

# InfoVis Group Research

Tamara Munzner

[@tamaramunzner](#)

**Department of Computer Science**

University of British Columbia

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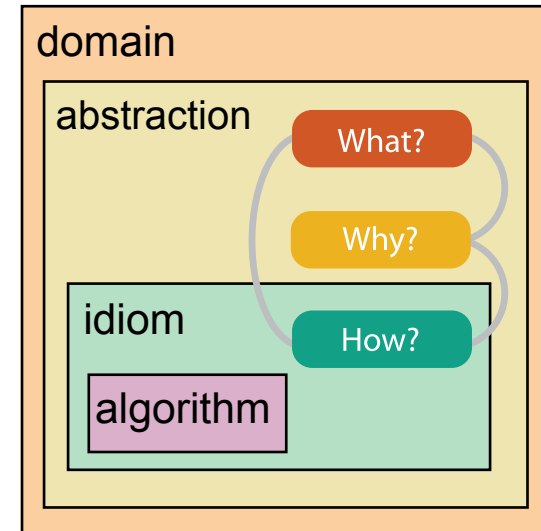
**<http://www.cs.ubc.ca/~tmm/talks.html#344-outro21>**

# Visualization defined & motivated

- computer-based visualization systems
  - provide visual representations of datasets
  - designed to help people carry out tasks more effectively.
- suitable when
  - there is a need to augment human capabilities
  - rather than replace people with computational decision-making methods

# Nested model: Four levels of visualization design

- *domain situation*
  - who are the target users?
- *abstraction*
  - translate from specifics of domain to vocabulary of vis
    - **what** is shown? **data** abstraction
    - **why** is the user looking at it? **task** abstraction
- *idiom*
  - **how** is it shown?
    - **visual encoding** idiom: how to draw
    - **interaction** idiom: how to manipulate
- *algorithm*
  - efficient computation





[A Nested Model of Visualization Design and Validation. Munzner. *IEEE TVCG* 15(6):921-928, 2009 (Proc. InfoVis 2009).]


[A Multi-Level Typology of Abstract Visualization Tasks. Brehmer and Munzner. *IEEE TVCG* 19(12):2376-2385, 2013 (Proc. InfoVis 2013).]

# Why is validation difficult?

- different ways to get it wrong at each level

 **Domain situation**  
You misunderstood their needs

 **Data/task abstraction**  
You're showing them the wrong thing

 **Visual encoding/interaction idiom**  
The way you show it doesn't work

 **Algorithm**  
Your code is too slow

[A Nested Model of Visualization Design and Validation. Munzner. *IEEE TVCG* 15(6):921-928, 2009 (Proc. InfoVis 2009).]

# Evaluation: broadly interpreted

- methods from many fields, qualitative & quantitative
  - controlled experiments in lab, field studies of deployed systems

