Australian Government
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Technology Organisation

The "Intelligent Listener" in Collaborative Planning

Dr Marilyn Cross and Dr Dominique Estival
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Dr Ahmad Hashemi-Sakhtsari and Jason Littlefield

Defence Science and Technology Organisation

Command and Control Division

Outline

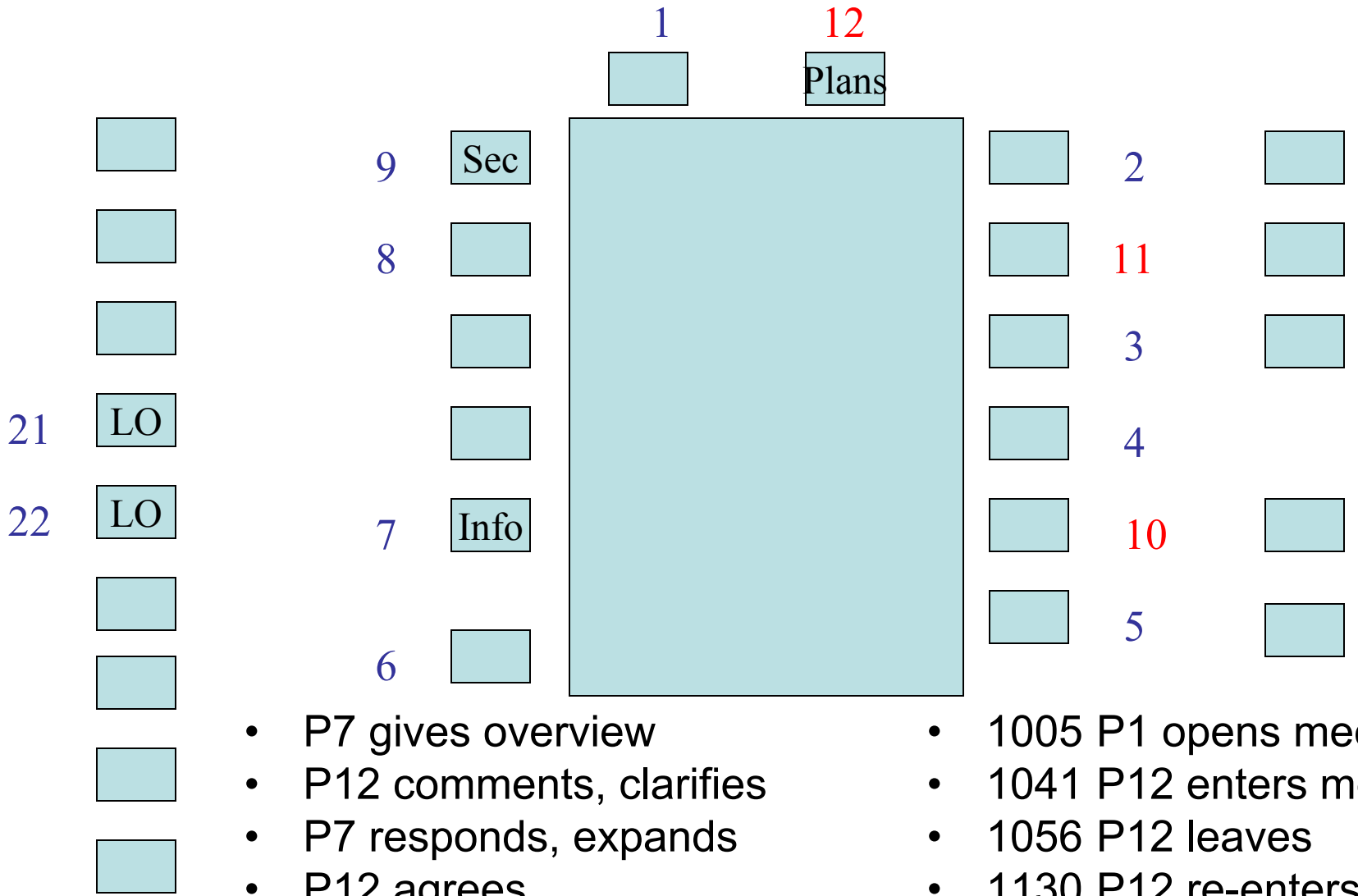
Capture and analysis of group planning

1. Experiment without automation
2. Experiment with automatic speech recognition





Planning Meeting



- P7 gives overview
- P12 comments, clarifies
- P7 responds, expands
- P12 agrees

