### 4. TITLE AND SUBTITLE

**Fall 2014 SEI Research Review Eliciting Unstated Requirements at Scale (EURS)**

### 5. AUTHOR(S)

Michael Konrad Bob Stoddard / Nancy Mead, Mary Beth Chrissis

### 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

**Software Engineering Institute Carnegie Mellon University Pittsburgh, PA 15213**

### 12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release, distribution unlimited.

### 13. SUPPLEMENTARY NOTES

The original document contains color images.

### 16. SECURITY CLASSIFICATION OF:

<table>
<thead>
<tr>
<th>a. REPORT</th>
<th>b. ABSTRACT</th>
<th>c. THIS PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>unclassified</td>
<td>unclassified</td>
<td>unclassified</td>
</tr>
</tbody>
</table>

### 17. LIMITATION OF ABSTRACT

SAR

### 18. NUMBER OF PAGES

10

### 19a. NAME OF RESPONSIBLE PERSON

unclassified
Copyright 2014 Carnegie Mellon University

This material is based upon work funded and supported by the Department of Defense under Contract No. FA8721-05-C-0003 with Carnegie Mellon University for the operation of the Software Engineering Institute, a federally funded research and development center.

Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the United States Department of Defense.

NO WARRANTY. THIS CARNEGIE MELLON UNIVERSITY AND SOFTWARE ENGINEERING INSTITUTE MATERIAL IS FURNISHED ON AN “AS-IS” BASIS. CARNEGIE MELLON UNIVERSITY MAKES NO WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED, AS TO ANY MATTER INCLUDING, BUT NOT LIMITED TO, WARRANTY OF FITNESS FOR PURPOSE OR MERCHANTABILITY, EXCLUSIVITY, OR RESULTS OBTAINED FROM USE OF THE MATERIAL. CARNEGIE MELLON UNIVERSITY DOES NOT MAKE ANY WARRANTY OF ANY KIND WITH RESPECT TO FREEDOM FROM PATENT, TRADEMARK, OR COPYRIGHT INFRINGEMENT.

This material has been approved for public release and unlimited distribution except as restricted below.

This material may be reproduced in its entirety, without modification, and freely distributed in written or electronic form without requesting formal permission. Permission is required for any other use. Requests for permission should be directed to the Software Engineering Institute at permission@sei.cmu.edu.


DM-0001769
When needs go unrecognized, critical features get overlooked, including:

- Non-functional requirements that drive architecture
- Innovative product and service features that sustain customer loyalty

And if left undiscovered, can result in:

- Stakeholder/user disruption and frustration
- Requirements volatility, expensive rework, delays
Existing Requirements Elicitation Methods

Limitations in what requirements specifications convey:

- Needs that are more likely to be salient to the stakeholder/user
  - Don't know what they don't know
- Motivation for requirements is often lost or missing

Other limitations with existing methods include:

- Timeboxed, workshop-style meetings that can’t be held virtually
- Missing stakeholders
- Won't work at scale

EURS aims to develop and validate a scalable method for determining the unstated needs of stakeholders, which result in a more innovative set of requirements as the basis for subsequent system design, implementation, deployment, sustainment, and modernization.
Overview of SEI KJ+ Approach

Step 1: Design open-ended, probing questions to interview users on extreme positive and negative experiences.

Step 2: Conduct interviews focusing on context not solutions (asking “how” and “why”).

Step 3: Mine interview output and characterize experiences in terms of action, motivation, context.

Step 4: Look across characterizations to identify themes of experience (KJ+ Affinitization).

Step 5: Derive unstated needs and brainstorm candidate innovative solutions.

Step 6: Triage need-solution pairs into:
- Delighters
- Satisfiers
- Must-be’s (Kano analysis)

Innovative Requirements

Start with known requirements (obtained by existing elicitation method).
## EURS Research Focus

<table>
<thead>
<tr>
<th></th>
<th>5-10 People</th>
<th>11-25 People</th>
<th>26-100 People</th>
<th>100+ People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summarized meta discussion data</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Discussion with real time data feedback</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Asynchronous discussion with data feedback</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Textual processing</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>“No frills” Ideation</td>
<td>X</td>
<td>“No frills” Ideation</td>
<td>Ideation with structured facilitation</td>
<td>Ideation fully asynchronous and continuous</td>
</tr>
<tr>
<td>KJ+ process redesigned and tool-enabled to facilitate offline and virtual performance</td>
<td>Facilitated telecons (take turns) supplemented by MS Word, Excel to manage data</td>
<td>Need to synchronize only in step 2 (interviews)</td>
<td>Other steps are asynchronous but facilitated</td>
<td>X</td>
</tr>
<tr>
<td>Face to Face</td>
<td>Traditional KJ conducted in a workshop setting</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Focus of FY14 research questions**

- **SUMMARIZE**: Automate and virtualize focus of FY14 research questions.
- **TEXTUAL**: Textual processing.
- **KJ+**: KJ+ process redesigned and tool-enabled to facilitate offline and virtual performance.
- **FACILITATE**: Facilitated telecons (take turns) supplemented by MS Word, Excel to manage data.
- **SYNCHRONIZE**: Need to synchronize only in step 2 (interviews).
- **ASYNCHRONOUS**: Other steps are asynchronous but facilitated.
- **FACE TO FACE**: Traditional KJ conducted in a workshop setting.
FY14 Task structure

1. Redesign the KJ method for virtual, asynchronous use to the maximum extent possible with minimal technology, creating KJ+

2. Develop pilot training, process scripts, briefing templates, and tooling to support pilot of KJ+

3. Select pilot candidate and train team

4. Conduct a small-to-moderate scale A-B comparison experiment
   a) Project requirements are developed without KJ+
   b) KJ+ is then applied
   c) New requirements are identified and effort is recorded

5. Analyze results
FY14 Accomplishments

Key SEI Activities/Contributions

• Adapted existing workshop-based method for distributed use
• Conducted A-B Comparison: pilot was successful
• Pilot collaborator intends to adopt the KJ+ method and has funded our continued engagement
• Will pursue publication in Requirements Engineering Journal

Revisiting our Research Questions: Can KJ be adapted for:

• Virtual, small-to-moderate scale use?
• Identifying innovative requirements that anticipate unstated needs?
• Increasing end-user satisfaction?
• Mitigating requirements volatility?
• Reducing sustainment and modernization costs?
Next Steps

Ultra-scale experiment allowing much more participation in developing requirements:

• Increase # of participants by introducing ideation
• Affinitize visually as well as virtually
• Automate identification of relevant ideas to keep others informed of what might interest them
  – through machine learning and probabilistic topic modeling

Contact us if you would like to collaborate.
Contact Information

Presenter / Point of Contact
Mike Konrad
Software Solutions Division
Telephone: +1 412-268-5813
Email: mdk@sei.cmu.edu

U.S. Mail
Software Engineering Institute
Customer Relations
4500 Fifth Avenue
Pittsburgh, PA 15213-2612
USA

Web
www.sei.cmu.edu
www.sei.cmu.edu/contact.cfm

Customer Relations
Email: info@sei.cmu.edu
Telephone: +1 412-268-5800
SEI Phone: +1 412-268-5800
SEI Fax: +1 412-268-6257