Software Visualization

November 9, 2005

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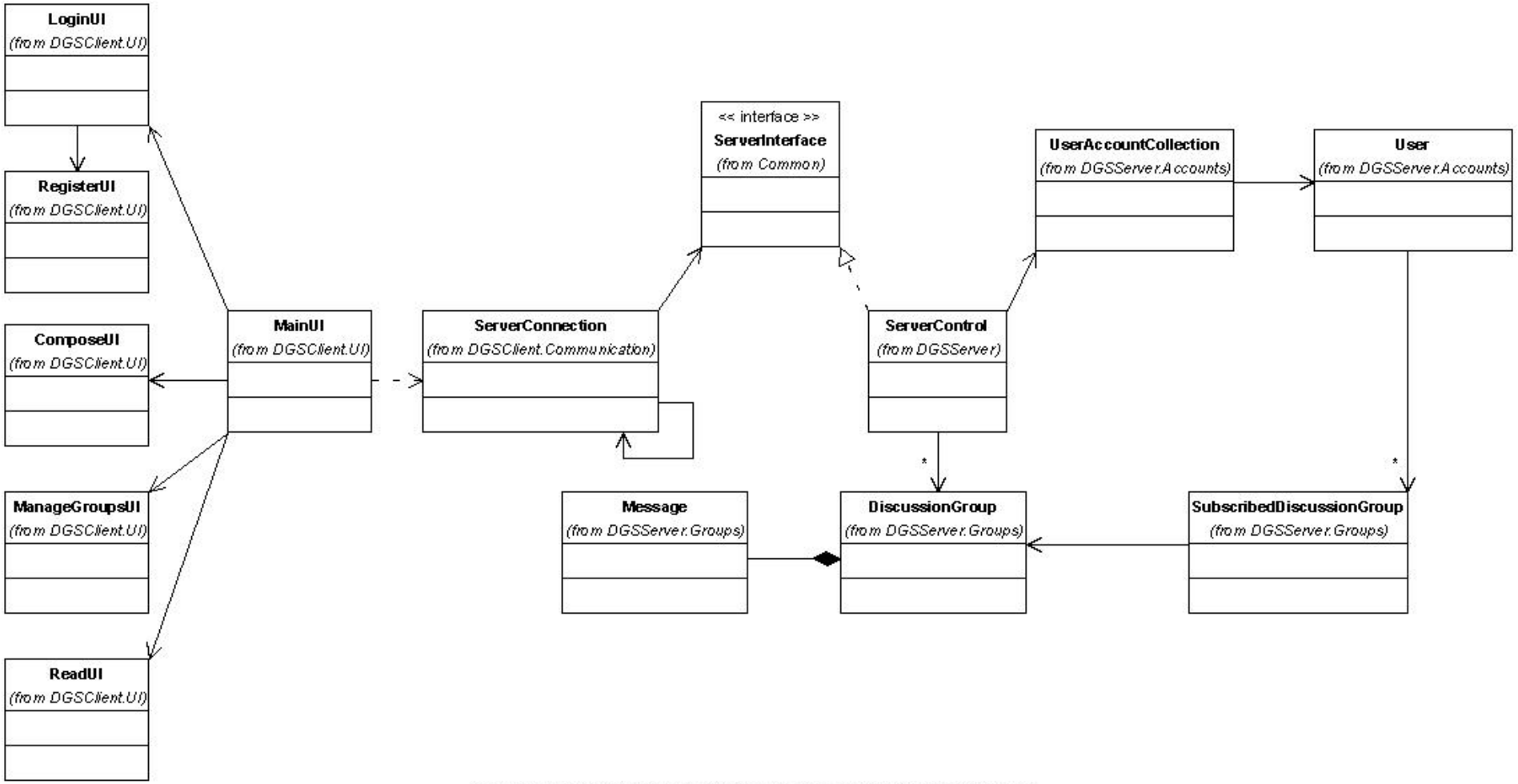
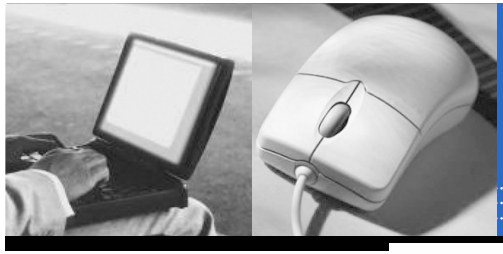
Introduction