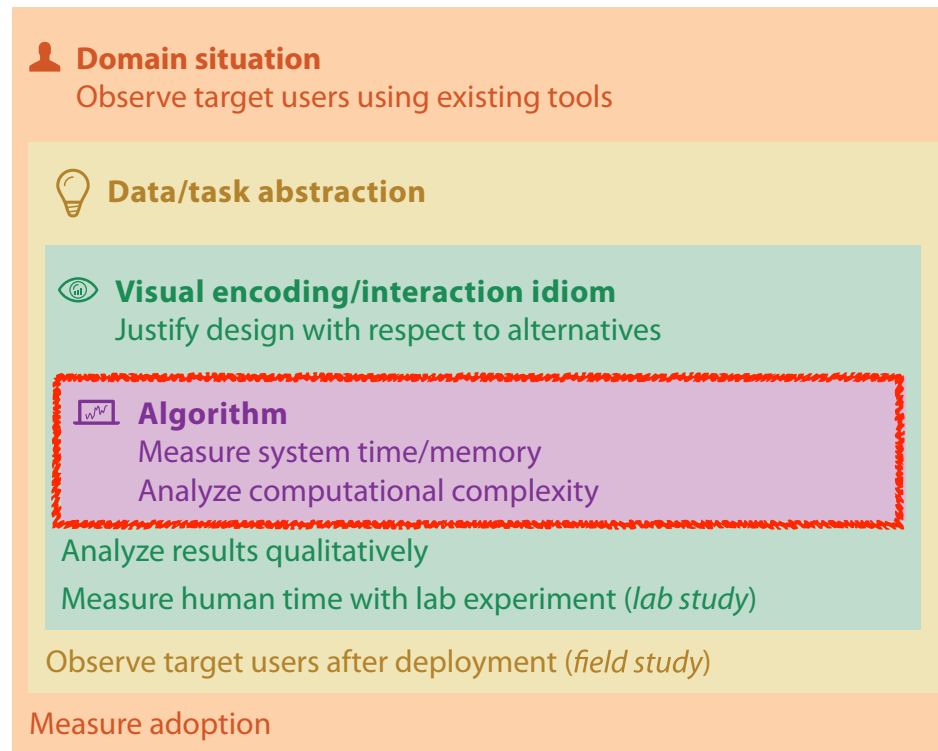
anthropology/  
ethnography

design

computer  
science

HCI/  
psychology

anthropology/  
ethnography

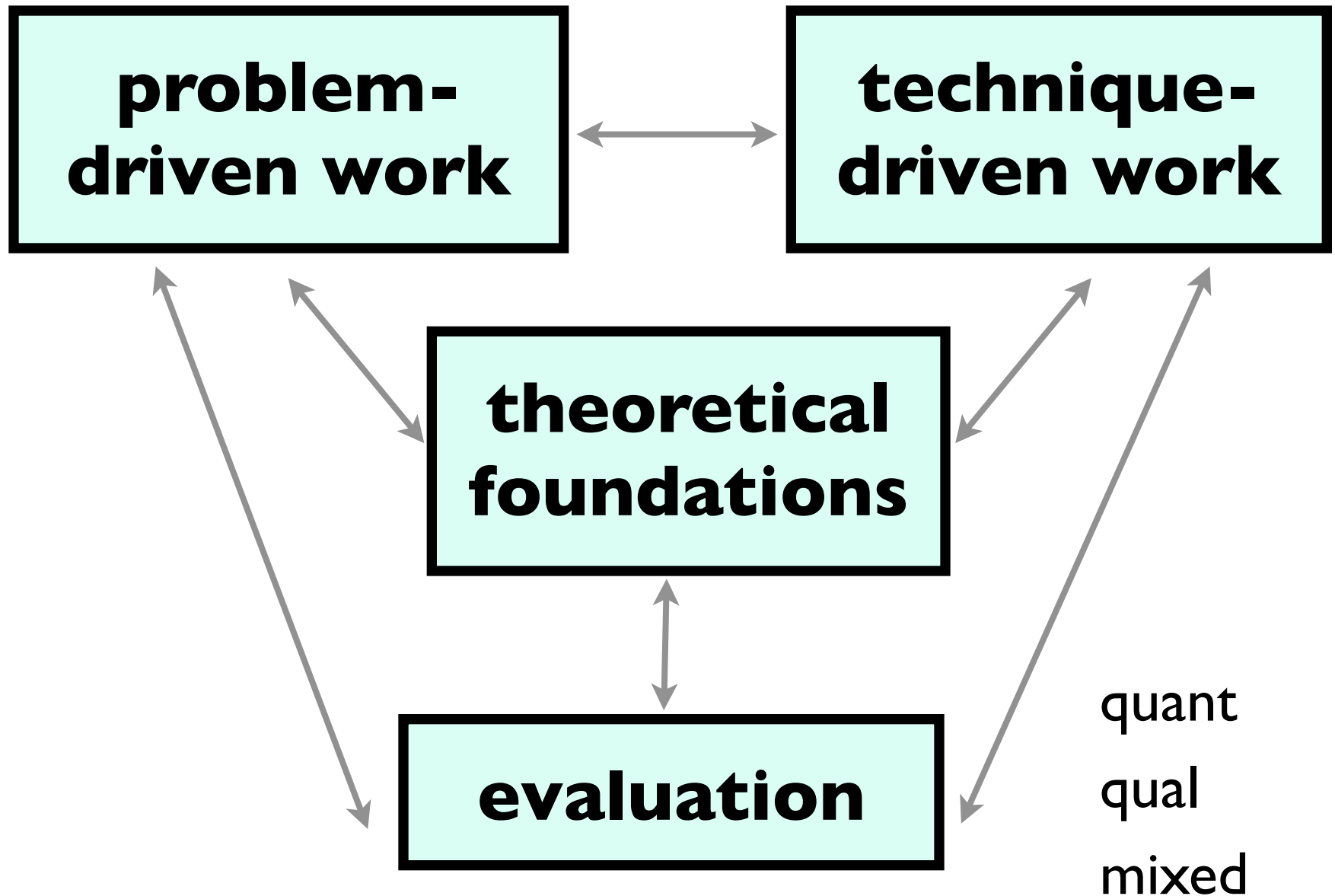


problem-  
driven work

↓

technique-  
driven work

[A Nested Model of Visualization Design and Validation. Munzner. *IEEE TVCG* 15(6):921-928, 2009 (Proc. InfoVis 2009).]



