Three Years in the Startup Trenches: Reflections on People, Product, and Software Evolution

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Co-Founder & Chief Scientist, AnswerDash

DESIGN USE BUILD

UNIVERSITY of WASHINGTON

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About me

- I've been a professor for 9 years
- I've been doing research about programming and software engineering for 18 years, inventing new developer tools and studying teams.
- Up until 2012, I'd never **worked** as a developer, I'd only ever **studied** developers.
- This is a talk about what I learned after finally engaging in practice, but with a **research lens**.

Background

- In 2013, I co-founded a startup based on my lab's research.

- I had three goals:

  1. Disseminate my lab's research

  2. Learn why research rarely makes it into practice

  3. **Reflect on software evolution by embedding myself in a software startup**

We know *how* developers work

- Hundreds of research papers **describe what developers do**:
  - Questions developers ask
  - Information they need
  - Coordination they require
  - Factors that affect productivity

Why do we work this way?

- Very hard to observe decisions longitudinally
  - Interviews/surveys rely on human memory
  - Field observations are time-consuming and can't observe individual decision making
  - Repository mining only sees a partial trace of a subset of decisions

Method

- **Participation observation** (from anthropology)
  - Founded a software company, worked as CTO full time, 60 hours per week, for three years
  - I wrote daily in diary, reflecting on *"What structured today's decisions and why?"*
  - Captured 15,000 emails with employees and customers
  - Interviewed co-founders and other executives for triangulation

