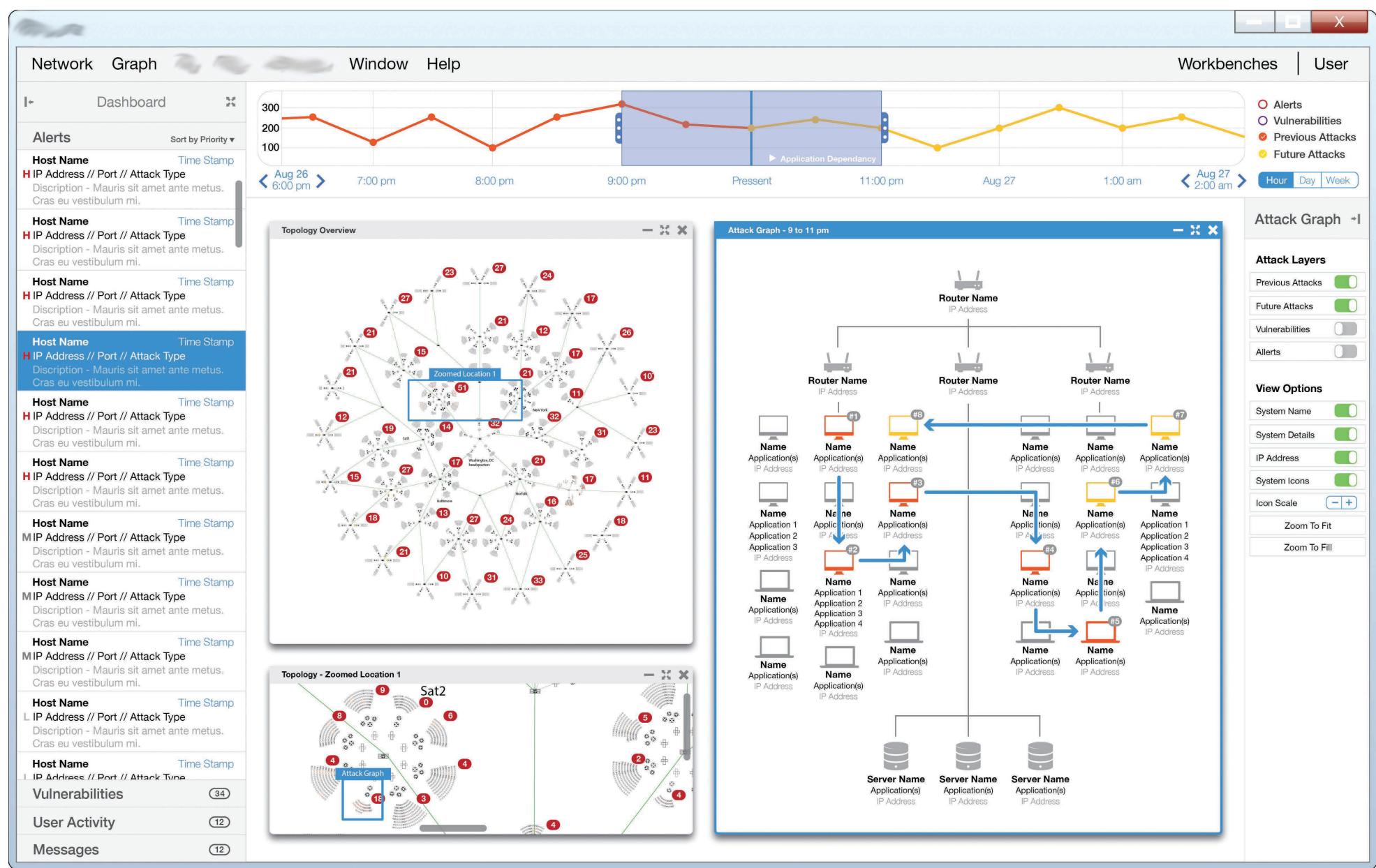


# Design Activity Framework for Visualization Design

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

# visualization design

# What We Did



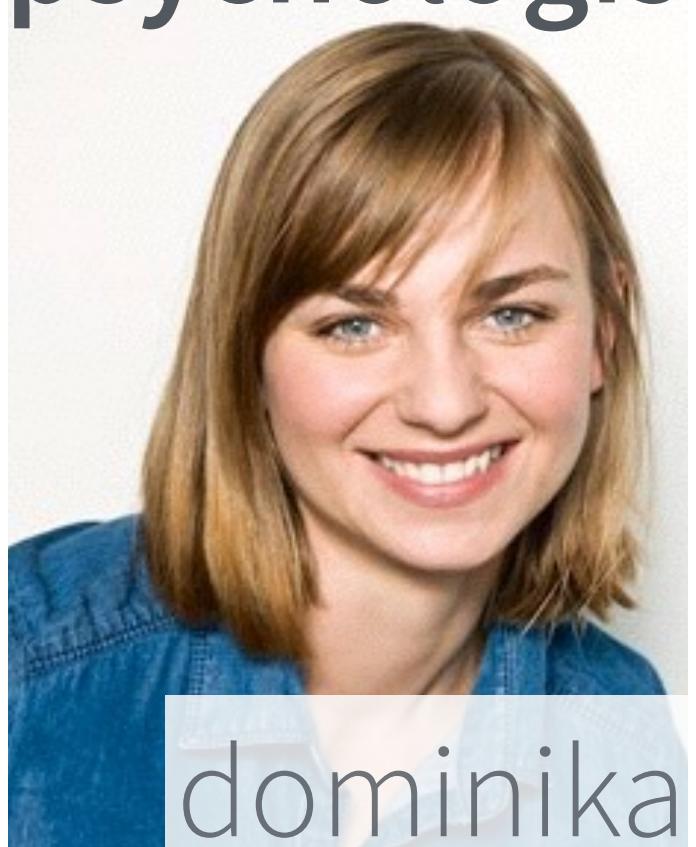
cybersecurity redesign project

