

# InfoVis Group Research

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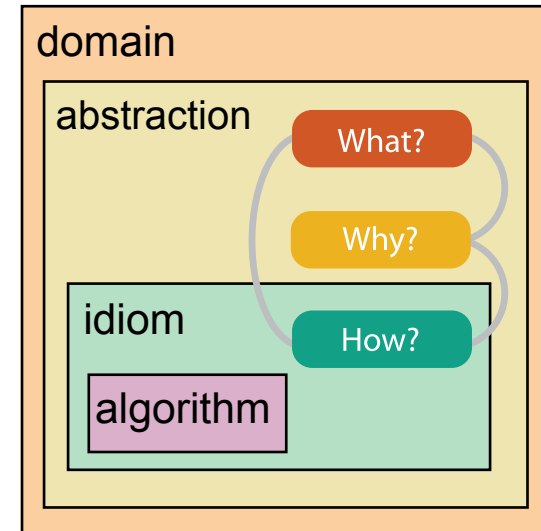
**[www.cs.ubc.ca/~tmm/talks.html#344-outro23](http://www.cs.ubc.ca/~tmm/talks.html#344-outro23)**

# 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

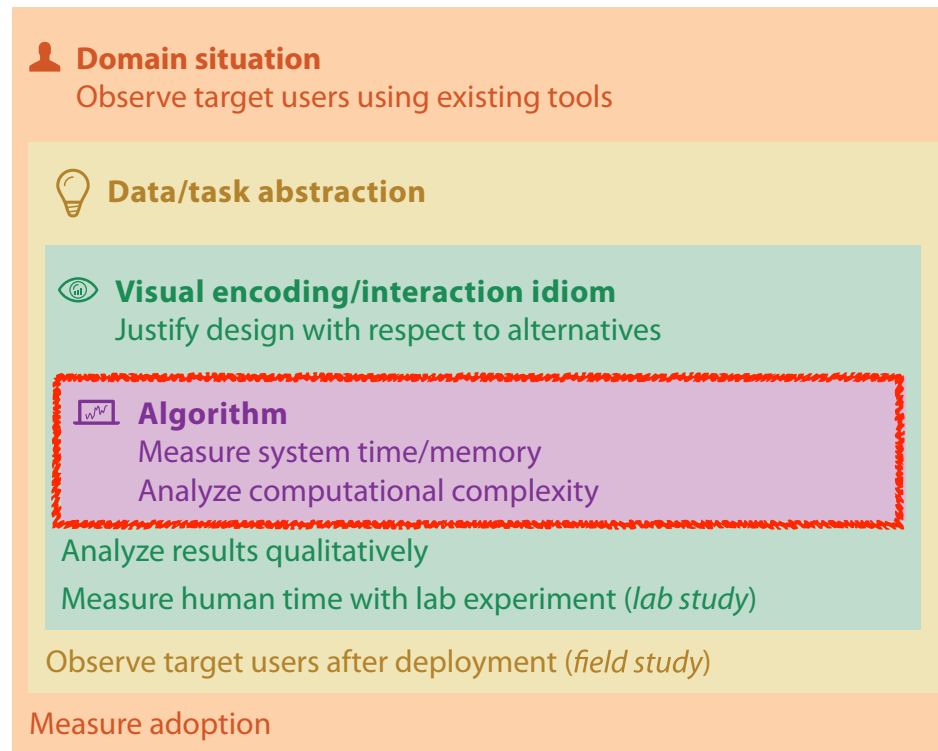
anthropology/  
ethnography

design

computer  
science

HCI/  
psychology

anthropology/  
ethnography

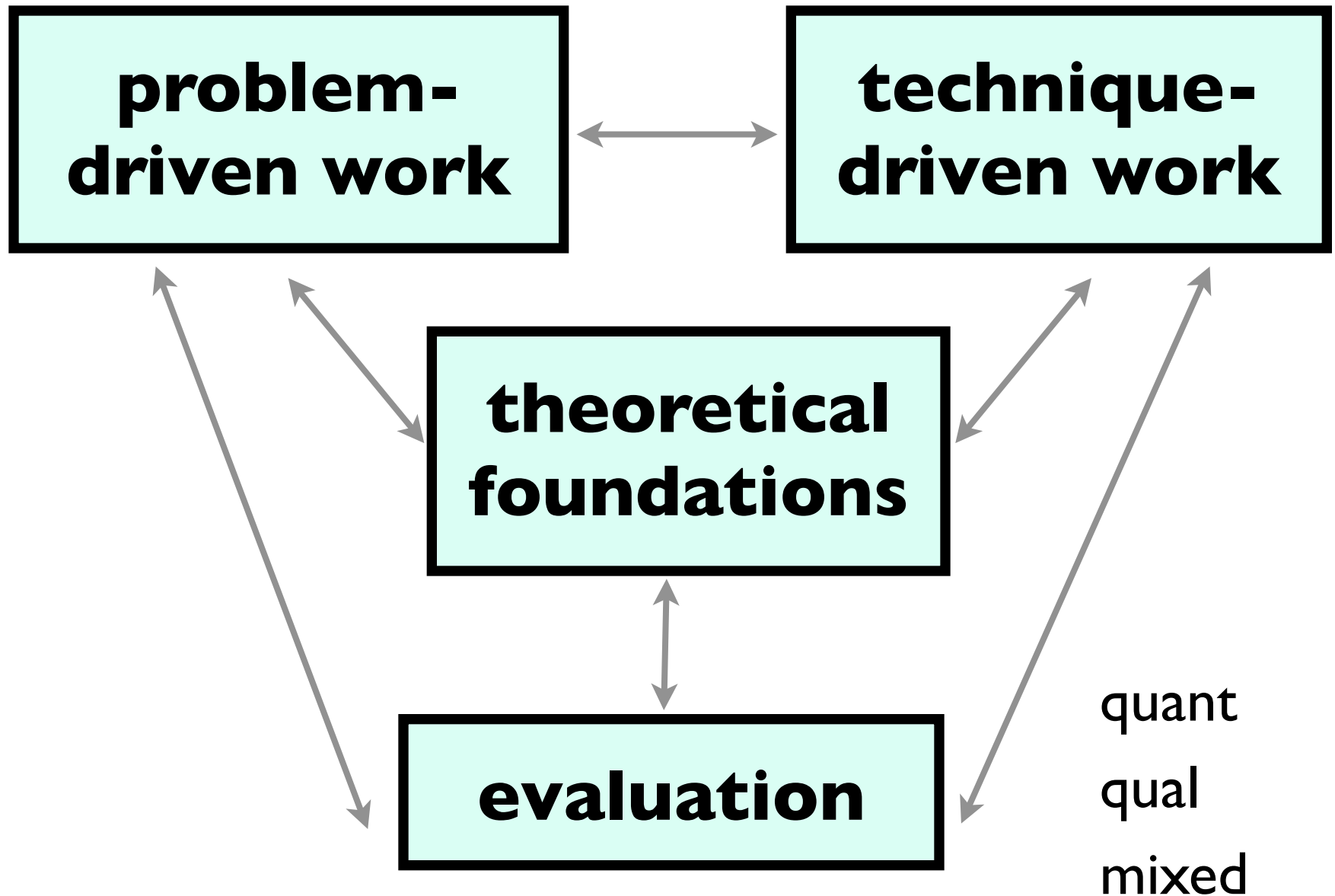


problem-  
driven work

↓

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

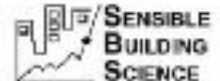
Tamara Munzner



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'. The top part features a horizontal timeline 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 columns for Date and Title. The right side of the interface contains a detailed text description of Danish pop music history, starting from the 1950s and mentioning bands like The Beatles and Steppenwolf.

Date	Title
1929	First radio broadcast
1956	The first Danish pop music album
1956	Jas & Cade
1960 - 1970	At the end of the 1960s
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 stealer-rock company
1966	who ran Stealer 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 Randam Larive
1975	In 1975 a popular came back
1978	Punk in Denmark in 1978
1979	Kold Martinsen recorded his first
1979	It was not until 1979
1980 - 1990	The same time it came
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** **2**

