

# CrowdRE: Achievements, Opportunities and Pitfalls

Martin Glinz

[www.ifi.uzh.ch/rerg](http://www.ifi.uzh.ch/rerg)

CrowdRE'19

@



University of  
Zurich<sup>UZH</sup>

Department of Informatics

Requirements  
Engineering  
Research  
Group



# What is CrowdRE?

---

CrowdRE is “a semi-automated RE approach for obtaining and analyzing any kind of ‘user feedback’ from a ‘crowd’, with the goal of deriving validated user requirements.”

[Groen, Dörr and Adam 2015]

“An umbrella term for automated or semiautomated approaches to gather and analyze information from a crowd to derive validated user requirements.”

[Groen et al. 2017]

# Who is the crowd in CrowdRE?

---

“The domain of RE should consider the crowd as a pool of current and potential stakeholders.”

[Groen, Dörr and Adam 2015]

“A large group of **current or potential users** of a software product”

[Groen et al. 2017]



# A broader definition

---

**DEFINITION.** **CrowdRE** – Any approach that engages a **crowd of mostly unknown people** for performing RE tasks or providing requirements-relevant information.

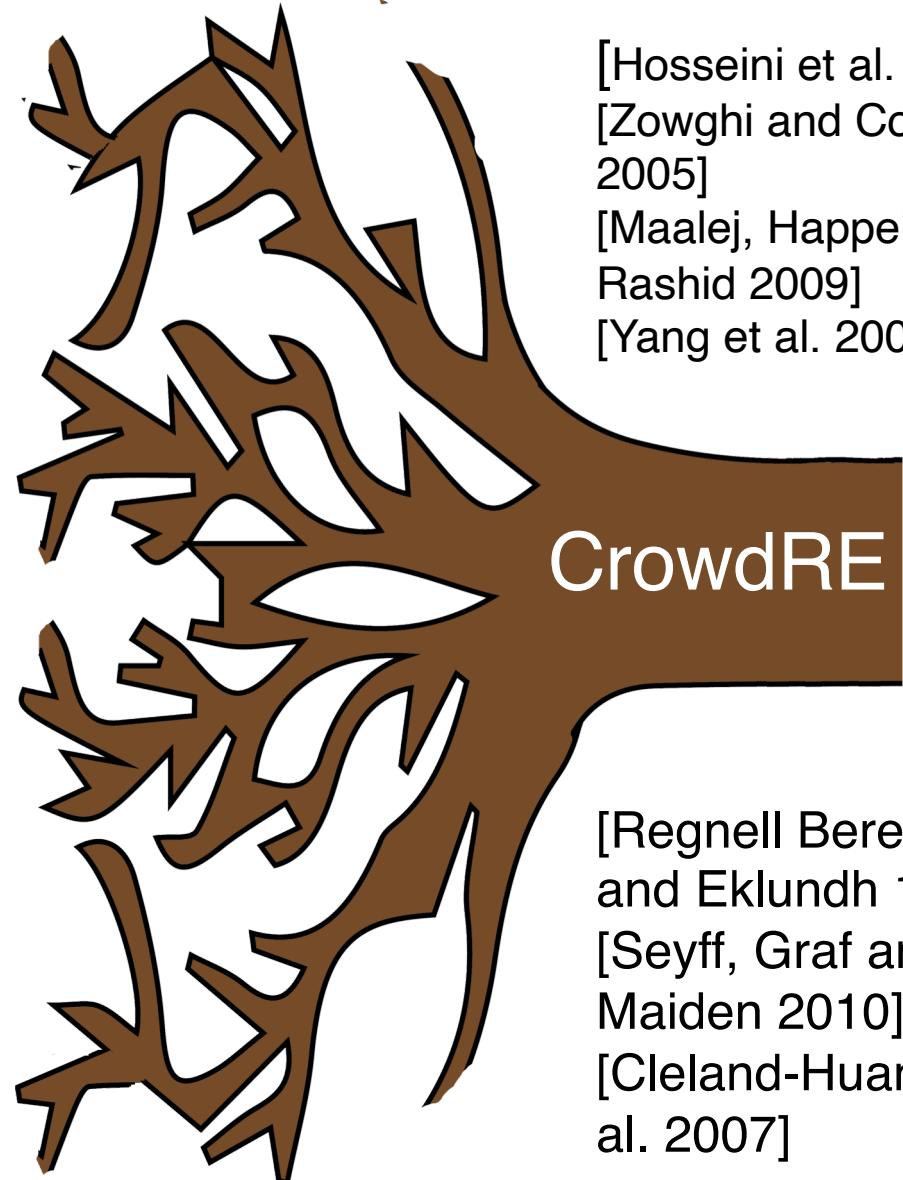
[Glinz 2019]

