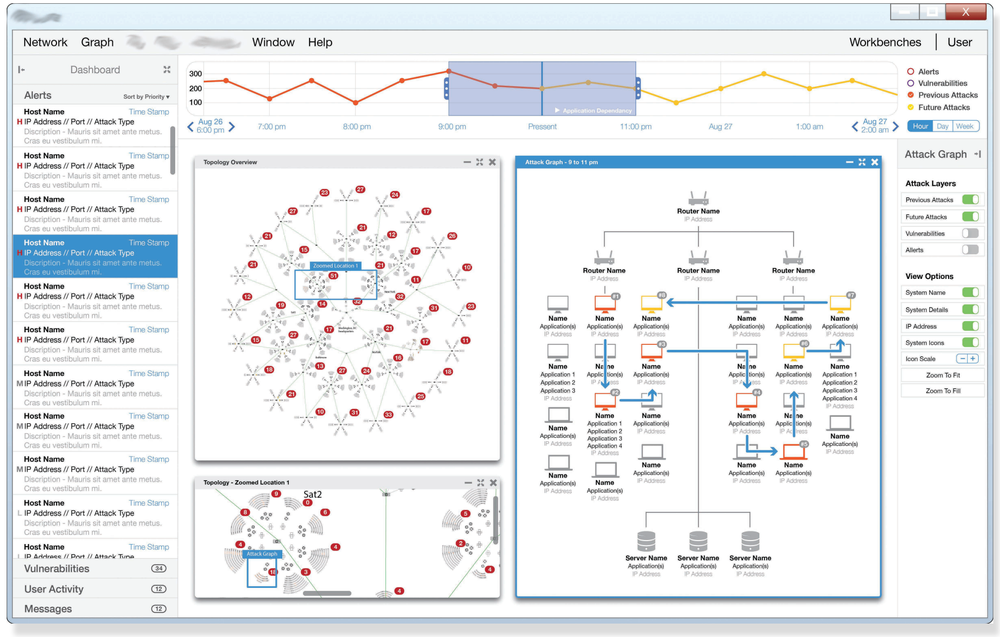
Design Activity Framework for Visualization Design

Sean McKenna, Dominika Mazur, James Agutter, Miriah Meyer
University of Utah

visualization design

What We Did



cybersecurity **redesign** project

Who We Are

visualization experts

psychologist

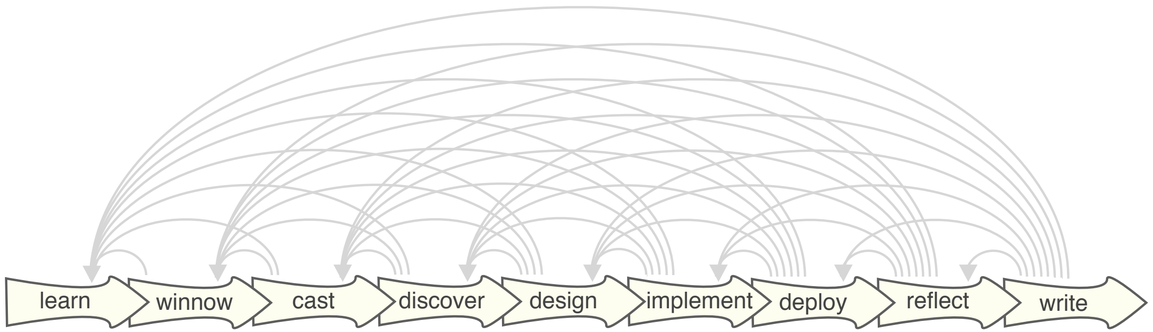
designer

visualization & creative re-**design**

Challenges

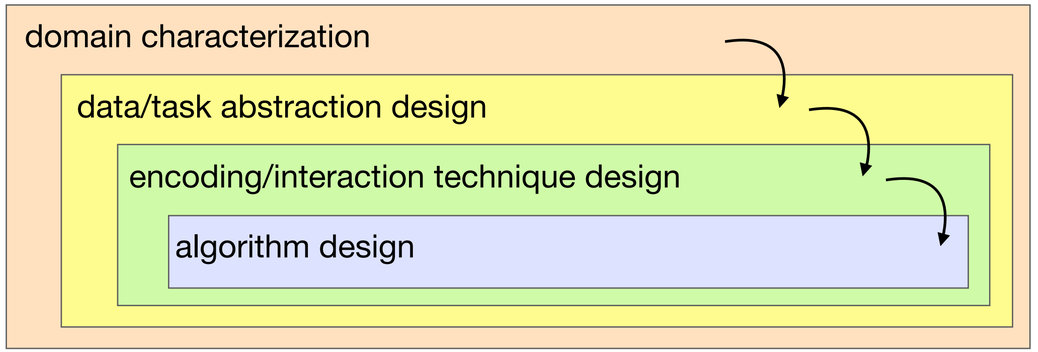
- connect **actions we take** and **decisions we make**