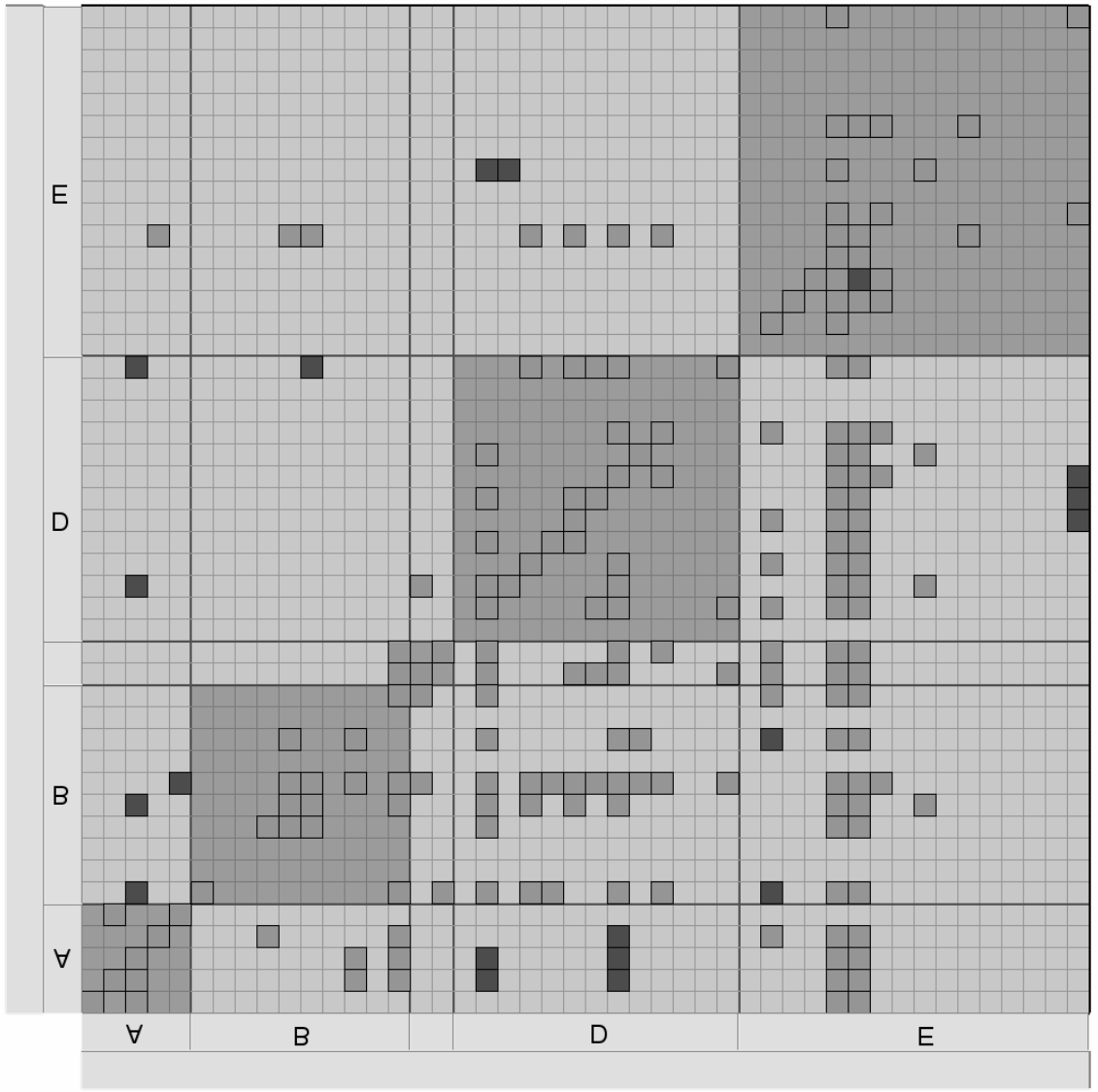
- Traditionally
  - Static software structure
  - Call graphs

