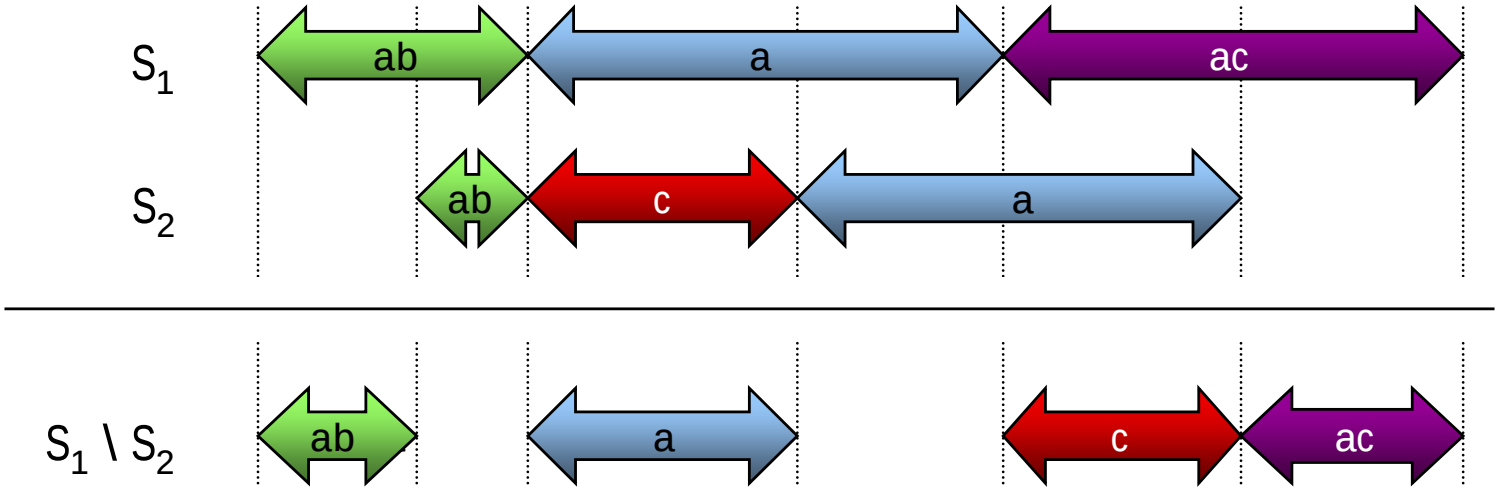
Difference: $\setminus : \mathcal{S} \times \mathcal{S} \rightarrow \mathcal{S}$

The difference of two situation sequences S_1 and S_2 is the situation sequence describing the “situational knowledge” contained in S_1 that do not appear in S_2.