# Who We Are

visualization experts



psychologist



dominika

designer



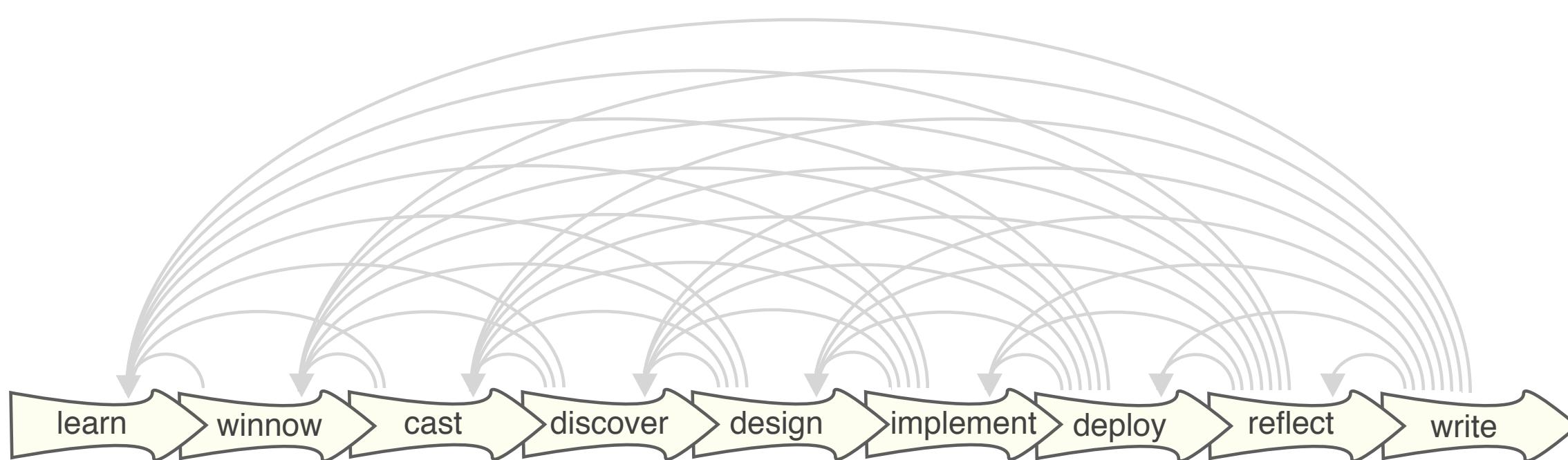
jim

visualization & creative  
re-design

# Challenges

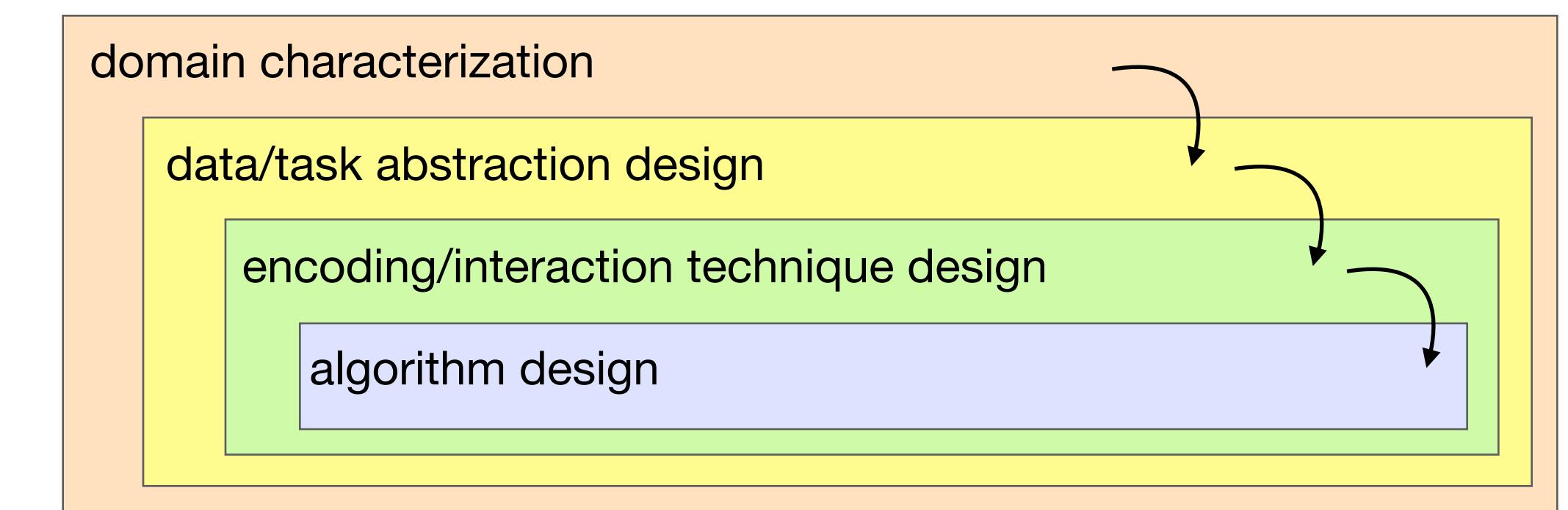
- connect **actions we take** and **decisions we make**

