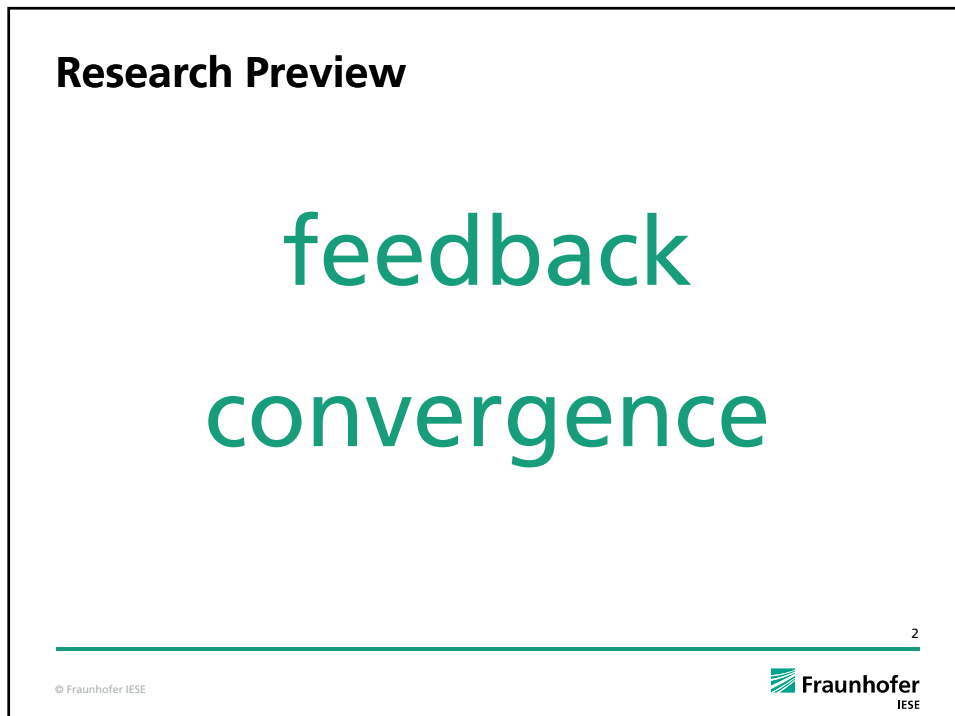Fraunhofer
IESE

Satisfy
Satisfaction engineered.