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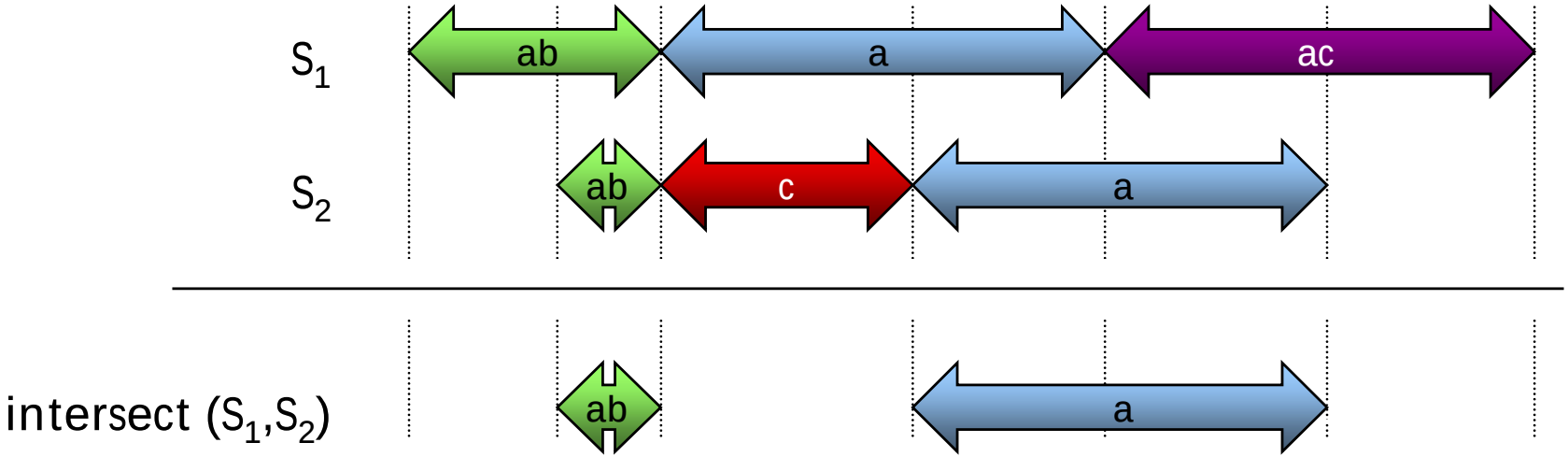
Intersection: $\cap : \mathcal{S} \times \mathcal{S} \rightarrow \mathcal{S}$

The intersection of two situation sequences S_1 and S_2 is the situation sequence describing the “situational knowledge” contained in S_1 as well as in S_2.



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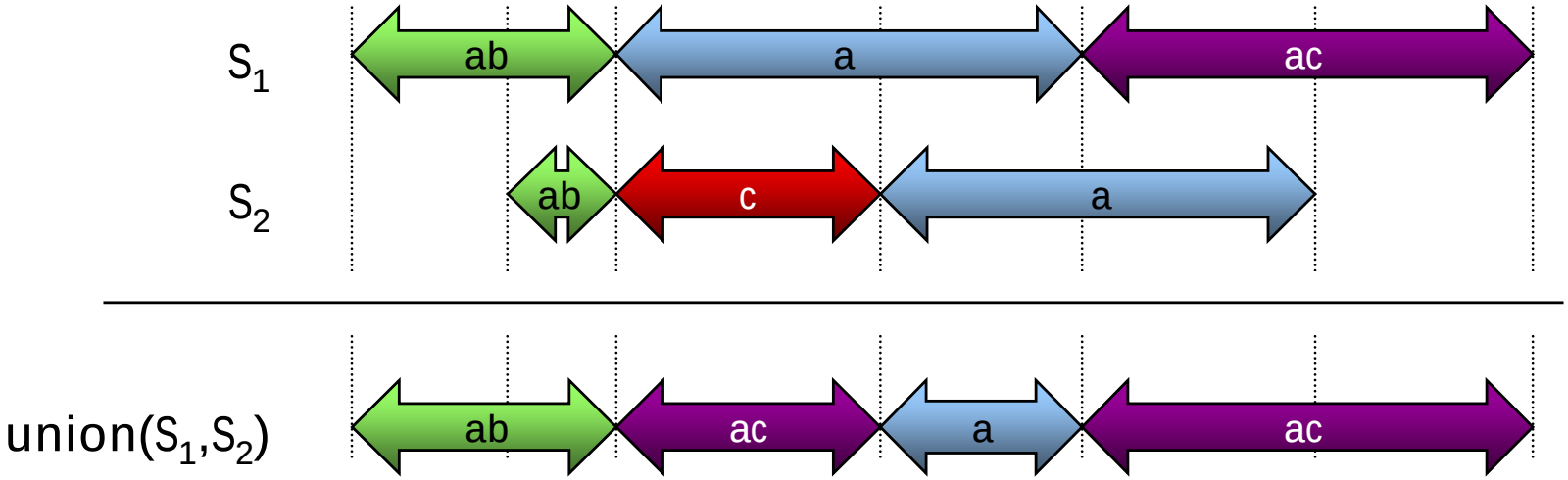
Union: $\cup : \mathcal{S} \times \mathcal{S} \rightarrow \mathcal{S}$

The union of two situation sequences S_1 and S_2 is the situation sequence describing the combined "situational knowledge" of both sequences.