- Systems, not just products
- Beyond user feedback
- From end-users to (potential) stakeholders and beyond
- Beyond elicitation: any kind of RE activities
- Beyond automation: include manual approaches

# The roots of CrowdRE

---

- Crowdsourcing
- Elicitation techniques:  
questionnaires, opinion polls
- Collaborative elicitation  
and prioritization
- Market-driven RE
- End-user involvement
- Mining RE texts with ML  
techniques



**TABLE I**  
**OVERVIEW OF CONTEMPORARY CROWDRE TECHNIQUES**

Technique	New	Evo	Driven by	Typical results	Selected approach
Stakeholder identification	x	(x)	REs	Set of actual or potential stakeholders	StakeNet [10]; GA of stakeholders outside organization
Collaborative elicitation and idea generation	x	(x)	Stakeholders	Ideas, needs, requirements	GARUSO [11]; REs within organization
Social media based elicitation and prioritization	x	x	Stakeholders	Ideas, needs, requirements, priorities	Seyff et al. [13]; Web-based elicitation
Collaborative prioritization				Requirements	WikiWinWin [6]; driven feedback prioritization
Questionnaires and opinion polls (for elicitation)				Opinions, needs, preferences	Classic requirement elicitation
User feedback gathering		x	Users (as providers) / REs, developers & POs (for analysis)	Feature requests, bug reports, sentiment, priorities	Feedback tools: iFAME [17]; App store mining [20][21]
User feedback polling		x	REs, POs	sentiment, preferences	Generic technique:
System monitoring		x	REs	Usage profiles, performance data, ...	SUPERSEDE ( <a href="http://RE@runtime">http://RE@runtime</a> ) approach
Preference finding		x	POs, developers	Frequency of use, preferences	Continuous experimentation, with A/B testing

New and Evo denote suitability for the development of new systems and evolving existing systems, respectively. REs stand for Requirements Engineers.

[Glinz 2019]

# Who & Where are my stakeholders?

## Stakeholders

Within  
organizational  
reach



Outside  
organizational reach

→ Snowballing

[Lim, Quercia and Finkelstein 2010]

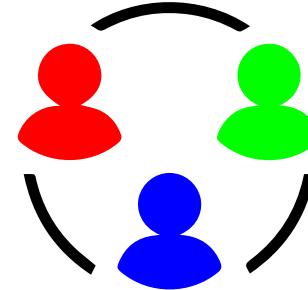
→ Attracting:      Community platform + access channels +  
motivation

[Kolpondinos and Glinz 2019]

# Give me your ideas, needs & priorities

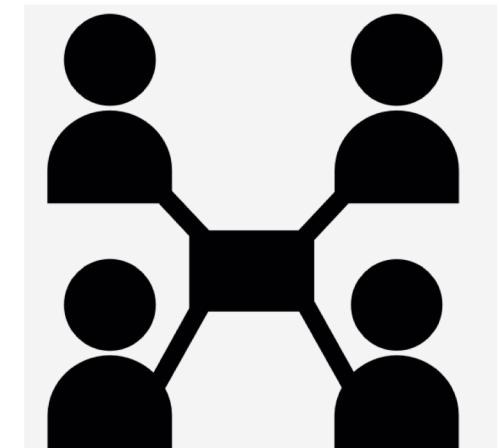
---

Collaboration in the crowd!



- Exploit stakeholders' existing social networks & platforms [Seyff et al. 2015]
- Provide a RE community platform [Kukreja and Boehm 2012]
- Hmm, who will contribute?
  - Serve existing communities
  - Provide explicit motivation to contribute  
→ Gamification

[Snijders et al. 2015]  
[Kolpondinos and Glinz 2019]

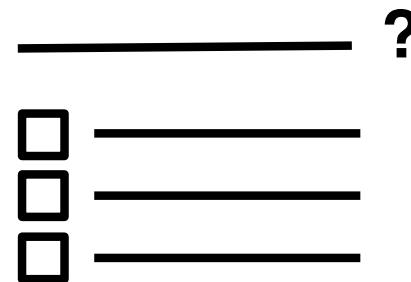


# Crowd Oldies for elicitation

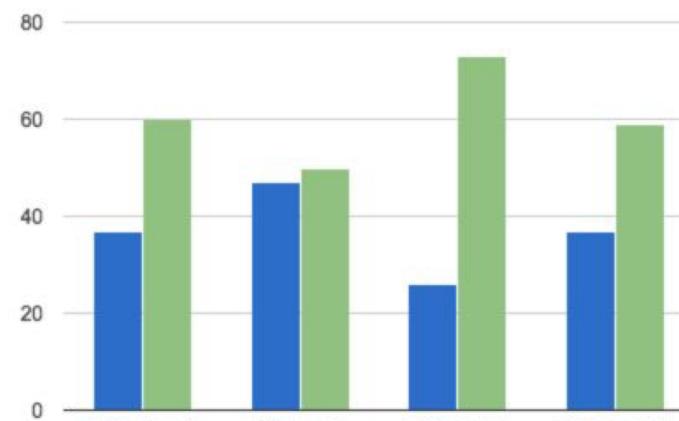
---

[Zowghi and Coulin 2005]

