

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

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Co-Founder & Chief Scientist, AnswerDash



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



- 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



T-Mobile

\$

BILLING

USAGE

PLAN

PHONE

SHOP

SEARCH GO

Bill details : Oct. 16

Sep. 17 - Oct. 16, 2015

Back to summary



Account



About account charges

Account charges either apply to multiple lines or do not apply to any individual line on your account.

Changes

\$0.00

There were no account level changes.

Equipment Installment Plan (EIP)

YOUR EIP BALANCE: \$917.79

You can pay off the plan at any time, or make extra payments and reduce the number of payments left.

[View Details](#)

Service prior to Oct 17

OTHER CHARGES AND CREDITS

Zeroed Int - Emp



Subtotal: (\$238.16)

Service from Oct 17 to Nov 16

PLAN

SimpleChoice Val FAM UnlTT+D

\$80.00

Subtotal: \$80.00

T-Mobile fees and charges & Government taxes and fees

Charges based on the following address: 4231 1/2 NE 113TH ST, SEATTLE WA 98125-5856

T-MOBILE FEES AND CHARGES

Federal Universal Service Fund \$1.43

Utility Use \$3.24

GOVERNMENT TAXES AND FEES

Questions about your Bill?

T-Mobile

\$

BILLING

USAGE

PLAN

PHONE

SHOP

SEARCH GO

Questions about your Bill?

Search all questions

Billing

- 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?

Contextual Browsing

Powered by AnswerDash

[View Details](#)

Utility Use

\$3.24

GOVERNMENT TAXES AND FEES

Bill details : Oct. 16

Contextual FAQ

Back to summary



Account

Click this, then click anything
in the page to get Q&A about it.

Service prior to Oct 17

OTHER CHARGES AND CREDITS

Zeroed Int - Emp

Popular Questions

▶ How do I view my bill history?

You can view your last 12 months' worth of bills by selecting the bill cycle you 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:

Bill Summary: Nov. 16

Selecting Nov. 16 will get the move value with optimized streaming at 65% quality. The design only loads what's needed for the current selection.

Balance: \$0.00

Previous Balance: \$0.00

Current Balance: \$0.00

Bill Highlights: No bill highlights for this bill.

Current charges: View bill details

Current usage: View bill details

Current plan: SimpleChoice Val FAM UnlTT+D

Current price: \$80.00

Subtotal: \$80.00

Total: \$80.00

Was this helpful? Yes No

[Pop out](#)

- Was this helpful? Yes No
- ▶ How do I set up a payment arrangement?
 - ▶ How do I see my detailed bill?
 - ▶ How do I make a bill payment?
 - ▶ What are Account charges?
 - ▶ Why is my bill higher than last month?
 - [See all questions...](#)

Powered by AnswerDash

Selection-based search

Bill details : Oct. 16

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Service prior to Oct 17

OTHER CHARGES AND CREDITS

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Service from Oct 17 to Nov 16

PLAN

SimpleChoice Val FAM UnlTT+D

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 - [See all questions...](#)

Powered by AnswerDash

Analysis

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

s happy by giving them the interesting work, challenging problems, problems they ca

I challenges

ith a point>

c. And where my feet will be less sweaty. They're quite sweaty.

you, our capable CTO, my co-founder, and someone who has to be more of an asshole:

any factors, some of which were outside your control (heartbleed, server port, additional hire), we have
nd Jake isn't being enough of an asshole, either."

t create a culture, engineering or otherwise, that is comfortable with slipping. We must hit our mark
st be "hit" effectively a week or two in advance of actually shipping. We knew we wouldn't do that, bu

oesn't view slipping as something to never, ever, ever, ever let happen. (I have worked in engineering
n effective one we respected and did not hate.) There's a subtle mentality around these things and, fo
low created a "slipping is kinda okay" mentality. It's subliminal, but it is real. We must not under-esti

happen in the all-hands meeting. I kept it light. I asked about the weekend. I let you indicate that if
message to the engineering team. It doesn't communicate that we're on the brink and the founders w

nust impress upon you that we MUST ship on or before next Wednesday. Not Thursday, not Friday, bu
rk. Otherwise, we're just in this "ongoing deadline, no deadline" state that is poisonous to hitting ma

Monday night; Tuesday latest. That's what it'll mean to ship Wednesday.

with respect and love for you and your efforts, I leave you with this video clip as homework. The hairy
d is soft-spoken, cautious, and not-an-asshole, and here is what Erlich tells him is required to be an

S

I have to become more of an asshole.