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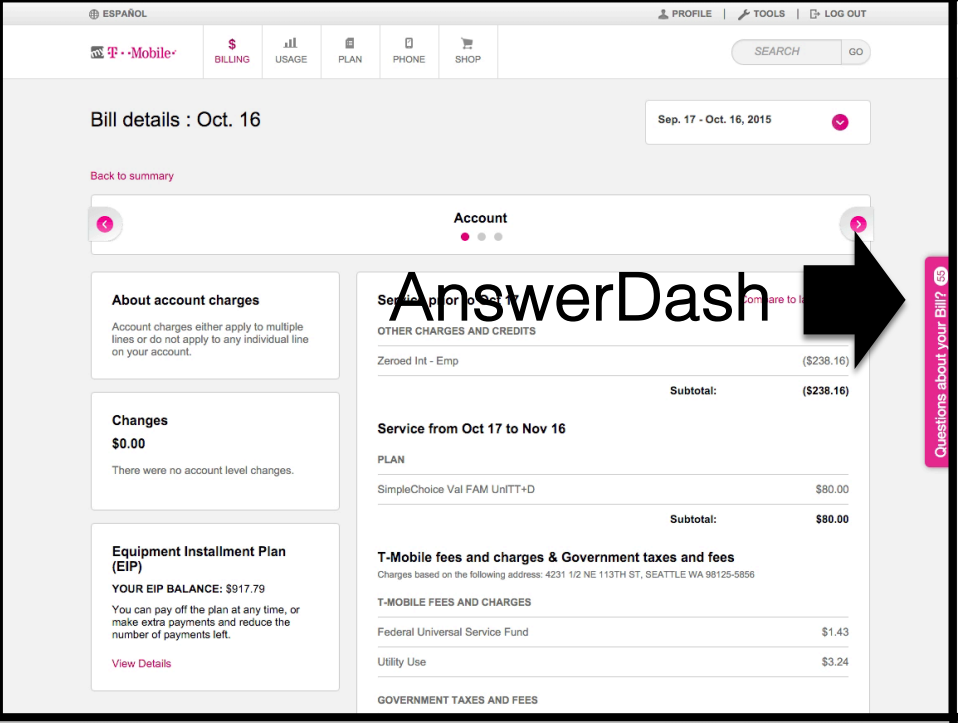
- Raised ~$2.5 million in venture capital with co-founders Jake Wobbrock & Parmit Chilana
- 20+ full-time employees, 100,000+ lines of code, customers big and small
- I managed 8 engineers, managed product, conducted sales, shaped marketing, architected system, wrote a *lot* of code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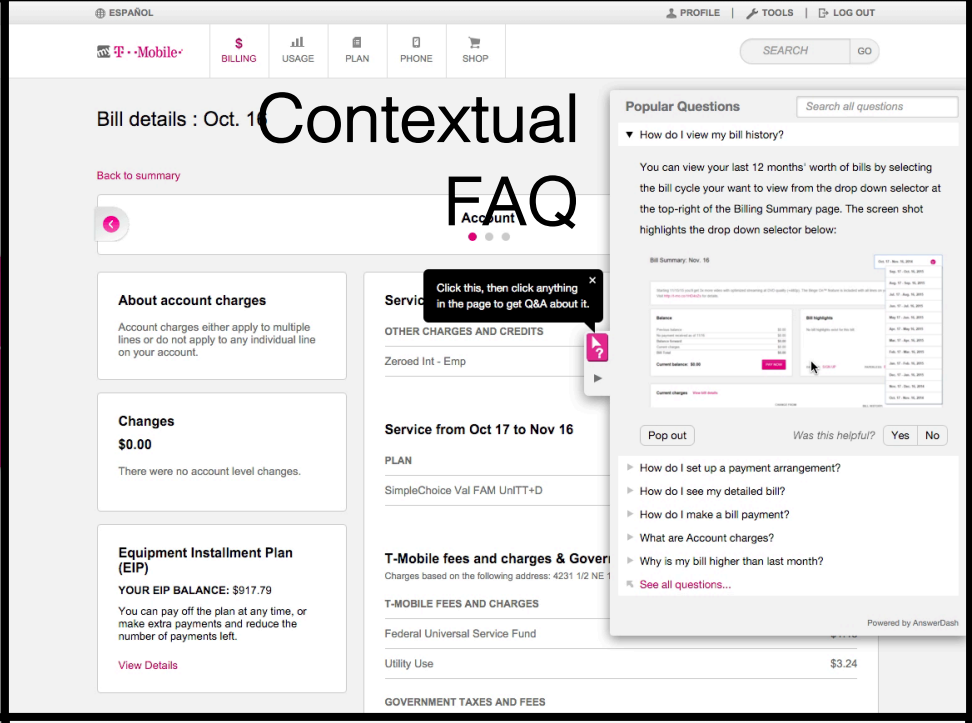
Questions about your Bill?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GOVERNMENT TAXES AND FEES
Contextual FAQ
Click this, then click anything in the page to get Q&A about it.
Popular Questions
Search all questions
How do I view my bill history?
