Expressiveness and Effectiveness of Program Comprehension: Thoughts on Future Research Directions

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Program Comprehension

- A major activity during software maintenance and evolution
- Need tools, techniques, and theories to support the process of program comprehension
- ICPC, ICSM, ASE, WCRE

Expressiveness & Effectiveness

- Focus on the expressiveness and effectiveness of program comprehension research
- Identify specific areas that require further research
- Supporting comprehension of large real-world software systems

Program Comprehension

- Expressiveness
- Effectiveness

Expressiveness

- Why we are trying to comprehend (i.e., task)
- What we are trying to comprehend (i.e., object)
- Who's trying to comprehend (i.e., subject)

- Issue of incremental vs. complete understanding
- What is our position on expressiveness?

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Effectiveness

- Quality of tools - the litmus test
- Better measures to assess tools

- Developer acceptance - the ultimate test
- Is it better than grep?

Open Issues in Effectiveness

- Library design
- Formal methods

- What we did in effectiveness? Eye tracking..

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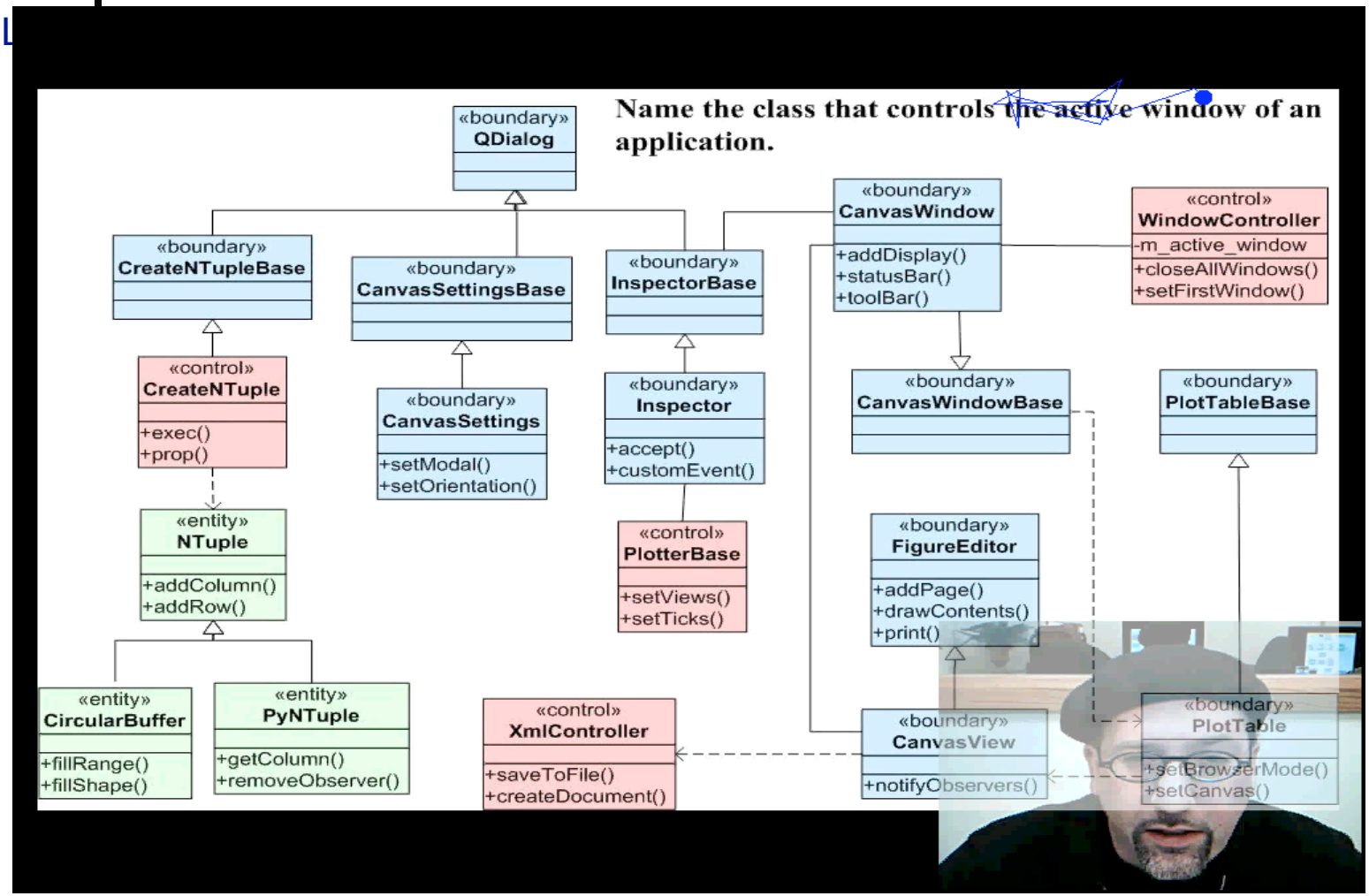
Improving Effectiveness

- Use eye movement measurements in conducting empirical studies of software engineering tools, especially visualization techniques
- Eye tracking adds a new additional dimension to the assessment arsenal by allowing access to the gaze activity of human subjects

Video of a Session



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User Study [ICPC'07]

- Human subject given a number of specific tasks concerning UML class diagrams
- Assess the effectiveness of different layouts (of UML Class diagrams)
- See if labeling of classes with their stereotype/color information is helpful
- Understand how we explore, examine, and navigate
- Understand difference between novices and experts

New Measure for Effort

Number of fixation (effort)

- Classes and relationships are laid out in ways that can leads to inefficient visual exploration, explanation, and navigation
- Spans the attention of the subject across a number of objects instead of narrowing down to a relevant area of interest

- Utilized for objective assessment of class diagram layout