TOWARDS CROWD-BASED REQUIREMENTS ENGINEERING: A RESEARCH PREVIEW

Eduard Groen
Eduard.Groen@iese.fraunhofer.de

REFSQ'15, Essen
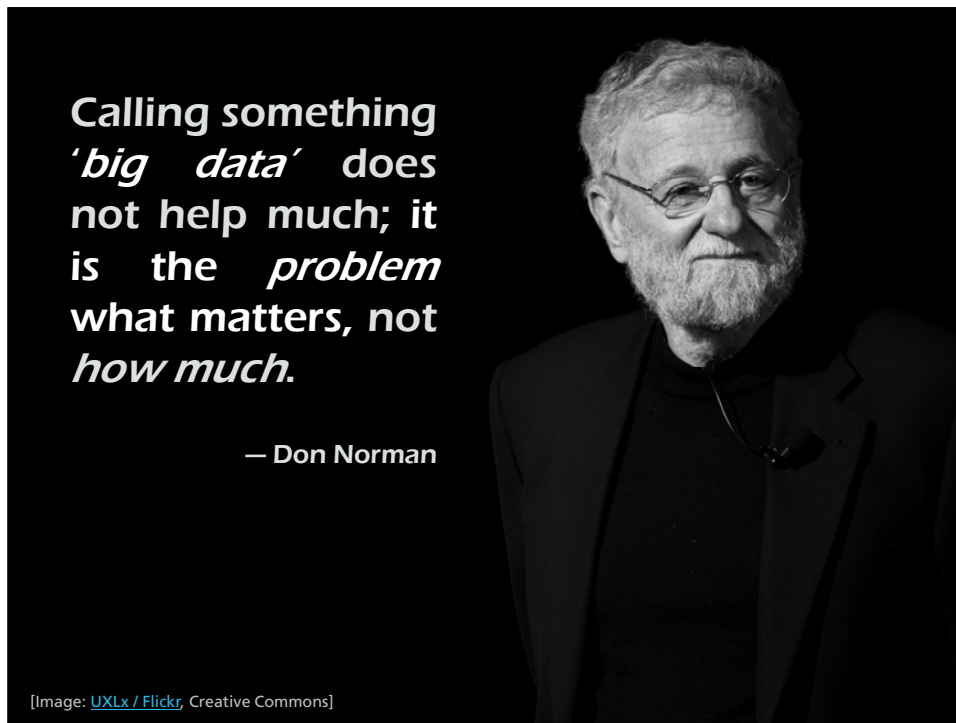March 26, 2015

Research Preview

feedback

convergence

2

© Fraunhofer IESE

Fraunhofer
IESE

User feedback --> crowd + psychology
Convergence: tooling --> SLR (inventorise, assess other domains), integrate (text and data mining) for statistical consolidation

> Calling something
> 'big data' does
> not help much; it
> is the *problem*
> what matters, not
> *how much.*
>
> — Don Norman

[Image: UXLx / Flickr, Creative Commons]

Expert in human-centered design at NordiCHI 2014

So let's focus on the problem, not on the amount.

Is There *Really* A Problem?

4

© Fraunhofer IESE

Fraunhofer
IESE

Fit as many people in a Citroen 2CV (world record). --> With how many people do you take a bus or train?
SCALABILITY
Kim Lauenroth on Monday: trend in the past 20 years:
Lower costs, faster development, greater complexity, higher quality, more innovation
Iterations, co-presence

Most Affected Areas

- B2C products and services with many stakeholders
  - A "crowd"

> "The crowd is a group of current or potential stakeholders, large enough in size to display group behavior, with a common interest in a particular service."
>
> Fraunhofer IESE

- Domains with a high demand for fast innovation
  - (Embedded) Electronics
  - Lifestyle

5

© Fraunhofer IESE

Fraunhofer
IESE

Psychological observances of "real" crowds.

What's the Solution?

- **(Partial) Automation**
  - Deal with large quantities of user feedback
  - Capable of handling an unlimited number of stakeholders

- **Remote techniques**
  - Analyst(s) and stakeholders can be in any place at any time
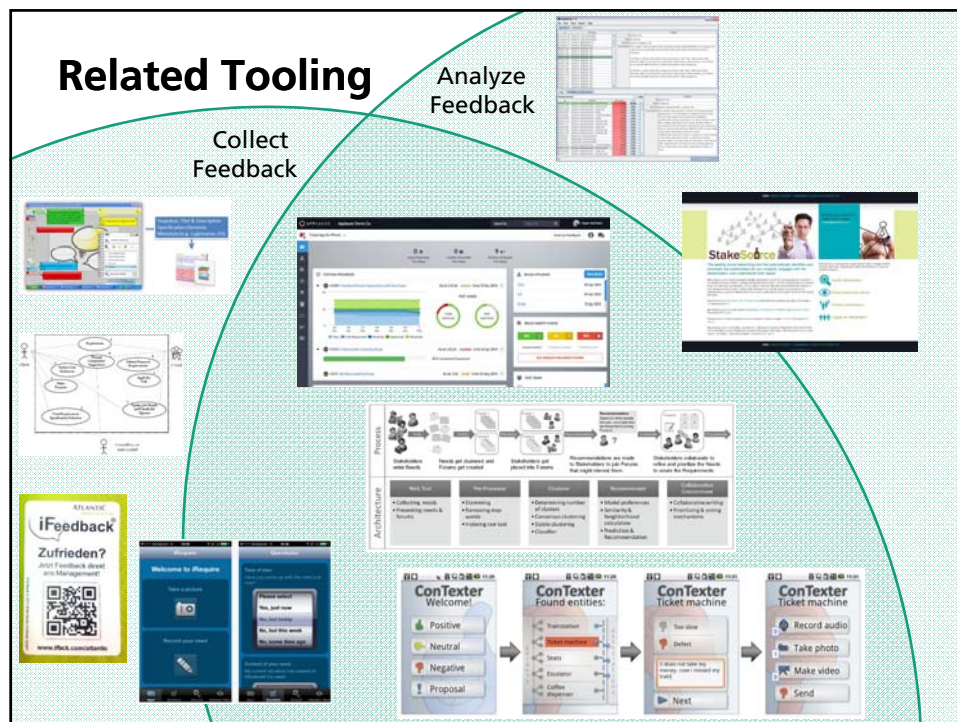 - Can be applied iteratively and/or continuously