You can view your last 12 months' worth of bills by selecting the bill cycle your want to view from the drop down selector at the top-right of the Billing Summary page. The screen shot highlights the drop down selector below:
Pop out
Was this helpful?
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Why is my bill higher than last month?
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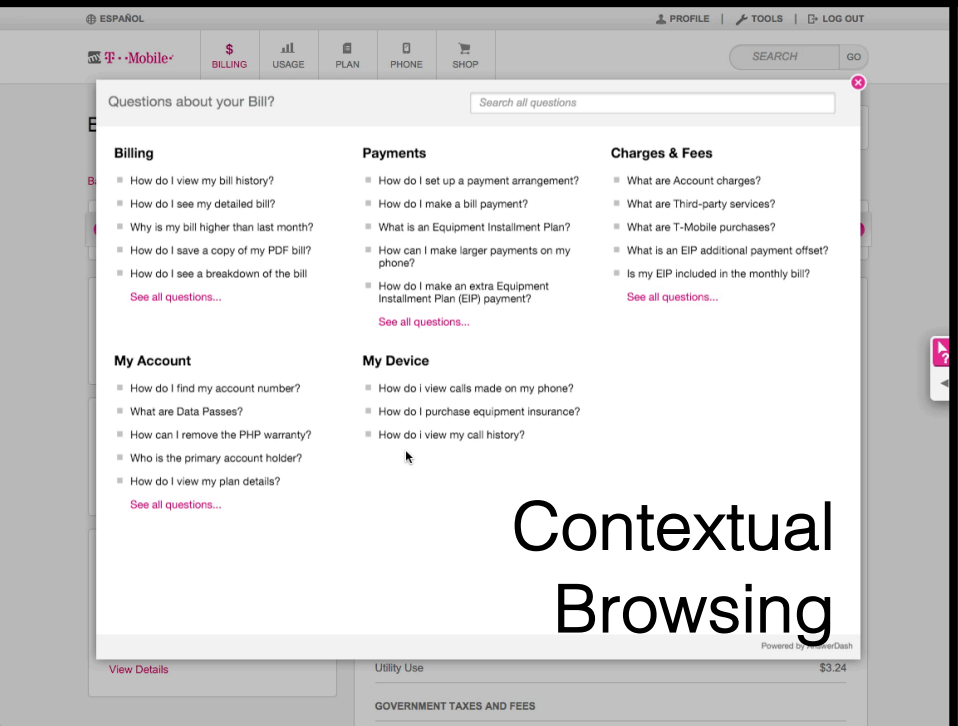
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How do I view my bill history?
How do I see my detailed bill?
Why is my bill higher than last month?
How do I save a copy of my PDF bill?
How do I see a breakdown of the bill
See all questions...
Payments
How do I set up a payment arrangement?
How do I make a bill payment?
What is an Equipment Installment Plan?
How can I make larger payments on my phone?
How do I make an extra Equipment Installment Plan (EIP) payment?