**process** models



Sedlmair et al, "Design study methodology" 2012

**decision** models

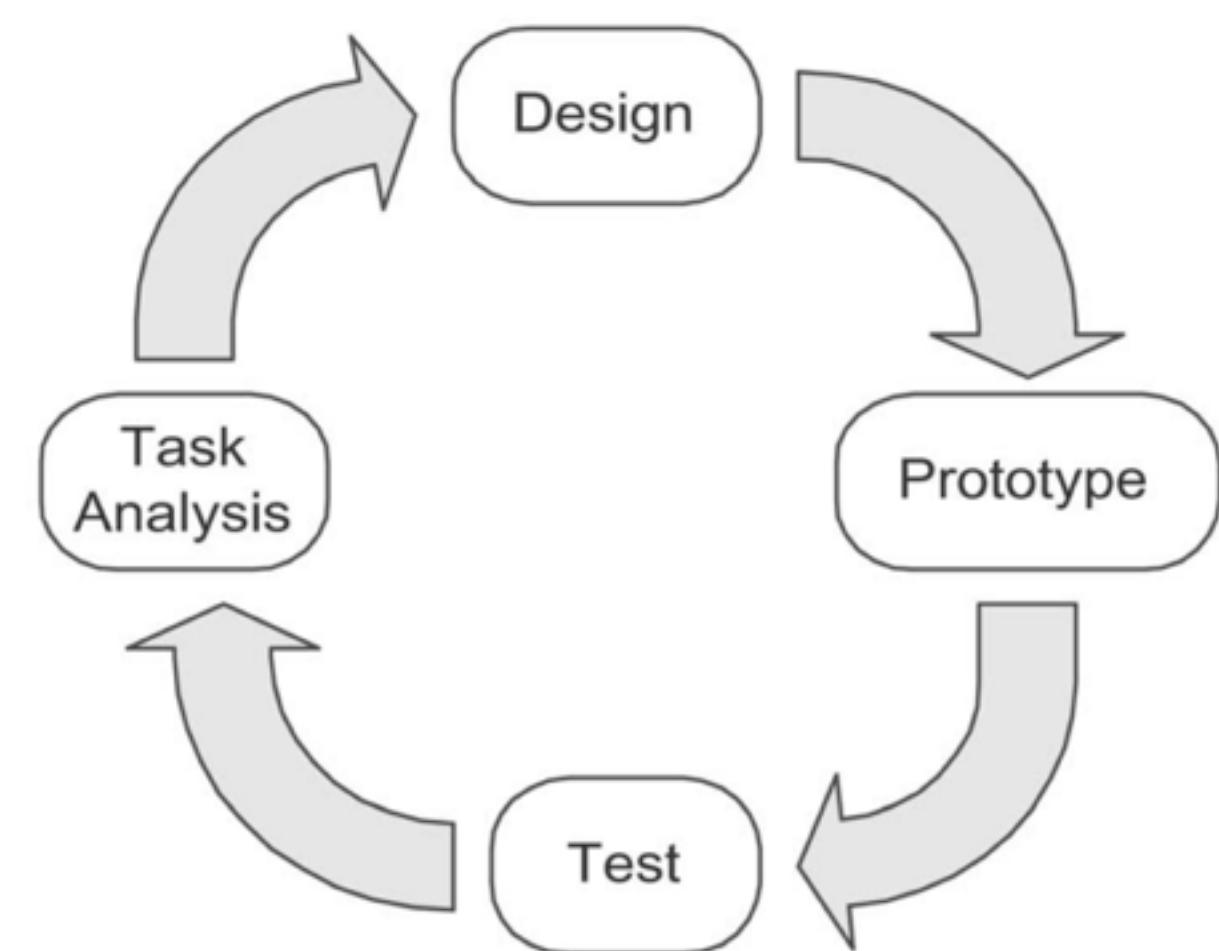


Munzner, "A Nested Model for Visualization Design and Validation" 2010

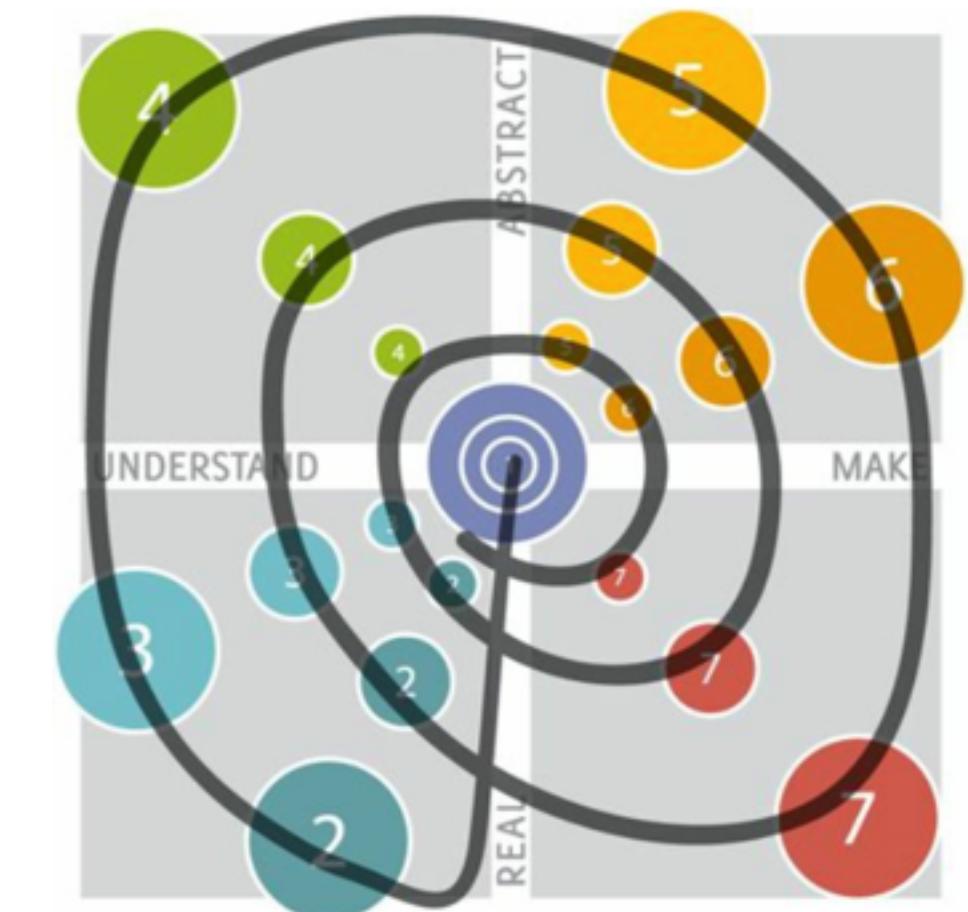
# Challenges

- support a **more flexible** design process

**engineering** process



**creative** process



Tory & Möller, "Human factors in visualization research" 2004

Kumar, 101 Design Methods, 2012

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

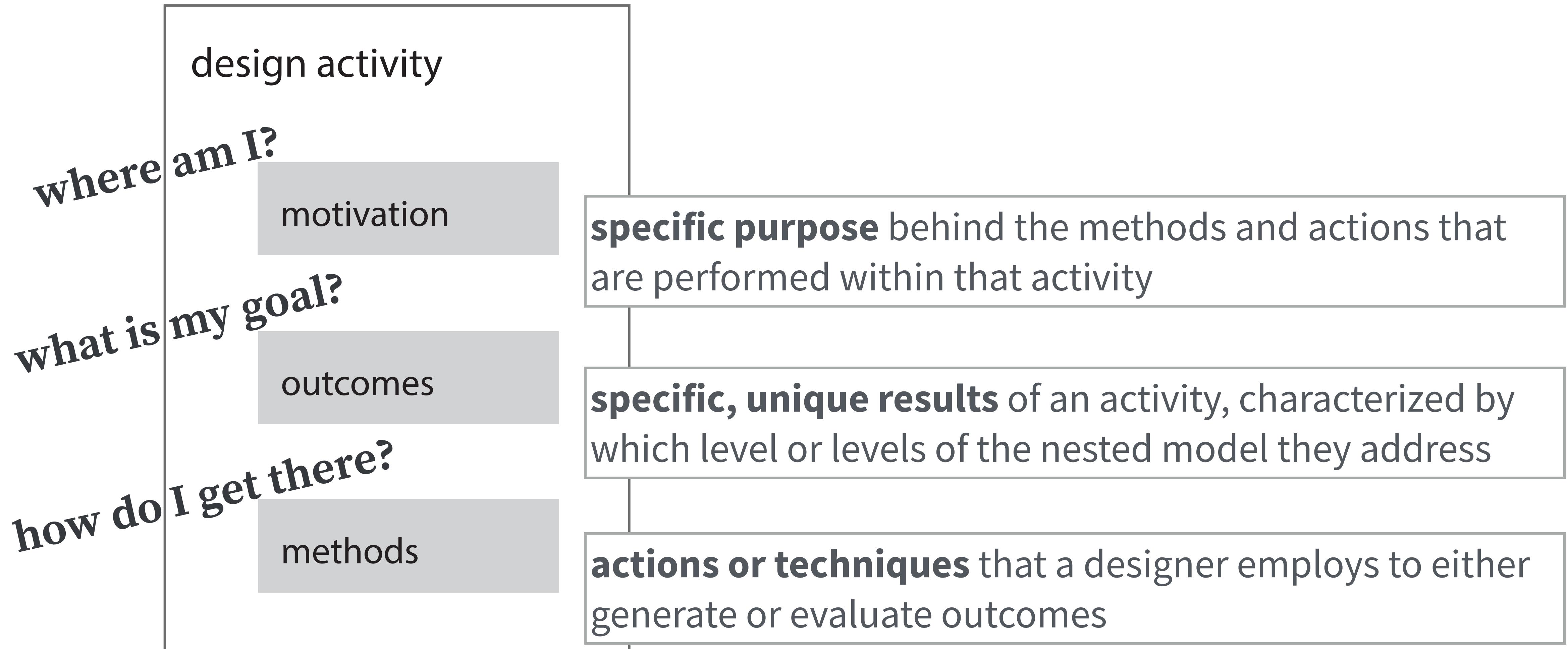


actionability

+

flexibility

# Design Activity Framework



# Design Activity Framework

four activities

***Understand***

***Ideate***

***make***

***deploy***

design activity

motivation

outcomes

methods

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

# Design Activity Framework

***Understand***

*motivation:* finding the needs of the user

***ideate***

generate good ideas to support needs

***make***

concretize ideas, make them tangible

***deploy***

bring a prototype into effective action

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

# Design Activity Framework

## ***Understand***

*motivation:* finding the needs of the user

*outcome:* sets of design requirements

## ***ideate***

generate good ideas to support needs  
sets of ideas

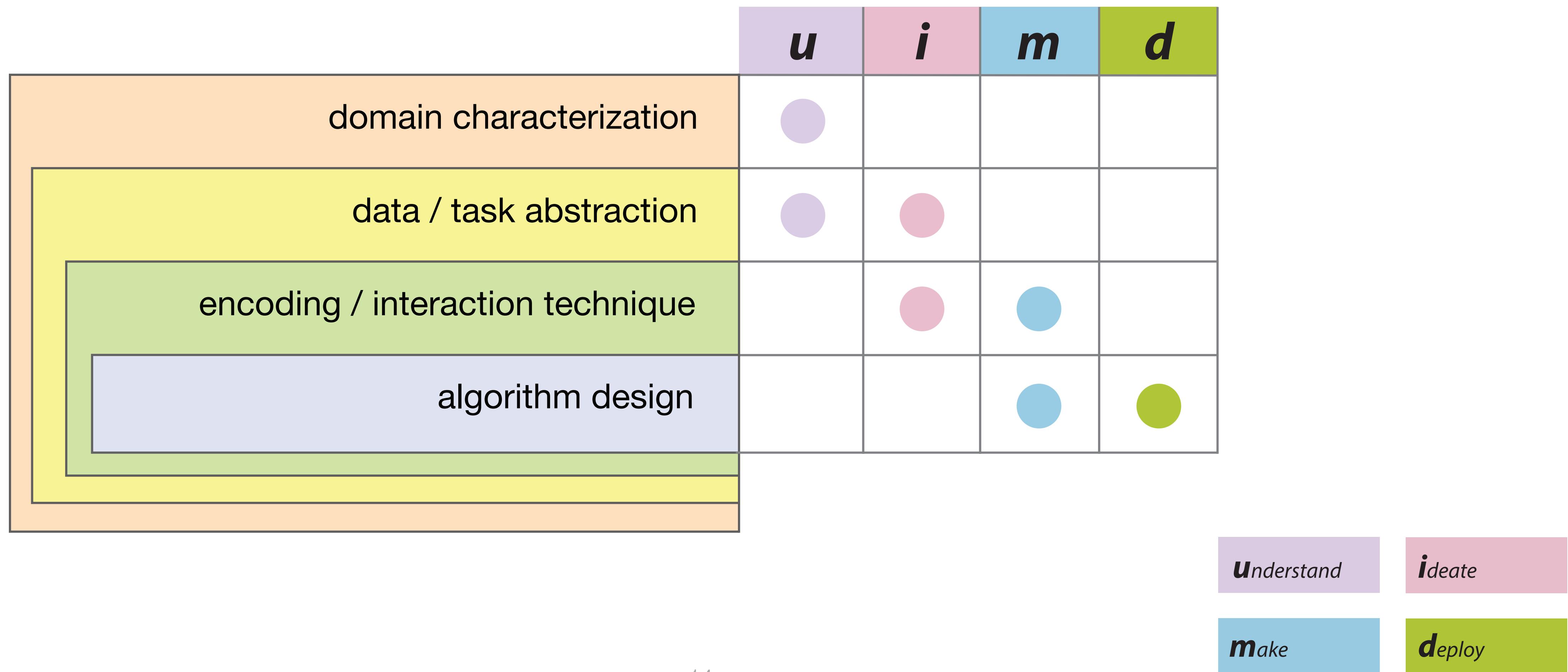
## ***make***

concretize ideas, make them tangible  
sets of prototypes

## ***deploy***

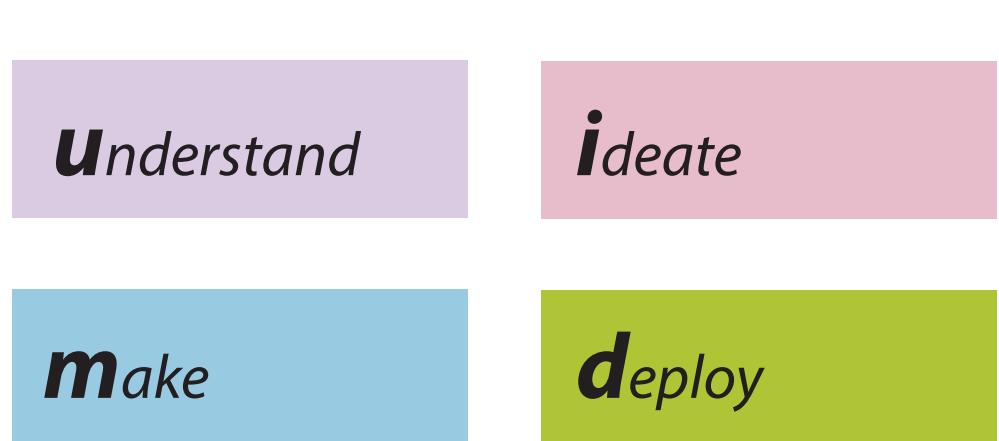
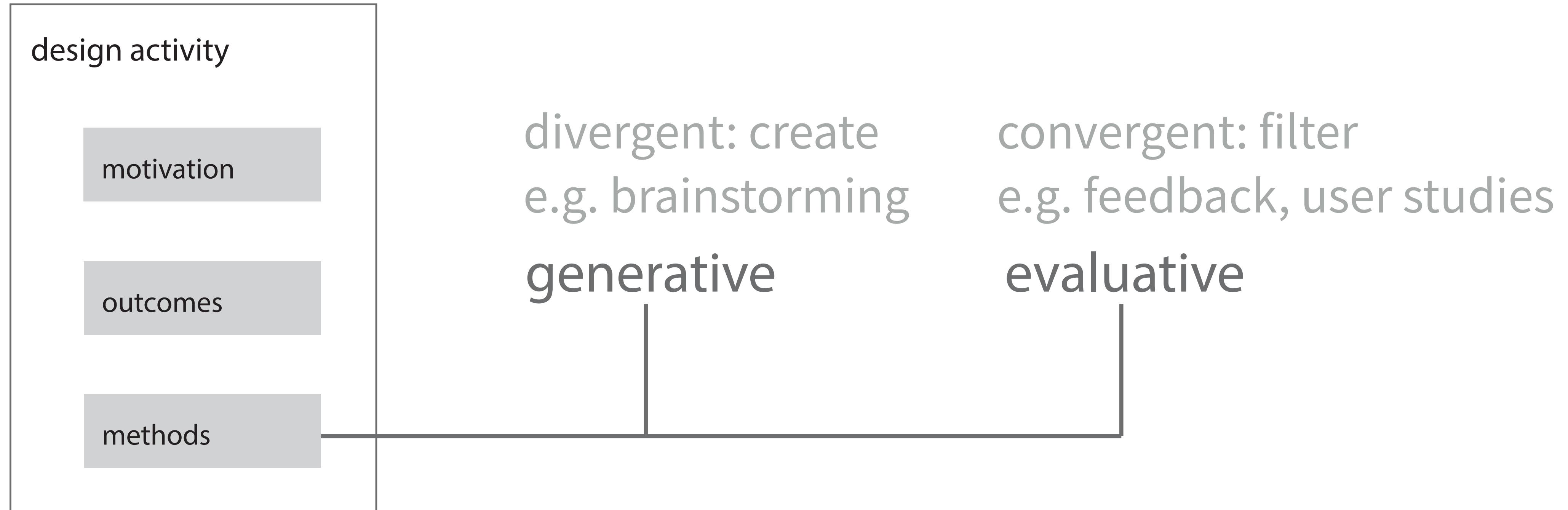
bring a prototype into effective action  
visualization system

# Design Activity Framework



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

# Design Activity Framework



#	method	g	e	g	e	g	e	g	e	v	definition
1	A/B testing						•		•	•	"compare two versions of the same design against a predetermined goal" [18]