- Questionnaires
- Opinion polls



How much do you trust public opinion polls?



# Oh, gimme, gimme feedback!

---

- Enabling user feedback: make it easy for users
- Polling user feedback: encourage / motivate / coerce users to give feedback
- Deducing user feedback: monitoring actual user behavior



[Seyff, Graf and Maiden 2010]  
[N. Seyff et al. 2017]  
[Seyff, Ollmann and Bortenschlager 2014]  
[Oriol et al. 2018]  
[Pagano and Maalej 2013]  
[Panichella et al. 2015]  
[Guzman, Ibrahim and Glinz 2017]  
[Williams and Mahmoud 2017]  
[Guzman and Maalej 2014]  
<http://supersede.eu> 2015-17

# You are my guinea pig

---

... but you don't know that you are one.

- A/B testing
- System usage monitoring
- Usage profile mining



[Bosch 2012]  
[Oriol et al. 2018]  
[<http://supersede.eu> 2015-17  
RE@runtime approaches]

# Opportunities

# Classic Crowdsourcing



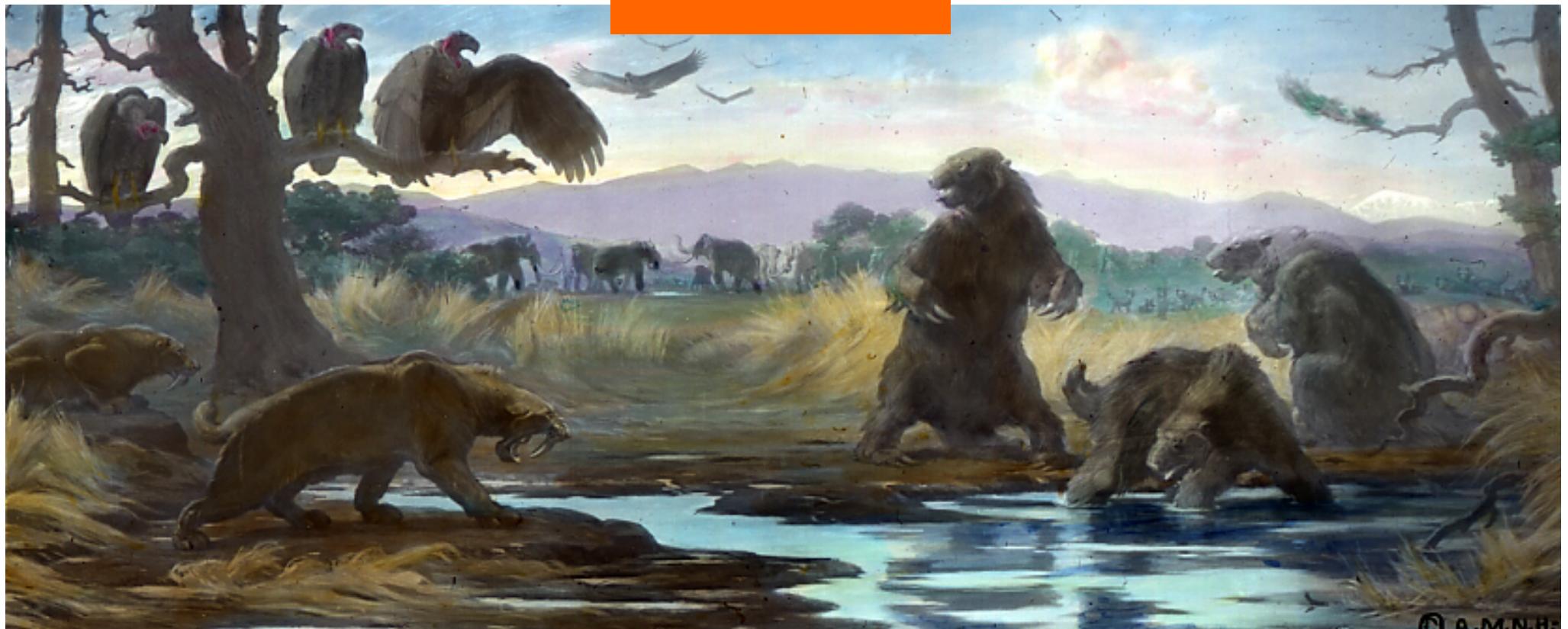
# Open Source RE

## More?



[Glinz 2019]

# Pitfalls



[Glinz 2019]

# The crowd is not always wise

---

J. Surowiecki (2004). *The Wisdom of Crowds: Why the Many are Smarter Than the Few (...)*

[Surowiecki 2004]

I disagree.