See all questions...
Charges & Fees
What are Account charges?
What are Third-party services?
What are T-Mobile purchases?
What is an EIP additional payment offset?
Is my EIP included in the monthly bill?
See all questions...
My Account
How do I find my account number?
What are Data Passes?
How can I remove the PHP warranty?
Who is the primary account holder?
How do I view my plan details?
See all questions...
My Device
How do i view calls made on my phone?
How do I purchase equipment insurance?
How do i view my call history?
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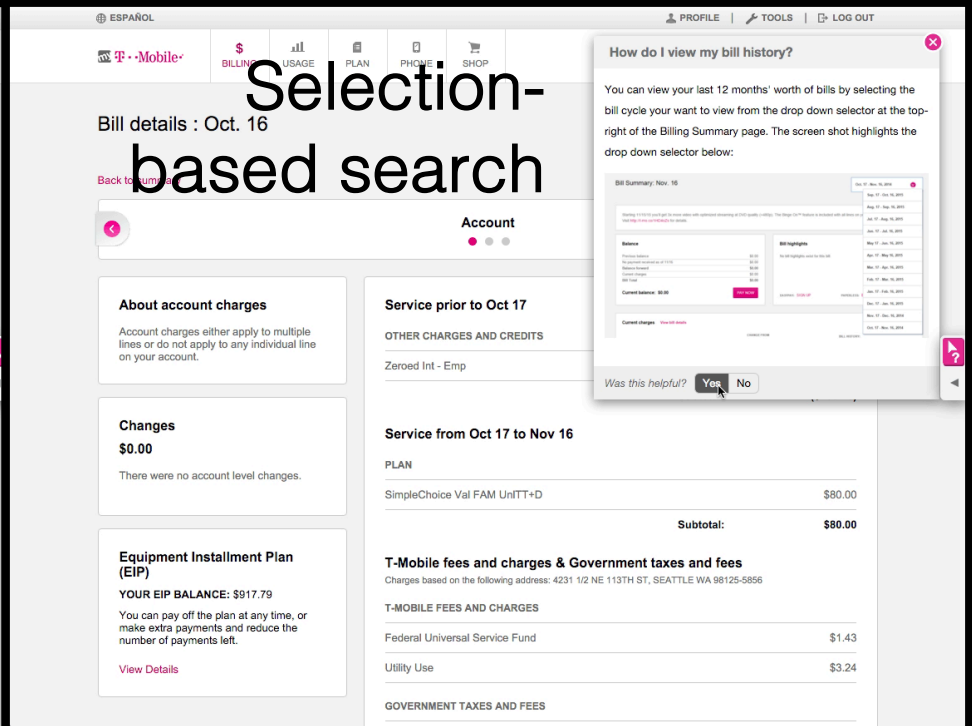
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Selection-based search
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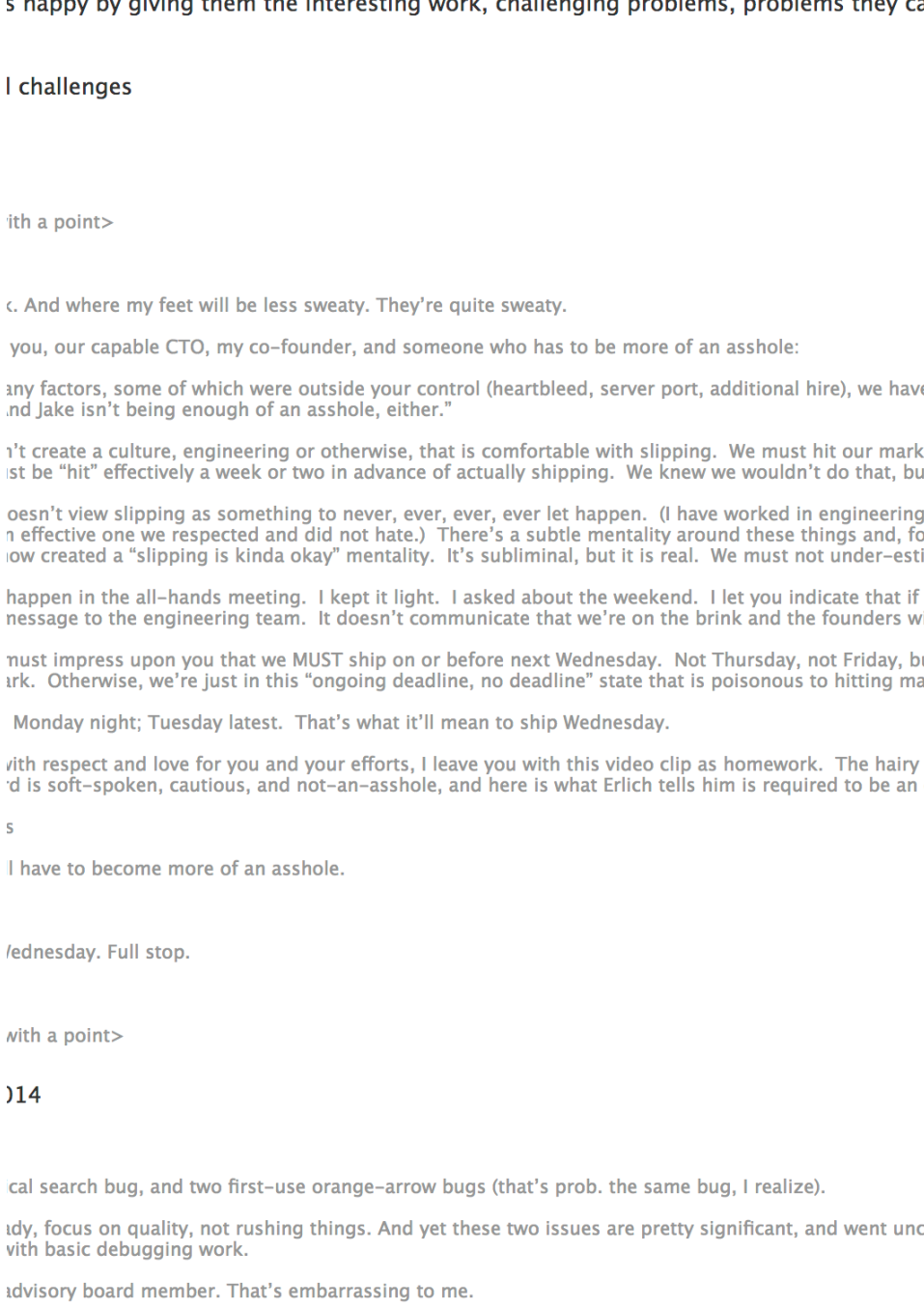
Analysis

