

Requirements Engineering II HS2016
Assignment 7: RE Tools

Tools for Requirements Elicitation and Analysis

Christopher Wells
Fatou Ceesay
12.12.2016

Agenda

- Tools and workstyles for User-Interface Design
- Market for Natural Language Tools in RE
- Strength and Weakness
- Questions / Discussion



"Good news! He said he only needs a few more weeks to finish the first draft of the Requirements Document."

Practitioner Tools and Workstyles for UI Design

➤ Support work style transition

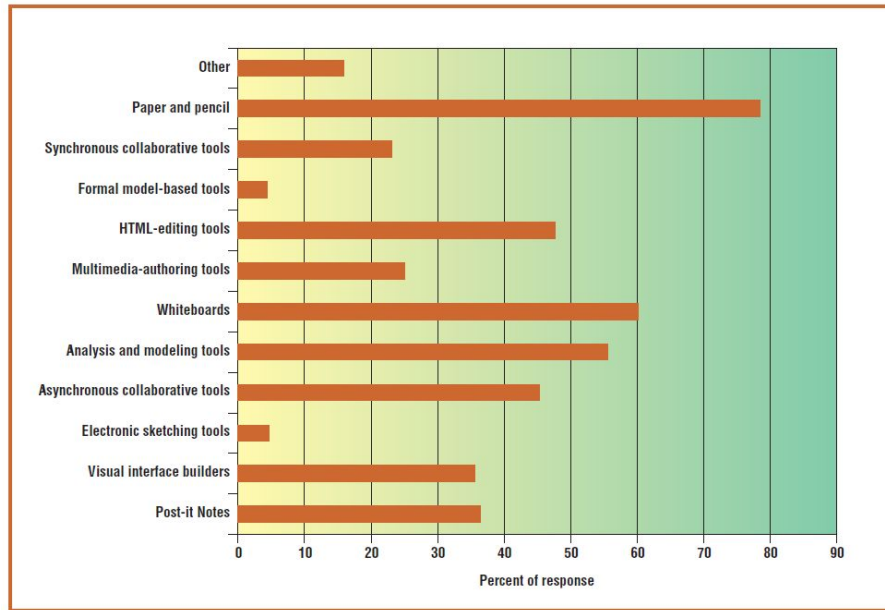
- Designers and developers to adapt tools to particular style of work

➤ Transition in terms of

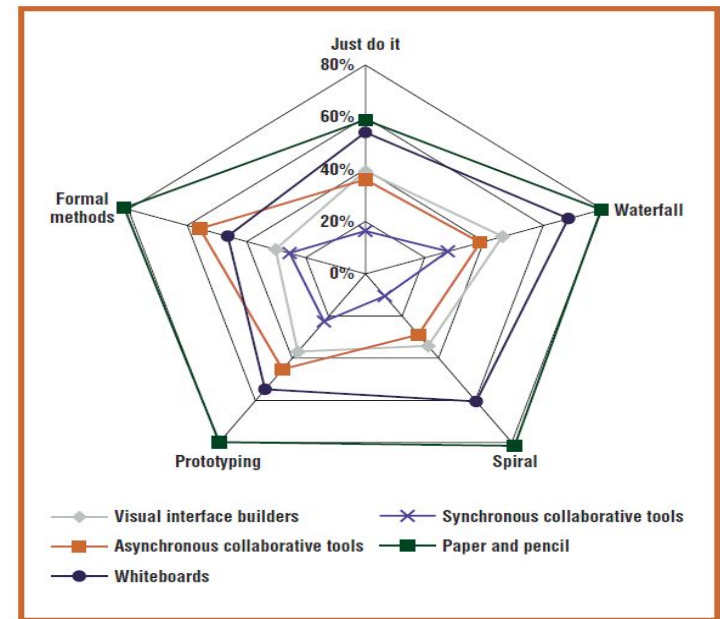
- perspective (from code to design or from requirements to final solution)
- detail (from highly detailed descriptions to few details and back)
- formality (meaningless sketches or semantically sound models)
- modifiability (e.g. preference based on task frequency i.e repositioning and renaming)
- traceability
- functionality
- asynchrony and distribution