process models



Sedlmair et al, “Design study methodology” 2012

decision models

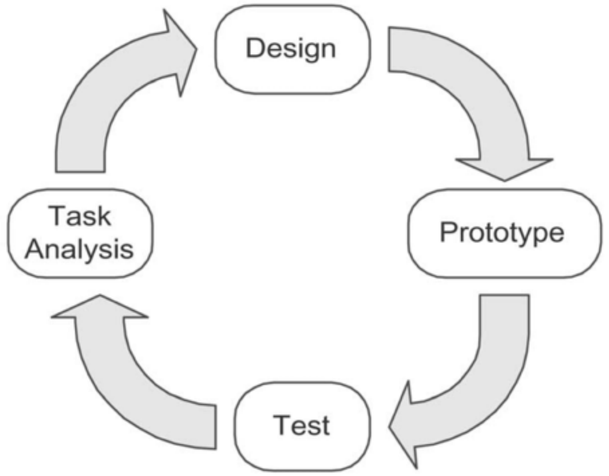


Munzner, “A Nested Model for Visualization Design and Validation” 2010

Challenges

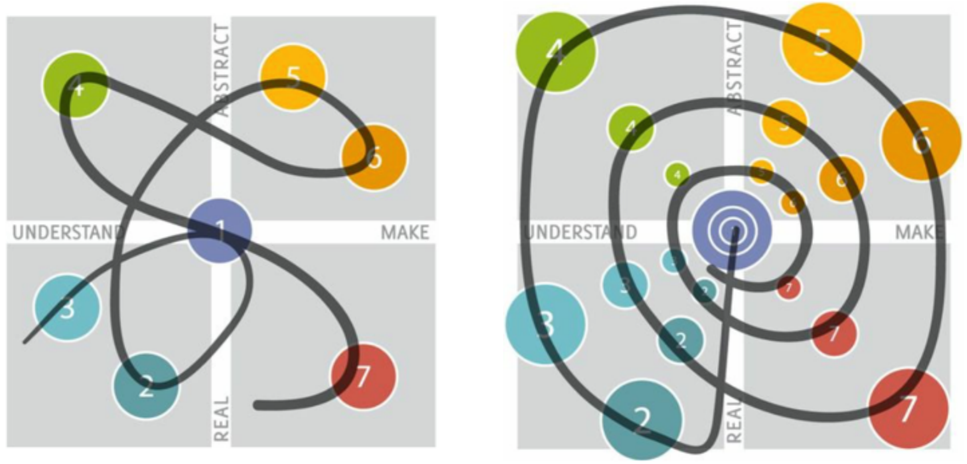
- support a **more flexible** design process

engineering process



Tory & Möller, “Human factors in visualization research” 2004

creative process



Kumar, 101 Design Methods, 2012

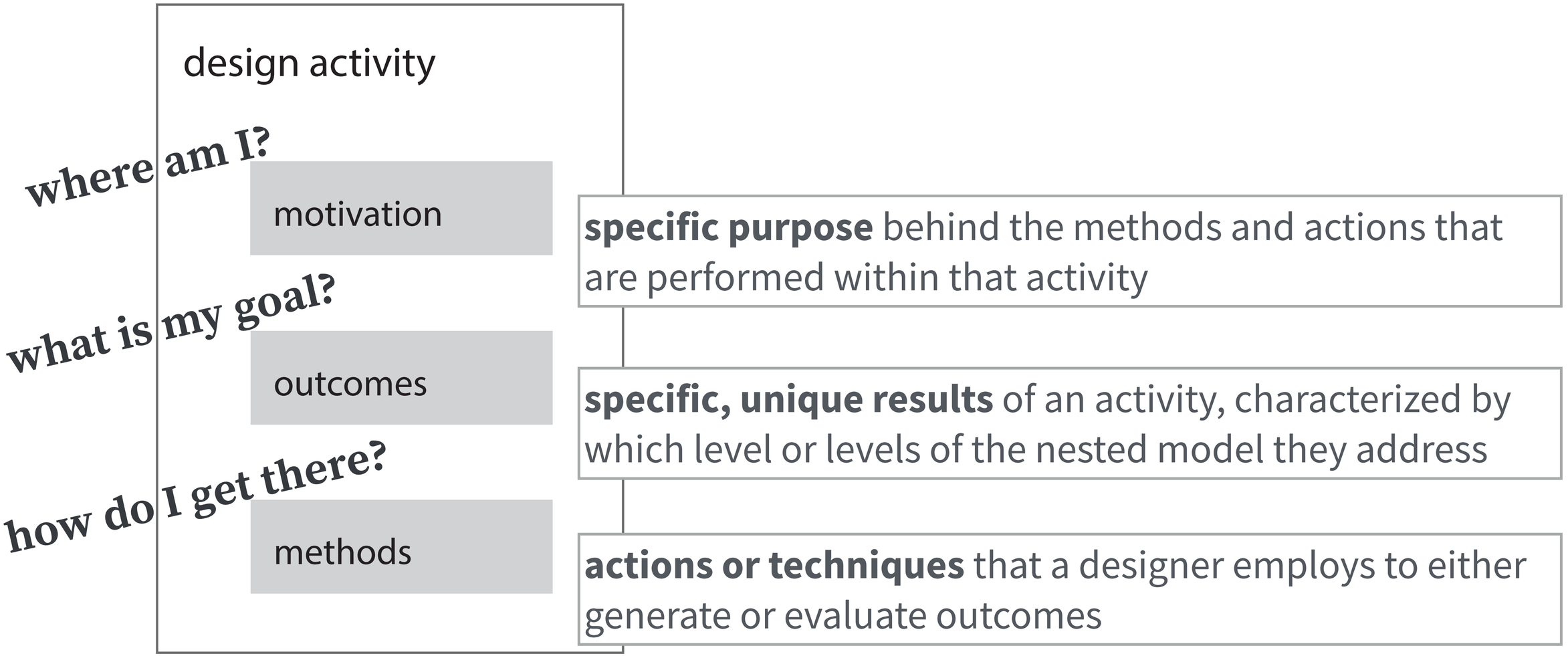
- where am I?
- what is my goal?
- how do I get there?

