

# Product Usage Monitoring

Anne Rozinat

*Together with ...*

*Mathias Funk, Evan Karapanos, Ana Karla  
Alves de Medeiros, and Aylin Koca*

# Multi-disciplinary Team

**Aylin Koca**  
(Business Process  
Design)



**Mathias Funk**  
(Electronic Systems)



**Industrial  
Design**



**Evan Karapanos**  
(User-centered Design)

**Electrical Engineering**  
**Technology Management**



# Outline

- 1. Introduction**
- 2. Approach**
- 3. Experimental Results**
- 4. Conclusion**

# Outline

- 1. Introduction**
- 2. Approach**
- 3. Experimental Results**
- 4. Conclusion**

# 1. Introduction

# 1. Introduction

***Problems in New Product Development:***

# 1. Introduction

## *Problems in New Product Development:*

1. Products are getting **more complex**

# 1. Introduction





# 1. Introduction

## *Problems in New Product Development:*

1. Products are getting **more complex**

# 1. Introduction

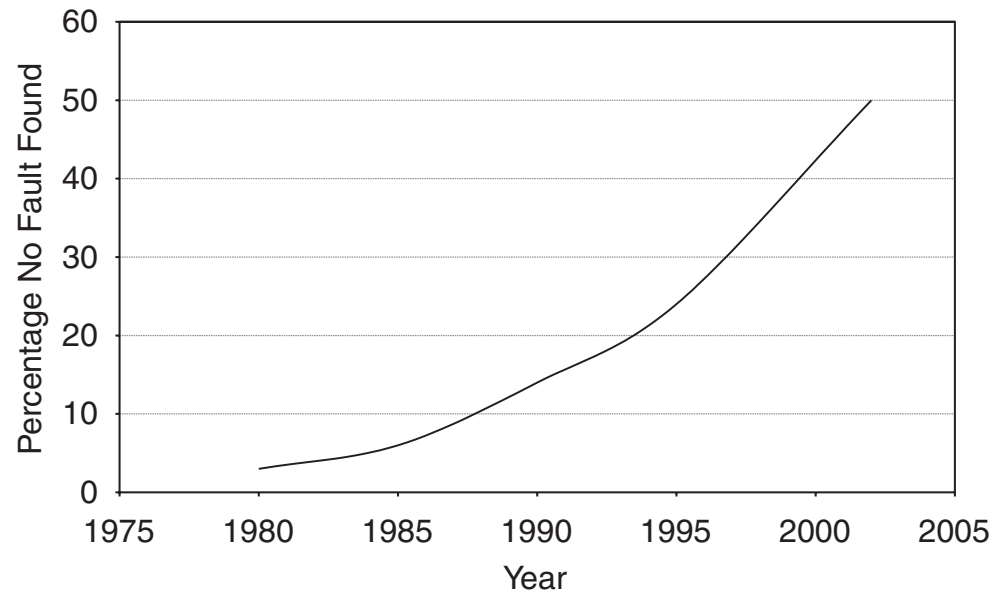
## *Problems in New Product Development:*

1. Products are getting **more complex**
2. Customers are becoming **more demanding**

# 1. Introduction

## *Problems in New Product Development:*

1. Products are getting **more complex**
2. Customers are becoming **more demanding**



# 1. Introduction

## *Problems in New Product Development:*

1. Products are getting **more complex**
2. Customers are becoming **more demanding**

# 1. Introduction

## *Problems in New Product Development:*

1. Products are getting **more complex**
2. Customers are becoming **more demanding**
3. Strong pressure on **'time to market'**

# 1. Introduction

## *Problems in New Product Development:*

1. Products are getting **more complex**
2. Customers are becoming **more demanding**
3. Strong pressure on '**time to market**'

→ **More complex** products need to be developed **better** and **faster!**

# 1. Introduction

*One possible solution:*

→ Involve potential customers in **early user tests**

*Challenges:*

- **Feasibility** (fit into development cycle)
- **Usefulness** (valid and relevant data)

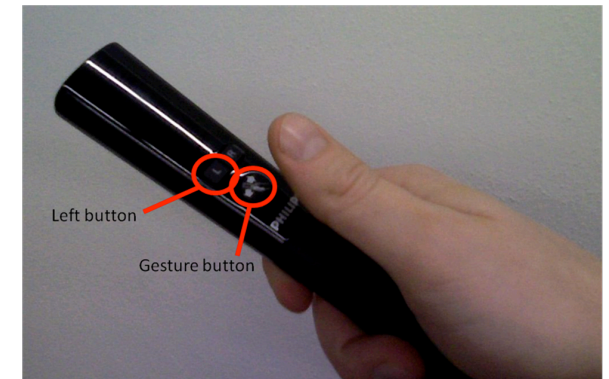
# 1. Introduction

*One possible solution:*

→ Involve potential customers in **early user tests**

*Challenges:*

- **Feasibility** (fit into development cycle)
- **Usefulness** (valid and relevant data)




**Example Case:**  
Internet on TV Prototype



# 1. Introduction

- During **video playback**: recommendations



The screenshot displays a video player interface. The main video area shows a scene from 'James Bond: Quantum of Solace' with a large building and a bright light beam. The video player includes a progress bar at the bottom left with the Machinima.com logo and a timestamp of 0:01:15. To the right of the video, the title 'James Bond: Quantum of Solace Excl' is displayed, followed by 'Runtime 0:01:16', 'Genre', and 'Date 2008:11:28'. Below the video, a row of six recommendation thumbnails is shown, each with a title and a source (YouTube or medeo). A large right-pointing arrow is visible on the right side of the recommendations row.

James Bond: Quantum of Solace Excl

Runtime 0:01:16

Genre

Date 2008:11:28

Publisher:Activision Developer:Treyarch Release Date:Nov 4, 2008

Machinima.com

0:01:15

James Bond: Quantum of Solace Excl

It's time for revenge! D

Alicia Keys and Jack Bl

Will you like this James

Making a Bond film is :

The best Bond ever?! D

YouTube

medeo

medeo

medeo

medeo

medeo

# 1. Introduction

- **Search:** results and text recommendation



# 1. Introduction

# 1. Introduction

***Our Approach:***

# 1. Introduction

***Our Approach:***

# 1. Introduction

## *Our Approach:*

- Observing user actions **automatically** (feasibility)

# 1. Introduction

## *Our Approach:*

- Observing user actions **automatically** (feasibility)
- In their **habitual environment** (validity)

# 1. Introduction

## *Our Approach:*

- Observing user actions **automatically** (feasibility)
- In their **habitual environment** (validity)
- Observation logic **can be changed dynamically** (relevant)



# 1. Introduction

## *Our Approach:*

- Observing user actions **automatically** (feasibility)
- In their **habitual environment** (validity)
- Observation logic **can be changed dynamically** (relevant)

# 1. Introduction

## *Our Approach:*

- Observing user actions **automatically** (feasibility)
- In their **habitual environment** (validity)
- Observation logic **can be changed dynamically** (relevant)

## *Furthermore:*

# 1. Introduction

## *Our Approach:*

- Observing user actions **automatically** (feasibility)
- In their **habitual environment** (validity)
- Observation logic **can be changed dynamically** (relevant)

## *Furthermore:*

# 1. Introduction

## *Our Approach:*

- Observing user actions **automatically** (feasibility)
- In their **habitual environment** (validity)
- Observation logic **can be changed dynamically** (relevant)

## *Furthermore:*

- **Semantic link** between observation and analysis phase

# 1. Introduction

## *Our Approach:*

- Observing user actions **automatically** (feasibility)
- In their **habitual environment** (validity)
- Observation logic **can be changed dynamically** (relevant)

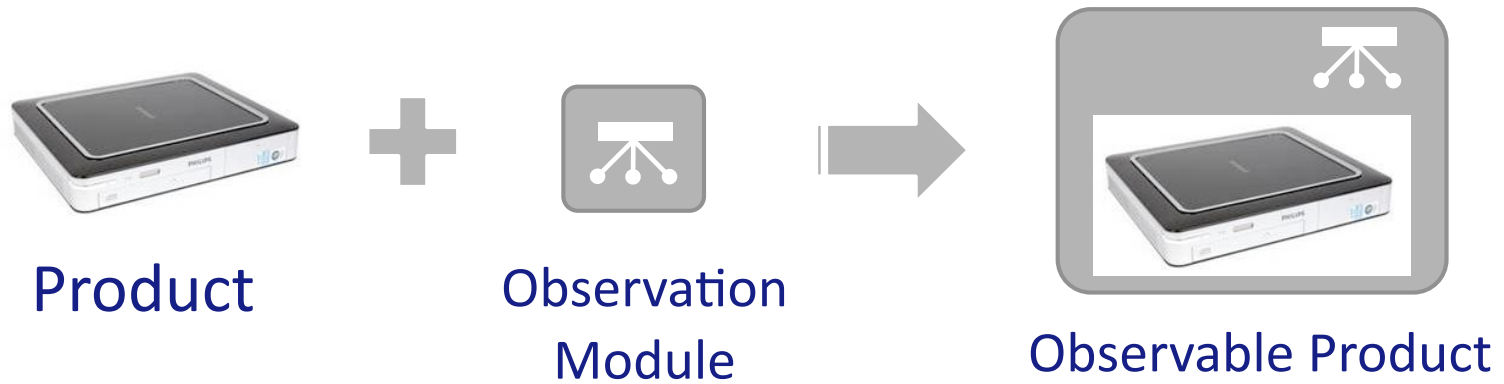
## *Furthermore:*

- **Semantic link** between observation and analysis phase
- Incorporation of **subjective feedback**