- N.B.: "Limitations to machine learning, text and data mining still make fully automated RE infeasible" – Berry, Gacitua, Sawyer and Tjong (2012)

6

© Fraunhofer IESE

Fraunhofer
IESE

Dan Berry: "you have to do the manual stuff anyway"

Solving the problems of RE in settings with a crowd by semi-automating RE through crowdsourcing, text mining, usage mining

iFeedback cards on every desk at the REFSQ

Crowd-Based Requirements Engineering

"Crowd-Based Requirements Engineering is a **semi-automated** requirements engineering approach for obtaining and analyzing any kind of **user feedback** from a **crowd**, with the goal of deriving validated user requirements."

Fraunhofer IESE

- It differs from traditional RE in:
  - the techniques and feedback types used
  - the iterative and continuous application (especially after the deployment of a system)
  - its scalability to any number of stakeholders

8

© Fraunhofer IESE

Fraunhofer IESE

"Convergence" first, "feedback" next

Crowd-Based RE In Perspective

- Traditional RE **asks for requirements** in a co-present setting

- Crowdsourcing in RE **asks for solutions (e.g., requirements)** in a remote setting

- Crowd-based RE **analyzes any kind of feedback** in a remote setting
  - Interaction (crowdsourcing, community management)
  - Text mining → conscious needs (verbalized)
  - Data mining (usage mining) → unconscious needs
  - Text and data mining combined → subconscious needs

9

© Fraunhofer IESE

Fraunhofer
IESE

Our Conceptual Model

5
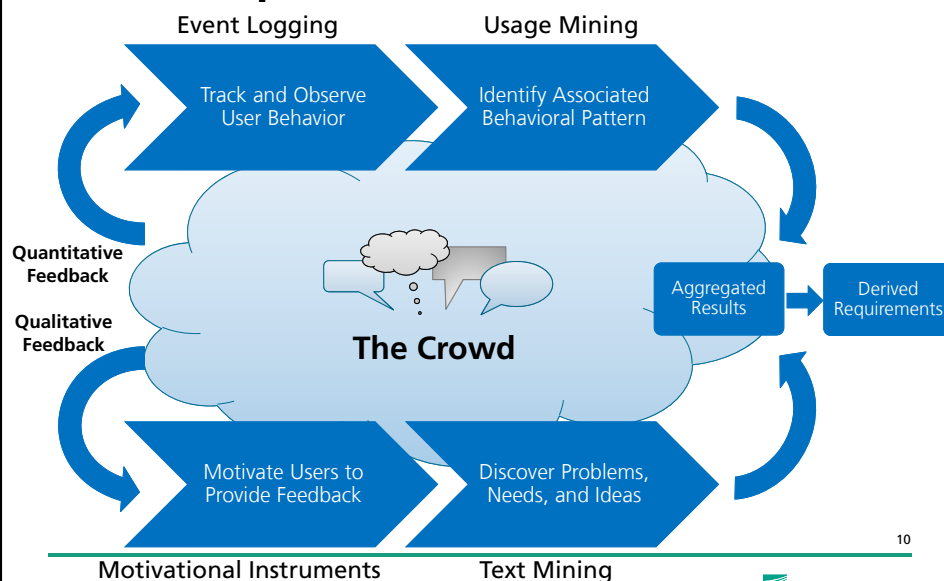
Definition of "Feedback"

1. Helpful **information or criticism** that is given to someone to say what can be done to **improve** a performance, product, etc.
2. Something (such as **information** or electricity) **that is returned** to a machine, system, or process.
3. An annoying and unwanted sound caused by signals being returned to an electronic sound system.

