WHO AM I

RESEARCH INTERESTS

- Human-Computer Interaction (HCI)
- Information Visualization (InfoVis)
- Visual Analytics (VA)
- Computer Supported Collaborative Work
- Large Interactive Surface

Real world problems
Close Collaboration with domain experts

- Business Intelligence
- Intelligence Analysis
- Architecture
- Civil Engineering
METHODS

- Ethnography
- Observational User Study
- Case Study
- System Building
- Qualitative & Quantitative Evaluation
WHO AM I

THEMES

▸ Understanding the need for new technology
▸ Designing visual tools for communication
▸ Helping people to make decision, making info
  ▸ more accessible
  ▸ more meaningful
▸ Evaluating & analyzing the effect
▸ Engaging Public: New media, Visualization
▸ Computational aesthetics
WHO AM I

MY MAIN RESEARCH CONTRIBUTIONS

VAST 2010, InfoVis 2012

HICS 2013, ITS 2011

VAST 2014, Best Paper Award

CSCW 2015, City Life

IEEE VIS 2015, Personal Vis

ICCC 2010, MSc. Thesis
OUTLINE OF THE TALK

- Vision
- Introduction
- A selection of my projects:
  - CLIP
  - Participatory Urban Design
- Contributions
- Vision & Teaching
PRESENT: DESIGN IN COMMUNICATION
This is the way we should be interacting with machines from now on!

Jeff Han, 2006
VISION

- Develop effective and engaging communication technologies
- Bridge the gap between designers and programmers
- Teach and use:
  - More interactive designs
  - Emerging media
FUTURE: DESIGN IN COMMUNICATION

- Interactivity
- Multi-touch/touch
- Sense
- New media
- Immersive displays
HOW I CAN CONTRIBUTE TO DEPARTMENT

- Design theories
- Strong technical background
- HCI techniques
WHY COLLABORATE VISUAL ANALYTICS

- Collaboration
  - Diverse backgrounds and expertise
  - Increasing the quality of work
  - Reducing individual bias
  - Sharing task load

- Visualization/VA
  - Visually representing complex information
  - Interactively exploring relationships in large datasets
CONTEXT

- Task: VAST 2006 challenge, a mystery task
- Dataset: 240 documents
- Setting: Collocated collaborative analysis
LINKED COMMON WORK (LCW)

- **LCW**: automatically identifying and visually representing similarities between collaborators’ work
  - Partial merging
  - Full merging
PARTIAL VS FULL Merging

George
Works
Club

Member
Meetings
Plaza

Laura Alex Mary

ISPS
CLIP: a visual thinking space to support collaborative sensemaking
EVALUATION OF LCW

- Experimental comparison of CLIP to a baseline tool
- Baseline tool: CLIP without LCW
BASELINE TOOL
USER STUDY & DATA GATHERING

- 16 groups of 3, 8 groups in each condition
  - Worked for 90 minutes
  - Used CLIP or Baseline
  - Followed by semi-structured interview
HYPOTHESES

- Linked Common Work will improve:
  - H1: Performance
  - H2: Communication
  - H3: Coordination
  - H4: Awareness
METRICS AND ANALYSIS

- Performance
  - Scoring scheme (from Isenberg et al., 2012):
    - Positive points for finding and connecting relevant facts
    - Negative points for incorrect hypotheses
  - Number of key documents found (out of 10)

- Conversation analysis
  - Classified and counted statements of 7 different types
  - 2 coders, Krippendorff’s alpha = 0.91
  - Spent around 520 hours on data analysis
# METRICS SCHEME

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH</td>
<td>Discussion / generating Hypotheses</td>
</tr>
<tr>
<td>RV</td>
<td>Referring to Visualization</td>
</tr>
<tr>
<td>CO</td>
<td>Coordination</td>
</tr>
<tr>
<td>SA</td>
<td>Seeking Awareness</td>
</tr>
<tr>
<td>VF</td>
<td>Verbalizing Findings</td>
</tr>
<tr>
<td>QF</td>
<td>Question about Findings</td>
</tr>
<tr>
<td>RU</td>
<td>Related but uncategorized</td>
</tr>
</tbody>
</table>
HYPOTHESES

H1: better performance

Key Documents

Score

$\ p < 0.001 \ $
PARTICIPATORY URBAN DESIGN

BEFORE I ARRIVED AT UBC

- **Main Goal:** Engaging Public
  - Use Visualization and collaboration technology

- **Other Goals:** Simplicity, credibility & fast and early feedback
  - **2D:** Familiar visualization and interaction techniques
  - **3D:** Real time

- **Metrics:** Simple visual encodings
DEPLOYED VERSION

- Multi-touch tabletop
- Large-screen wall displays
- Visualization for sustainability metrics
MY ROLE IN THIS PROJECT

▸ What are the limitations of a single shared screen in supporting collaborative analysis scenario?