- 1005 P1 opens meeting
- 1041 P12 enters meeting
- 1056 P12 leaves
- 1130 P12 re-enters

Slide

Experiment 1

- Adopted approach successful in the analysis of casual conversation [Eggins, 1990; Eggins and Slade, 1997] - Speech Function Network (SFN)
- Techniques for analysing interactional patterns through which interactants jointly achieve the purposes of discourse
  - Purposes are to make decisions and progress planning
  - Based on the actual data of the exchanges not observers' impressions

Decision Making Cycles

- Focus on the analysis of patterns of discourse structure
  - Potential for elucidating the cycles of decision making that observers believed typified the planning process
  - Analysis of patterns of discourse structure
    - would ‘standardise’ the data and assure higher levels of confidence in any results obtained
    - investigate the suitability of this type of method for military planning and decision making

Example of Opening Move

Excerpt: 4 moves, 3 speaker turns

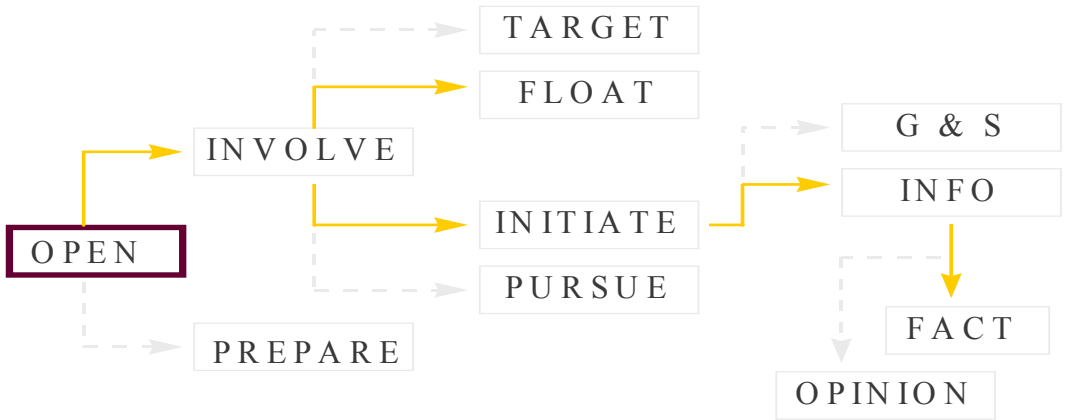
Paul: 1. *Have there been any developments in X-land?*

2. *I heard they are moving west.*

Joan: 3. *Yes, that's correct.*

Bob: 4. *Why is this important at this stage?*

First Move 1: *OPEN; INVOLVE; FLOAT: INITIATE; INFO; FACT*



Summary Experiment 1 Decision Cycles

- Decision closure was typically marked by ‘accordance’ or ‘complying’ moves:
  - Paul: *Yes, okay, that's great...excellent choice*
- Decision cycles not closed by accordance or complying moves were invariably re-visited later.

Decision Cycle Micro Cycles

- Decision cycles tended to contain smaller, ‘micro-cycles’
- Micro-cycles contributed to construction of the overall decision cycle
- Micro-cycles were organised into clear, but short accounts of topic opening, discussion and closure

Data Limitations

- Extract manually transcribed one observer
- Other observations did not satisfactorily yield close to verbatim accounts
- Extract being a ‘best shot’ at manually recording the verbal progression of a planning session
- Between-rater reliability, the extract was categorised in terms of the Speech Function Network by two observers
- Results are represented by extracts from small worked examples with generalisations derived from more extensive analyses of the data

Experiment 2

- Use of Automation: accuracy, reliability & workload
- Automatic Transcription of Meetings
  - integrate current systems for speech recognition and transcription
- Extracting and Retrieving Information from Recorded Interactions
  - Build upon the research already being conducted in intelligent environments (e.g. the Stanford Interactive Workspaces, or the MIT Intelligent Room)
  - Application of topic extraction and summarisation tools
- Organising and Visualising Retrieved Information