Merriam-Webster Dictionary

11

© Fraunhofer IESE

Fraunhofer
IESE

This third definition we are tempted to skip. Two perspectives:
1. What do people do when you hear feedback over a PA? They start talking
2. Is annoying or tacit feedback (e.g., "this is a crap app") really useless? --> interaction, data mining

Definition of "User Feedback"

"Meaningful information provided by end-users of widely used software applications with the purpose of suggesting improvements to such applications (i.e. new needs, modifications, or strategic behaviours)."

Itzel Morals-Ramirez

"User feedback is any information provided by members of a crowd that can be analyzed to derive their needs, wishes, ideas, bug reports, and clues about trends."

Fraunhofer IESE

12

© Fraunhofer IESE

Fraunhofer
IESE

This does not necessarily have to come from users; basically any (current and potential) stakeholder and even competitors can provide this type of feedback.

Characterization, ontology, clusters of feedback types

6

User Feedback Dimensions

Dimension	Type	Description
Awareness		Does the user intend to contribute requirements directly with a reasonable expectance that these data will be used?
Mode		Does an interaction of some kind take place between the user and the developer?
Data type		Is natural language provided or is it log file data?
Intention		Does the user share an opinion, explain his motives or ask for an improvement?
Homogeneity		Is it a closed community or can anyone join?