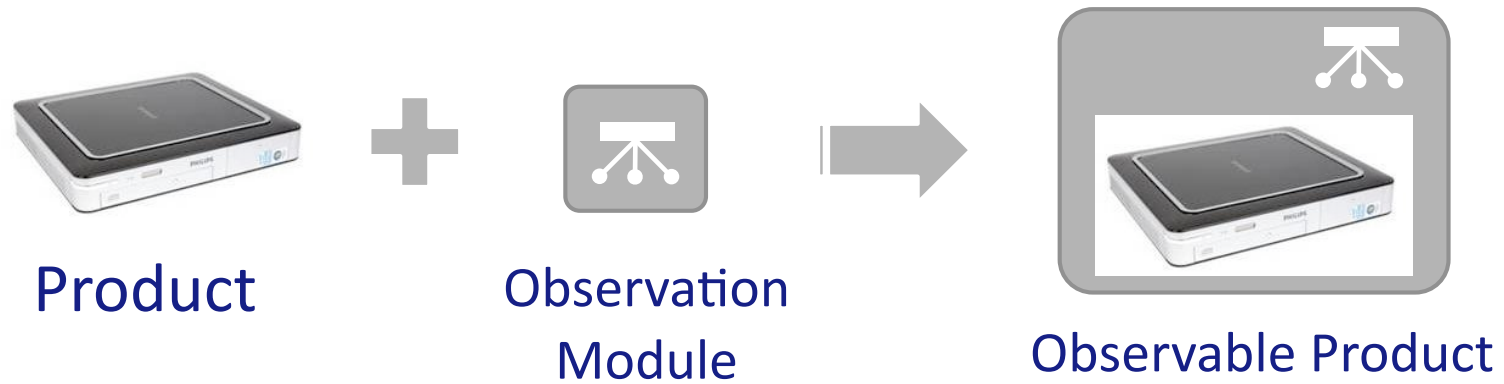
# Outline

1. Introduction
2. Approach
3. Experimental Results
4. Conclusion

## 2. Approach



## 2. Approach



User



User



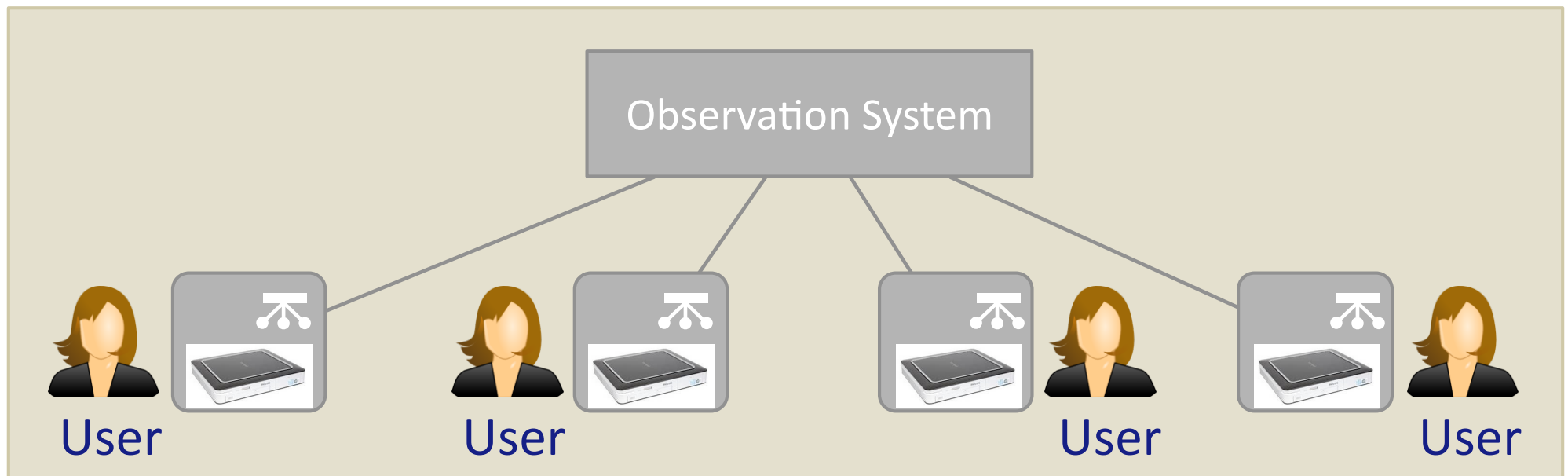
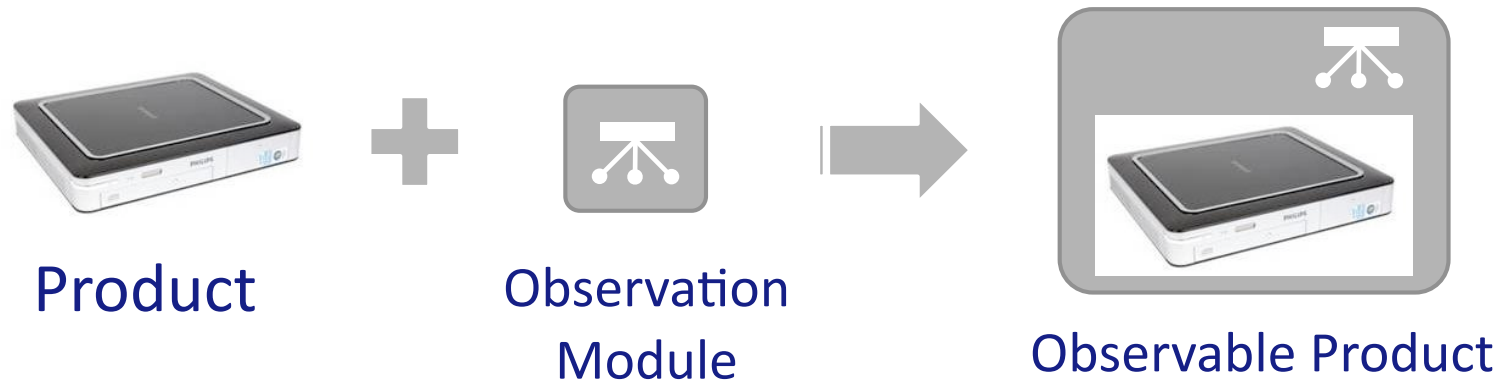
User



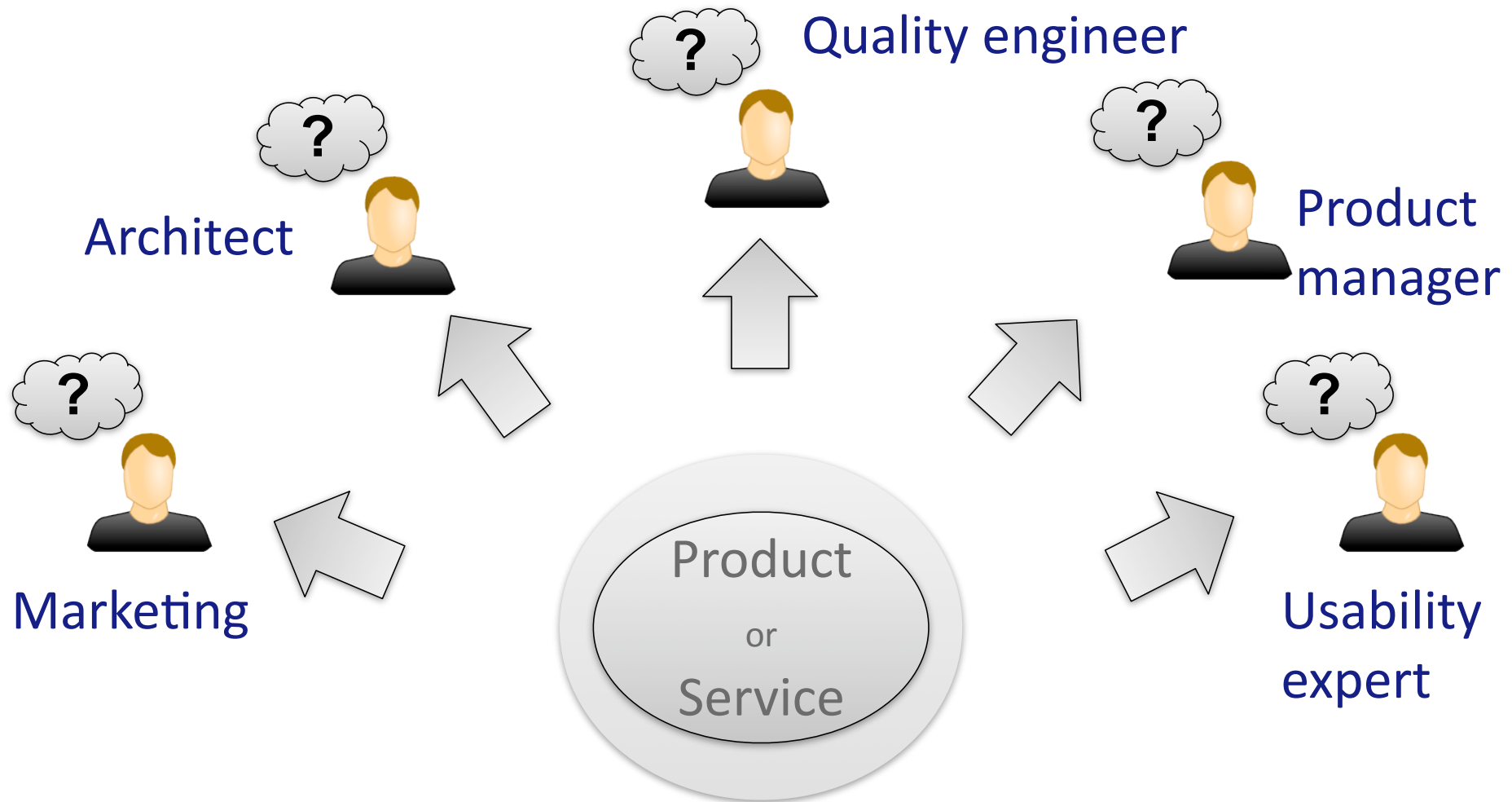
User



## 2. Approach



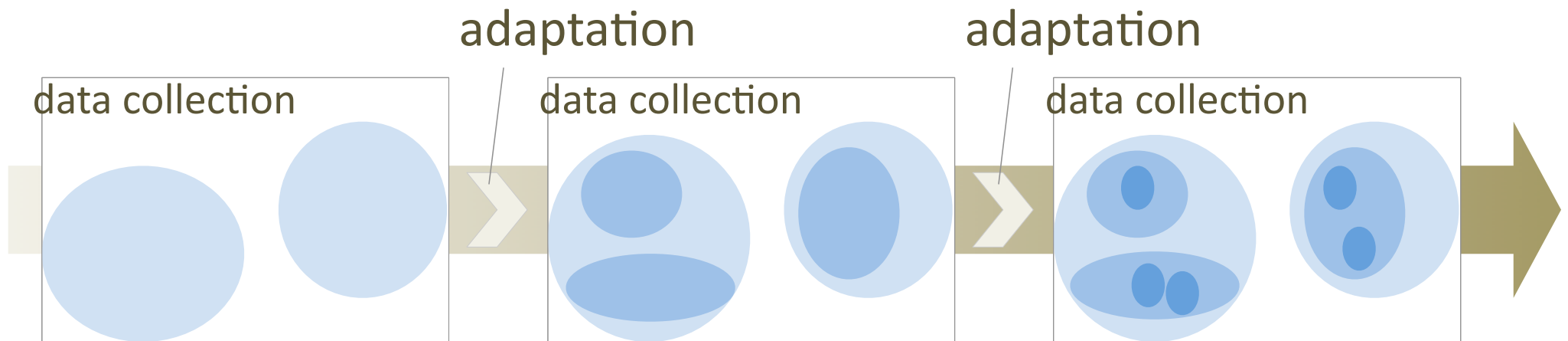
## 2. Approach



*Who are the stakeholders?*

## 2. Approach

Flexibility to adapt data collection...