actionability

+

flexibility

Design Activity Framework



Design Activity Framework

four activities

***u**nderstand*

***i**deate*

***m**ake*

***d**eploy*

design activity

motivation

outcomes

methods

- **where am I?**
- what is my goal?
- how do I get there?

Design Activity Framework

***u**nderstand*

motivation: finding the needs of the user

***i**deate*

generate good ideas to support needs

***m**ake*

concretize ideas, make them tangible

***d**eploy*

bring a prototype into effective action

- where am I?
- **what is my goal?**
- how do I get there?

Design Activity Framework

***u**nderstand*

motivation: finding the needs of the user
outcome: sets of design requirements

***i**deate*

generate good ideas to support needs
sets of ideas

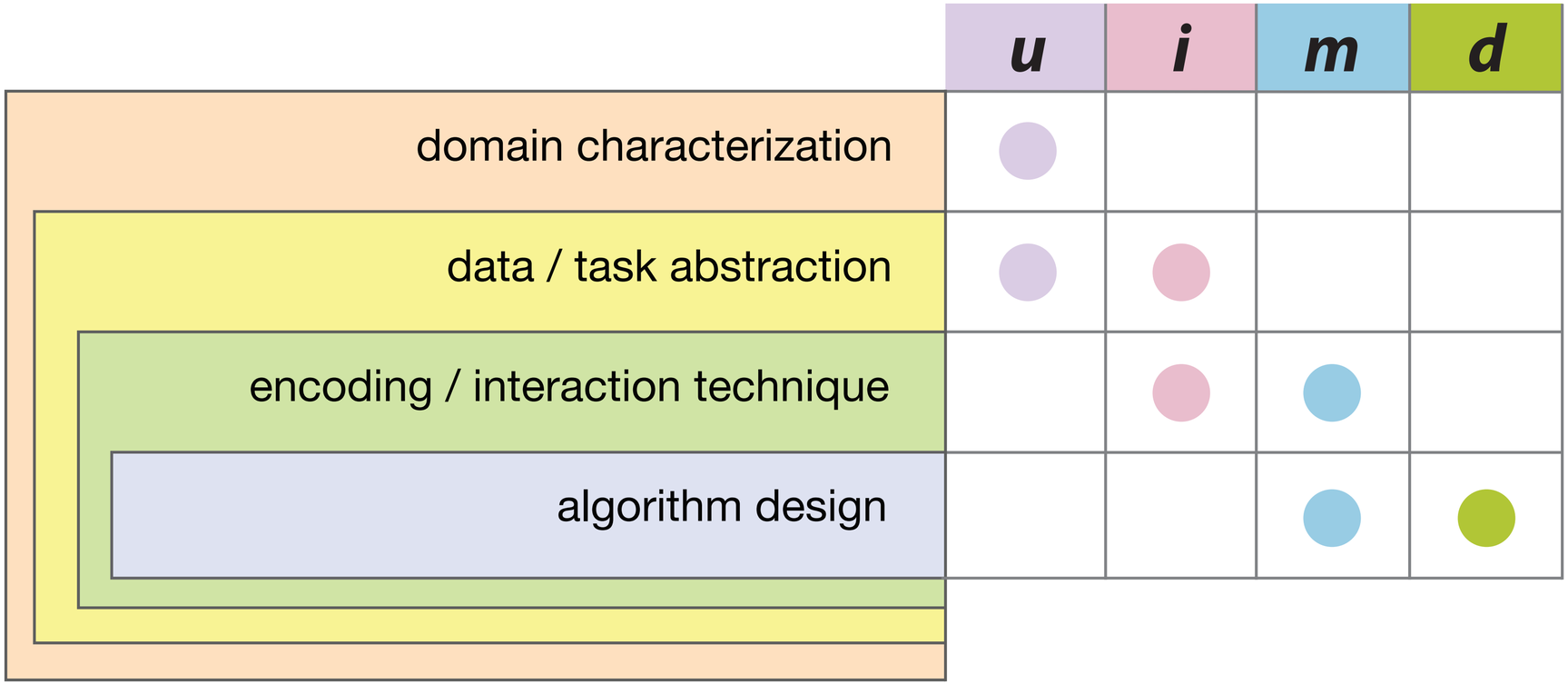
***m**ake*

concretize ideas, make them tangible
sets of prototypes

***d**eploy*

bring a prototype into effective action