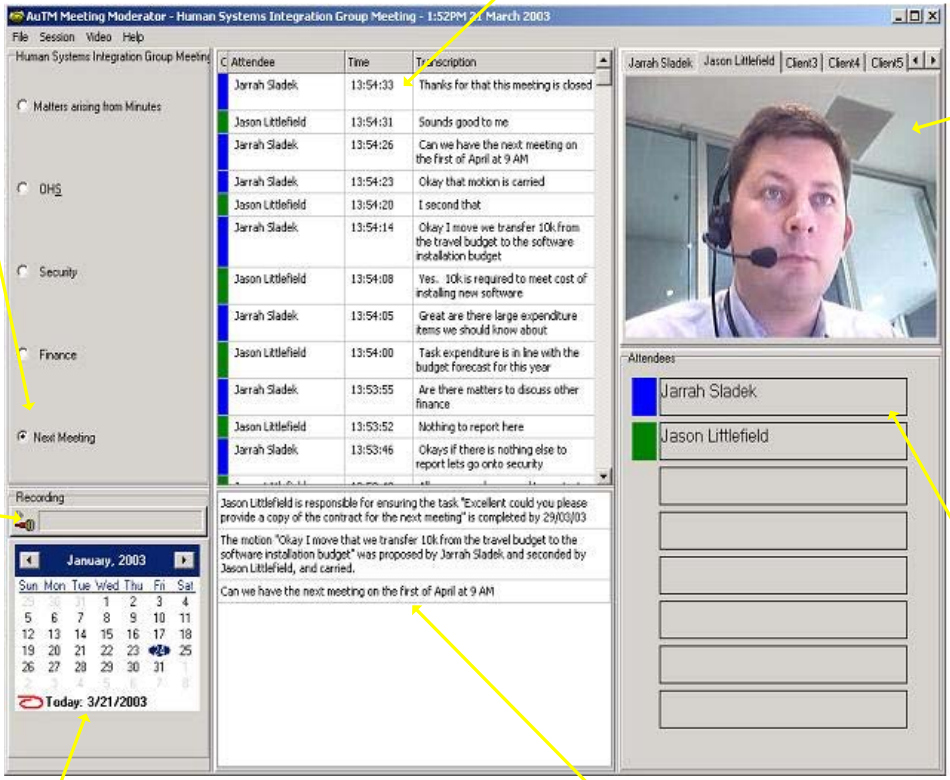
“Intelligent Listening”

1. the ability to recognise and understand communicative intents and speech acts in planning sessions or meetings;

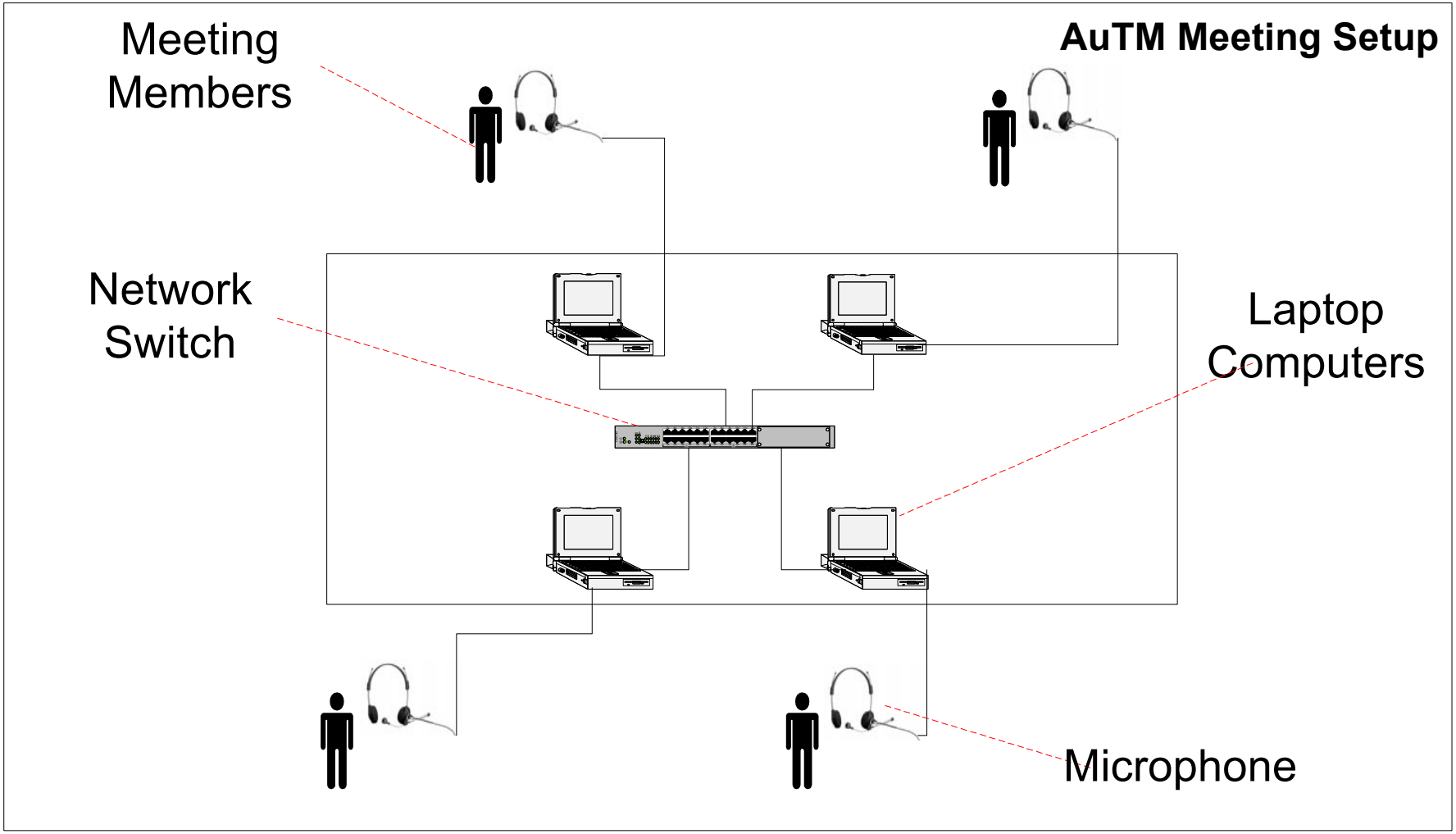
2. the ability to extract and retrieve information from recorded interactions during such sessions or meetings;

