



Complexity and Mental Models

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16.459

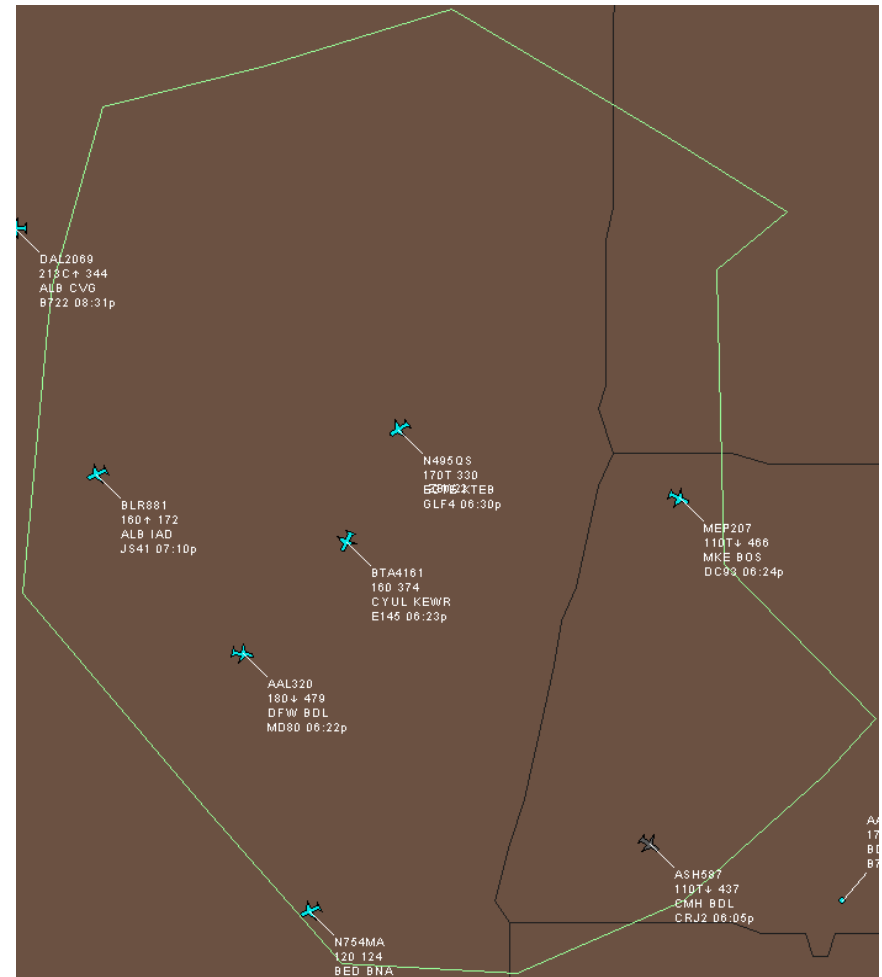
February 13, 2002



Example of Importance of Mental Models and Complexity Metrics

Albany Sector, ZBW, 14:00:00 EST, November 30, 2001

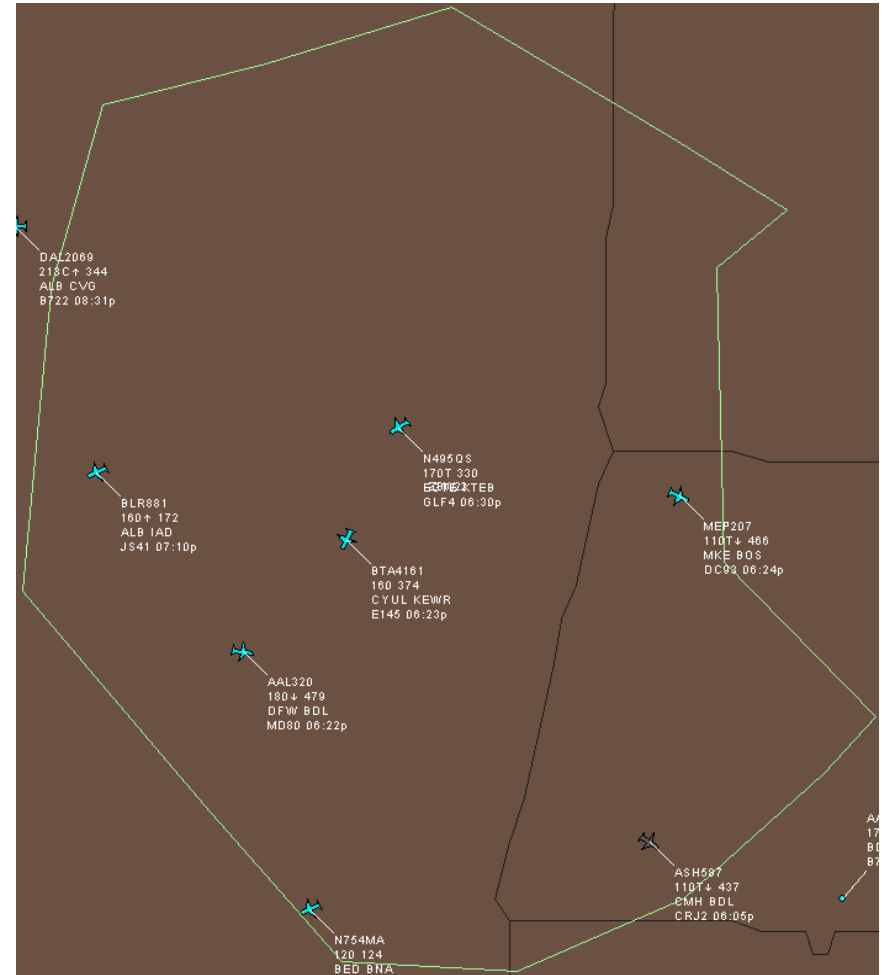
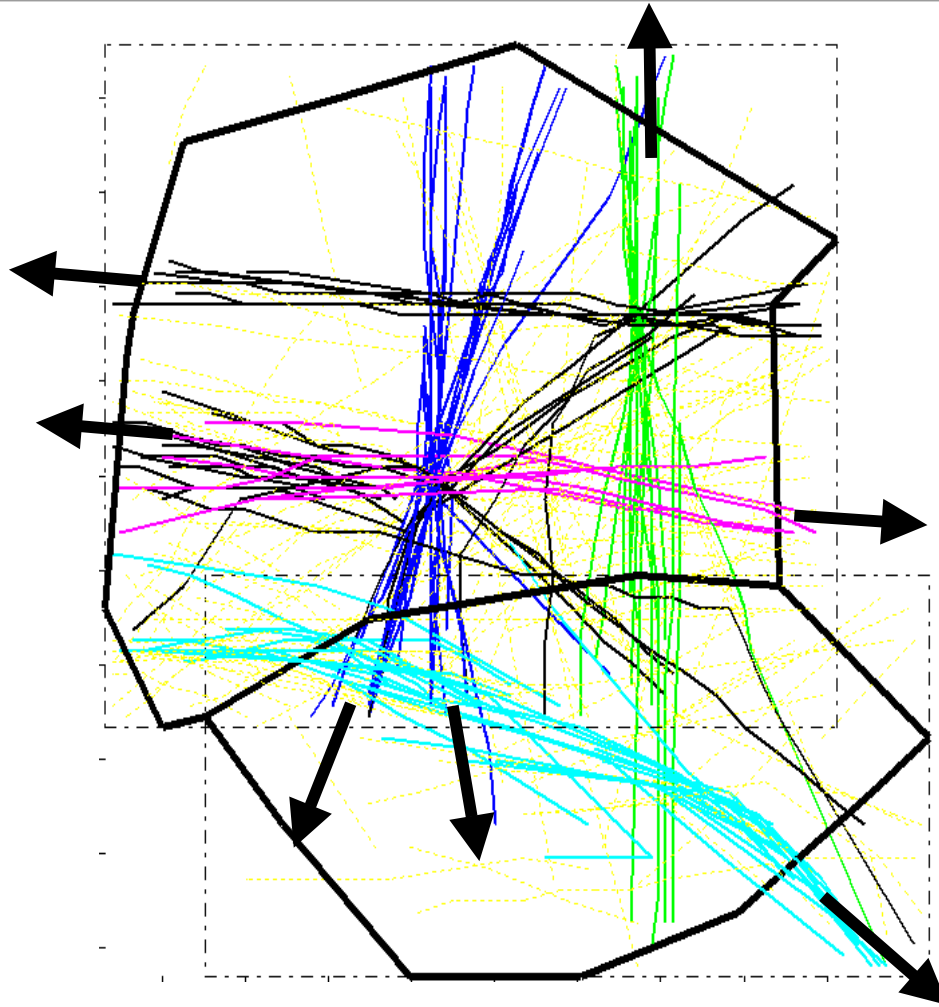
- Controllers mental representation richer than instantaneous “observables” on radar display.





“Aircraft Flows” Used as Complexity Reduction Mechanism

ZBW, Albany Low Altitude Sector (110 – FL230), October 19, 2001



No metrics have been found that systematically include the impact of underlying structure on complexity.



Issues to Examine Next Week

- **Complexity is....**
 - ☐ Size?
 - ☐ Number of Relationships?
 - ☐ “Order” of a system?
- **Applications of “Measures of Complexity”**
 - ☐ Complexity of what?
 - ◆ Humans?
 - ◆ Mental Models?
 - ◆ Systems?
- **How do Humans Cope with Complexity?**
 - ☐ Mental Models and Simplification Strategies



Selected Papers in “Complexity”

- **Requested Readings:**

- ☐ What is Complexity? – The philosophy of complexity *per se* with application to some examples in evolution.
(Edmonds)
- ☐ Off-Loading, Prevention, and Preparation: Planning Behaviours in Complex Systems Management
(Xiao, Milgram, Doyle)
- ☐ A Framework for the Evaluation of Air Traffic Control Complexity
(Pawlak)

- **Additional Readings: Examples of Other Approaches to Complexity**

- ☐ Airspace Complexity and its Application in Air Traffic Management
(Sridhar, Sheth, Grabbe)
- ☐ How to Measure Cognitive Complexity in Human-Computer Interaction
(Ratnerberg)



Homework Assignment! 😊

- **Prepare a definition of “Complexity”**

- ☐ What do we mean by saying something is “complex”?
- ☐ What properties of a task make it “complex”?

- **Identify 2 examples of “complexity reduction” strategies you use in interacting with a complex system?**

1)

2)