- Synthesized diary, emails, and interviews into **claims** about engineering decisions
- Distilled into **claims** and a **theory** of software evolution decision-making



Results

- Decisions were ultimately structured by a collective effort to **define product value**

- **Product value proposition**: an explanation for *why* software is valuable to stakeholders such as end users or customers

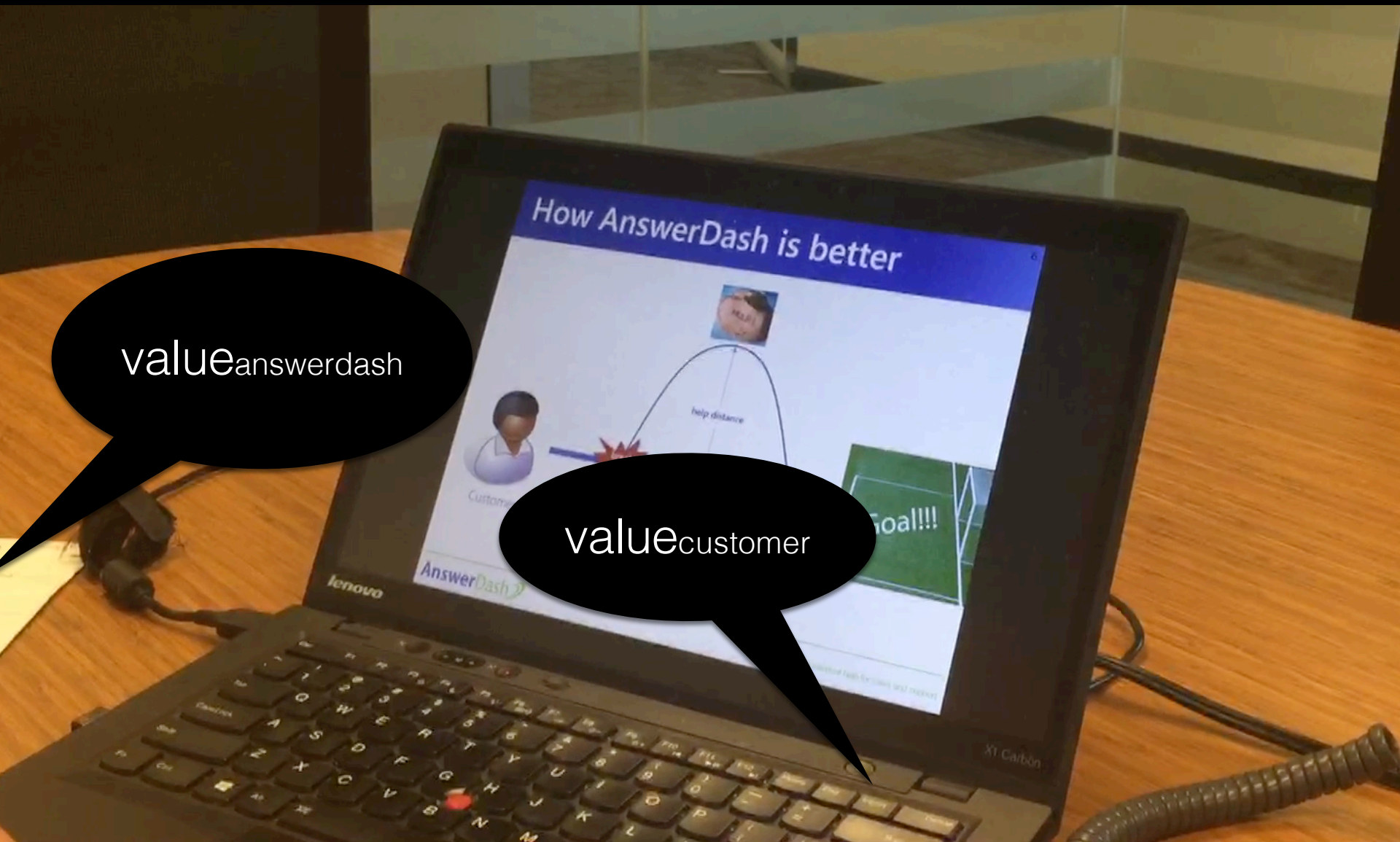
- Multiple factors structured the evolution of this proposition, which then structured the evolution of software

