# DECISION SUPPORT SUMMARY

## 30th June 2005

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# Agenda

▶ Papers

▶ Key Results & Discussions Sketches

▶ Issues for the Future

# DS – Trajectory Prediction

▸ Improvement on the Acceptance of a Conflict Resolution System by Air Traffic Controllers (Flicker & Fricke, Tech. Uni Berlin)

▸ Impact of Factors, Conditions and Metrics on Trajectory Prediction Accuracy (Mondoloni CSSI Inc & Bayraktutar Eurocontrol)

# DS – ATM Capabilities

▷ Miami Controller Pilot Datalink Communications Summary and Assessment (Gonda, Saumsiegle MITRE, Blackwell AA & Longo CA)

▷ Integration of Downlink Aircraft Parameters in a French En Route ATC Controller Working position (Kapp DSNA)

▷ Managing Sector Congestion using Airspace Restriction Planner (Kopardekar & Green NASA Ames)

▷ Quantifying Convective Delay Reduction Benefits for Weather Systems (Evans, Robinson & Allan, MIT)

# DS Paper Tally

▸ 11 DS papers submitted

▸ 6 accepted papers:
- 2 Europe
- 3 US
- 1 Europe & US

# TP Results & Discussions Sketches (1/2)

▸ **DS Tools with in-built Controller expertise**

- ▪ Integration of ATCO strategies and knowledge

- ▪ Planner "vision into the future" for conflict deactivation to reduce Tactical workload

- ▪ How far away should the Planner's horizon be to ensure prediction accuracy?

# TP Results & Discussions Sketches (2/2)

▷ Understanding key factors impacting prediction accuracy

- Metrics derivation to evaluate performance

- Factor ranking enabling development "investment" where needed for improved accuracy

- System "observability": predict what pilots want to do or what it is actually going to happen?

# ATM Capabilities Results & Discussions Sketches (1/4)

▸ AG data comms fundamental to all future ATM concepts of operations

- CPDLC Op. trials in Miami en route airspace (1st NAS)

- Implemented and validated 4 basic services: transfer of comm, initial contact; altimeter setting; menu-text

- Level of operational acceptance was good

- Collect metrics to support implementation decision

# ATM Capabilities Results & Discussions Sketches (2/4)

▸ Conducted Controller needs study regarding possible use of DAPs (polled through Mode-S)

- Study reported on DAP display for indicated airspeed, magnetic heading & instantaneous rate of climb descent

- Sims show DAP usage evolution (short vs long consultations)

- Given HMI current constraints: where to display and how to access the information? No ideal access method found

- Impact of DAP update frequency (e.g. instantaneous climb/descent) on utility

- Display of Intent information (selected vs cleared flight level)

# ATM Capabilities Results & Discussions Sketches (3/4)

▷ **Support Provision for adequate reaction before congestion**

- Airspace Restriction Planner tool for Traffic Manager Coordinators
- Ensure "just in time, just enough" principle not to under / over protect sectors
- Quick flow control measures impact analysis (metering, capping / tunnelling & departure planning and restrictions)
- Human in the loop simulation showed indication of very useful capability
- Suggestions for promoting collaboration between neighbouring sectors, restriction equity and allocation of user preferences

# ATM Capabilities Results & Discussions Sketches (4/4)

▸ **What to do with severe weather?**

- Delays arise from poorly understood interactions between convective weather and increasing complexity in the aviation system

- Methodological principles are derived in order to evaluate systemic delay reduction benefits, complemented by assessment through multi-day observation "blitzes" on operations quantifying delay savings

- Evaluation is made very difficult as weather occurrences are not repeatable

- Suggestions for weather products improved understanding (e.g. echo tops) for enhanced utilisation and for support to resolve severe weather situations as problems may not be optimally solved by humans

# For the Future

▷ ## ATM Seminar 2007, desired paper contents?

- ▪ Datalink, operational implementation in 20xx
- ▪ Working practices adaptation and evolution as decision support measures are implemented operationally. How to ensure Controllers acceptance?
- ▪ Once the ATC system is pushed beyond Controller human capability through tools and automation, how to ensure a safe & graceful degradation when disrupted (e.g. weather)
- ▪ "Global Picture" needs to be considered when tweaking ATM System by the introduction of DS
- ▪ To the Decision Makers, in an ATM world also going through globalisation, how to strengthen and build more research bridges?

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