3. the ability to organise this information to present it in a useful fashion.

Automatic Transcriber of Meeting (AuTM)



AuTM Schematic Diagram of Meeting Room Setup



Feasibility Experiment at HQJOC

Opportunity to experiment in a live HQ:

1. analytical assessment
2. **assessment and management of security**
3. assessment and management of ethical concerns
4. **assessment of technology for capture**
5. **assessment of processing requirements for captured information**

Technical set-up

- AuTM (version 1.7) configuration:
  - one computer and microphone per participant
  - one participant running a *moderator* program per meeting
  - remaining participants running a *client* program each
- Hardware:
  - laptops for 16 users and 1 server, headsets, USB sound cards
- Organisation
  - installing software on the machines
  - networking the machines
  - placing the equipment on the planning room table

Recording sessions

- initial training
- difficulties during recording:
  - people taking off their headsets
  - networking
  - acoustics of the room
  - users using the experiment equipment or looking at the output
  - some users had not trained with the system (generic profiles)
- positive aspects:
  - kept going for 5 days
  - users got used to the technology (even the headsets)
  - solutions for the difficulties were identified
  - recordings and transcripts for more than half the sessions
  - confirmed planned improvements to system configuration

Lessons Learned

- technical aspects
  - architecture of the system (changed in AuTM version 2.0)
  - networking issues (solved in AuTM version 2.0)
  - user profile management
  - availability of machines to participants
  - importance of improving the speech signal quality
- people aspects
  - accepting the technology
  - awareness of benefits
  - tolerance of inconvenience
- organisational aspects
  - support from end users, support from the hierarchy
  - help from colleagues
- financial aspects
- expect the unexpected!

Example of Automatic Transcription

"Two missions that have **come out of the** two AOCs"

Automatically transcribed as:

*Shows are **come out of the** twoway overseas*

Automatic recognition 4/10 words

Experiment Outcomes

- Understood how the technology can be made to work in the Theatre Planning Group
- Identified improvements to be made to the current AuTM system
- Users realised the utility of the technology
- Assessed the user acceptance of the technology
- **Obtained data for analysis**
- Sowed seeds benefits for Collocated Headquarters

Conclusion

- Future of “Intelligent Listener”:
  - development of AUTM (version 2.0, iScribe and iListen)
- Transcription will provide rich source of data
- Sociolinguistic Analysis of the data
  - Tip of the Iceberg
  - Inform Tool Building

QUESTIONS