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Analyzing i* System Models for Dependability Properties: The Uberlingen Accident

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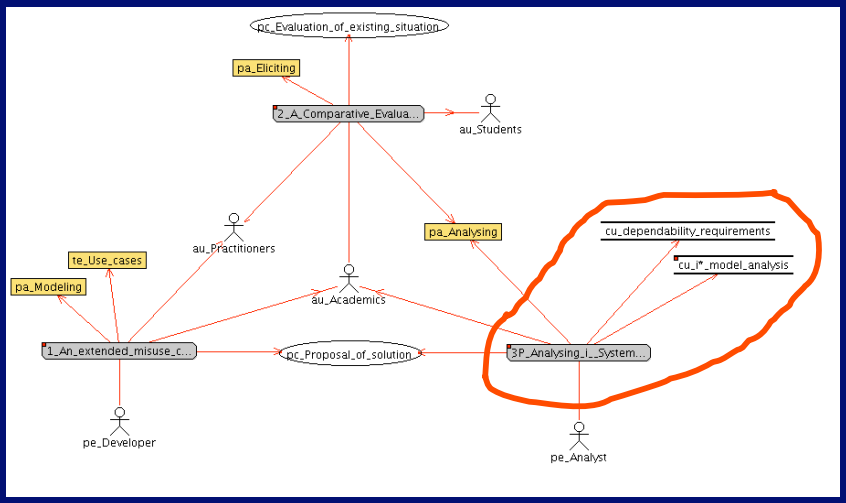
First Slide



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Analyzing Dependability Properties

Pressing need in requirements

- Determine properties such as reliability and safety of socio-technical systems
- Methods such as HAZOPS not always suitable
- Can requirements models such as *i** help?

Exploratory retrospective analysis

- Model socio-technical systems during Uberlingen air accident in 2002 using *i**
- Analyze *i** models with derived treatments
- Explore whether classes of problems that occurred might have been predicted
- Refine and re-apply treatments to other case studies

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Uberlingen Accident

Evening 1st July 2002, in Swiss-controlled air space

Two planes collided in mid-air, killing 71

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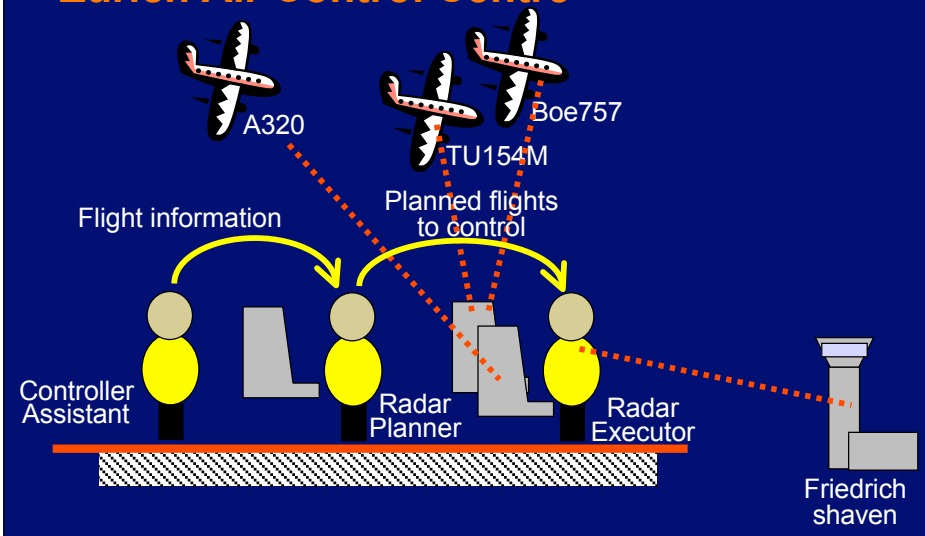
Zurich Air Control Centre