/ednesday. Full stop.

with a point>

)14

cal search bug, and two first-use orange-arrow bugs (that's prob. the same bug, I realize).

idy, focus on quality, not rushing things. And yet these two issues are pretty significant, and went unc
with basic debugging work.

advisory board member. That's embarrassing to me.

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...

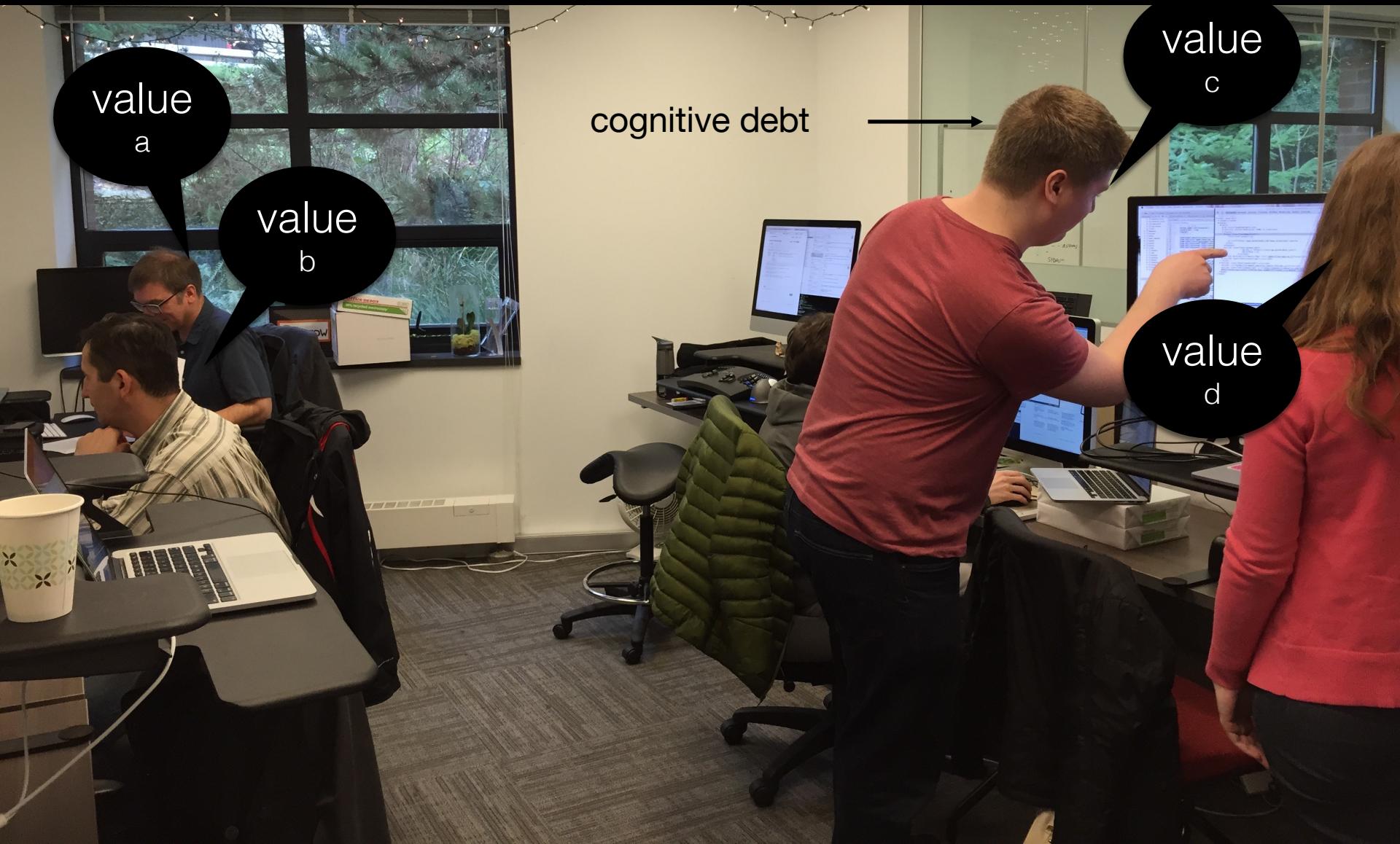
Read the paper for the other three...