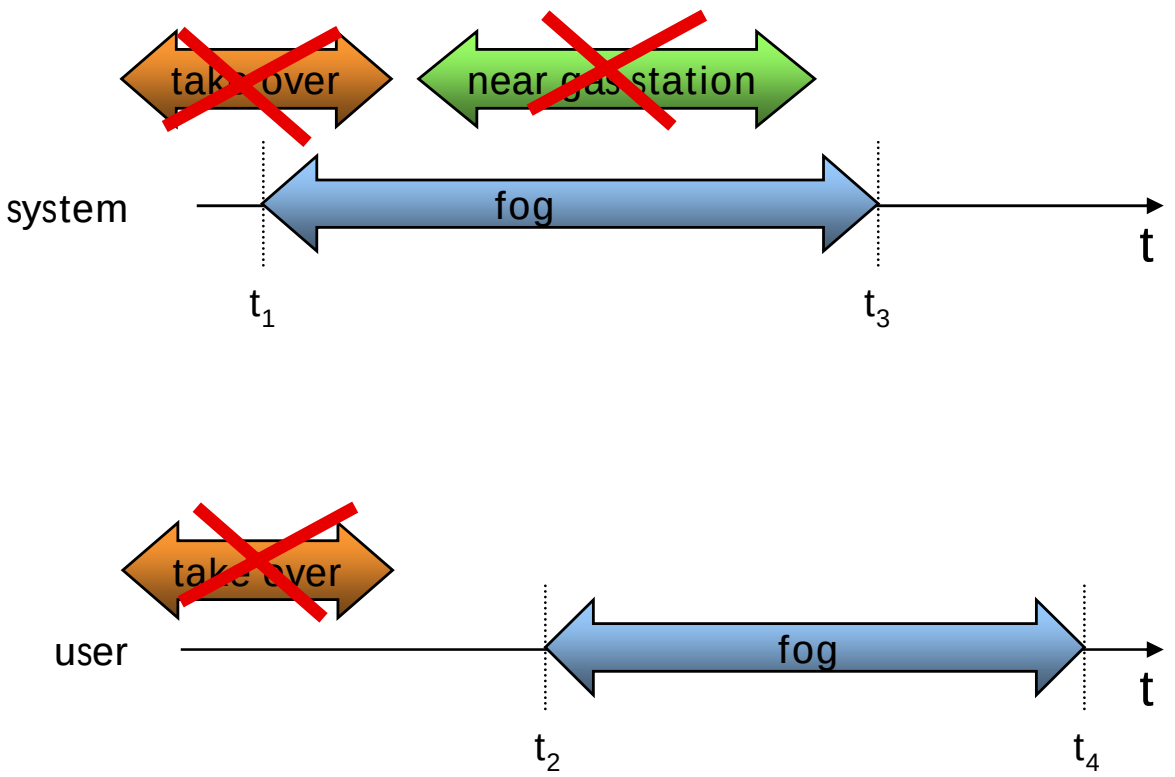


Operands need to be compatible!