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 Lili & Kyle even make it into the US charts with Tiger Lili & Kyle. Their success leads to the start of the band Lillipops. In the 1960s the local scene gets influenced by the British beat invasion. Groups like The Beatles, Sir Henry & his Sisters 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 1960s pop 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-time member. In 1968 the stealer-rock company Mad Max with the brothers Lars and Troels Trind becomes popular with political content folk songs. In the seventies the bottomers would also work roles. The band Savage Rose with singer Annette and Thomas Neppgaard perhaps the best known band that came 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 rock musicians in Denmark began to experiment with new sounds that influenced some.

This timeline was created with TimelineCurator

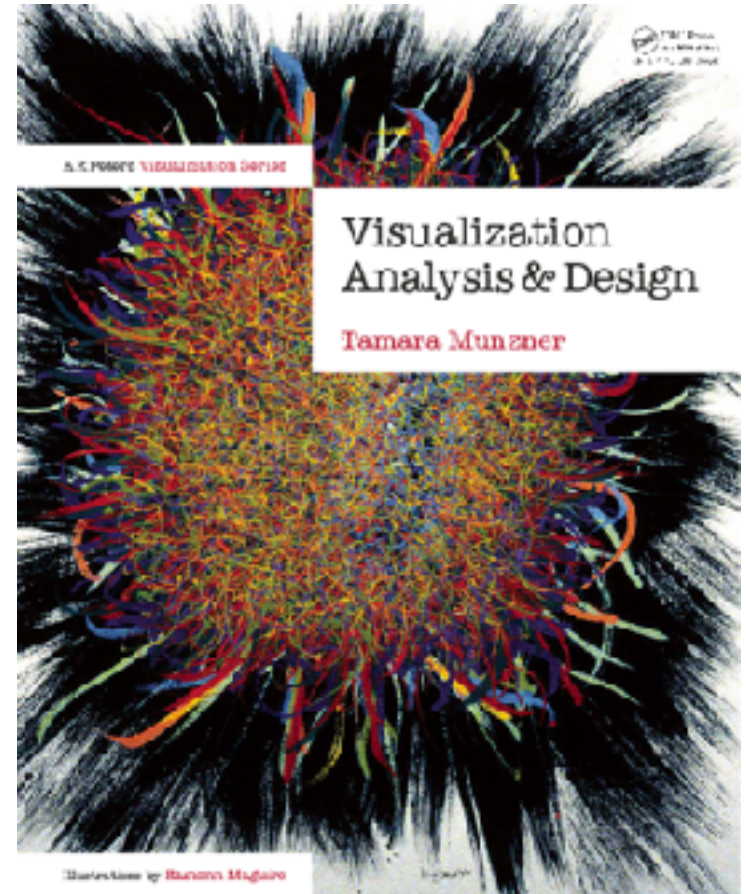
<https://youtu.be/Lff398EEswM>

# Courses

- grad course CPSC 547: next offering Sep 2025
- new-ish ugrad course: CPSC 447
  - (first three years was CPSC 436V)
  - current offering
    - <https://www.students.cs.ubc.ca/~cs-447/23Jan/>
  - next offering Sep 2023, then Jan 2025
  - 4th year majors course
    - theory: visualization foundations
    - tooling: D3.js
    - prereq: CPSC 310
    - HCI not required, but very helpful

# 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**