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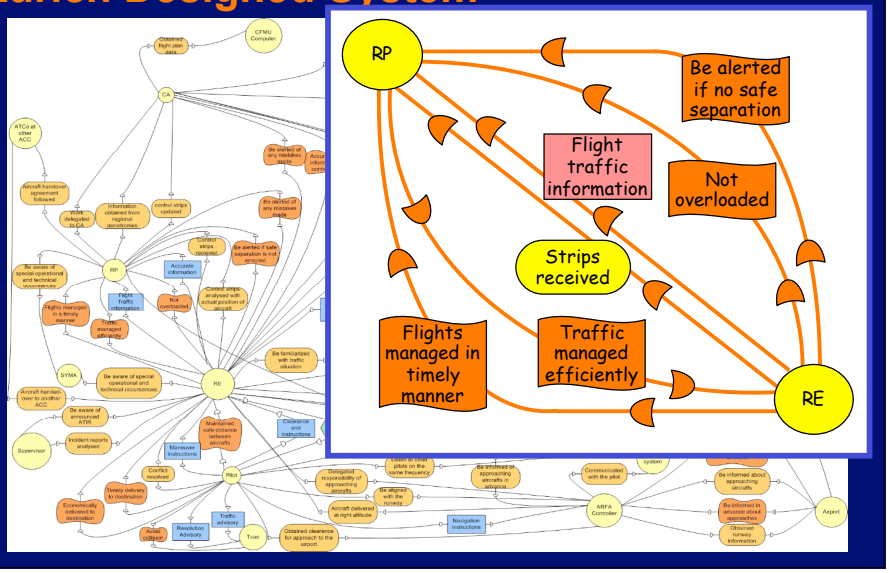
Zurich Designed System



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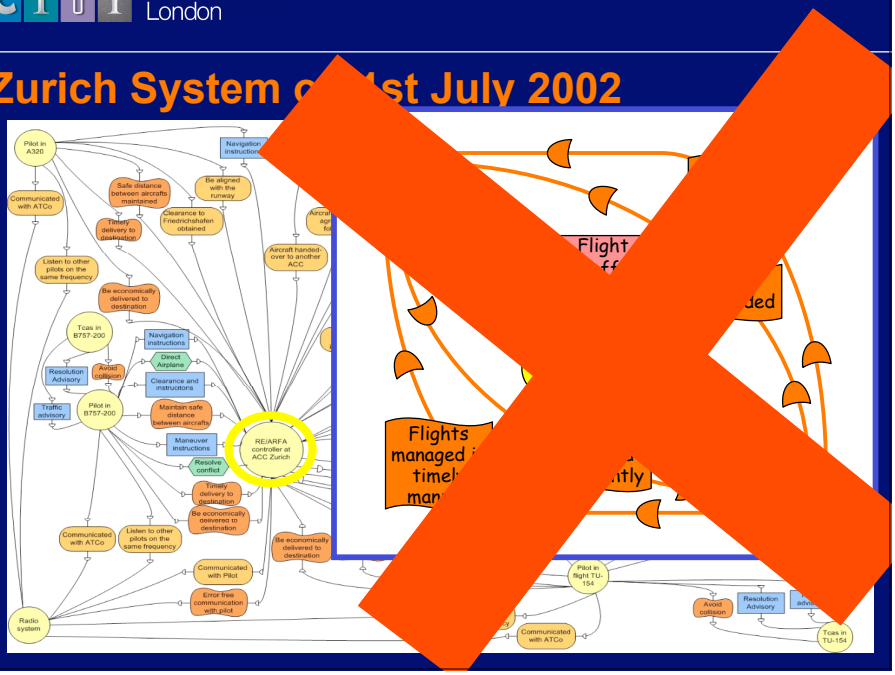
Zurich System c st July 2002



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Analytic Treatments

1. Increased actor dependencies
   - If actor fulfils 2 or more roles, do additional dependencies risk overloading dependee actor
   - RE was dependee in 17 rather than 10 dependencies
   - Indicative of increased actor workload
2. Unachieved goals and soft goals
   - RE actor cannot achieve critical soft goal *not overloaded* if RP not present
   - But need to extend expressiveness of *i** models with KAOS patterns [Darimont & van Lamsweerde 1996]
   - Infer FAIL TO ACHIEVE if dependee not present
   - Not all missing dependencies are detrimental

Future Work

Develop formal heuristics

- Analyze formally-expressed dependability properties of socio-technical systems expressed as *i** SD and SR models
- Derive from diverse sources including published requirements and safety-critical case studies
- Extend *i** expressiveness with KAOS goal patterns
- Re-apply to other case studies

Extensions to REDEPEND

- Explore use of actor agents, roles and positions in *i**
- Implement formal heuristics in graphical tool to analyse system models to inform early requirements analysis

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Conclusions

Quality features addressed

- Dependability properties such as reliability and safety

Novelty and contribution

- Integrating important treatments in RE representations

Contribution to research and practice

- Exploration of scaleability and applicability of RE research outcomes to real problems

Main problems

- Position paper applied to one case study

Scaleability

- Do not know yet!