2	activity map			•	•						"structuring activities of stakeholders around a list of activities gathered during research and showing how they relate to one another... take a list of activities gathered during research and see how they are grouped based on their relationships" [14]
3	AEIOU framework			•	•						"organizational framework reminding the formation under a guiding taxonomy of 'Users'" [18]
4	affinity diagramming				•	•		•			"process used to externalize and meaningfully keep design teams grounded in data"
5	algorithmic performance			•	•			•	•	•	"quantitatively study the performance examples include measurements of rendering time"
6	analogical reasoning			•		•				•	"cognitive strategy in which previous knowledge requirements of a novel situation" [8]
7	appearance modeling				•		•		•		"refined model of a new idea that emphasizes"
8	artifact analysis			•	•					•	"systematic examination of the material tributes to an understanding of their physical properties"
9	automated logging			•	•			•		•	"captures the users' patterns of activity, error message, menu-item selection, dialog or web-page access.... can also capture"
10	behavioral prototype					•					"simulating situations of user activity concepts.... through observation and conversation on the concepts" [14]

#	method	g	e	g	e	g	e	g	e	v	definition
11	Note taking										
12	bulletin board										
13	buy a feature										
14	card sorting										
15	case study										
16	coding										
17	cognitive map										
18	cognitive task analysis										
19	cognitive walkthrough										
20	collage										
21	competitive testing										
22	concept map										
23	concept sketching										
24	concept sorting										
25	consistency inspection										
26	constraint removal										
27	constraint inquiry										
28	controlled experiment										
29	creative matrix										
30	creative facilitation										
31	debugging										
32	diagramming										
33	documentation										
34	ergonomics evaluation										
35	example exposure										