6 (of 9) factors…

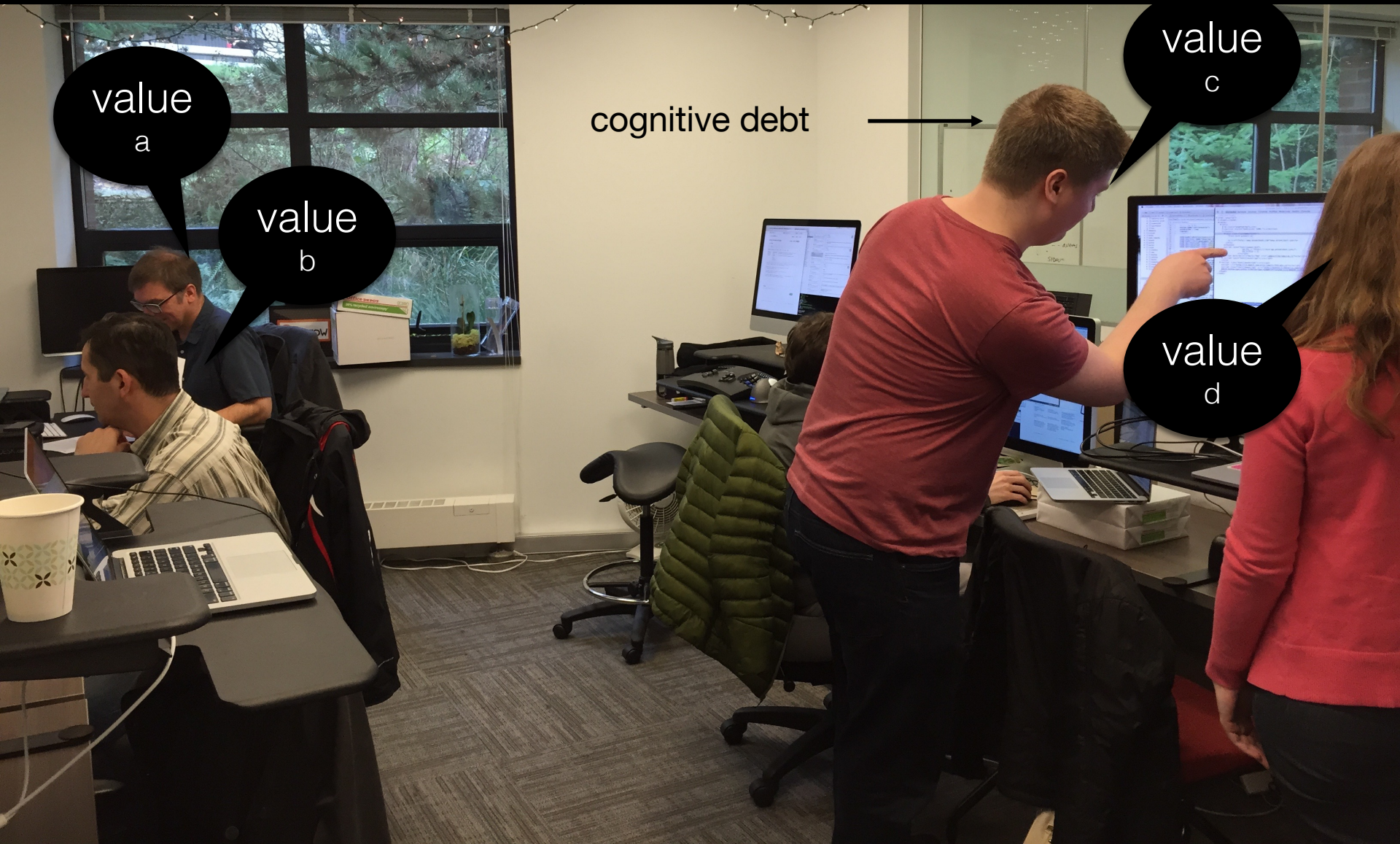
Read the paper for the other three…

http://faculty.uw.edu/ajko/publications/answerdash