Back to IN:SIGHT

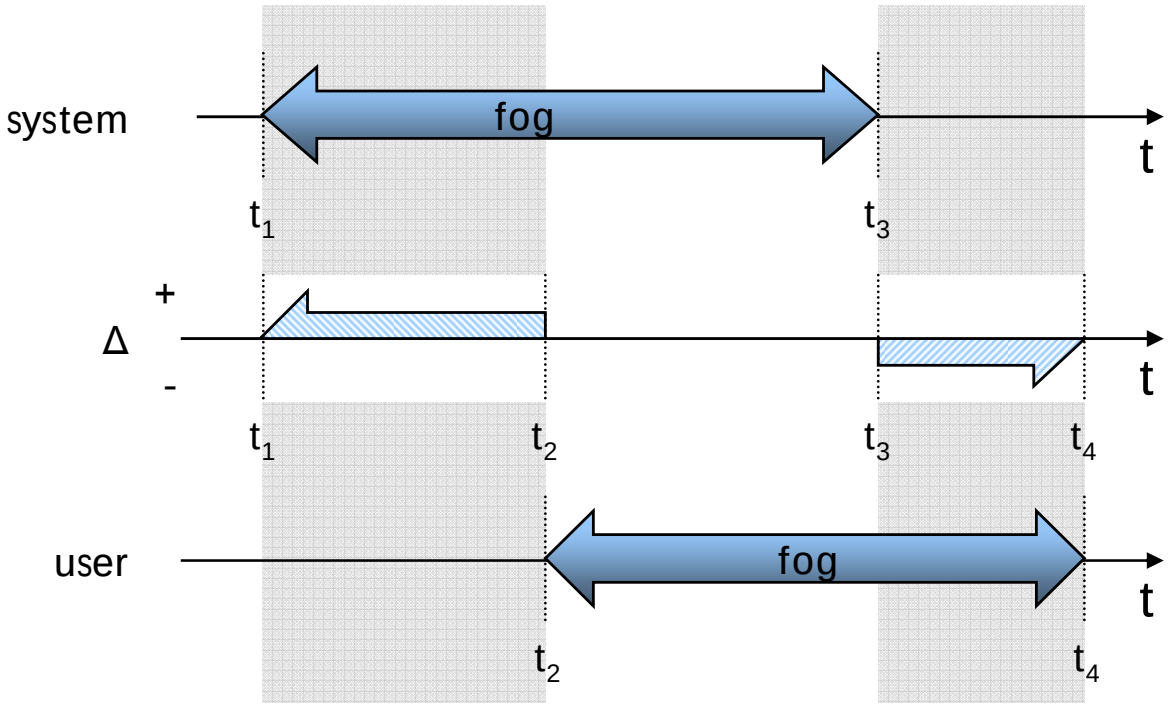
IN:SIGHT – General Procedure

- **filtering**
- computing Δ
- information value
- informing
- updating



IN:SIGHT – General procedure (cont'd)

- filtering
- **computing Δ**
- information value
- informing
- updating



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IN:SIGHT – General procedure (cont'd)