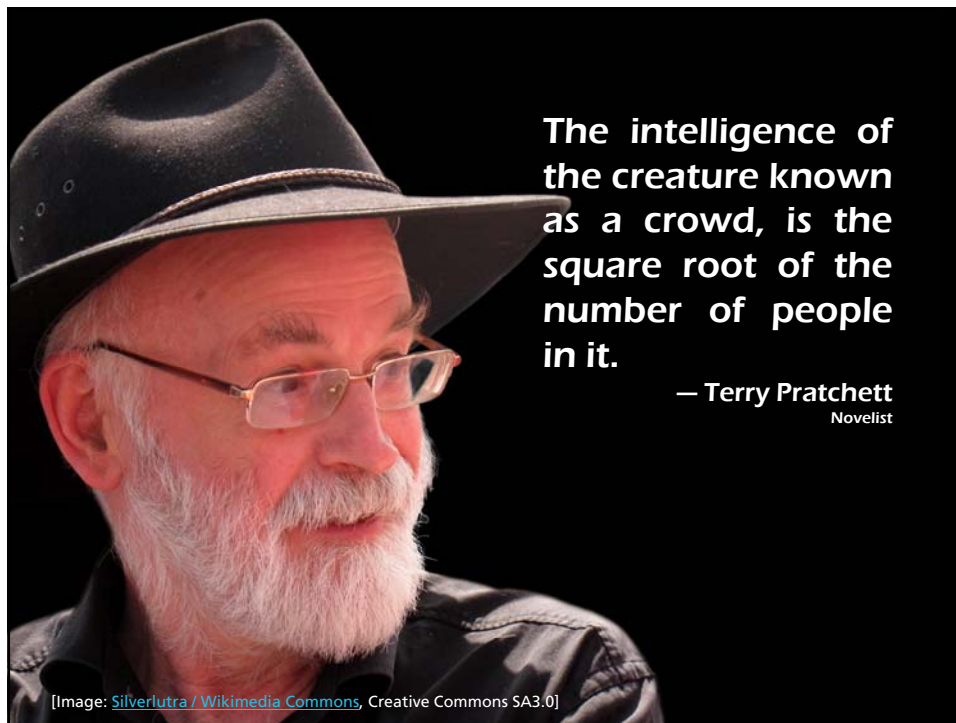Awareness = explicit, implicit, tacit
Example: the intranet of a company is an online and private crowd.
The employees in a union are a real and private crowd, which we don't necessarily consider.
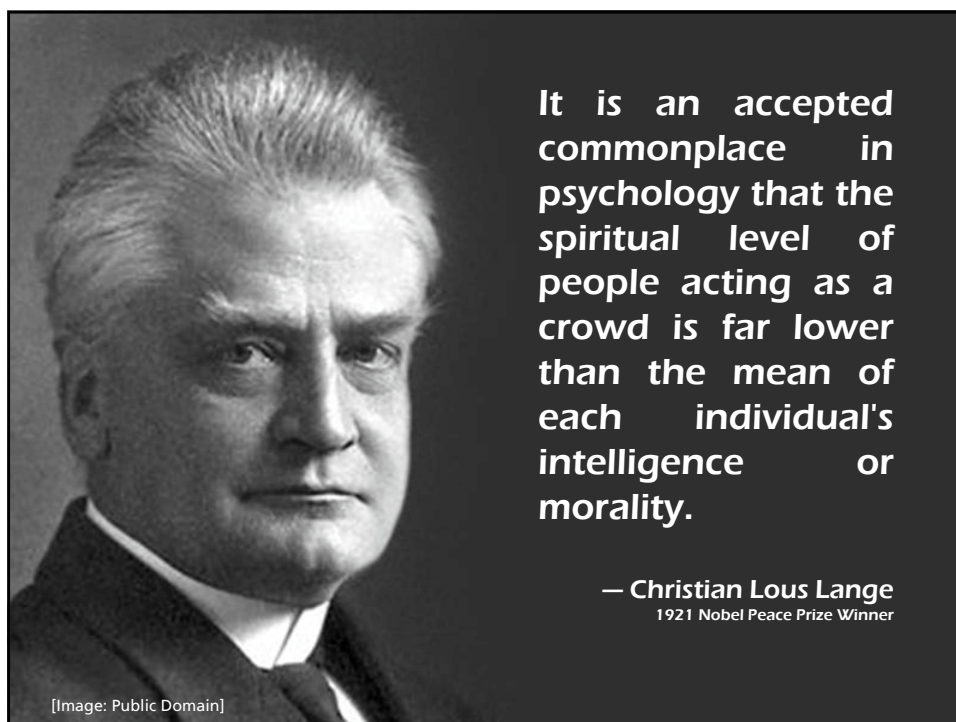

So everything about a crowd is great... or is it?

The intelligence of the creature known as a crowd, is the square root of the number of people in it.

— Terry Pratchett
Novelist

[Image: Silverlutra / Wikimedia Commons, Creative Commons SA3.0]

But why should we believe someone writing about a flat world lying on the back of four elephants standing on a giant tortoise swimming through space?

It is an accepted commonplace in psychology that the spiritual level of people acting as a crowd is far lower than the mean of each individual's intelligence or morality.

— Christian Lous Lange
1921 Nobel Peace Prize Winner

[Image: Public Domain]

Maybe a Nobel Peace Prize winner can say it just as well.

Crowd psychology (social loafing, social facilitation)

A crowd's output is different from the sum of its parts: people are often at their best—and their worst—in groups

