



## STUDYING COLLABORATIVE DESIGN IN HIGH BANDWIDTH VIRTUAL ENVIRONMENTS

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## Project Statement

- Project is concerned with:
  - High bandwidth communication systems + the associated commercial tools in the architectural design and construction industry.




## Study Aim and Objectives

**The aim**  
is to evaluate the impact of high bandwidth virtual environments in design practice.

**Objectives:**

- Develop guidelines for
- Analyze and document the collaboration in a virtual environment with

Team members from same company	Team members from different companies
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## Phase 1: Baseline Study

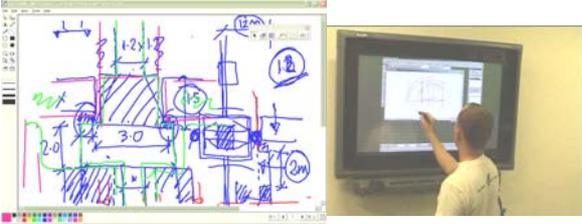
- Set-up for First Study: Use of currently available design and communication technology





## Phase 2: Introducing communication technology

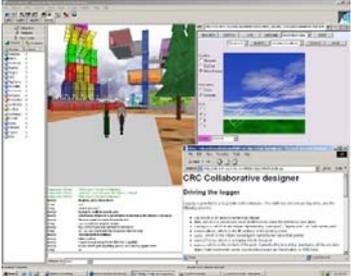
- Set-up for Second Study: Introduction of shared drawing and video communication





## Phase 3: Introducing 3D modeling

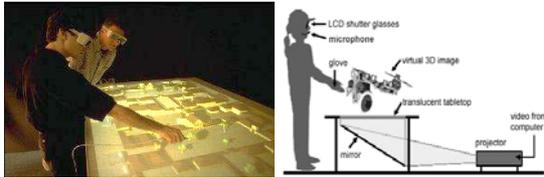
- Set-up for Third Study (A) : Active Worlds on Desktop





## Phase 3: Introducing 3D modeling

- *Set-up for Third Study (B): Introduction of 3D virtual environment*



## Understanding the Collaborative Experience

- Series of studies of design in the work places of the collaborating partners in the project.

Studies of “Design in practice”  
Context Analysis  
Protocol Analysis

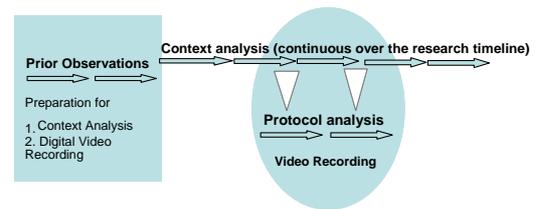
## Context Analysis

- An **informal** mode of description and analysis.

## Protocol Analysis

- A **formal** method: The derivation of data from *verbal* and other *non-numeric* reports (drawings, diagrams, gestures).

## The methods involved over the timeline of the study



## Sydney and Melbourne Offices



## Coding Scheme Development

“Who”

is present during the collaborative activity,

“how” they are communicating,

and “What” they are doing.

We want to explore how much time is spent within *how*, *who* and *what* categories

## How category: Communication medium

- FTF (gesture – talking)
- Phone (talking)
- Fax (words)
- Email (words and attachments)
- Software
- Interruption
- Collaborative drawing (Local /Remote)
- Collaborative modelling (Local/ Remote)



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## How category: Tools

- Sketches / drawings as output
- Reference material as input



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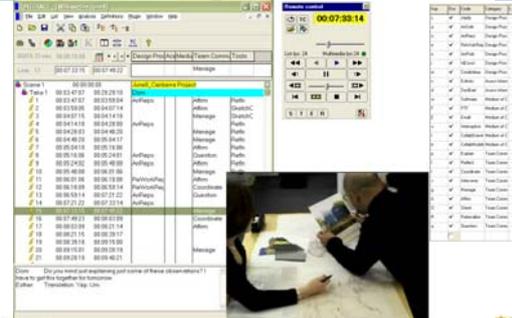
## What category: Content

- **Design Process:**
  - Propose
  - Clarify
  - Analyse Problem
  - Analyse Solution
  - Identify Constraints...
- **Access Information:**
  - Consult external information /Ask for a partner's idea/ view/ decision)
  - Refer to design brief/ client requirements



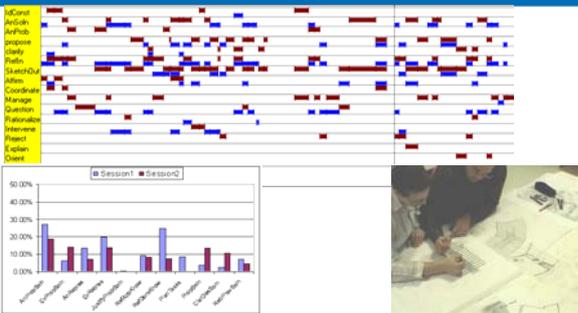
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## “INTERACT” Software for Analysis Design Behavior



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## Protocol Analysis



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## Current Status

- So far we collected data in the work environment (for baseline study) and analyzed parts of the data.
- Data collection continues for second and third phases (introducing shared whiteboard and introducing 3D worlds)



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## Summary & Outcomes

- Three phases  
(baseline, communication technology and 3D worlds)  
allows comparison and the impact of high bandwidth virtual environments to be measured and described.
  - Transferable to other research projects by using the same incremental phases approach
- Coding scheme for analyzing activity
  - Transferable to the study of any collaborative process



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