visualization system

Design Activity Framework



understand

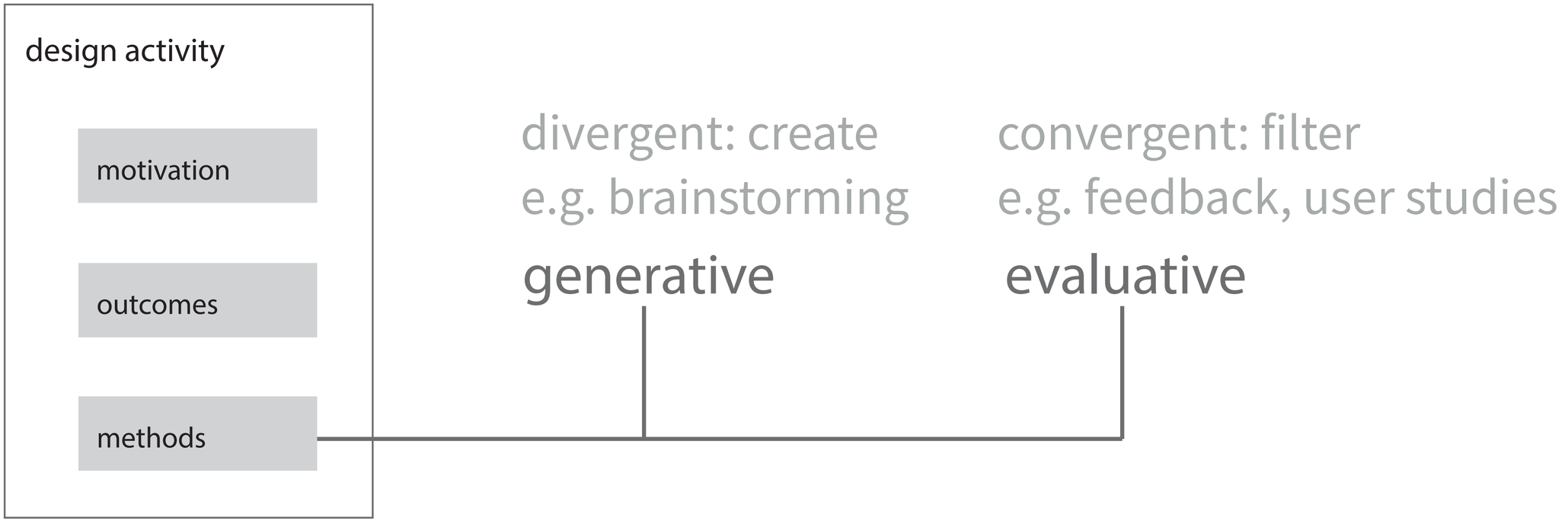
ideate

make

deploy

- where am I?
- what is my goal?
- **how do I get there?**

Design Activity Framework

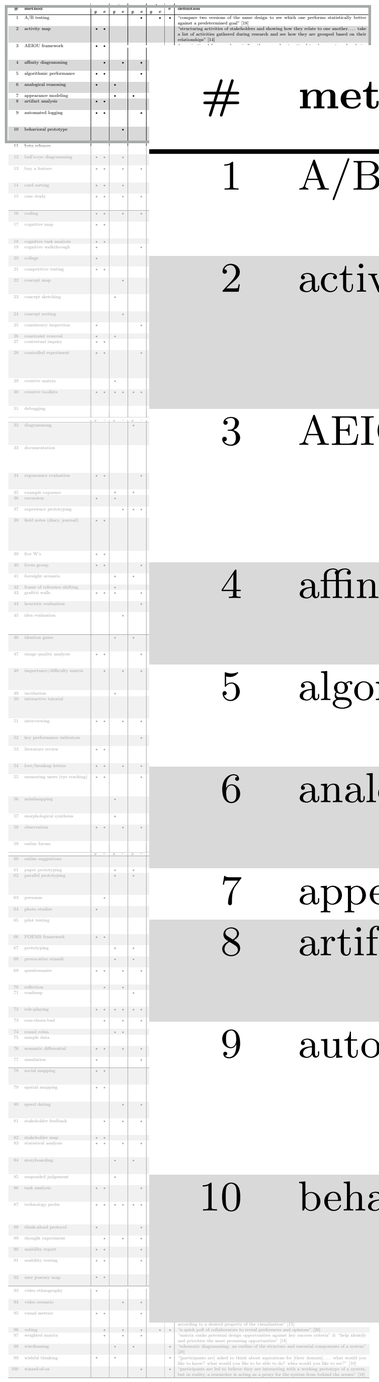


***u**nderstand*

***i**deate*

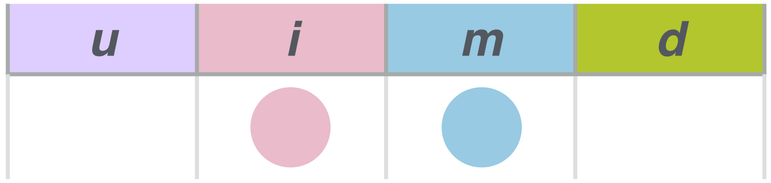
***m**ake*

***d**eploy*



#	method	u g	u e	i g	i e	m g	m e	d g	d e	v	definition
1	A/B testing						•		•	•	"compare two versions of the same de against a predetermined goal" [18]
2	activity map	•	•								"structuring activities of stakeholders a a list of activities gathered during rese relationships" [14]
3	AEIOU framework	•	•								"organizational framework reminding t formation under a guiding taxonomy of Users" [18]
4	affinity diagramming		•		•		•				"process used to externalize and meaning keeping design teams grounded in data