Survey with Practitioners on Tools Usage

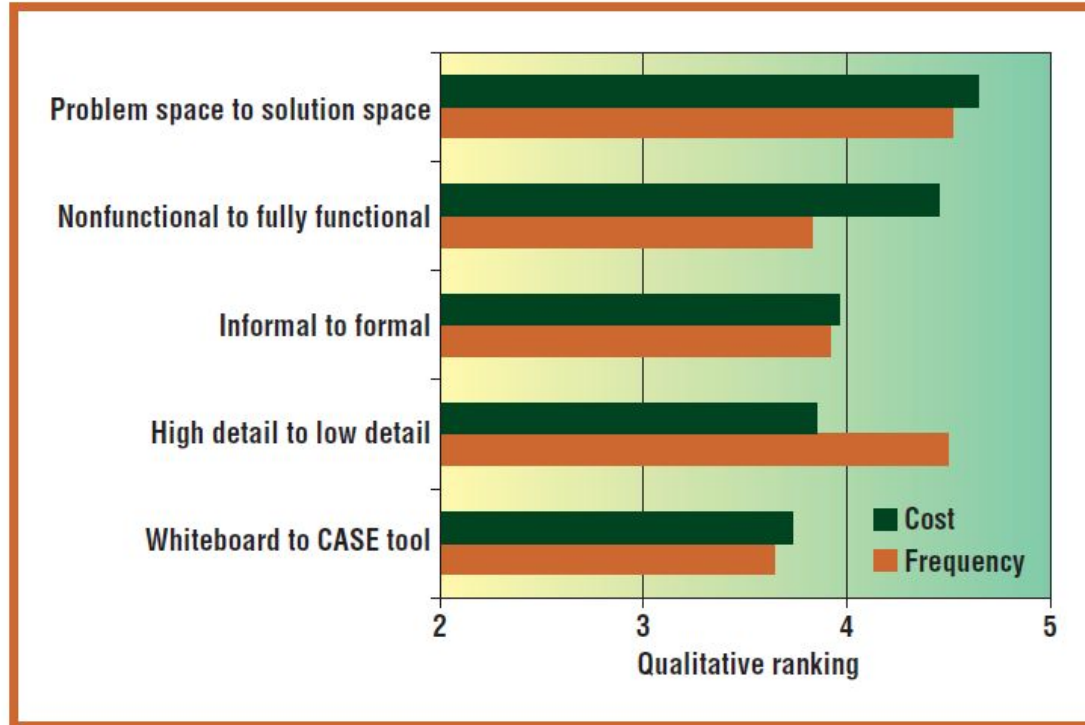
For UI Design



In Development Process



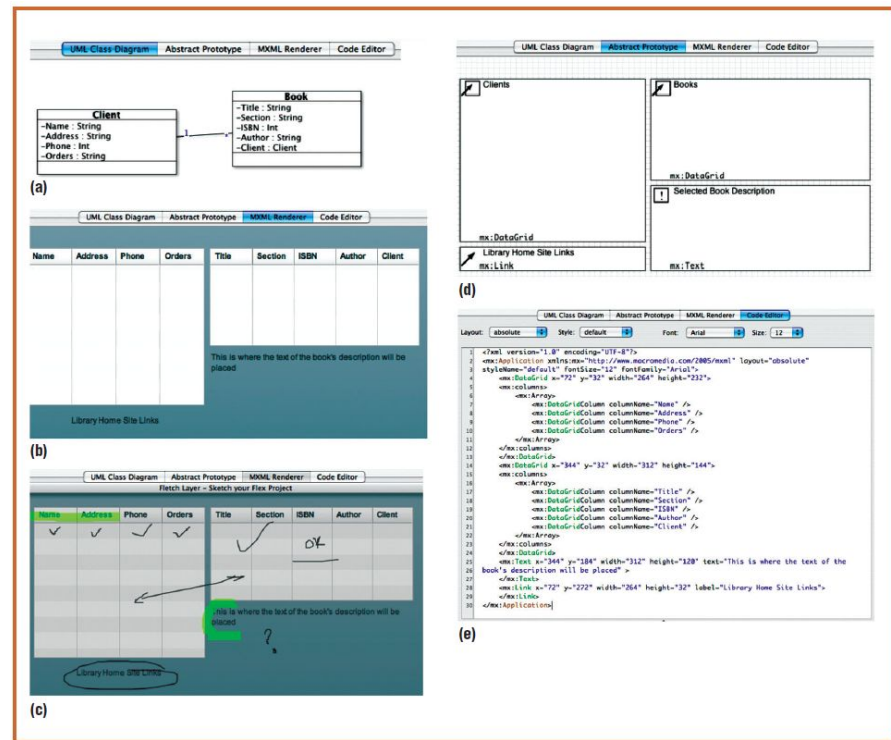
Workstyle transitions: Frequencies and Cost



Tool for Workstyle transitions: CanonSketch

Views to support workstyle transition:

- (a) UML class view for domain modeling
- (b) Concrete UI view for testing the fully functional system
- (c) a layer over the concrete view that lets users add informal comments and annotations
- (d) abstract prototype view for laying out the user interface and specifying UI elements and connecting them to UML classes
- (e) the code editor view for adding extra functionality.



Market research for Natural Language Tools in RE

- Natural Language Processing (NLP) has gained attention in the RE community as a potential Computer-Aided Software Engineering (CASE) tool aid.
- The advanced capabilities of NLP provides a potential to automate the transcription of requirements documents into conceptual models.