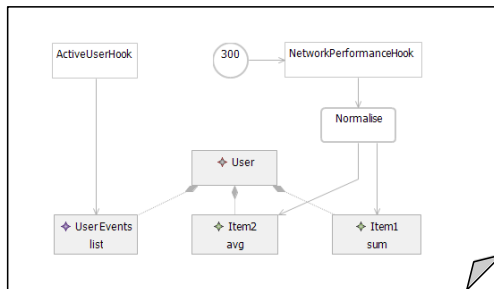
...remotely and on-the-fly

## 2. Approach

### Authoring



Domain expert



### Observation

Global Observation

### Process analysis using

ProM



User



User



User



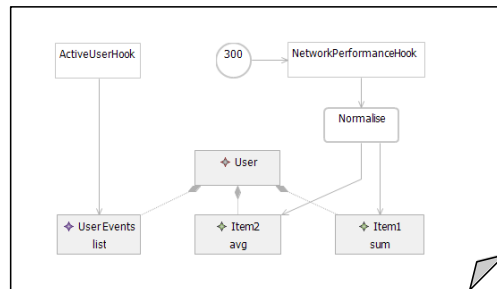
User

## 2. Approach

### Authoring



Domain expert



### Observation

Global Observation

### Process analysis using

ProM



User



User



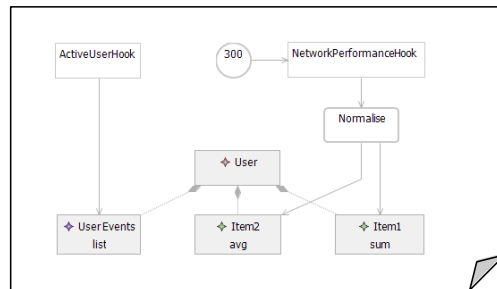
User



User

## 2. Approach

### Authoring



### Observation

Global Observation

### Process analysis using

ProM



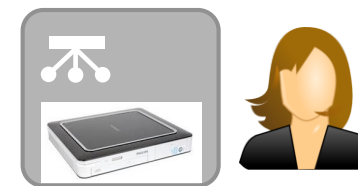
User



User

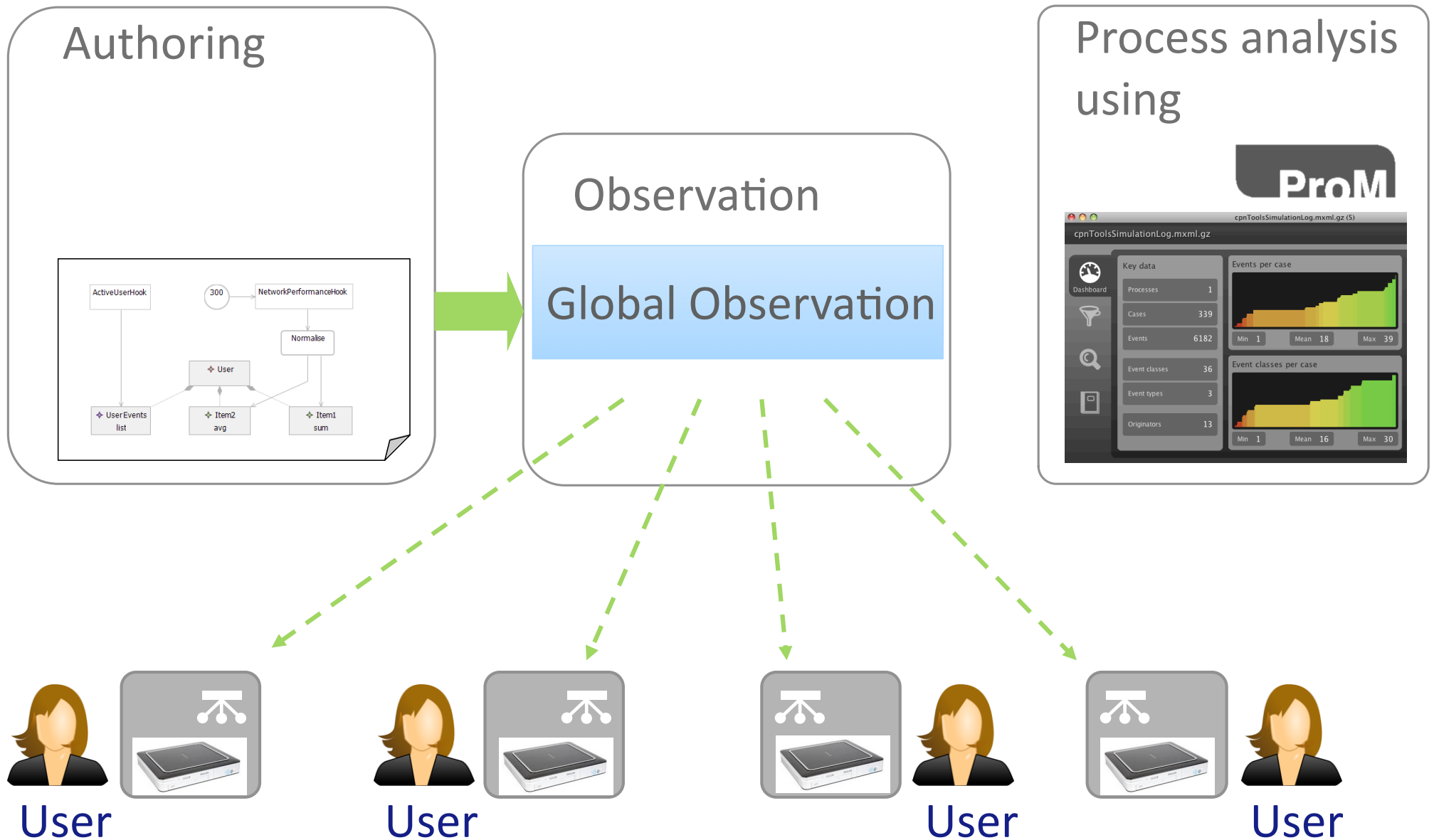


User

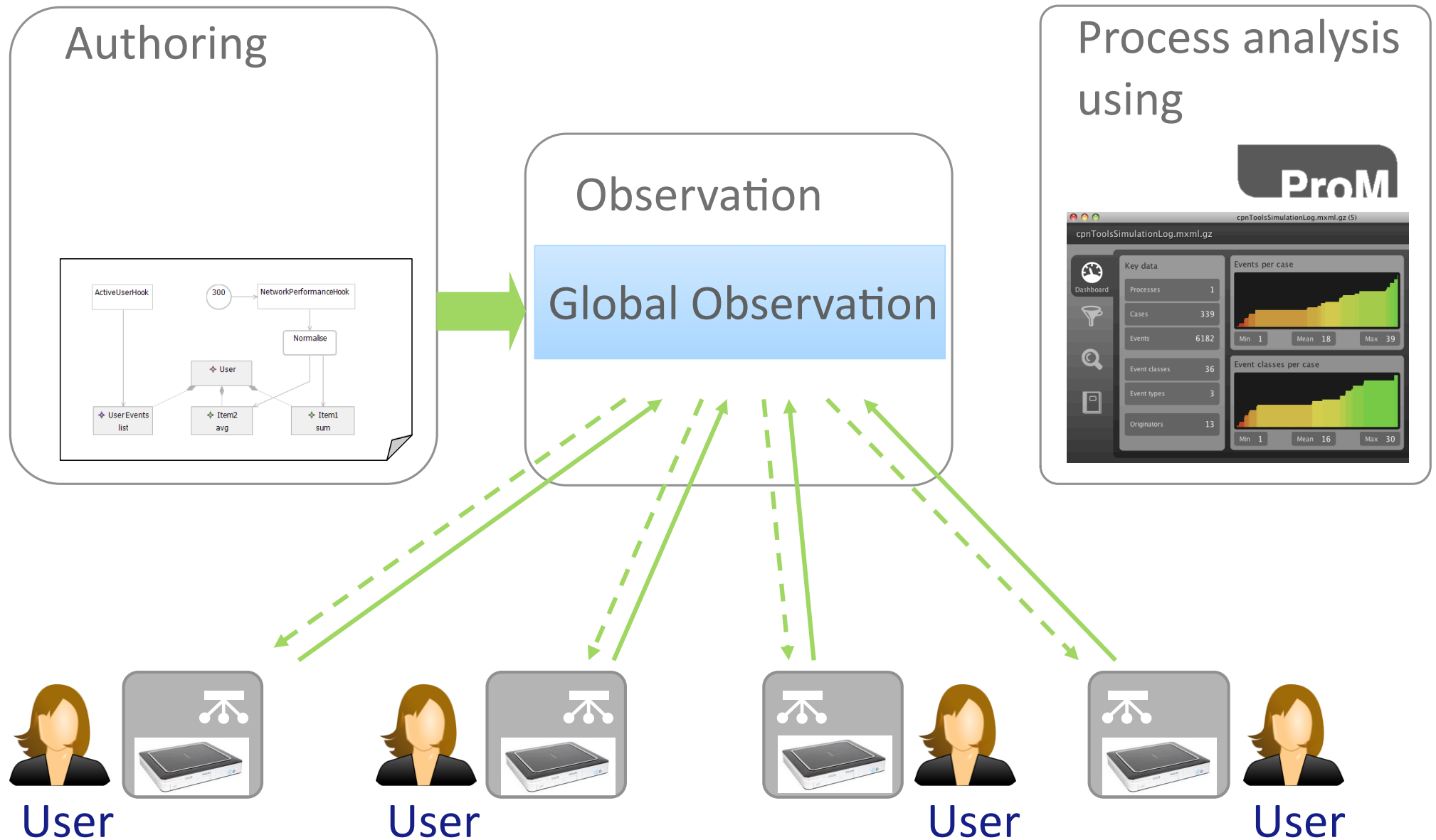