5	algorithmic performance	•	•				•		•	•	"quantitatively study the performance examples include measurements of rend
6	analogical reasoning	•		•						•	"cognitive strategy in which previous kn requirements of a novel situation" [8]
7	appearance modeling			•		•		•			"refined model of a new idea that emph
8	artifact analysis	•	•							•	"systematic examination of the materia tributes to an understanding of their ph
9	automated logging	•	•				•		•	•	"captures the users' patterns of activity error message, menu-item selection, dialo or web-page access. . . . can also capture
10	behavioral prototype				•						"simulating situations of user activity cepts. . . . through observation and conv on the concepts" [14]

Methods: Paper Prototyping

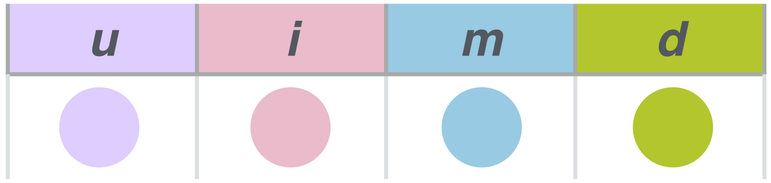


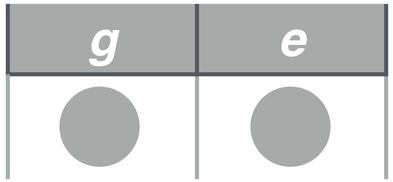
"create a **paper-based simulation of an interface** to test interaction with a user"