Introduction





Introduction



From: Using Multilevel Call Matrices in Large Software Projects, Frank van Ham, Proc. InfoVis 2003

Introduction

- Concerned more than structure
  - Application Behavior
  - Execution Patterns
  - **Testing data**
  - **Managing software projects**

Encoding Program Test Information

- TARANTULA
  - Test suite visualization
    - Provides overview of test results
    - SeeSoft visualization of code
    - JUnit integrated into Eclipse
  - Potentially thousands of tests with text based output
    - Difficult to analyze as a suite

Encoding Program Test Information

- Visualization input
  - Test case number
  - Whether the test passed or failed
  - Line numbers of covered code

```
1 P 1 2 3 12 13 14 15 ...
2 P 1 2 23 24 25 26 27 ...
3 F 1 2 3 4 5 123 124 125 ...
```

Encoding Program Test Information

Encoding Program Test Information

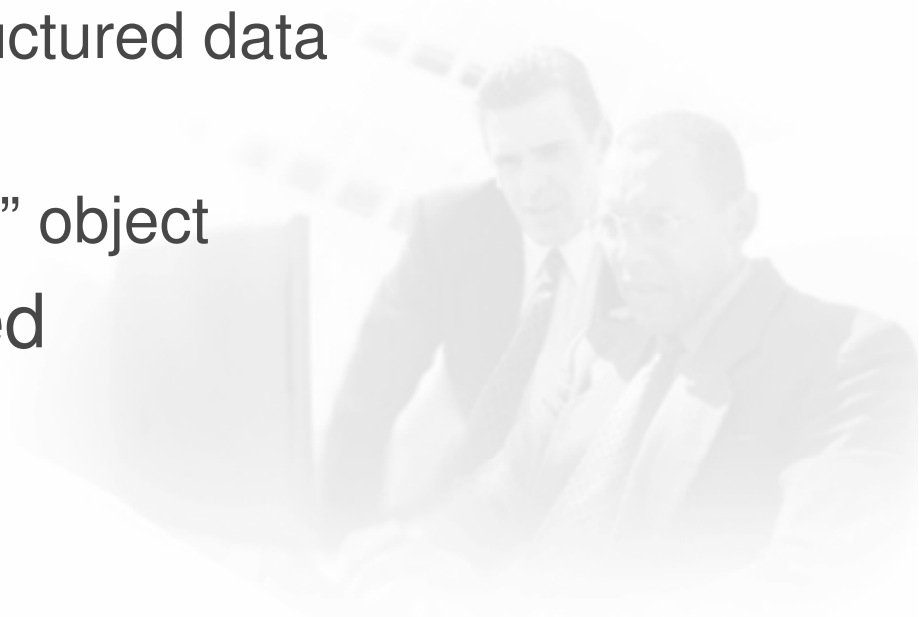
- Strengths
  - Elegant solution to a real problem in software development
  - Mini user study done to select coloring scheme
  - Many interaction techniques provided to user
    - Discrete mode
    - Test case subset
    - Lightness of unrelated lines of code

Encoding Program Test Information

- Weaknesses
  - Not scalable
    - Would be unable to handle a real system
  - Unable to read source code due to color choice and size of code window
  - No mention of how to get the data to the preferred format (or any tool to give the coverage and pass data)
  - Bad description of how the coloring scheme works