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

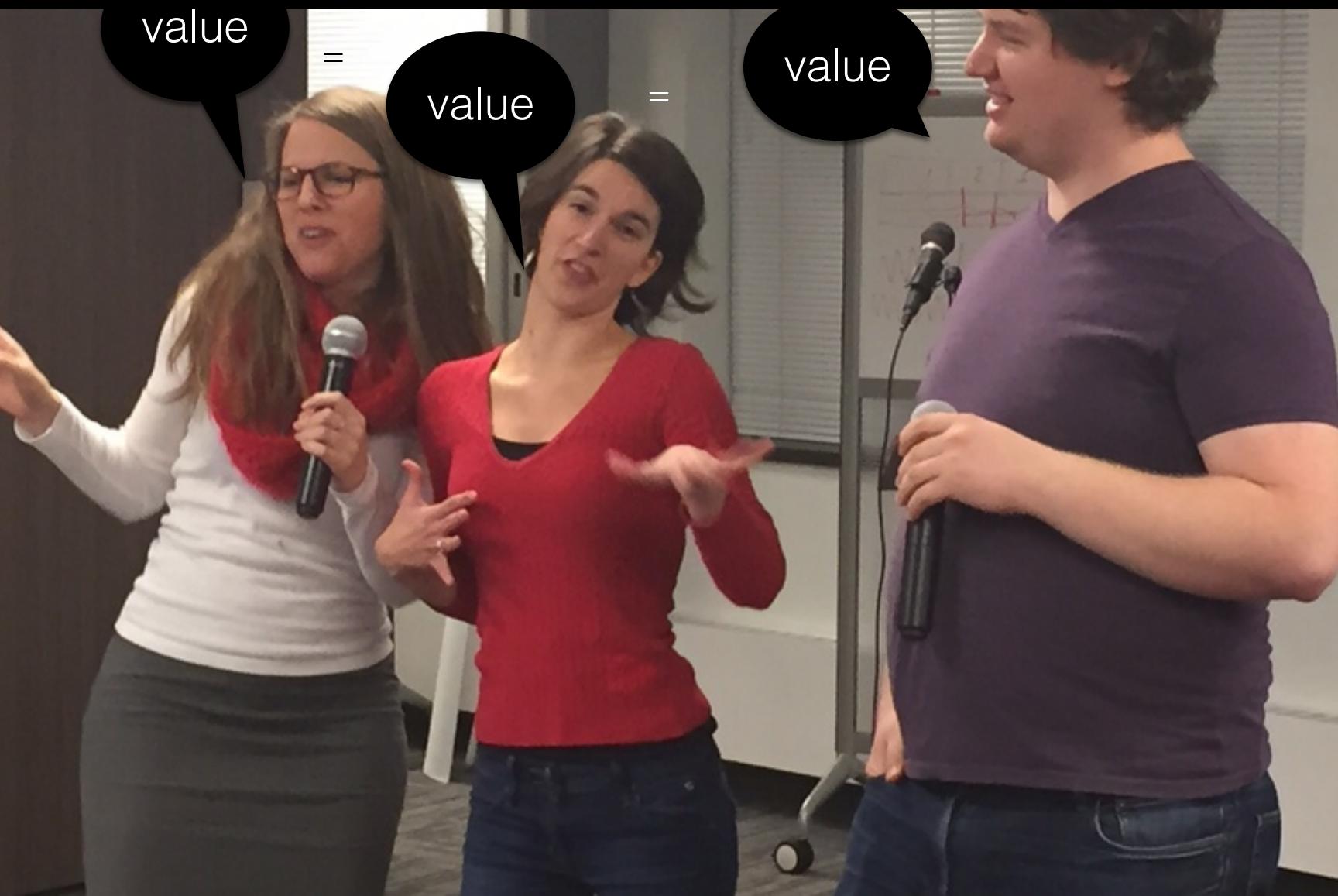
Diffusion of power constrained collective agreement of value