Maguire, "Methods to support human-centred design" 2001

Lloyd & J. Dykes, "Human-centered approaches in geovisualization design" 2011

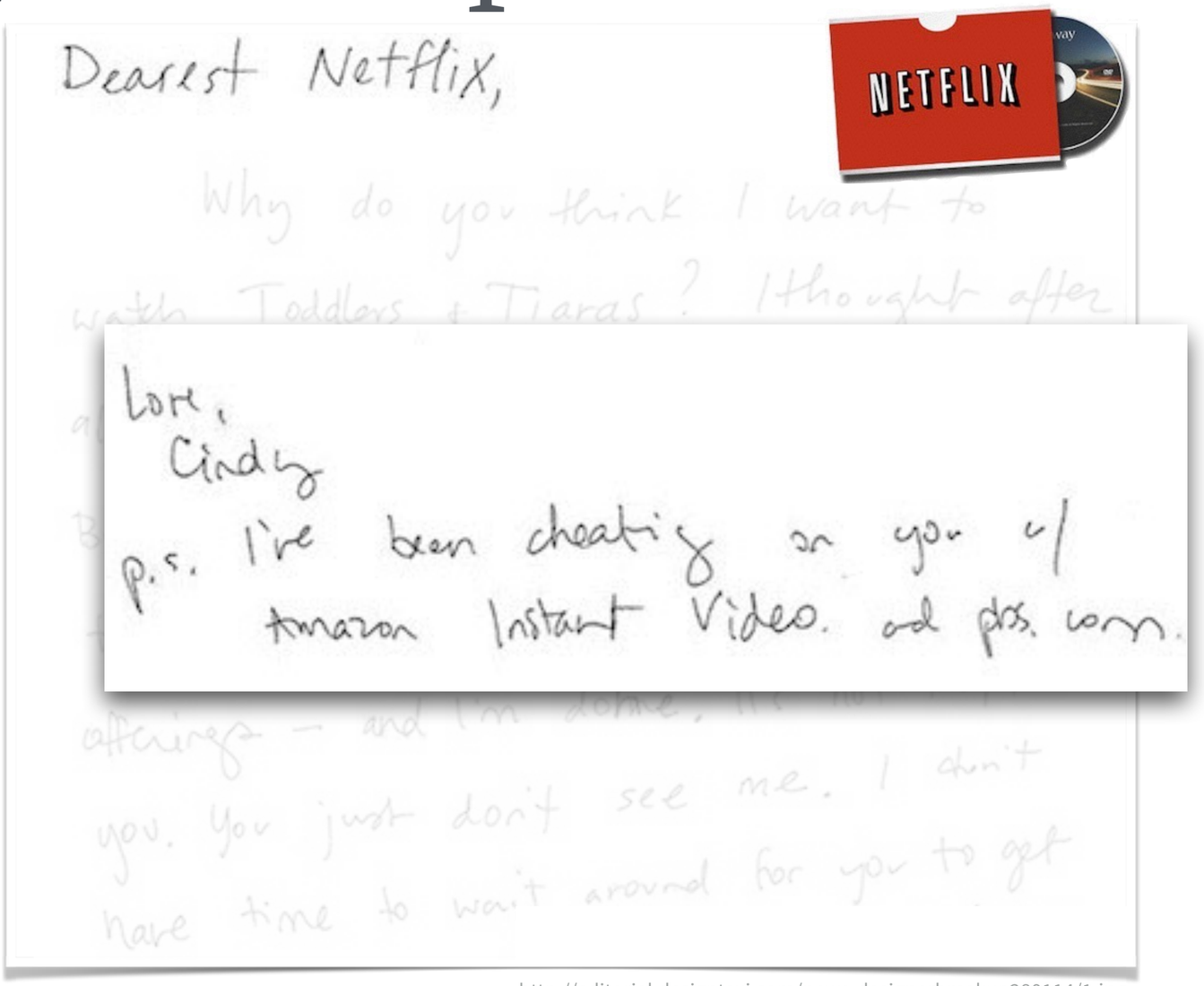
Methods: Love/Breakup Letters





"**personal letter written to a product**… [to reveal] profound insights about what people value and expect"

Martin & Hanington, Universal Methods of Design: 100 Ways to Research, 2012



http://editorial.designtaxi.com/news-designerbreakup280114/1.jpg

- where am I?
- what is my goal?
- how do I get there?

actionability

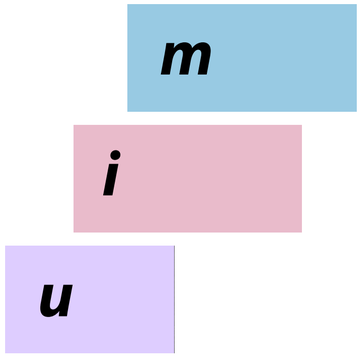
+

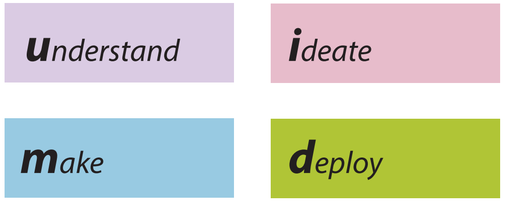
flexibility

Capturing Design Flow

- **flexible**; support messiness
- two basic **movement principles**
  1. **forward** movement is **ordered**

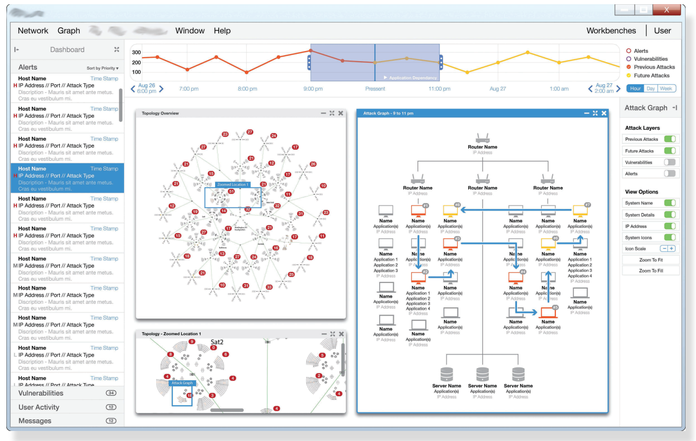
  2. activities can be **nested** or conducted in **parallel**