Standard i\* symbol set

Actor	Agent	Belief	Goal	Position	Resource	Role	Softgoal	Task

A new crowd-created i\* symbol set

Actor	Agent	Belief	Goal	Position	Resource	Role	Softgoal	Task

[Caire et al. 2013]

# Featuritis

---

Which / How many features

- do users **really need?**
- can users actually **digest?**



Feedback-based elicitation can lead to

- implementing **lots of features**
- that only **few users** actually **want.**

# Listening to the Loudspeakers

---

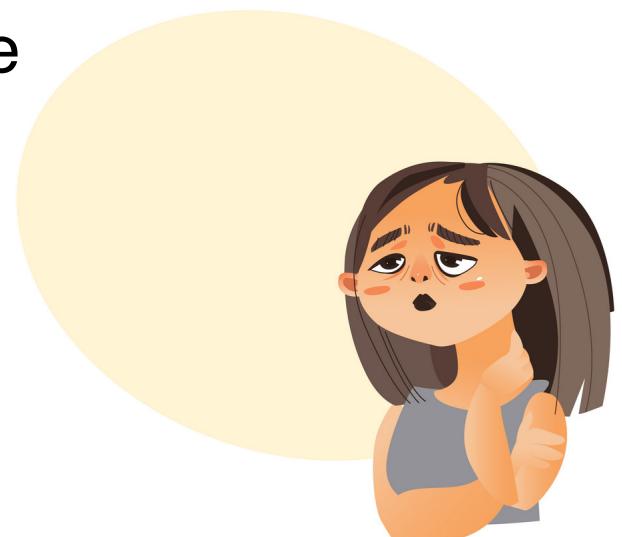
The loudest users are not always the most important ones.



# Feedback fatigue

---

- How was your stay?
  - Please rate the product you recently bought!
  - How did you like our service today?
  - We want your feedback on our magazine.
- The more feedback is requested, the more people get tired of giving feedback



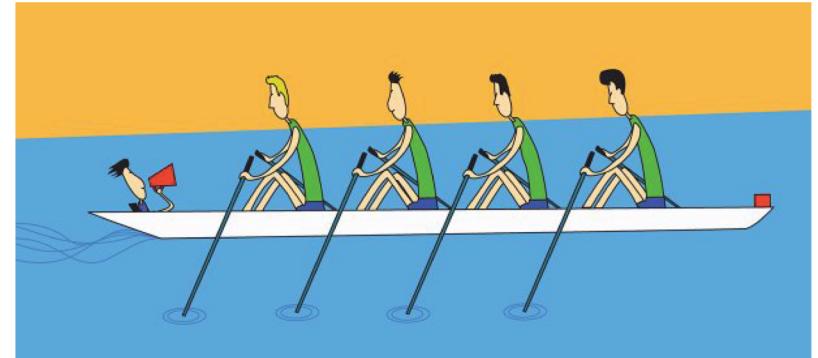
# Inadequate Motivation

---

Why should I help you solve your problems?

→ Crowd members need to be motivated to contribute

- No motivation
  - Nobody will contribute voluntarily
- Wrong / inadequate motivation concept:
  - The **wrong** people might contribute
  - The right people might **not contribute**
  - Inherent motivation can be **damaged**



[Kolpondinos and Glinz 2019]

# Organizational Limits

---

How many A/B tests can you run in parallel  
without

- losing configuration control,
  - unwanted interaction between different tests,
  - and annoying your customers?
- There are organizational limits when performing continuous experimentation on a large scale



[Kevic et al. 2017]

# Summary & Conclusions

---

Take a broad view of CrowdRE

Think bigger and achieve more

Achievements

Actually use what we have and know

Opportunities

Waiting for exploitation

Pitfalls

Avoid the tar pits

# References

---

See references in:

M. Glinz (2019). CrowdRE: Achievements, Opportunities and Pitfalls. 3rd International Workshop on Crowd-Based Requirements Engineering (CrowdRE'19): In 27th IEEE International Requirements Engineering Conference Workshops (REW), 2019. pp. 172–173.