User

## 2. Approach

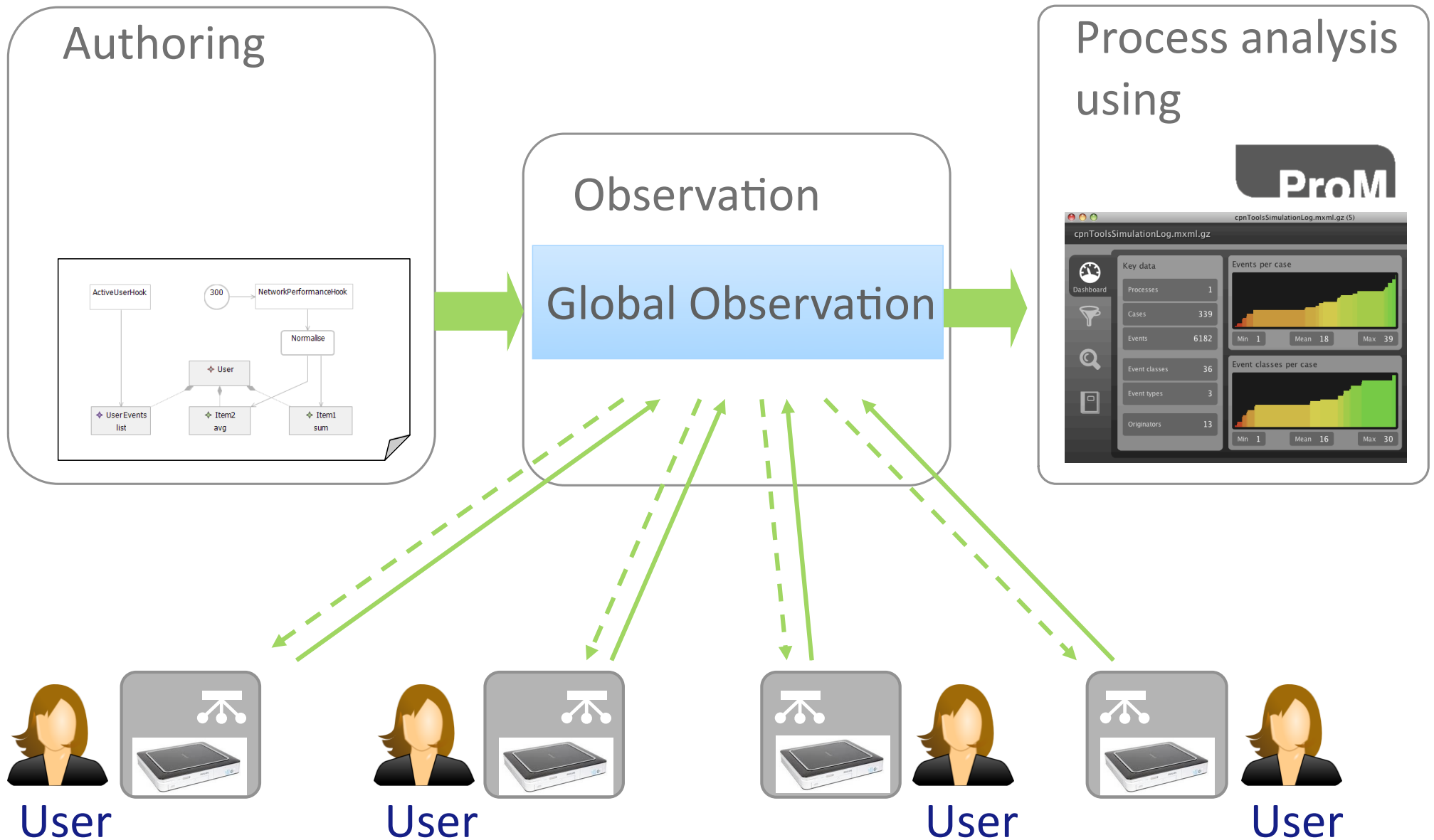


## 2. Approach

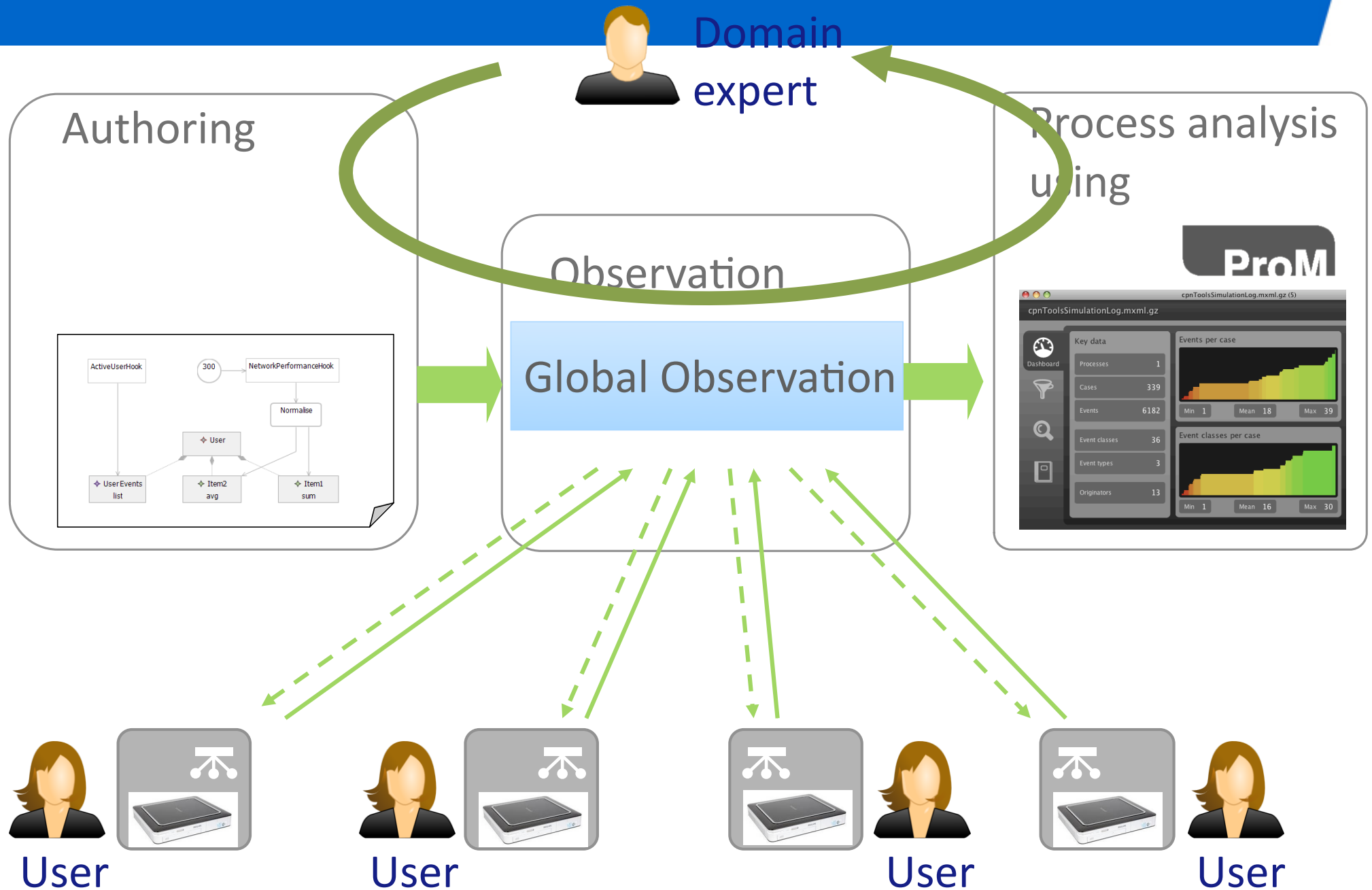




## 2. Approach



## 2. Approach

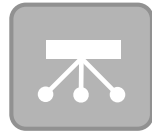


## 2. Approach

1



Product



Observation  
Module



Observable Product

2

Conceptualization



Observation  
definition



Automatic data  
collection



Data analysis



# Outline

1. Introduction
2. Approach
3. Experimental Results
4. Conclusion

### 3. Experimental Results

- **8 people** used the prototype at home for **2 weeks**
- We gathered **15.325 events**

### 3. Experimental Results

- **8 people** used the prototype at home for **2 weeks**
- We gathered **15.325 events**