- **Question:** Is there an industrial market for such capabilities aiding CASE tools?

NLP Tools in RE - What it can help

- Possible applications of NLP in RE include:
 - Traceability - Allowing an automated means to link requirements to conceptual models produced (i.e. in UML)
 - Documentation - Use NLP to automatically generate reports during various phases of requirements collection and modelling
 - Translation - Documents can be translated to other languages, an increasing necessity in international information systems.

NLP Tools in RE - Ok, is there a market for this?

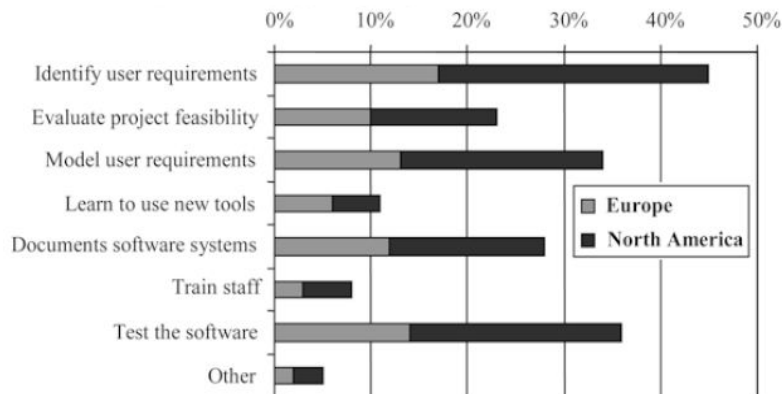
- According to [Mich et al. 2004] there is a market for NLP CASE tools
- [Mich et al. 2004] conducted a market research study surveying 151 individuals about their companies and the processes they used for software development.
- The questions were designed to answer the question: does the software development industry have needs that an NLP CASE tool can satisfy?