Software Management

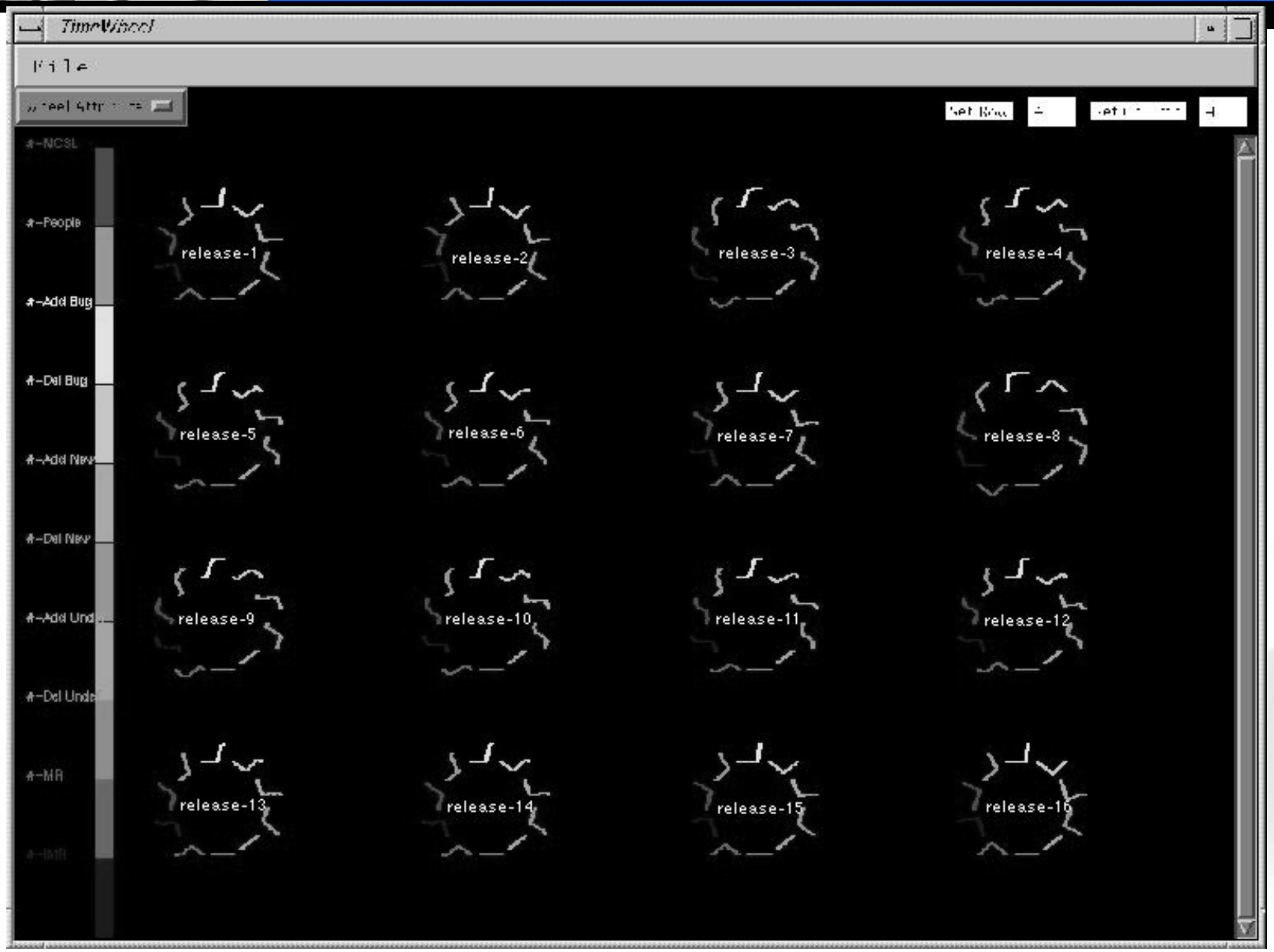
- Project Management
  - Many different types and quantities of resources to track and manage
  - Difficult to manage the amount of data collected with existing tools
    - Large volume of unstructured data
    - Diverse types
    - Resource = “real world” object
  - All data is time oriented