Consistent engineering of value required required consistent understanding of value



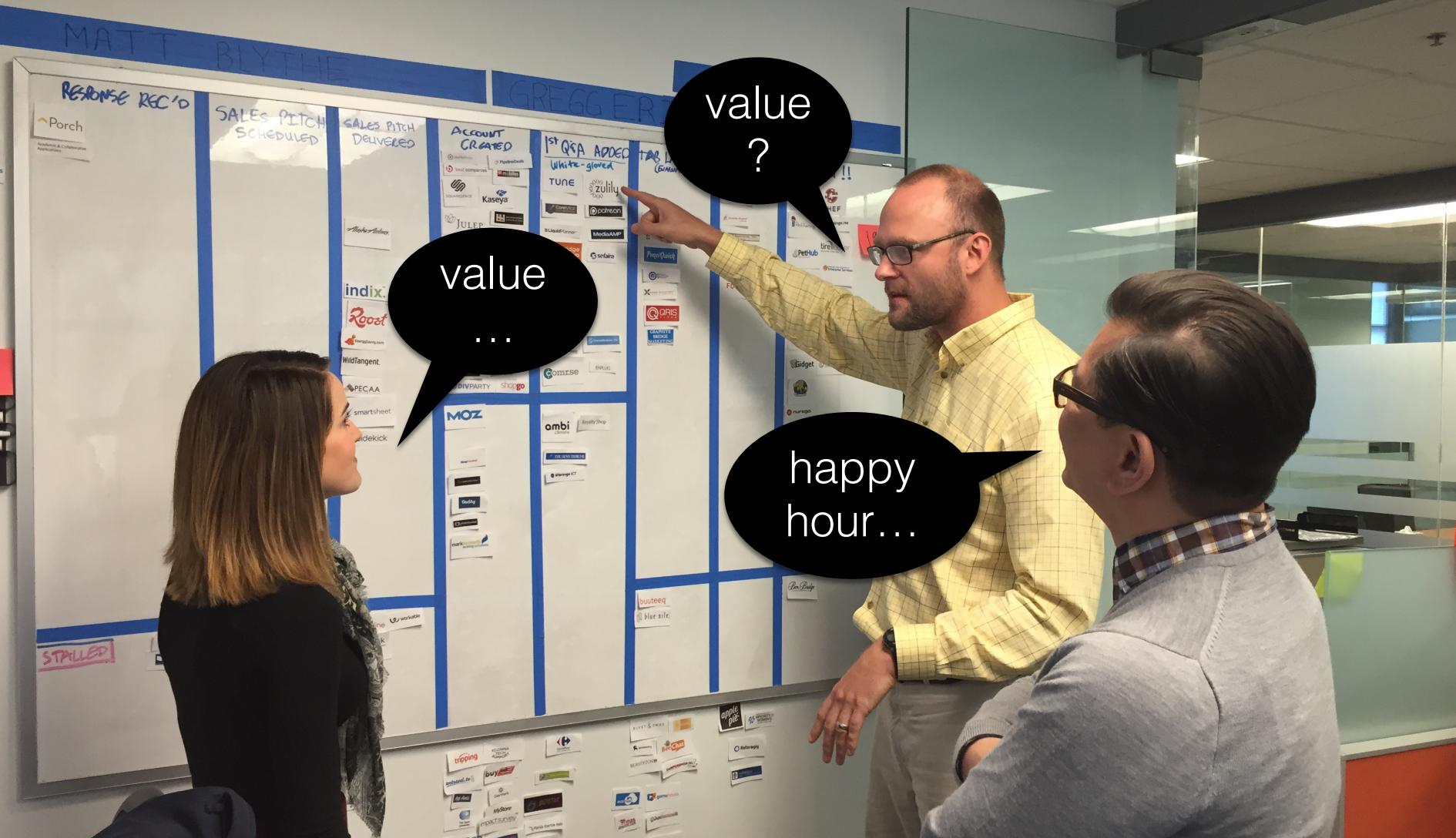
Prosocial communication streamlined communication of value



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.