- filtering
- computing Δ
- **information value**
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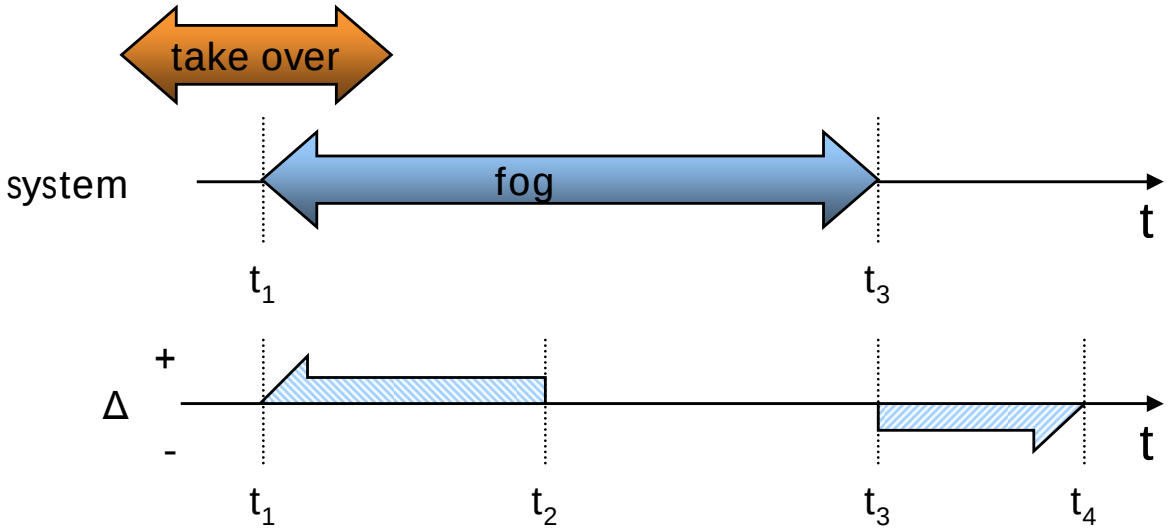
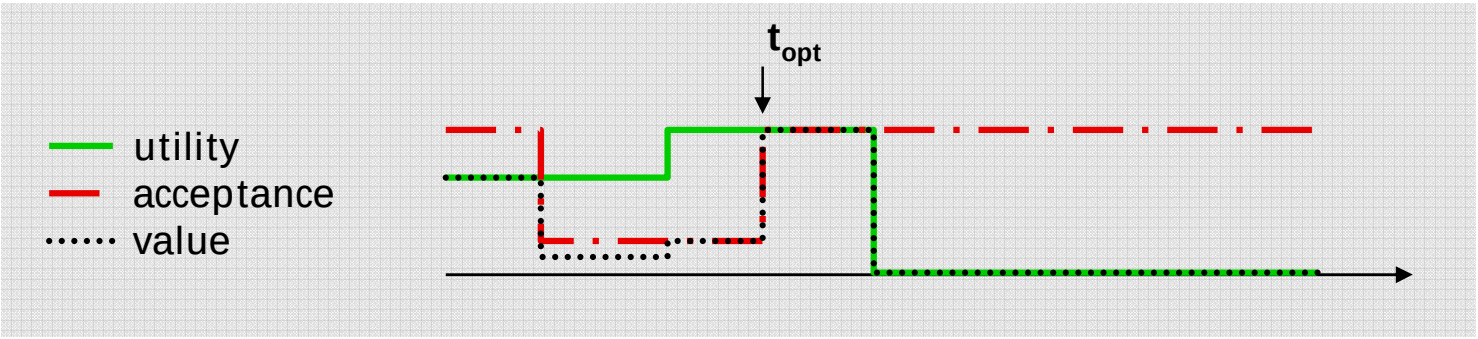
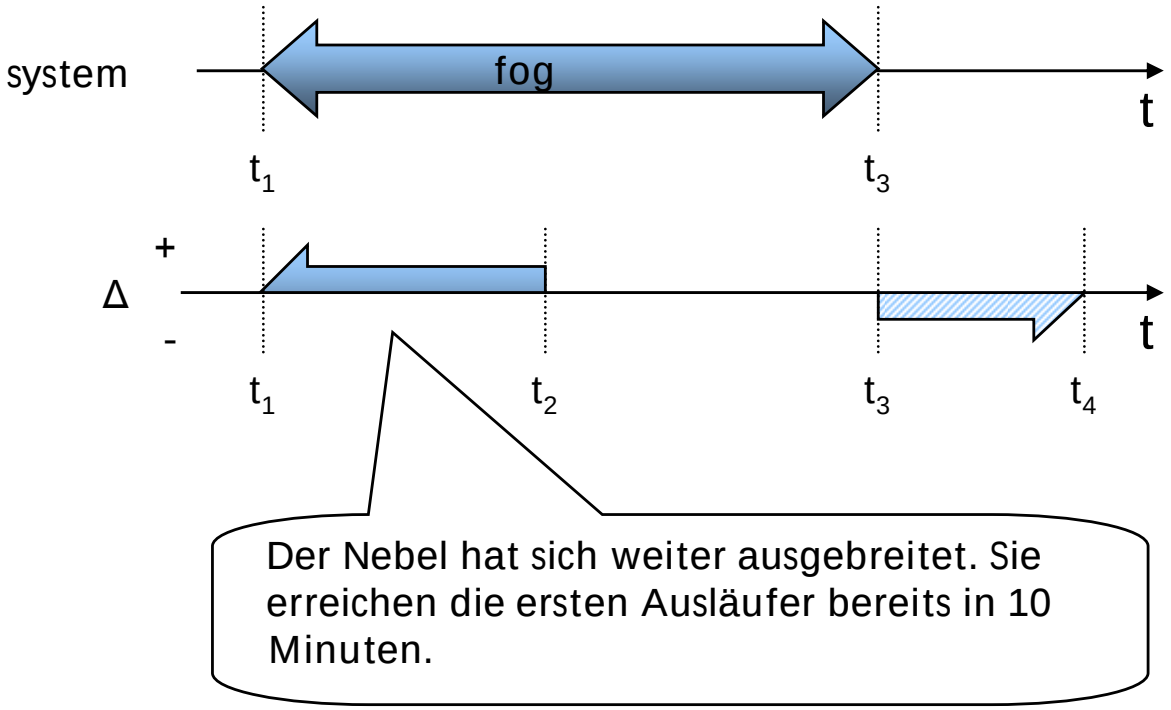