Diffusion of power constrained collective agreement of value

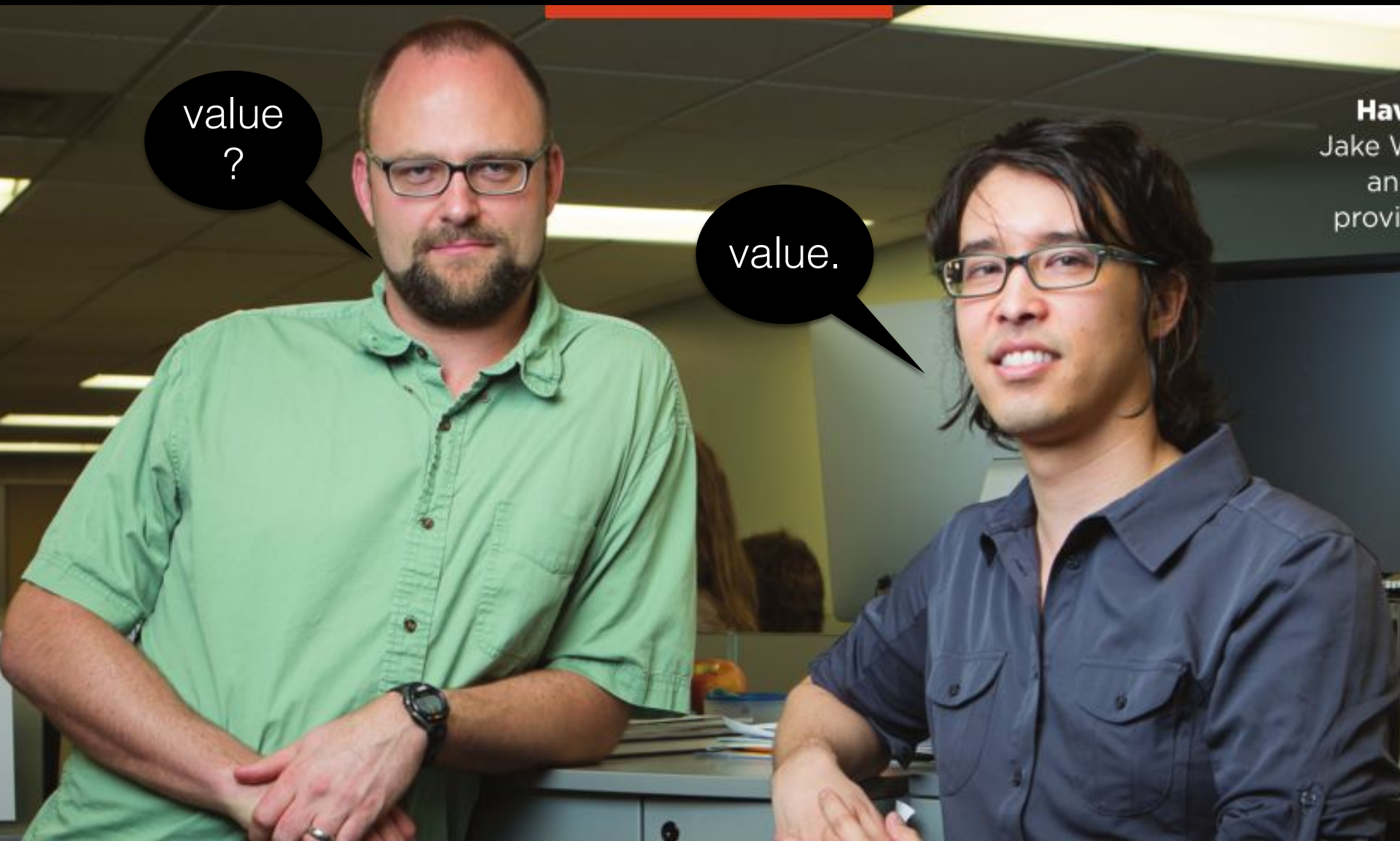


Consistent **engineering** of value required required consistent **understanding** of value