36	exercising										
37	experience prototyping										
38	field notes (diary, journal)										
39	free W's										
40	focus group										
41	forensic scenario										
42	frame of reference shifting										
43	gradient words										
44	heuristic evaluation										
45	idea evaluation										
46	selection pane										
47	image quality analysis										
48	importance/difficulty matrix										
49	iteration										
50	interactive tutorial										
51	interviewing										
52	key performance indicators										
53	literature review										
54	low/medium letters										
55	monitoring users (eye tracking)										
56	misnaming										
57	metacognitive evaluations										
58	observation										
59	online forum										
60	online investigations										
61	paper prototyping										
62	parallel prototyping										
63	personas										
64	photo studies										
65	pilot testing										
66	POEMs framework										
67	prototyping										
68	proto-interactive stimuli										
69	questionnaire										
70	reflection										
71	roadmap										
72	role-playing										
73	root-cause-load										
74	round robin										
75	sample data										
76	semantic differential										
77	simulation										
78	social mapping										
79	spatial mapping										
80	speed dating										
81	stakeholder feedback										
82	stakeholder map										
83	statistical analysis										
84	storyboarding										
85	suspected judgment										
86	task analysis										
87	technology probe										
88	think-aloud protocol										
89	thought experiment										
90	modality report										
91	modality testing										
92	user journey map										
93	video ethnography										
94	video scenario										
95	visual metrics										
96	virtual reality metrics										
97	wireframing										
98	world thinking										
99	wireframing										
100	wireframing										