NLP Tools in RE - Results

- Key takeaways from respondents of the survey:
 - Most requirements documents are made in natural (casual) language (79%)
 - Most companies adopt a methodology when developing software (80%)
 - A high-level of automation was reviewed as useful to making the respondent's day more efficient (64%)

NLP Tools in RE - Crucial activities for NLP CASE

- One crucial question underpinning the basis for the survey was asked:
“What are the two things in your job you would like to do more efficiently?”



- Joint analysis of this crucial question with the question
“What would be the most useful thing to improve
general day-to-day efficiency?”
yielded the following results:

	Automation
Identify user requirements	69%
Evaluate project feasibility	44%
Model users requirements	75%
Learn to use new tool	86%
Documents software systems	71%
Train staff	18%
Test the software	67%
Other	43%

NLP Tools in RE - Confirmation of market potential

- To confirm their findings for market potential, the authors conducted a Correspondence Analysis (CA) of the results.

CA construction procedure:

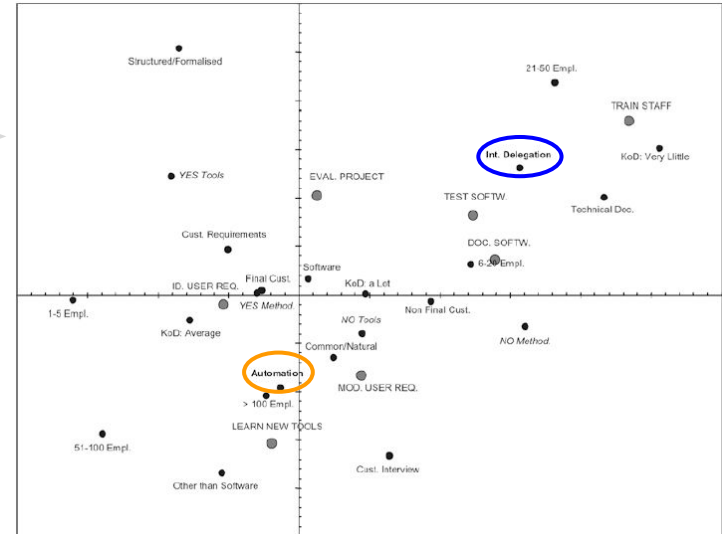
- 1) Define a cloud of points (rows and columns of a contingency table) in a multidimensional vector space.
- 2) Choose the metric structure on this space
- 3) Produce the fit of the cloud in step 1 to a variable low-dimensional subspace onto which the points (row and column profiles) are projected for display.
- 4) Give and interpretation of the clusters of points corresponding to the projections of the rows and columns of the original contingency table;
 - a) Analyze their absolute contributions to determine the underlying dimensions
 - b) Analyze their relative contributions (squared correlations) to indicate how well the points are described along the considered dimension

CA configuration:

Dependent variable: "What should be done more efficiently?"

Independent variables: # employees, core business, etc.

CA plot:



NLP Tools in RE - Market conclusions

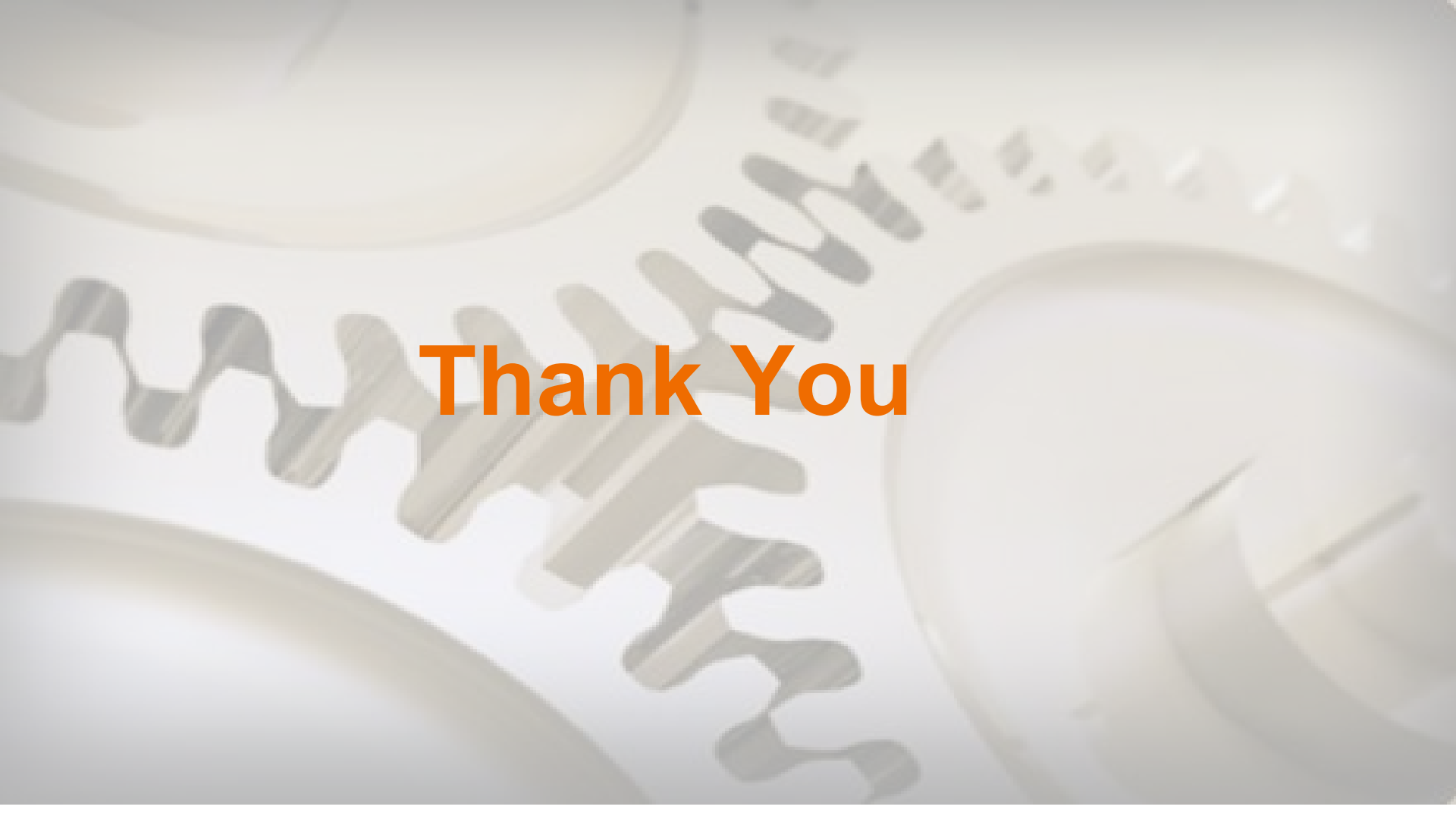
- The authors provide some evidence of market potential for these tools following the CA:

Market niche #1 – Companies that use methodologies and tools for requirement analysis and top-level design. NLP CASE tools would provide them with more efficiency.

- The product would require customization to accommodate the domain knowledge within the company.
- Often requirements language is not formal, but in cases when it is more formal, less sophisticated techniques can be employed to create conceptual models in those cases.

Market niche #2 – Medium to Large companies, neither using methodologies or instruments supporting requirements analysis.

- They perceive requirements modelling as crucial as other activities they can use a CASE tool for.
- The author asserts that a linguistic tool could be made that has the capabilities of the other tools but contains linguistic functionalities and could drive them to using an engineering (structured) approach to developing software.

The background of the slide features a close-up, shallow depth-of-field photograph of several interlocking metal gears. The gears are a light, metallic grey color. The central gear is in sharp focus, showing its teeth and the circular rim. Other gears are visible in the foreground and background, slightly out of focus, creating a sense of depth and mechanical complexity. The lighting is soft and even, highlighting the metallic texture of the gears.

Thank You