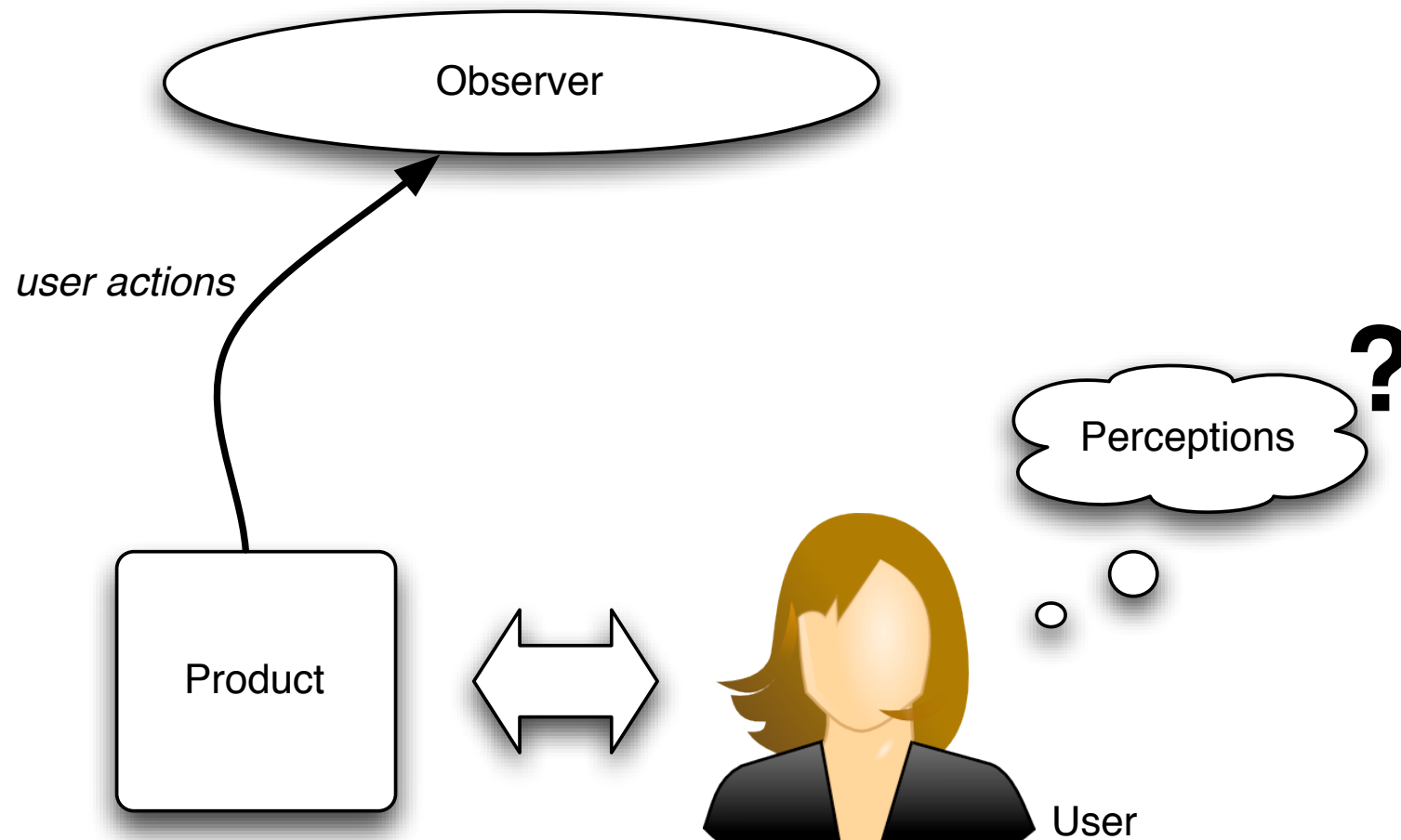
*ProM Tool Demo*



<http://prom.sourceforge.net>  
<http://www.processmining.org>

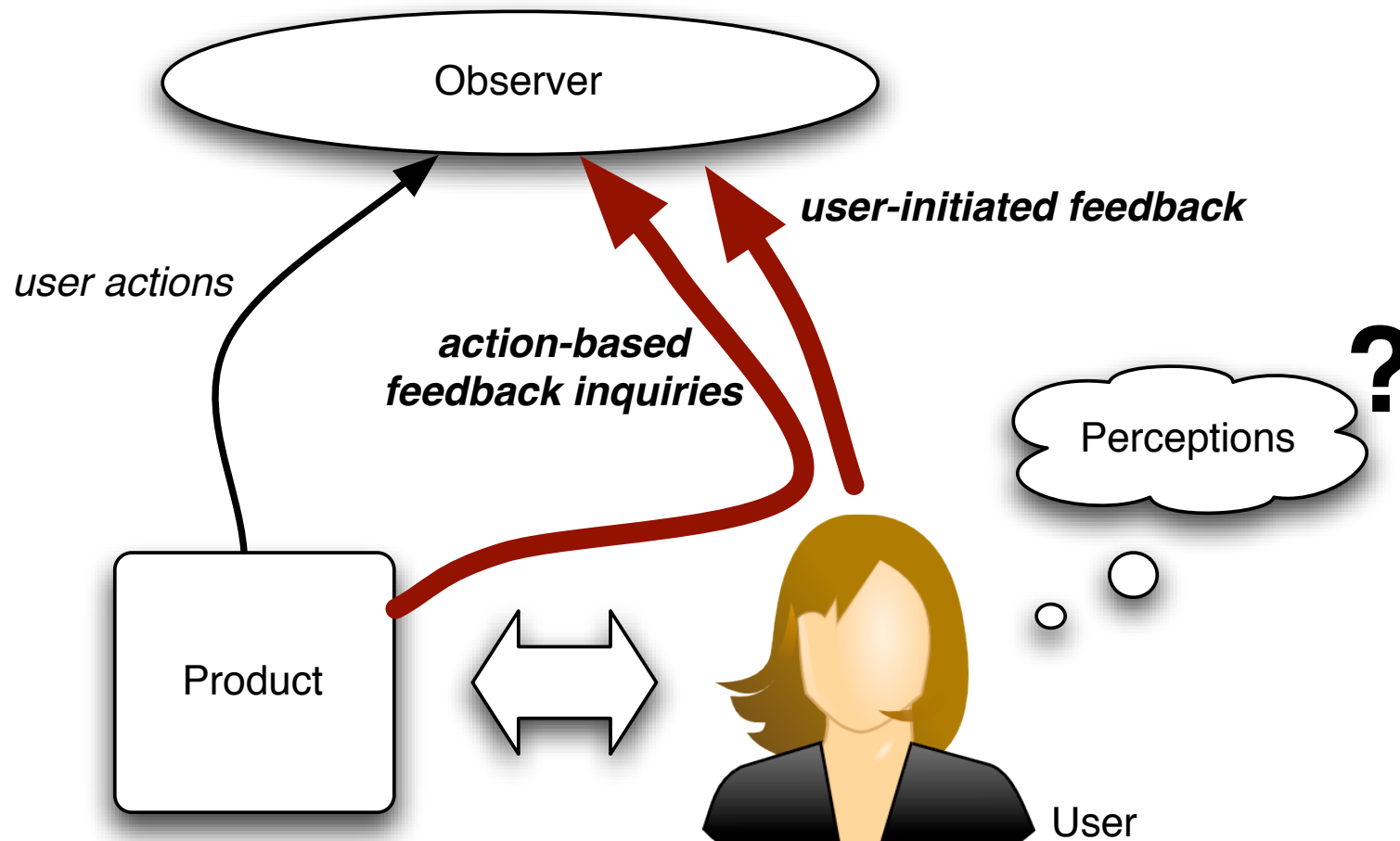
### 3. Experimental Results

- Incorporate **subjective** feedback



### 3. Experimental Results

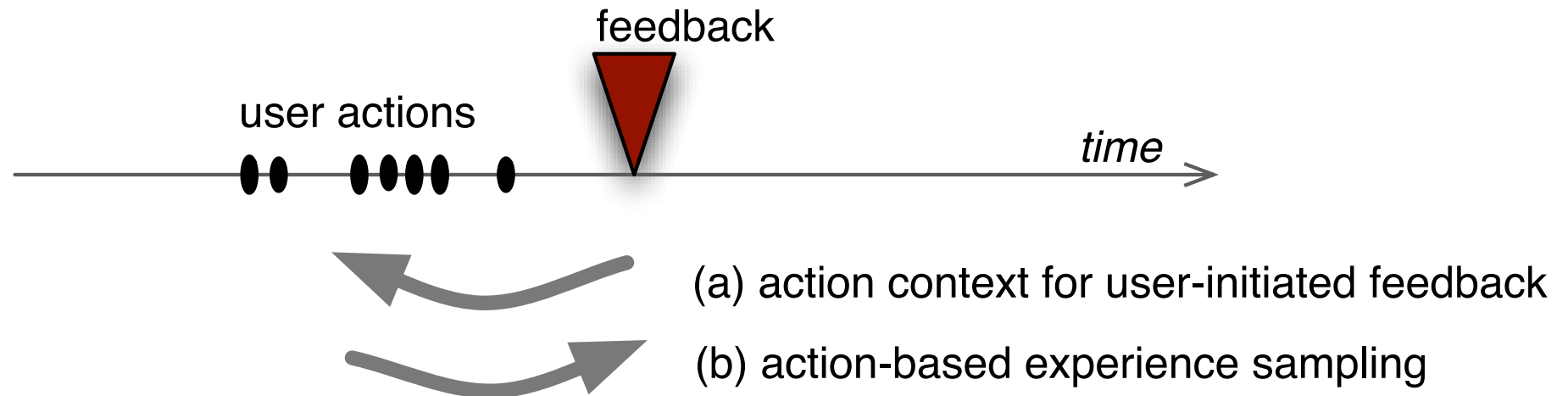
- Incorporate **subjective** feedback





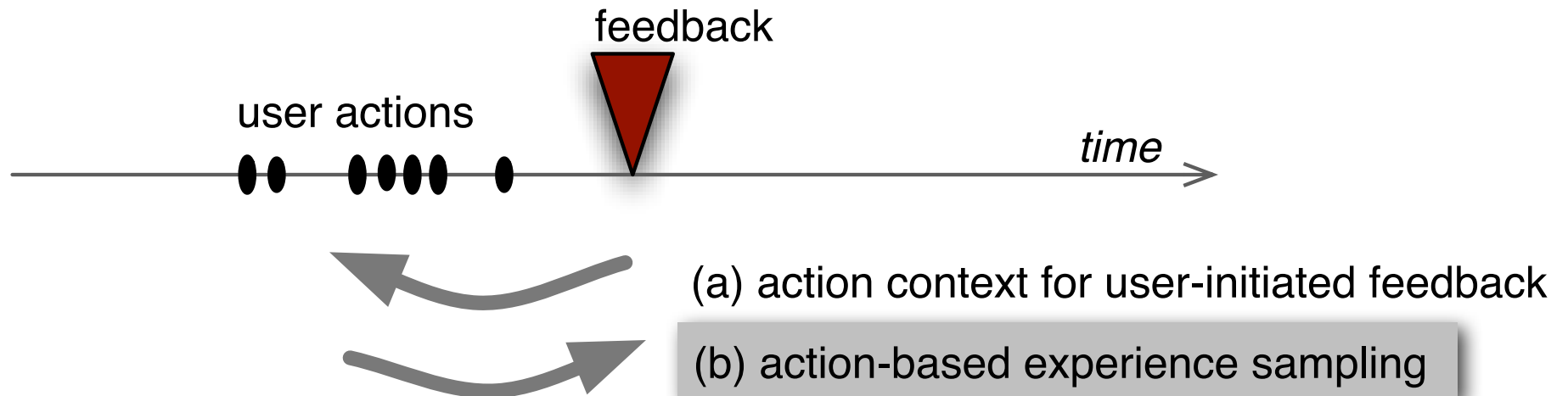
### 3. Experimental Results

- How can **objective and subjective** data be related?