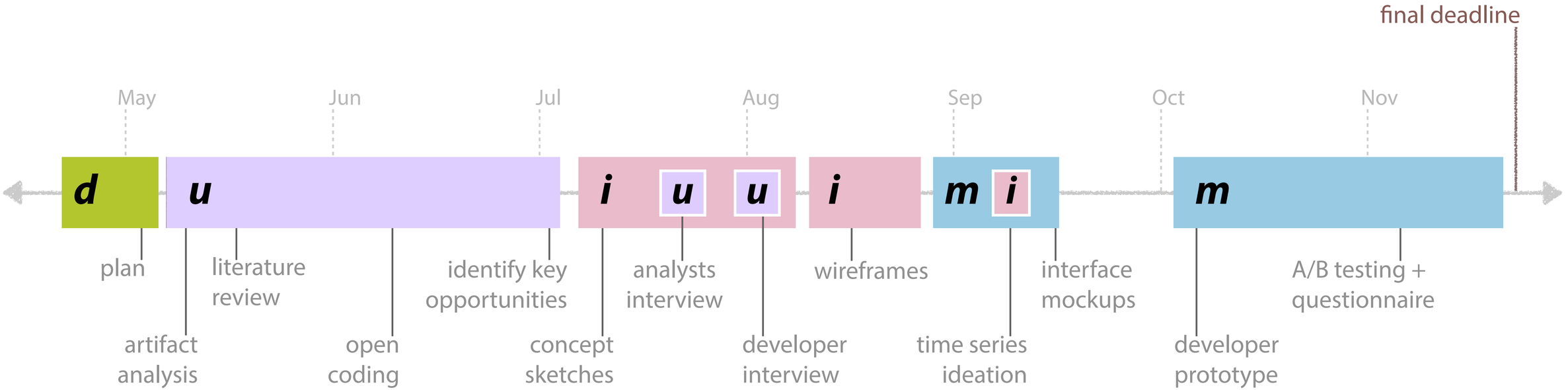




Process Timelines

- redesign project





***u**nderstand*

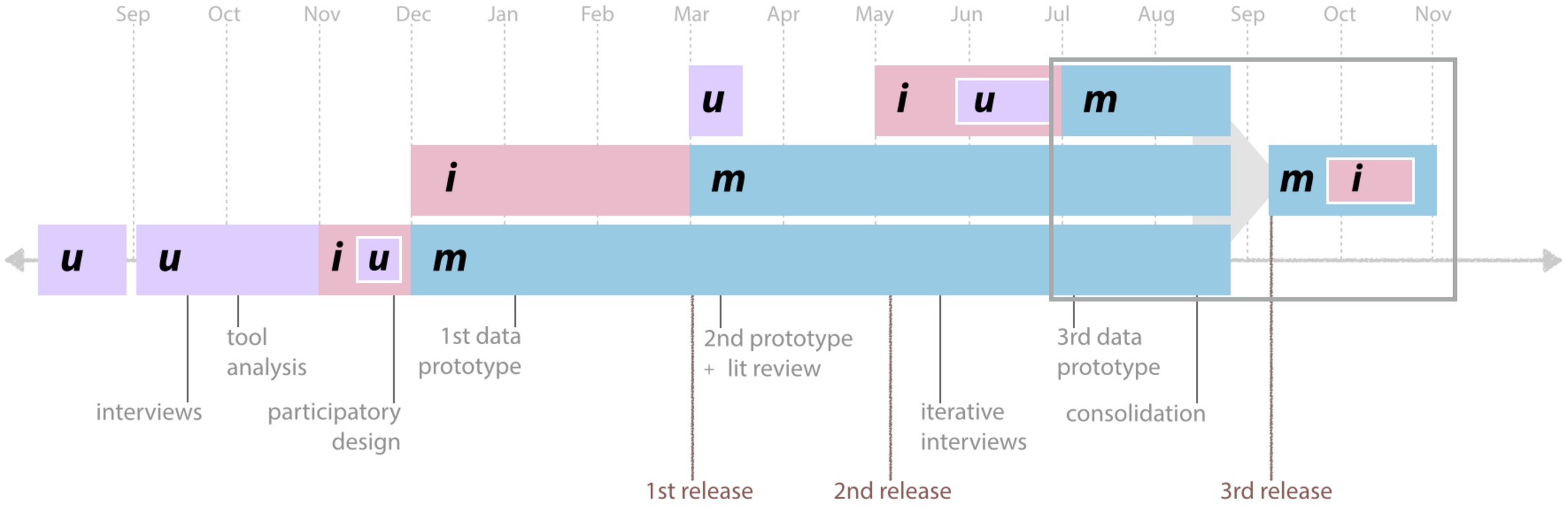
***i**deate*

***m**ake*

***d**eploy*

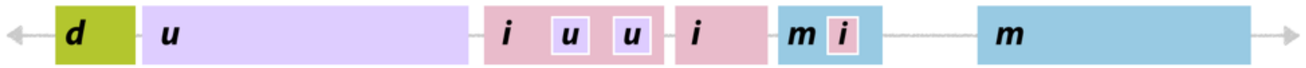
Process Timelines

- colleague's design study

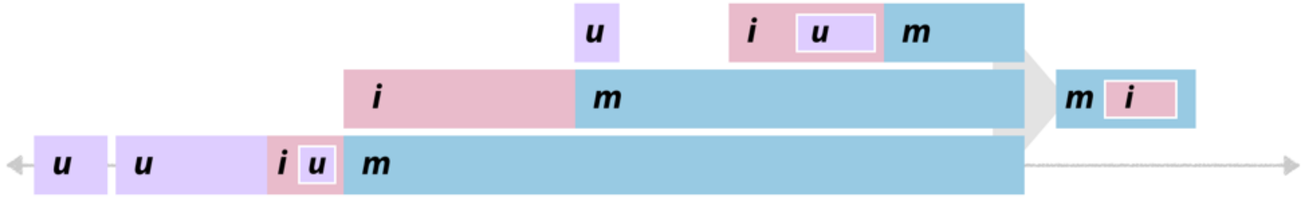


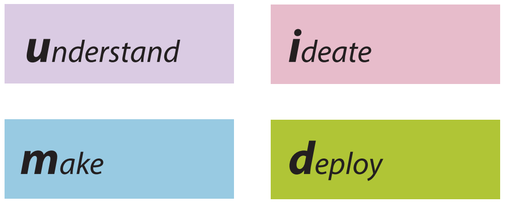
Process Timelines

- **communicates** a messy, creative process



- **supports flexibility**
  - nested
  - parallel





- motivation
- outcomes
- methods

***u**nderstand*
motivation: finding the needs of the user
outcome: sets of design requirements

***i**deate*
generate good ideas to support needs
sets of ideas

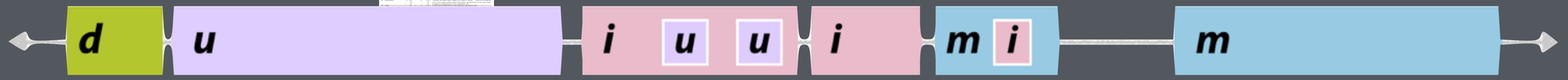
***m**ake*
concretize ideas, make them tangible
sets of prototypes

***d**eploy*
bring a prototype into effective action
visualization system

actionability