▸ What are the ways which we can design multi-display eco-system to better support multi-users’ interactions?

▸ Observed the system in action

▸ Interviewed and closely worked with experts

▸ Led the design and mentored 2 students to develop new features

▸ Current stage: evaluation
DESIGN OBJECTIVES

▸ Personal displays
  ▸ Individual space to explore and customize data
  ▸ Support the workflow

▸ Visual history
  ▸ Record and review session history
    ▸ Foster discussion
    ▸ Better comparison, possibly better decisions

▸ Tracking the session

▸ Building models
INTEGRATING INDIVIDUAL DISPLAYS

- iPad 3D viewer app
  - Improve interaction with the 3D wall display
  - Remotely manipulate the 3D view
- iPad indicator app
  - Improve interaction with indicator dashboards
  - Explore and customize indicators
- iPad history app
  - Record and visually represent the interaction history
SUPPORTING GROUP DYNAMICS
INDIVIDUAL & GROUP DISCOVERY
MY MAIN RESEARCH CONTRIBUTIONS

Critical role of note taking

Integrating record keeping

LCW, and metrics

Multi-display eco system

Metrics for engagement

Creativity support tool, ideation
VISION: INNOVATIVE TECHNOLOGY, PROMOTING MULTI-DISCIPLINARY

- Effective & engaging communication technologies
- Bridge the gap between designers & programmers
- Teaching and promoting:
  - More interactive designs
  - More use of interactive media
HOW I CAN CONTRIBUTE TO DEPARTMENT

Helping the department to be a leader in merging:

- strong design background
- strong technical background
- the science of human experience
- the analysis of media, art and culture
TEACHING GOALS

- Prepare students to play a leading role in the inception of new media and the design of innovative technologies.

- Equipping students with the knowledge, skills and experiences that prepare them to work in an ever-changing and challenging world.
TEACHING PHILOSOPHY

- Engaging and motivating students
- Integrating research and teaching
- Providing a collaborative environment
- Being available and accessible
- Fostering creativity & respecting individual differences
- Developing critical thinking & reasoning
TEACHING EXPERIENCES

- TA: CS courses: instructor, marker, admin
- Guest lecturer: several HCI Courses
- Fine art instructor
- Co-founder & instructor, Creative Children Institute
MY FUTURE RESEARCH THEMES

- Media Arts, multi-media environment
- Design for public, design for mobile, multi-touch
- Visual storytelling
- Analyze human behaviour using social media
- Collaborative sketching & note taking
- Visual history
- User engagement
THANKS TO MANY
THANK YOU!

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INTERESTING LINKS

- Jeff Han, Demo, 2007, Multi-touch wall display:
  - https://www.youtube.com/watch?v=JfFwgPuEdSk

- Jeff Han, Ted Talk, 2006:
  - https://www.ted.com/talks/jeff_han_demos_his_breakthrough_touchscreen?language=en

- Interactive data journalism:
  - http://www.macleans.ca/shape-of-the-house/
OBSERVATIONAL STUDY


AWARENESS PROBLEMS

- Notetaker lost track of what others were doing
- Suggests: integrate notes within the application
**COSPACES**


COSPACES
MOST IMPORTANT RESULTS

- Groups found chart saving and note functions very useful
- Worksheet flexibility facilitated analysis
- Tabs were not used as much as we expected
- Use of tabs did not result in noticeable closer collaboration
UNDERSTANDING ENGAGEMENT

Low Engagement

Expose
Involve
Analyze
Synthesize
Decide

High Engagement
WHAT IS HUMAN–COMPUTER INTERACTION (HCI)

- The design and evaluation of systems, applications, or devices that utilizes computation or information and communication technology to support human activity in a manner that respects the users physical, cognitive, social, and cultural needs and aspirations.