DESIGN STUDY METHODOLOGY:
Reflections from the Trenches and the Stacks

Michael Sedlmair, Miriah Meyer, Tamara Munzner
Design Study

Definition
• A project
• a specific real-world problem
• design a visualization system
• validate the design
• reflect about lessons learned

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner’s Design Study Methodology talk
Design Study

real people and real data, collaboration is (often) fundamental

Definition
• A project
• a specific real-world problem
• design a visualization system
• validate the design
• reflect about lessons learned

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner’s Design Study Methodology talk

Design Study

implications: requirements, multiple ideas

Definition
• a project
• a specific real-world problem
• design a visualization system
• validate the design
• reflect about lessons learned

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner’s Design Study Methodology talk
Design Study

Definition

• A project
• a specific real-world problem
• design a visualization system
• validate the design
• reflect about lessons learned

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner's Design Study Methodology talk

Design Study

Definition

• A project
• a specific real-world problem
• design a visualization system
• validate the design
• reflect about lessons learned

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner's Design Study Methodology talk
9-stage Framework
How to do a Design Study?

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner's Design Study Methodology talk

...
Precondition: Learn

- solid knowledge of
- the visualization literature,
- possible visual encodings
- possible interaction techniques,
- existing design guidelines, and
- evaluation methods.

This visualization knowledge will inform all later stages.
Precondition: Winnow

- identify the most promising collaborations.
- a lengthy process of separating the good from the bad
- careful selection is necessary
- not all potential collaborations are a good match

Premature commitment to a collaboration is a very common pitfall that can result in much unprofitable time and effort.

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner’s Design Study Methodology talk
Precondition: Winnow

**considerations**

Have data?  
Have time?  
Have need?

...  
Interesting problem?

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner’s Design Study Methodology talk

---

Precondition: Winnow

**roles**

Are you a user???

... or maybe a fellow tool builder?

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner’s Design Study Methodology talk
Precondition: Winnow

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner's Design Study Methodology talk

initial conversation

(potential collaborators)

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner's Design Study Methodology talk
Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner’s Design Study Methodology talk
Collaborator Winnowing

Talk with many, stay with few!

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner's Design Study Methodology talk
Precondition: Winnow

- Does real data exist, is it enough, and can I have it?
- How much time do they have for the project, and how much time do I have? How much time can I spend in their environment?
- Is there an interesting visualization research question in this problem?
- Is there a real need or are existing approaches good enough?
- Am I addressing a real task? How long will the need persist? How central is the task, and to how many people?
- Establishment of rapport?

Premature commitment to a collaboration is a very common pitfall that can result in much unprofitable time and effort

Precondition: Cast

Identify Collaborator Roles

- **front-line analyst** - who will use the new visualization tool
- **gatekeeper** - power to approve, including authorizing people and release of the data
- **connectors** - connect the visualization researcher to other parties.
- **translators** - good at abstracting their domain problems into a more generic form, and relating them to larger-context domain goals
- **co-authors** are part of the paper writing process;
- **fellow tool builders** – will probably have their own tool agenda

user-centered design distinguishes users, stakeholders, researcher
Core: Discover

- learn about target domain – the practices, needs, problems, and requirements of the domain experts
- focus on both problematic and successful aspects
- related to – requirements analysis, interviewing and observing
- problem characterization and abstraction is iterative and cyclic - through all subsequent stages
- abstraction should frequently be validated
- talking is necessary but typically not sufficient. People’s descriptions are often incomplete
- combination of methods including interviews and observations

Core: Design

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner’s Design Study Methodology talk
Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner's Design Study Methodology talk
**METAPHOR**

**Design Space**

[Diagram showing a design space with 'know', 'consider', 'propose', and 'select' buttons highlighted.]

Adapted from Michael Sedlmair, Miriah Meyer, Tamara Munzner's Design Study Methodology talk
Core: Design

• Think broadly!

Core: Implement

• Rapid prototyping
• Do paper prototypes
• Usability – too much and too little focus
• Inspection methods
Core: Deploy

- Let them try it
- Lab studies
- Field studies
- Case studies – long term field usage

Analysis: Reflect

- how a specific design study relates to visualization research
- crucial for adding to the body of knowledge
- allowing other researchers to benefit from the work
- improving currently available design guidelines
  previously proposed guidelines can be
  - confirmed, by substantiating further evidence of their usefulness;
  - refined or extended with new insights;
  - rejected when they are applied but do not work
  - or new guidelines might be proposed
Analysis: Write

- few weeks is usually not enough, and a few months
- time to revisit abstractions, to identify contributions, and to come up with a coherent and understandable line of argumentation.
- writing phase inevitably forces revisiting the abstractions to clearly articulate them.
- many additional insights have emerged in the intervening stages.
- a pitfall in writing is too much domain background