# Problem-driven work

- design studies
  - in collaboration with target users
    - real data, real tasks
    - intensive requirements analysis
  - iterative refinement
    - deploy tools/systems
  - typical evaluation: field studies
    - pre-design & post-deployment, often qualitative
  - opportunistic collaboration
    - many domains, industry & academia

# Design studies: domains

- many domains
  - fisheries, in-car networks, journalism, ...
- genomics
  - Harvard Med School, BC Cancer, UBC Biodiversity, Agilent, ...
- log analysis
  - Google web search, AT&T web hosting, Mobify e-commerce
  - building & energy usage



# Ocupado design study

## Ocupado: Visualizing Location-Based Counts Over Time Across Buildings

Michael Oppermann

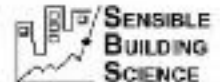
Tamara Munzner



THE UNIVERSITY  
OF BRITISH COLUMBIA



Project partner:



<https://youtu.be/KcwjVK8eUdw>

# Technique-driven work

- **scalable algorithms & systems**
  - typical evaluation: computational benchmarks
- **new visual encoding & interaction techniques**
  - typical evaluation: controlled experiments with people (quant)
  - typical evaluation: qualitative assessment
- **areas**
  - graph drawing, dimensionality reduction
  - human-in-the-loop curation/assessment of ML results

# TimelineCurator

The screenshot shows the TimelineCurator interface for 'Iceland & Denmark'. At the top, the browser address bar shows the URL: [www.es.abc.ca/grip/itools/software/TimeLineCurator/NEExport/NI-IcelandDenmark](http://www.es.abc.ca/grip/itools/software/TimeLineCurator/NEExport/NI-IcelandDenmark). The main timeline features a horizontal axis from 1900 to 2010, with blue and red dots representing events and horizontal bars indicating durations. Below the timeline is a list of events with their dates and titles, and a detailed text description of Danish pop music history.

Date	Title
1929	First radio broadcast
1956	The first Danish pop music album
1956	Jas & Kalle
1960 - 1970	At the end of the 60s
1960 - 1970	More progressive rock was made
1960 - 1970	Popular rock and folk music in
1966	In 1966 they make a
1966	In 1966 the blues-rock company
1966	who ran blues is founded in
1970	It only came to one
1970 - 1980	In the seventies the biggest
1970 - 1980	In the seventies the bottom
1975	Charlotte Parham Larive
1975	In 1975 a guitar came back
1978	Punk in Denmark in 1978
1979	Kalle Mathieson recorded his first
1979	It was not until 1979
1980 - 1990	The scene made it clear
1980 - 1990	The definite breakthrough of Amer
1986	Superstar
1990 - 2010	Some of the best in it

**Iceland & Denmark**

In this timeline we overview the history of pop music in Iceland and in Denmark.

**Iceland** **Denmark**

The first Danish pop music dates from 1956 and was influenced from Elvis, local folk music and skiffle. The basic playing instrument is the guitar. The first band to make it into the US charts was Tiger Lilianna, born 1956. Their success leads to the start of the first popstars. In the 60s the local scene gets influenced by the British beat invasion. Groups like The Beatles, The Searchers & The Shadows with Torrie Seebach on vocals (with the hit 'Can't') and Peter Stoll & The Defenders all follow in their footsteps. At the end of the 60s progressive music becomes more experimental with space guitars and jazz influences. The first band that creates this music in the Danish language is Steppenwolf (translated: Steppenwolf) with Ole Skole on vocals. It stayed with just one album due that Skole disappeared during a hippie-trip in Afghanistan. Band member Sig Møller continues a solo career with the one-step music. In 1966 the blues-rock company Rock Max with the brothers Lars and Troels Tind becomes popular with political central folk music. In the seventies the bottomers would also work rock. The band Savage Rose with singer Annette and Thomas Neppgaard perhaps the best known bluesband that come from this period. In the 1970s, following trends from North America and the United Kingdom, Danish pop music starts to change and audiences fragment.