When I read commentary about suggestions for where C should go, I often think back and give thanks that it wasn't developed under the advice of a worldwide crowd.
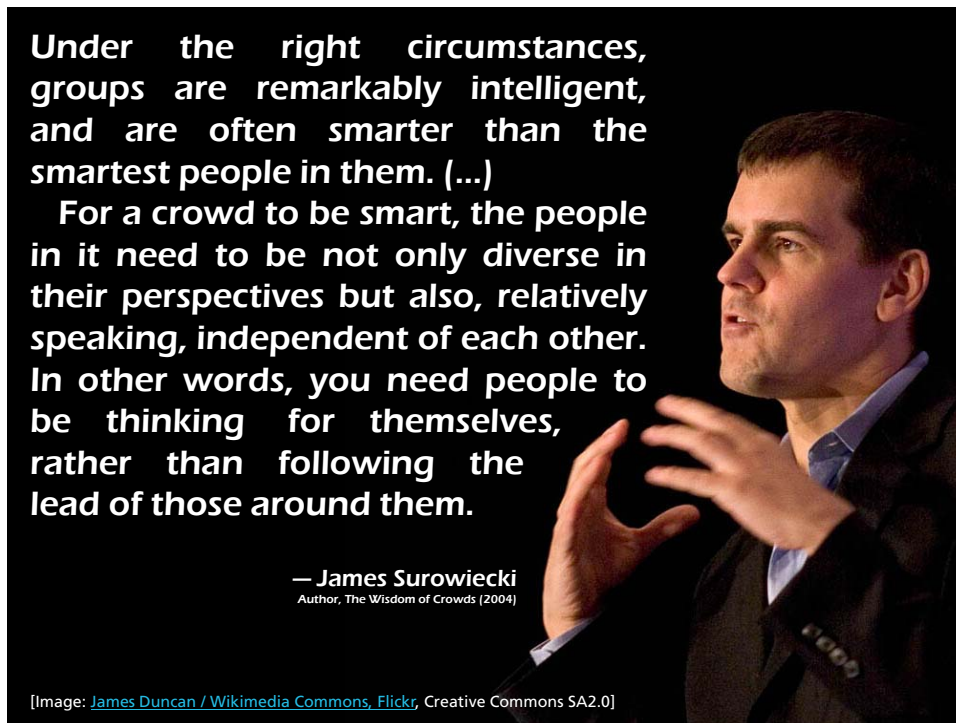
— Dennis Ritchie
Co-Creator of C

[Image: Peter Hamer / Wikimedia Commons, Creative Commons SA2.0 Generic]

SE version of the famous Henry Ford quote. I guess we don't want the crowd in SE either?

Some Common Problems

- Selection bias
  - Not all users provide feedback or are involved
  - Over- / underrepresentation of stakeholder groups
  - 100% of the users' true needs will never be obtained → no "One Truth"

- Sabotage
  - Intentional bias by (unknown) motivations

- Loss of nuance
  - Often forced in a template/wizard, excludes exceptions
  - Tacit information, e.g.: *"This new feature is awful."*

18

© Fraunhofer IESE

Fraunhofer IESE

Under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them. (...)

For a crowd to be smart, the people in it need to be not only diverse in their perspectives but also, relatively speaking, independent of each other. In other words, you need people to be thinking for themselves, rather than following the lead of those around them.

— James Surowiecki
Author, The Wisdom of Crowds (2004)

[Image: James Duncan / Wikimedia Commons, Flickr, Creative Commons SA2.0]

Results are not derived from averaging solutions, but from aggregating them.

Dan Formosa: "What we need to do to design is to look at the extremes. The middle will take care of itself."

We Have to Interact with the Crowd

- There is much power and potential in a crowd
  - Chain reactions amplify contagious mass behavior
  - Reciprocal relationships and group behavior

- Benefits
  - Large sample size → statistical analyses
  - Involve the uninvolved
  - Reduce anonymity
  - Discussions → drafting, prioritization, validation, reconciliation

20

© Fraunhofer IESE

Fraunhofer IESE

There are great benefits to including the crowd and using a crowd's strengths.
"The Crowd is not perfect, but with the right tweaking, their feedback is like music in our ears."

Thank You For Your Attention!

Eduard.Groen@iese.fraunhofer.de

© Fraunhofer IESE

Fraunhofer
IESE

I hope you enjoyed listening as much as this man does.
You heard it here at REFSQ first.