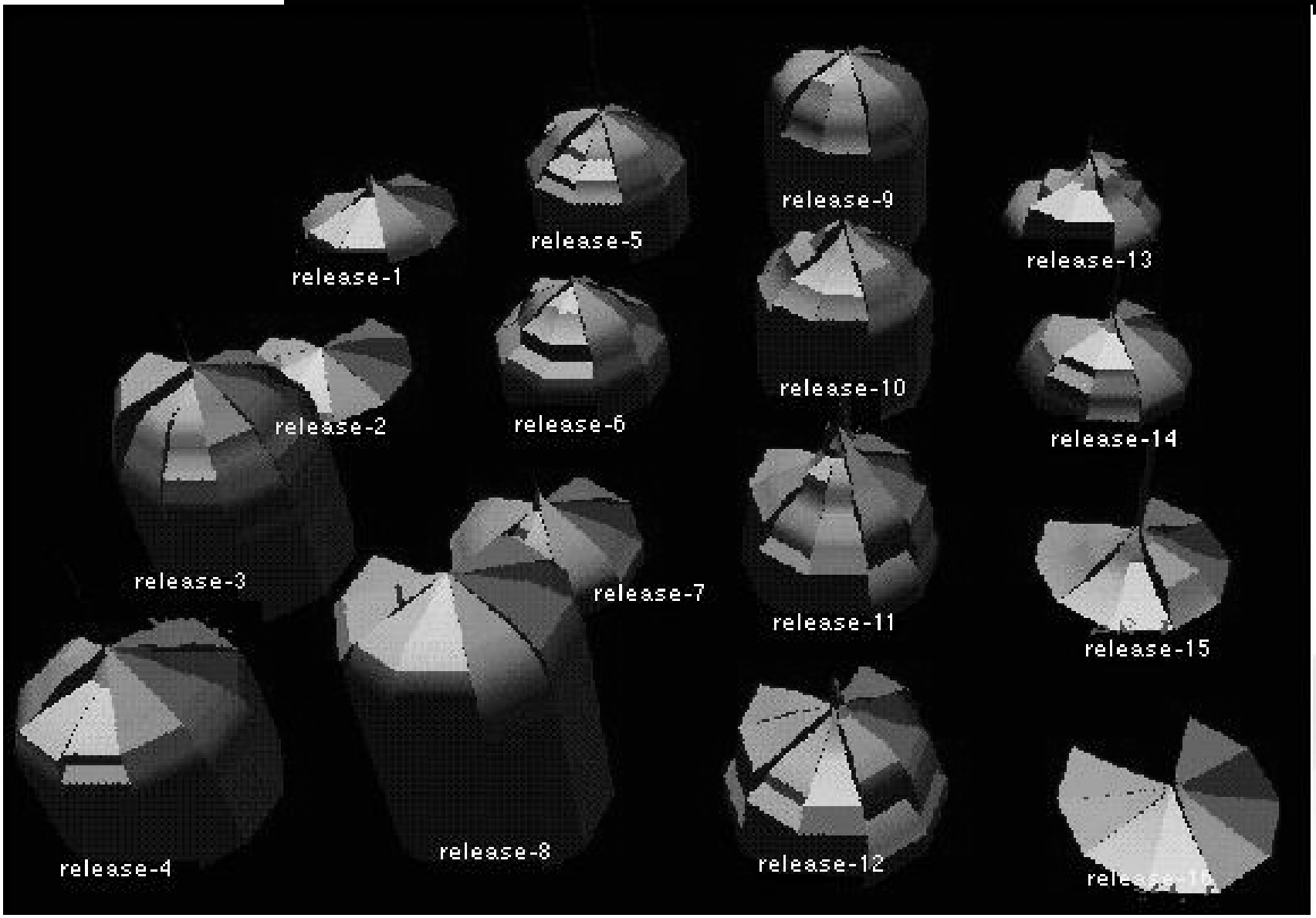
Software Management

- Solution
  - Use a glyph to group the data and its properties
  - Shows the trends over time