Essential for Danish pop is the halcyon place of Aarhus where a lot of pop music originates. In the seventies many music acts from in Denmark began to experiment with new sounds that influenced the scene.

This timeline was created with TimelineCurator

<https://youtu.be/Lff398EEswM>

# Grad course: CPSC 547

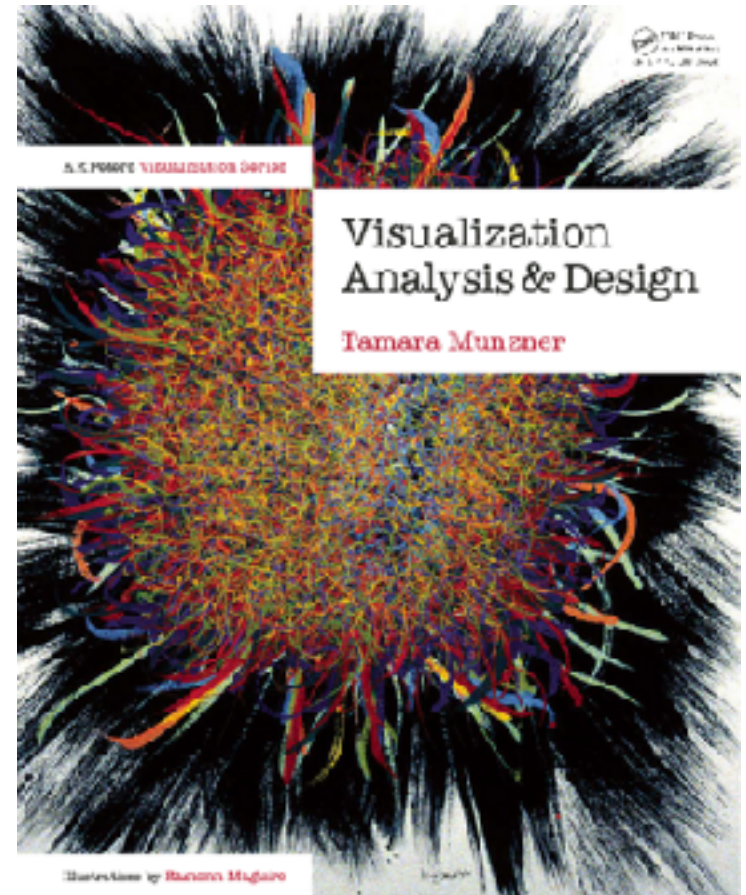
- teaching now, final presentations Wed Dec 10
  - 2-5:30pm, FSC 2330, you're invited!
  - topics <https://www.cs.ubc.ca/~tmm/courses/547-21/projects.html>
    - Hood Hunter: A House Hunter's Guide to Narrowing Neighbourhoods
    - Drinking Behavior Patterns in Dairy Cattle
    - Multiscale Visualization of Pathogenic Structural Variants
    - A New City Map
    - What Can We Learn From User-Movie Ratings?
    - SoundMap: A Visualization Tool to Explore Multi-Attribute Sound Data
    - MultiModalTopicExplorer: Topic modeling for exploring multi-modal data from asynchronous online conversations
    - PartViz: Visualizing Graph Partitioners
    - Explorify: A Personalized Interactive Visualization Tool for Spotify Listening History
    - Necklace Maps for COVID-19 Visualization
    - Definitions and Aspects of Visualization Literacy: A Survey
    - Course Friction Explorer: Visualizing and Validating Indicators of Student Struggle
    - Visualizing Android Features Through Time
    - Visualizing the Run Time Execution of Command Patterns

# Ugrad course: CPSC 436V

- new-ish, third offering is Jan 2022
  - previous offering
    - <https://www.students.cs.ubc.ca/~cs-436v/21Jan/>
- 4th year majors course
  - theory: visualization foundations
  - tooling: D3.js
  - prereq: CPSC 310
  - HCI not required, but very helpful
  - just 5 spots left!

# More info

- book (free through UBC library)  
<http://www.cs.ubc.ca/~tmm/vadbook>
- papers, videos, software, talks, courses  
<http://www.cs.ubc.ca/group/infovis>  
<http://www.cs.ubc.ca/~tmm>



**Visualization Analysis & Design**