# Methods: Paper Prototyping

<i>u</i>	<i>i</i>	<i>m</i>	<i>d</i>
	●	●	

<i>g</i>	<i>e</i>
●	

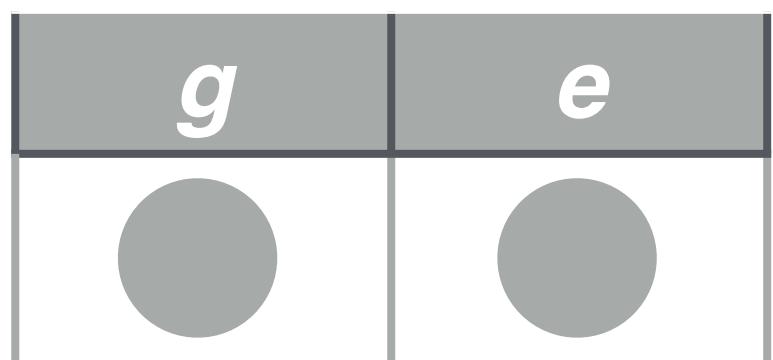
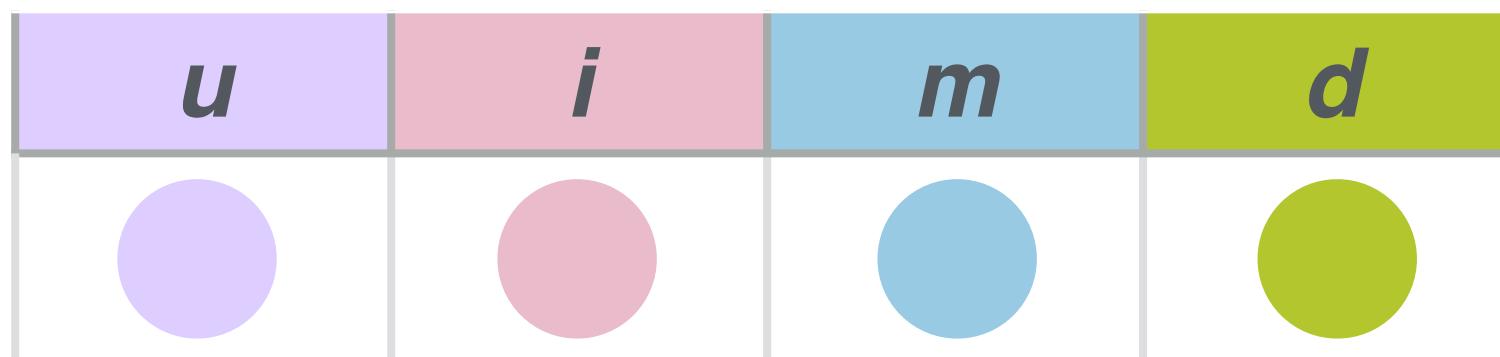
“create a **paper-based simulation of an interface** to test interaction with a user”

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

Dearest Netflix,



Why do you think I want to  
watch Toddlers + Tiaras? I thought after

love,  
Cindy  
P.S. I've been cheating on you w/  
amazon Instant Video. od pss.com.

offerings - and I'm done. I don't  
you. You just don't see me. I don't  
have time to wait around for you to get