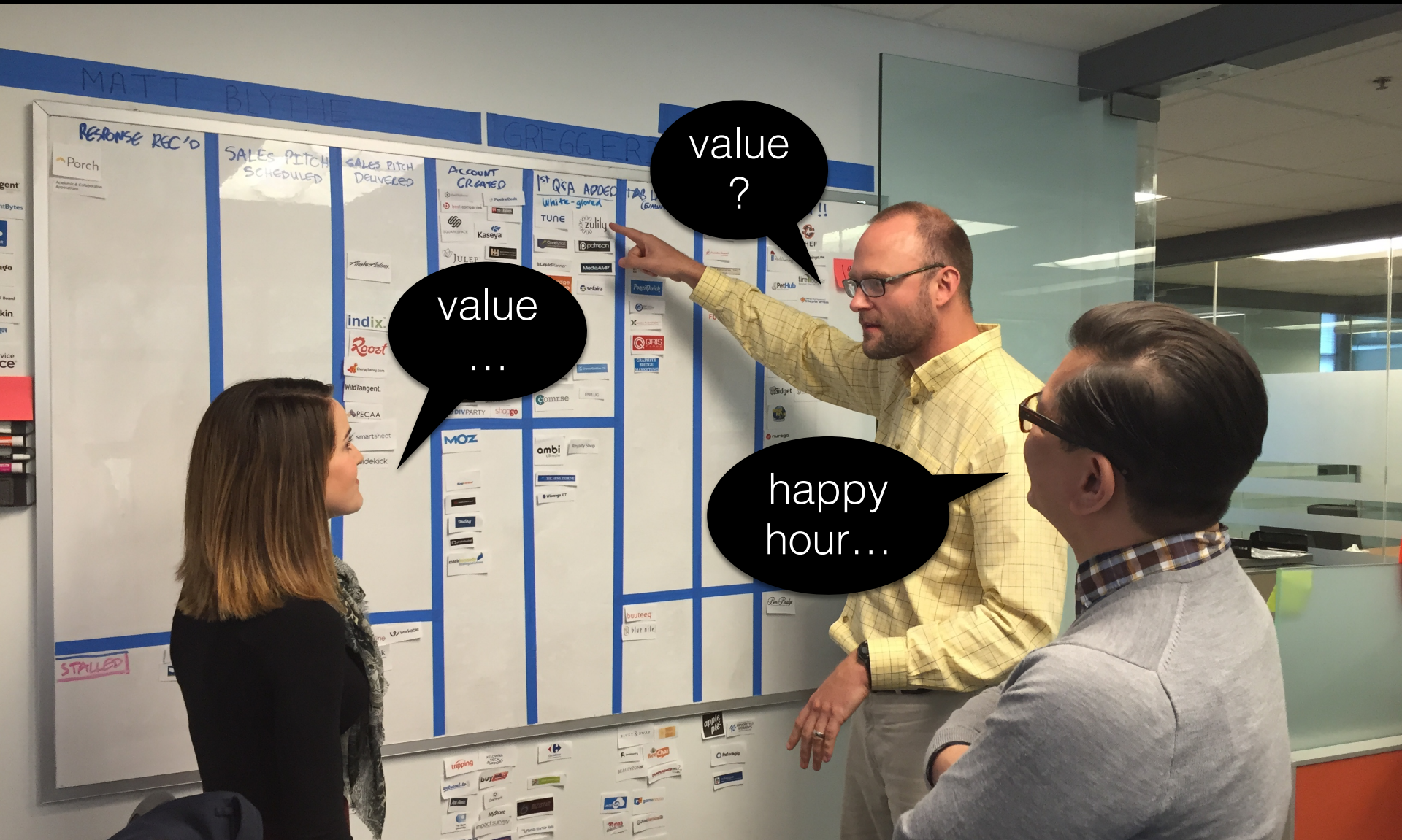


Prosocial communication streamlined communication of value

Cross-discipline implementation of value required **trust in expertise**



Social decision fatigue under uncertainty
limited value consensus



Expression of value in code was **lossy**

A theory of software evolution decisions…

Software evolution is structured by the frequent, collective communication and agreement of a coherent proposition of a product's value across design, engineering, product, marketing, sales, support, users, and customers.

Decisions in software evolution are primarily about **shaping and communicating product value**, not about code.

Implications

- Product management and process were far more important than languages, tools, infrastructure in shaping how, why, and when software evolves
- Developers needed to excel at understanding, communicating, and translating value into code
- Tools might help developers enforce, check, communicate, prioritize, and filter representations of value in code

Open questions

- Does this theory hold in other settings?
- What is the effect of inconsistent understanding of product value propositions on defects?
- When a value proposition changes, how can teams disseminate the change and reflect it in code?
- How does value proposition ***ownership*** affect software evolution?
- How should engineering balance product value-driven and engineering-driven decisions?

Questions?

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Research takeaway: Software evolution is structured by the frequent, collective communication and agreement of a coherent proposition of a product's value across design, engineering, product, marketing, sales, support, users, and customers.

Practice takeaway: engineering isn't just about great code, it's about translating and expressing a value negotiated across multiple disciplines.