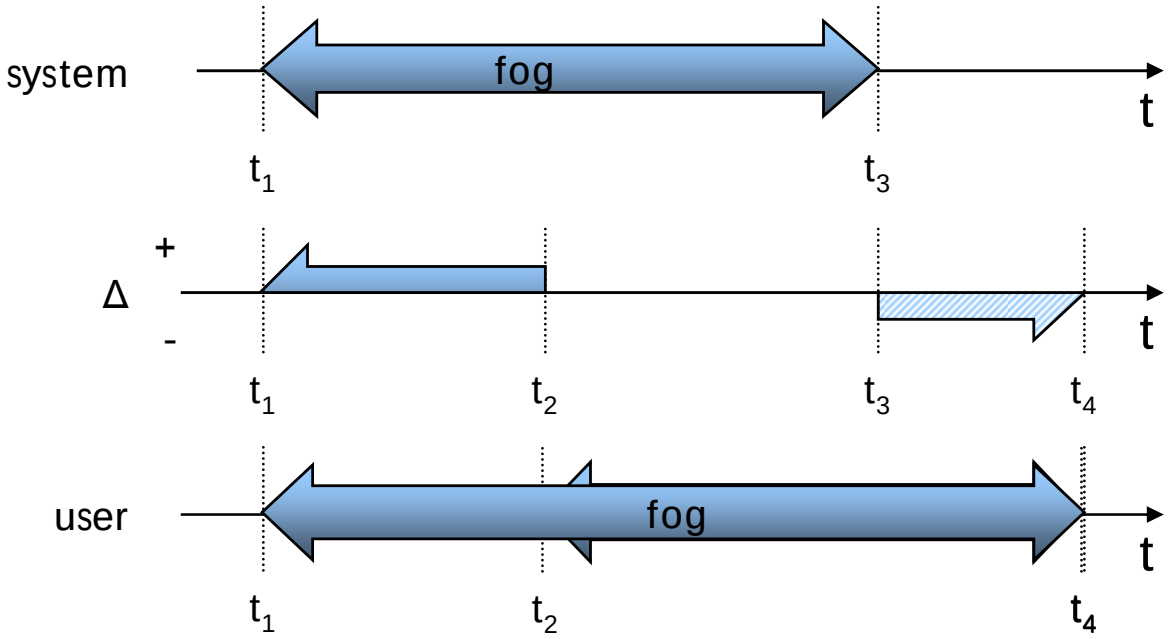
IN:SIGHT – General procedure (cont'd)

- filtering
- computing Δ
- information value
- **informing**
- updating



IN:SIGHT – General procedure (cont'd)

- filtering
- computing Δ
- information value
- informing
- **updating**



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Conclusion

Conclusion

main points

- need-oriented information supply:
  only (new) information is delivered
- general model supporting various application cases

examples

- congestion information
- demand-oriented navigation
- cooperative work support
- mobile gaming

enhancement

- memory function
- using local sensor data (e.g., rain sensor)
- additional situation overview

Thank you very much!

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