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

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



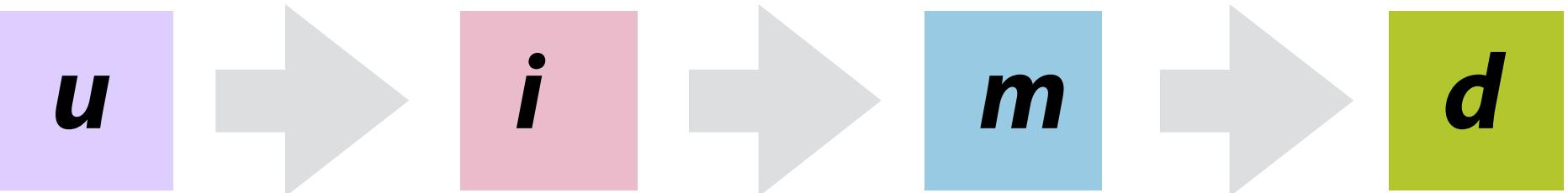
actionability

+

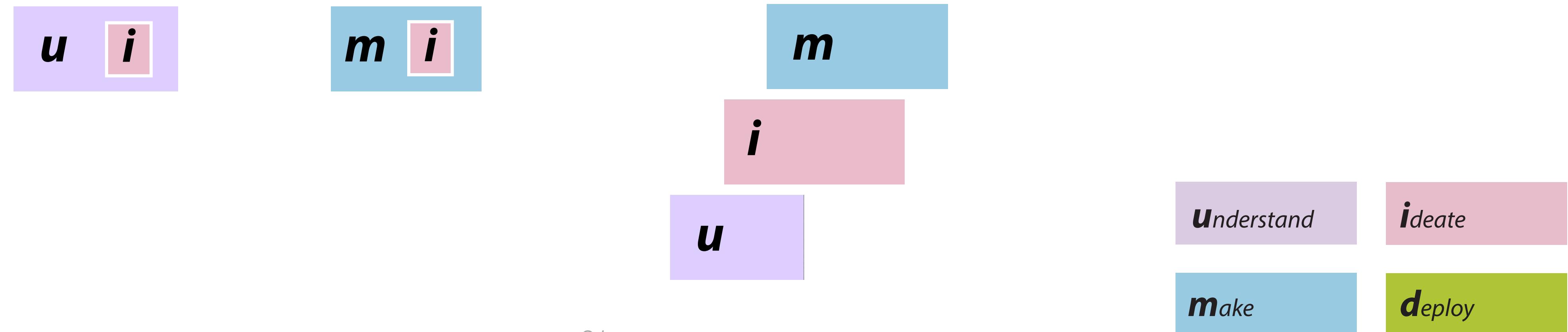
flexibility

# Capturing Design Flow

- **flexible**; support messiness
- two basic **movement principles**

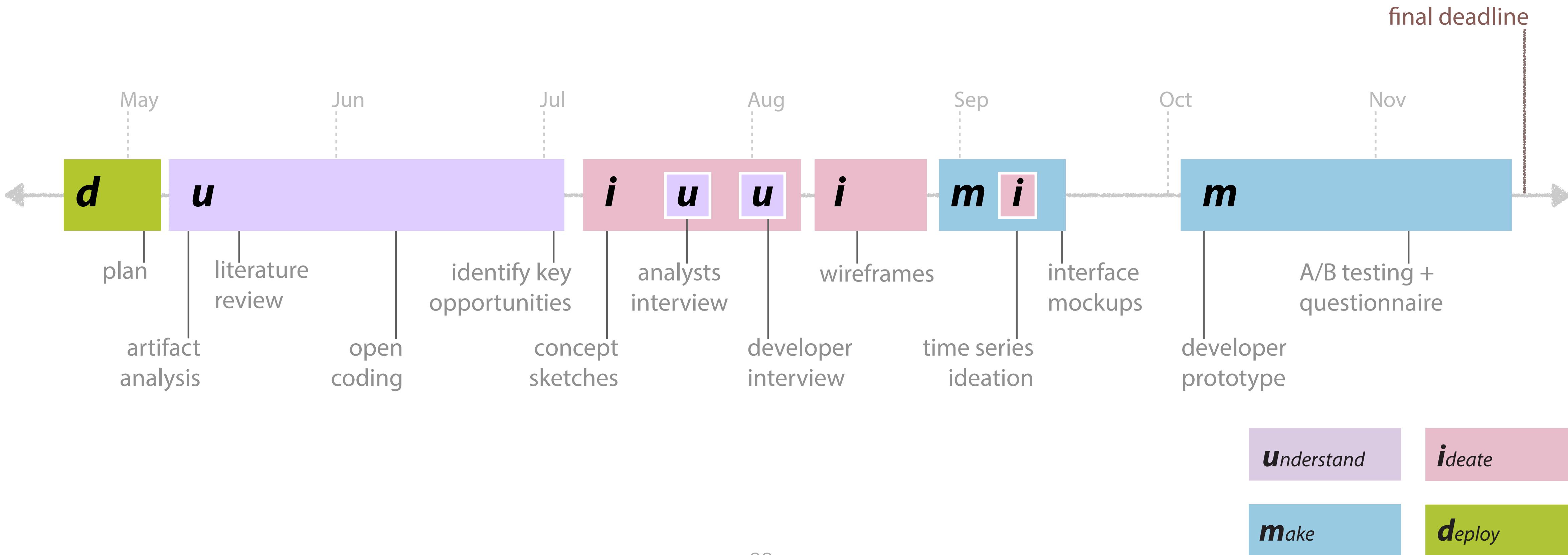
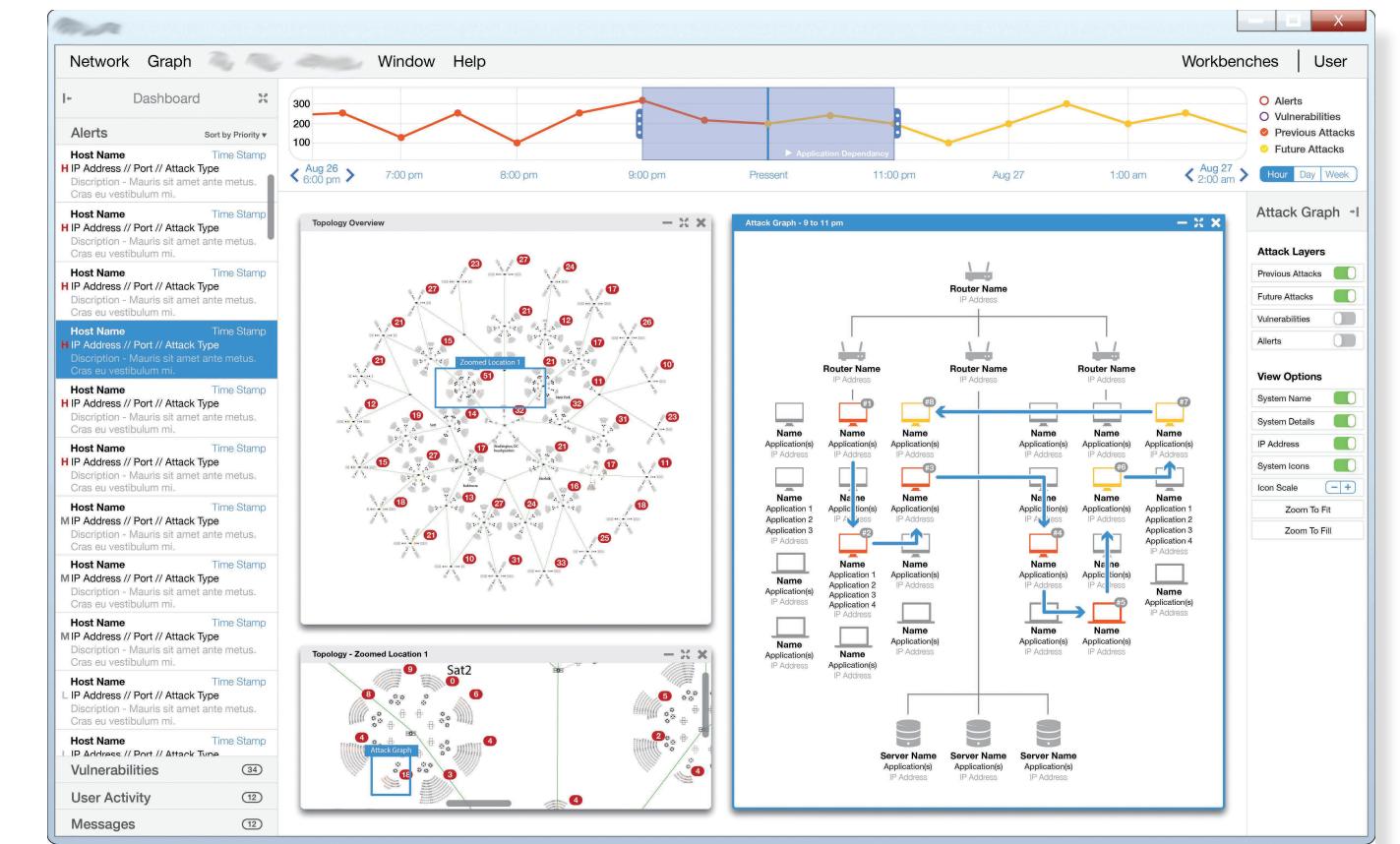
1. **forward** movement is **ordered** 