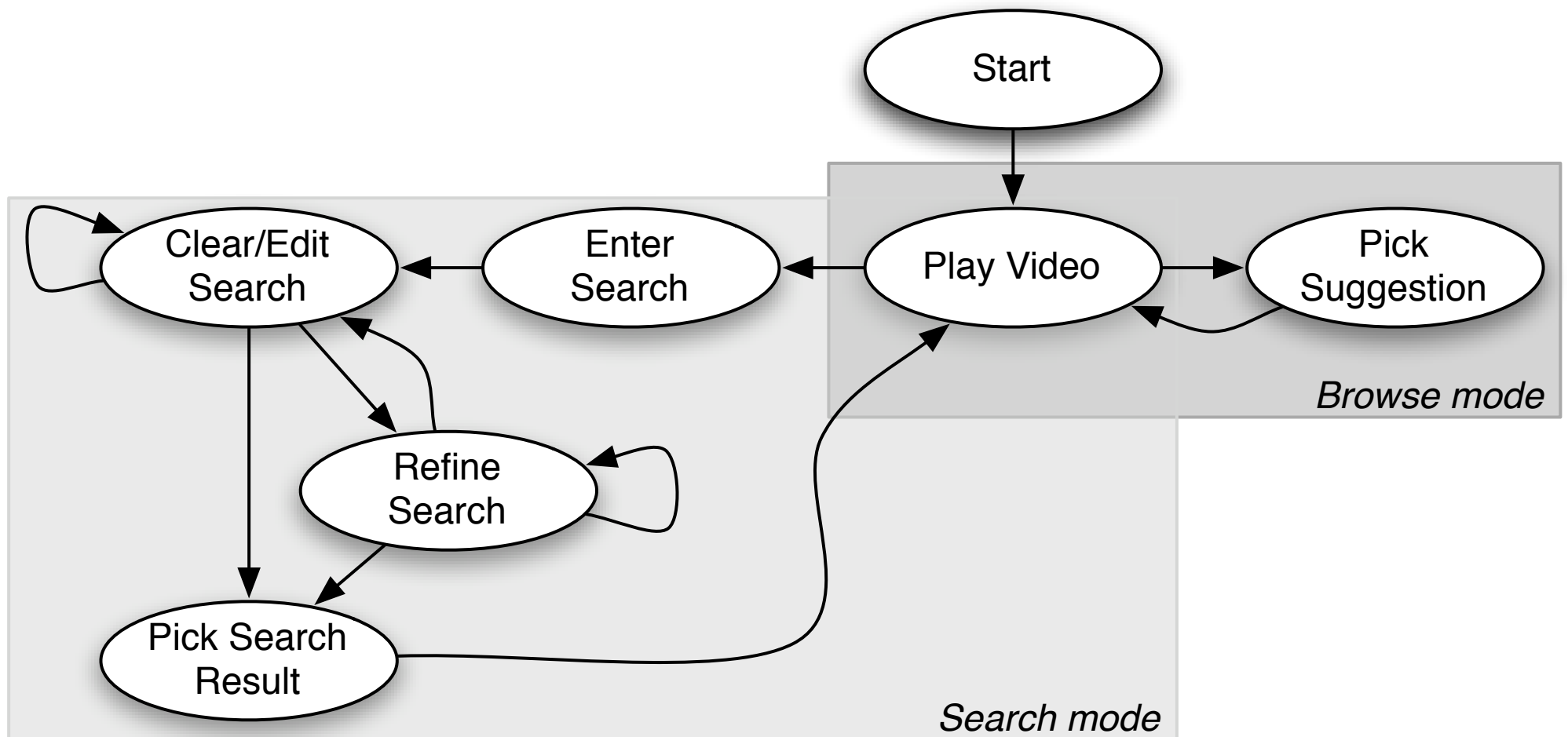
### 3. Experimental Results

- How can **objective and subjective** data be related?



### 3. Experimental Results

- Simplified **user action space**:


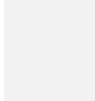

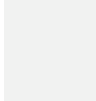

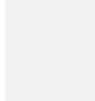

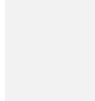



### 3. Experimental Results








- Raising surveys in particular action context

#### Product Satisfaction Survey

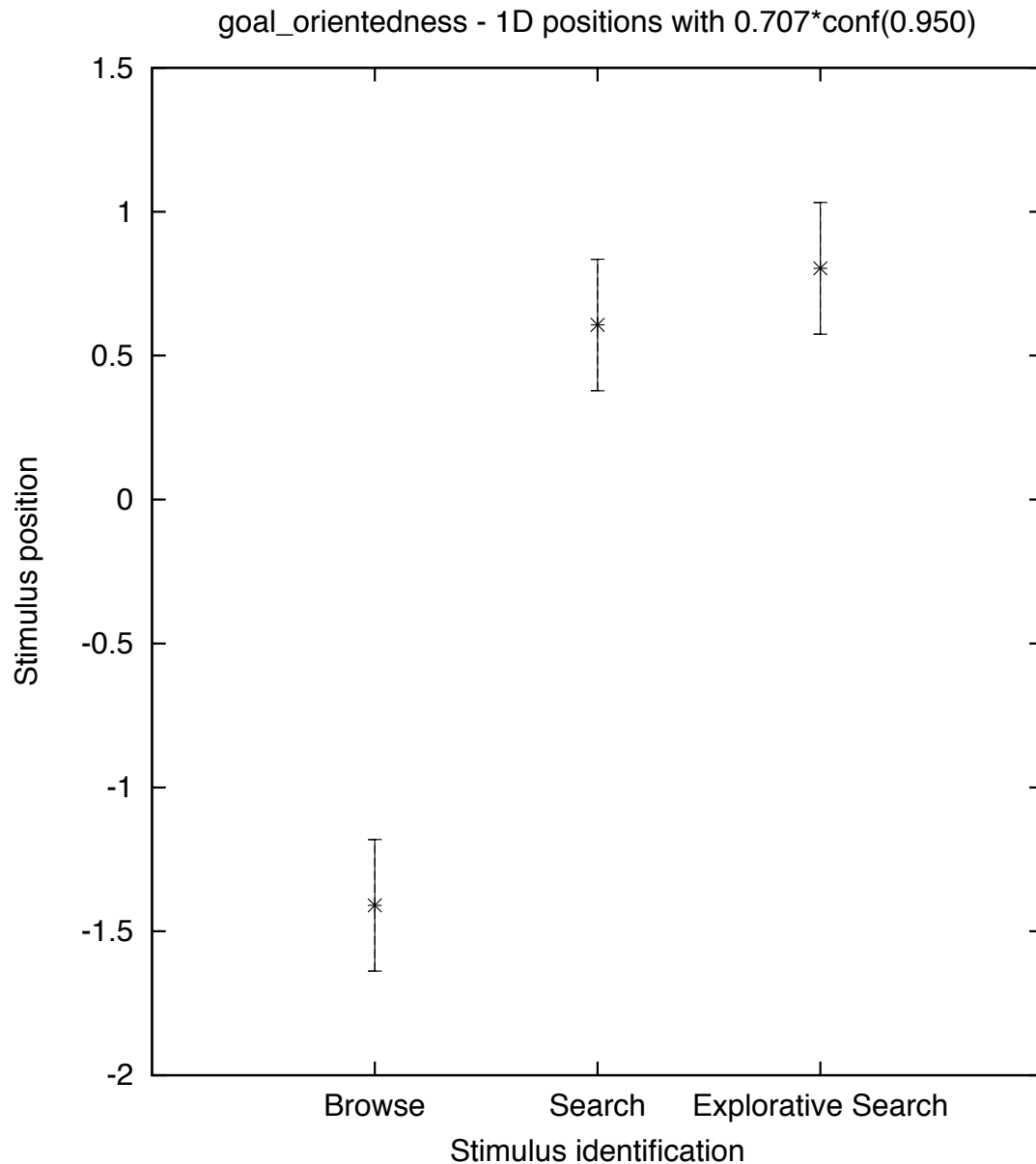
How do you feel about the product?

								
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I was looking for a specific video

						
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strongly disagree	Clearly	Slightly	Neutral	Slightly	Clearly	Strongly agree