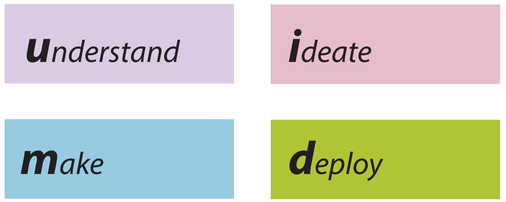
+

flexibility

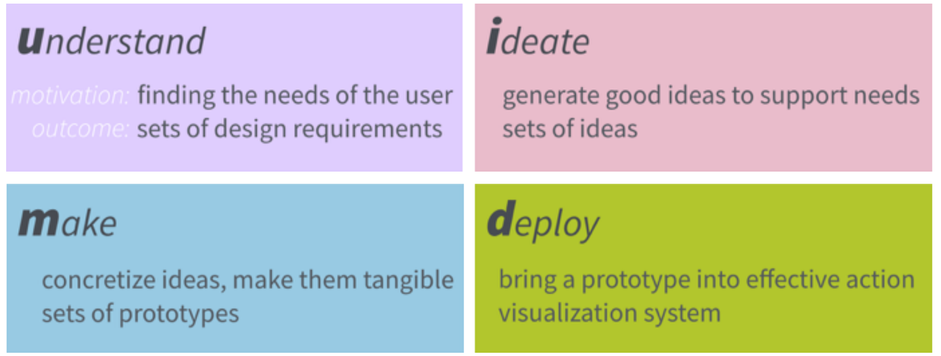


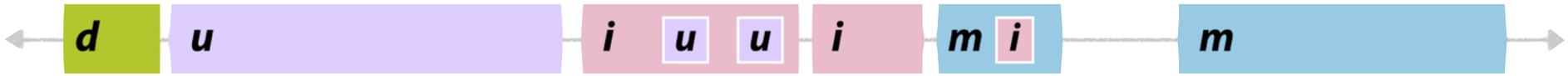
Take-Aways

- **design activity framework** can influence how you:
  - design
  - connect
  - explore
  - communicate
- **embrace the messiness!**



Questions?





http://mckennapsean.com/projects/design-activity-framework/

sean@cs.utah.edu

Many thanks to: Michael Sedlmair, Mike Kirby, Alex Bigelow, Ethan Kerzner, Nina McCurdy, Sam Quinan, Kris Zygmunt, and Matthew Parkin

This work is sponsored in part by the Air Force Research Laboratory and the DARPA XDATA program, and by the U.S. Army Research Office under a prime contract issued to Intelligent Automation, Inc. The content of the information does not necessarily reflect the position or the policy of the government or Intelligent Automation, Inc., and no official endorsement should be inferred.