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



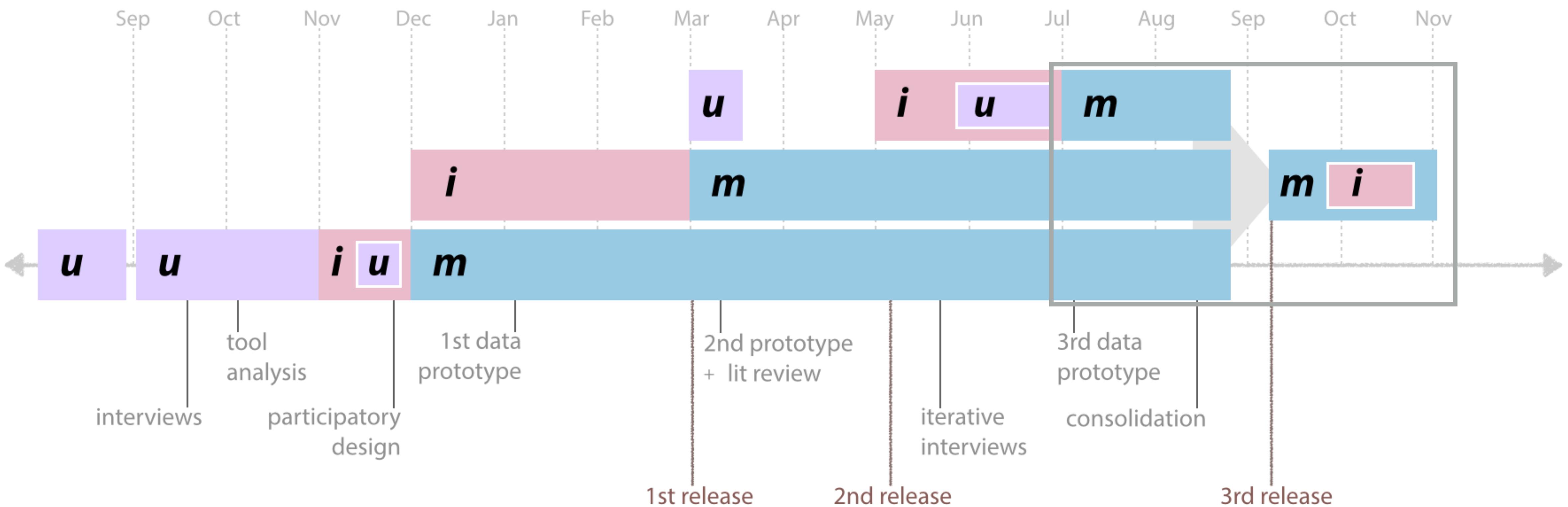
# Process Timelines

- redesign project



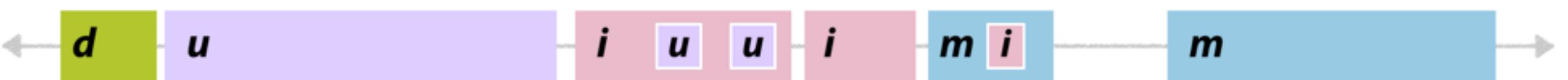
# Process Timelines

- colleague's design study



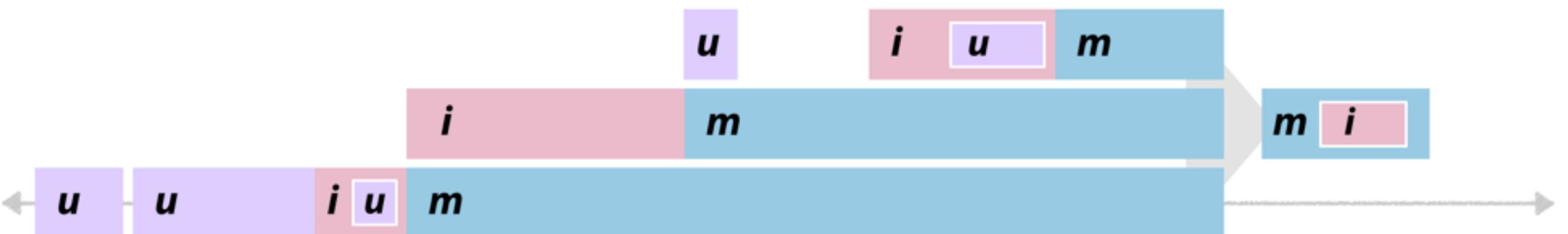
# Process Timelines

- **communicates** a messy, creative process

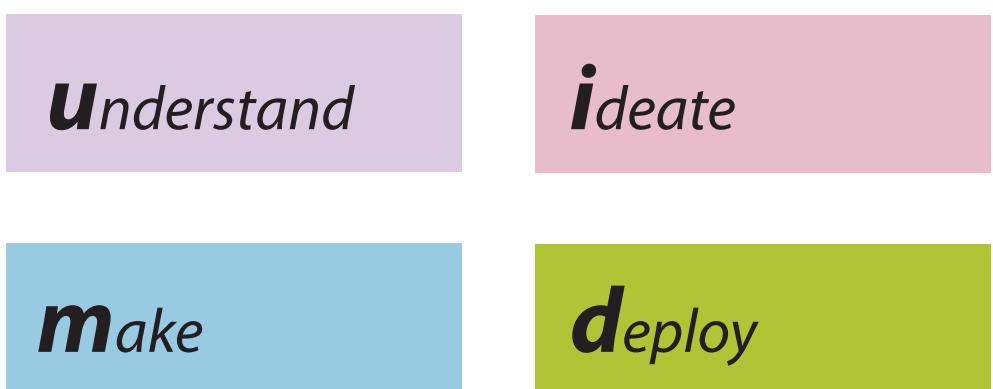


- **supports flexibility**

- nested



- parallel



- motivation

***understand***

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

***ideate***

generate good ideas to support needs  
sets of ideas

***make***

concretize ideas, make them tangible  
sets of prototypes

***deploy***

bring a prototype into effective action  
visualization system

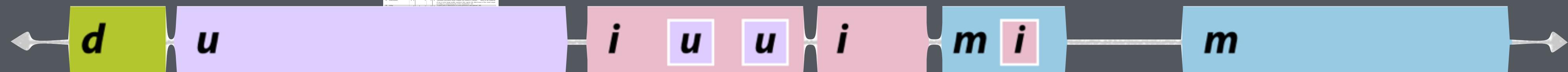
- outcomes

- methods

actionability

+

flexibility



# Take-Aways

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

*Understand*

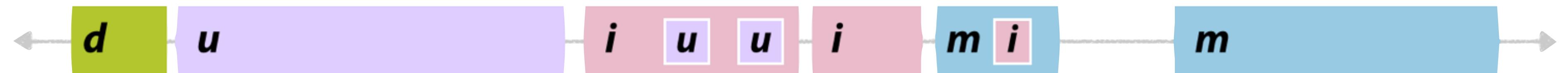
*Ideate*

*make*

*deploy*

# Questions?

<b>understand</b> <i>motivation:</i> finding the needs of the user <i>outcome:</i> sets of design requirements	<b>ideate</b> generate good ideas to support needs sets of ideas
<b>make</b> concretize ideas, make them tangible sets of prototypes	<b>deploy</b> bring a prototype into effective action visualization system



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

 [sean@cs.utah.edu](mailto:sean@cs.utah.edu)

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