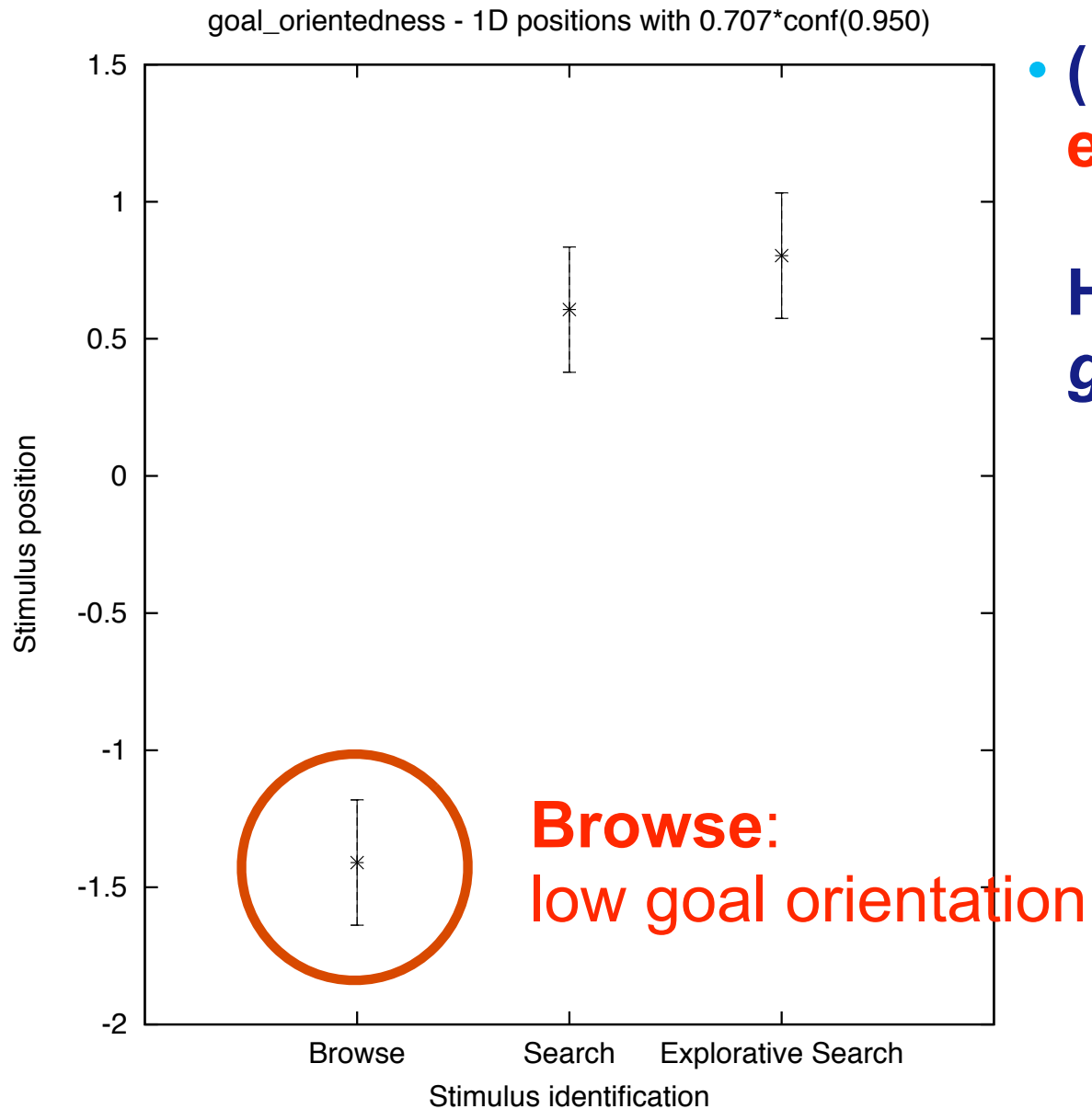
### 3. Experimental Results



- (b) Action-based experience sampling:

Here, result for *goal orientation* is shown

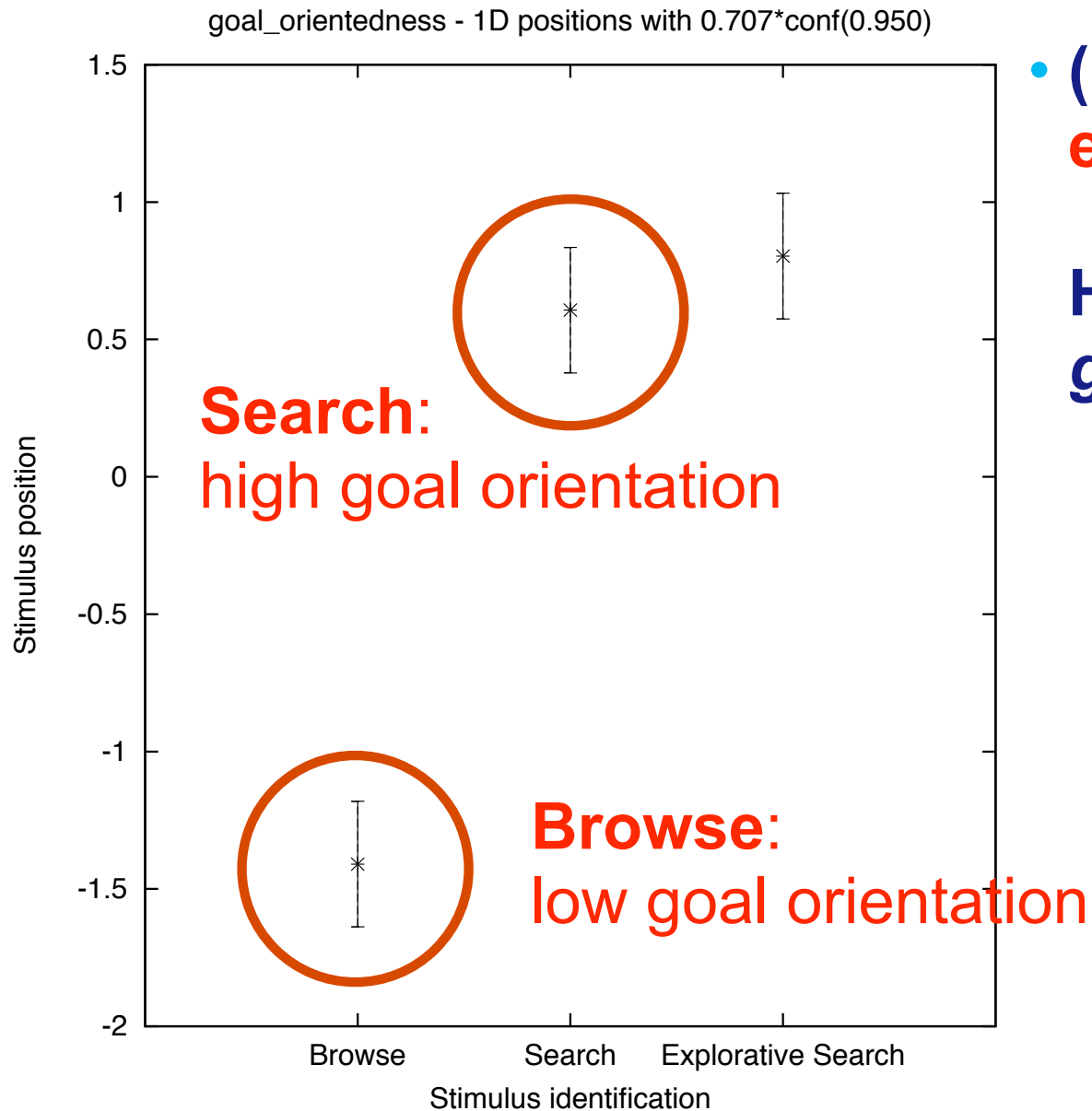
### 3. Experimental Results



- (b) Action-based experience sampling:

Here, result for *goal orientation* is shown

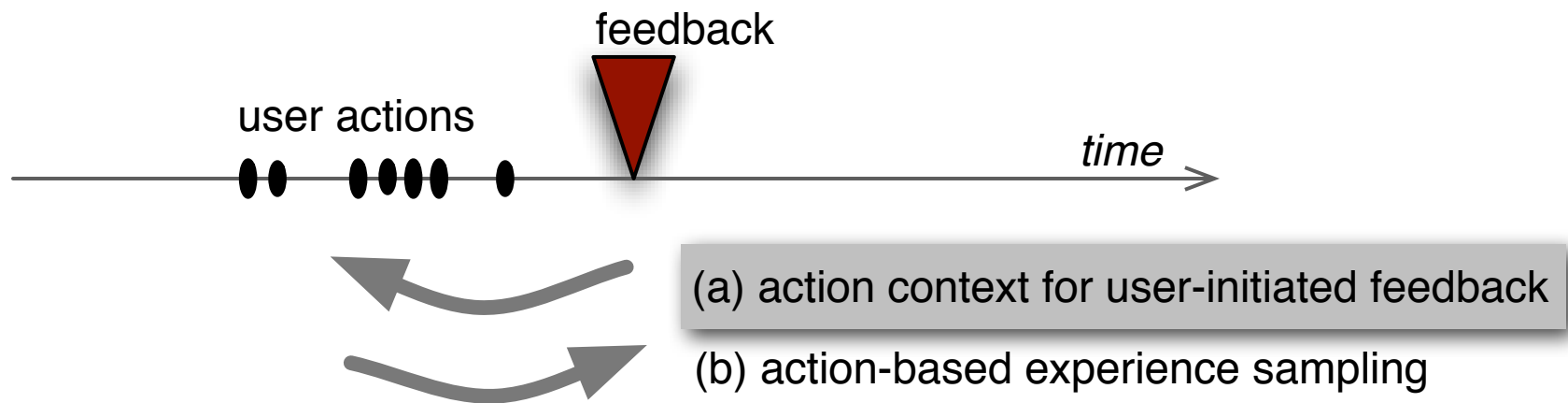
### 3. Experimental Results



- (b) Action-based experience sampling:

Here, result for *goal orientation* is shown

### 3. Experimental Results



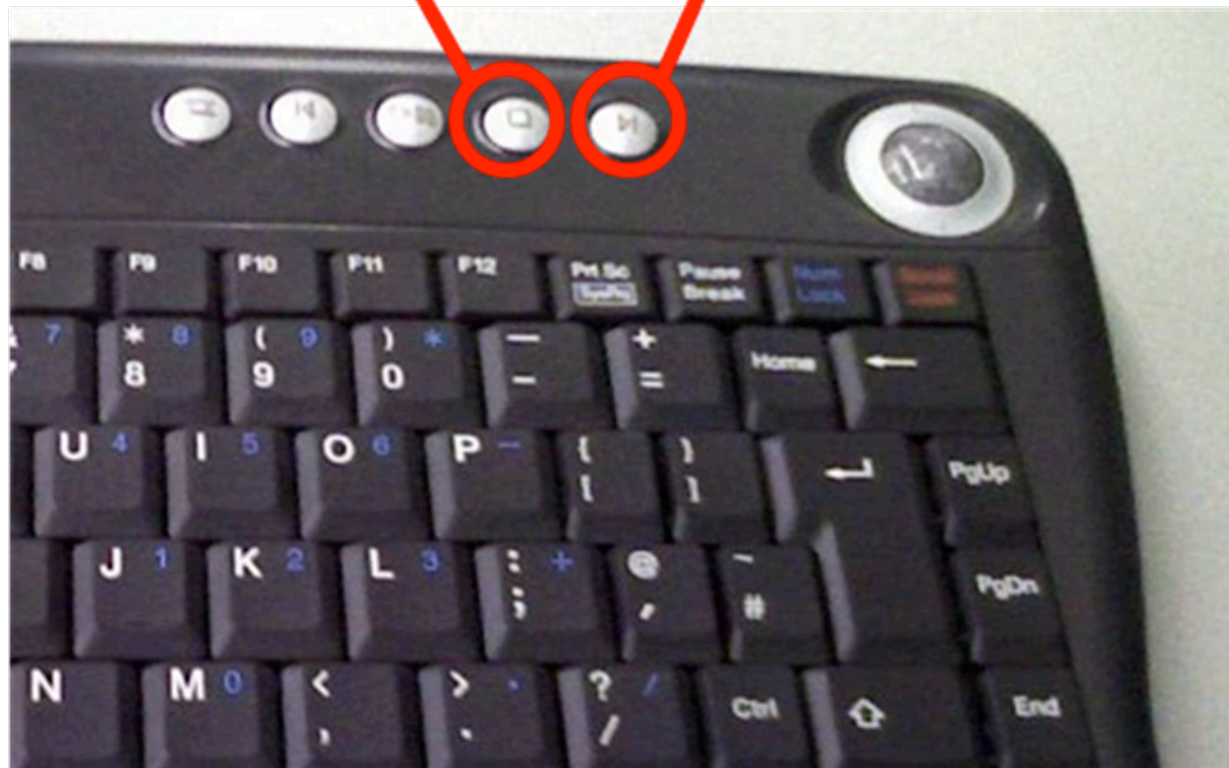


### 3. Experimental Results

- ‘Thumbs up’ and ‘Thumbs down’ buttons

Positive feedback (+)

Negative feedback (-)



# 4. Experiment Results

- Fragment of 'Thumbs down' survey:

2- The importance of this issue for me is:

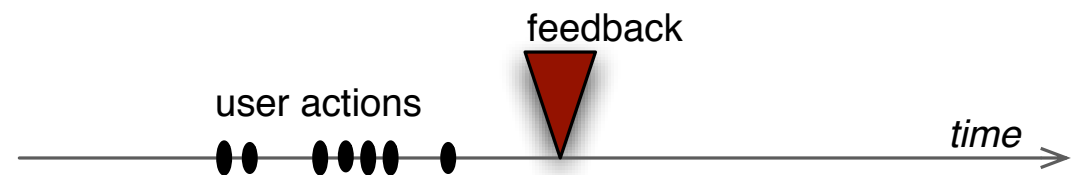
Minor <input type="radio"/>	Major <input type="radio"/>	I don't know <input type="radio"/>
--------------------------------	--------------------------------	---------------------------------------

3- My feedback about the product can be best phrased as the problem(s) of:

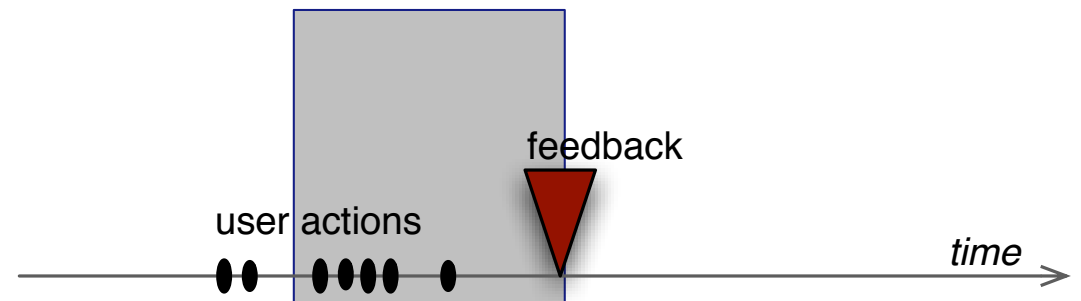
- ☐ **Feature awareness** I was not aware of this feature before, so I never used it.
- ☐ **Motivation for use** Although I am aware of this feature, I do not use it.
- ☐ **First use** Although I try, I cannot (never could) get this feature work properly.
- ☐ **Stopped working** I used this feature until now. Now I need advice to get it working.
- ☐ **Beauty** I do not like how this feature looks or feels. I would have liked it better if...
- ☐ **Ease of (repeated) interaction** I do not like the current ease of interaction. It would have been better if ...
- ☐ **Missing feature** I would expect a feature that the product does not appear to have.
- ☐ **Broken product/feature** Professional repair is needed for proper functioning.
- ☐ **Other (please specify in the box below)**

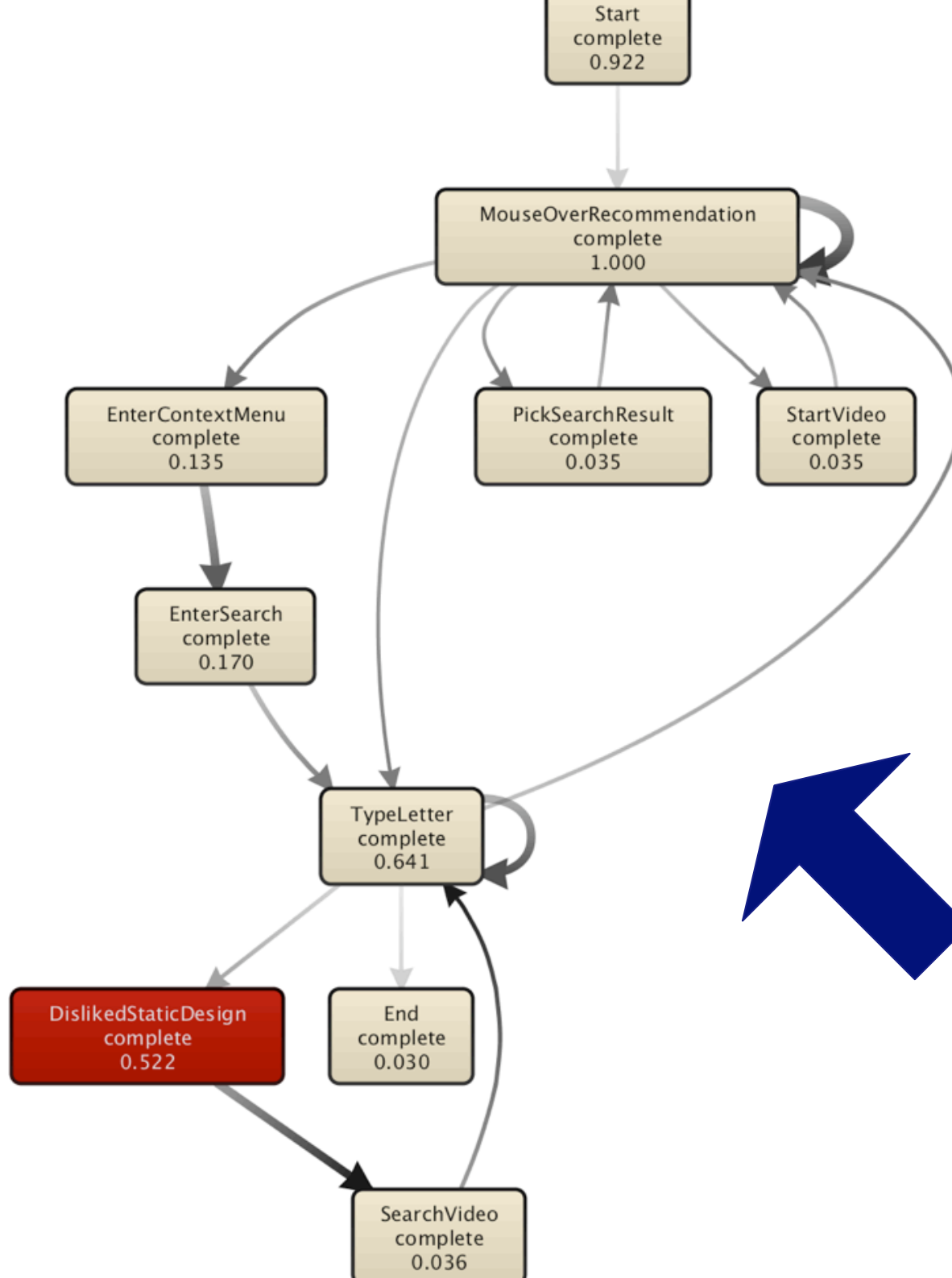
4- My feedback could improve:

## 4. Experiment Results



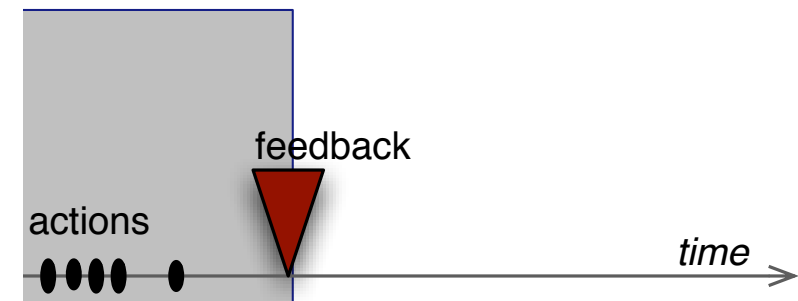
## 4. Experiment Results





**Action context for user-initiated feedback!**

**Process Mining**



# Outline

1. Introduction
2. Approach
3. Experimental Results
4. Conclusion

## 4. Conclusion

## 4. Conclusion

- **User actions can be observed automatically**



## 4. Conclusion

- User actions can be observed automatically
  - In their habitual environment
- *Iterative, large-scale user tests are feasible*

## 4. Conclusion

- User actions can be observed automatically
  - In their habitual environment
- *Iterative, large-scale user tests are feasible*

## 4. Conclusion

- User actions can be observed automatically
  - In their habitual environment
- *Iterative, large-scale user tests are feasible*
- Analyzing *any deployed* application is interesting
    - **How** are the systems used (interaction)?
    - **Which functionality** is used at all?
    - How does the the usage behavior relate to the **opinion** of the users?

## 4. Conclusion

- User actions can be observed automatically
  - In their habitual environment
- *Iterative, large-scale user tests are feasible*
- Analyzing *any deployed* application is interesting
    - **How** are the systems used (interaction)?
    - **Which functionality** is used at all?
    - How does the the usage behavior relate to the **opinion** of the users?
  - Further information: <http://www.softreliability.org>