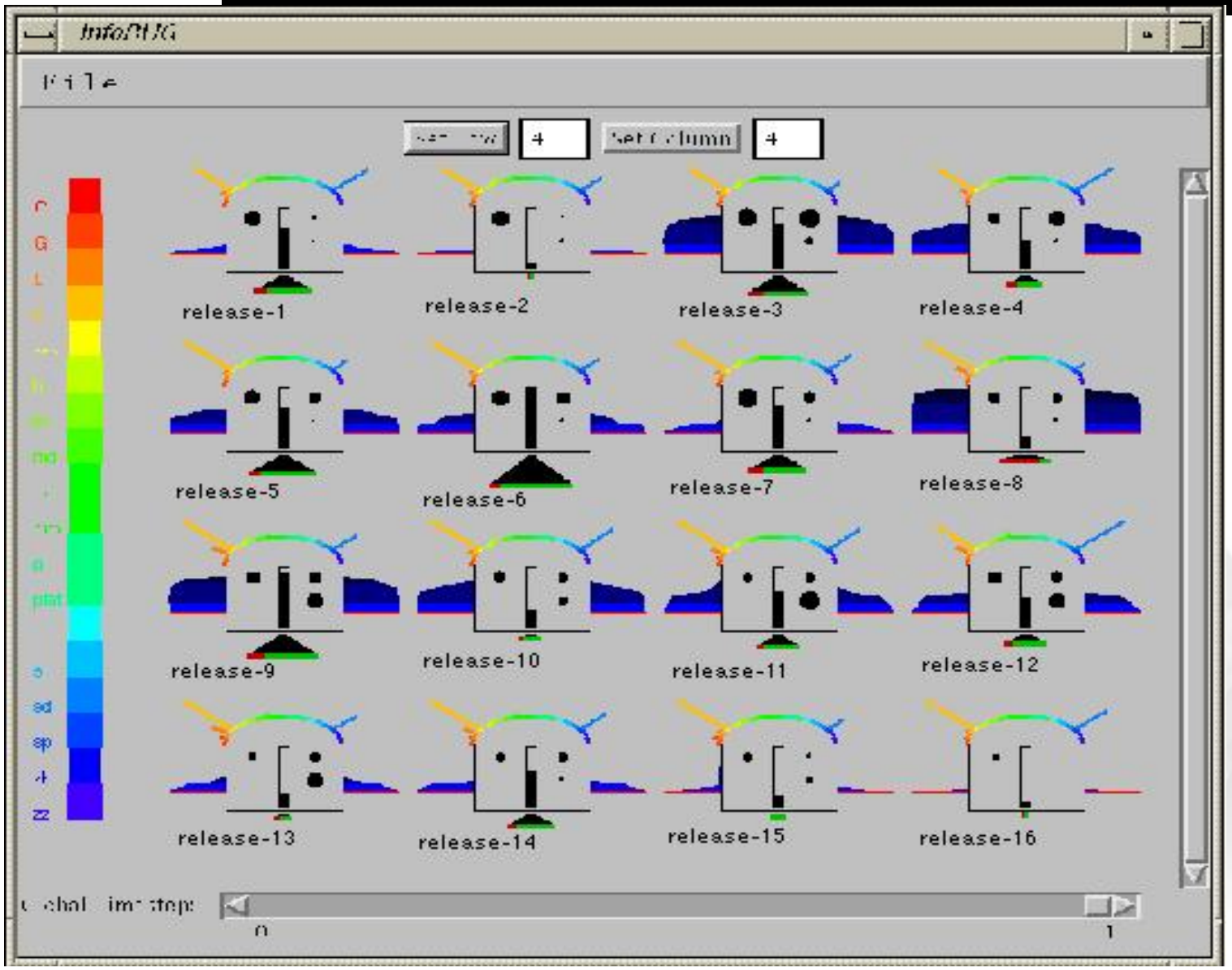
Software Management



Software Management

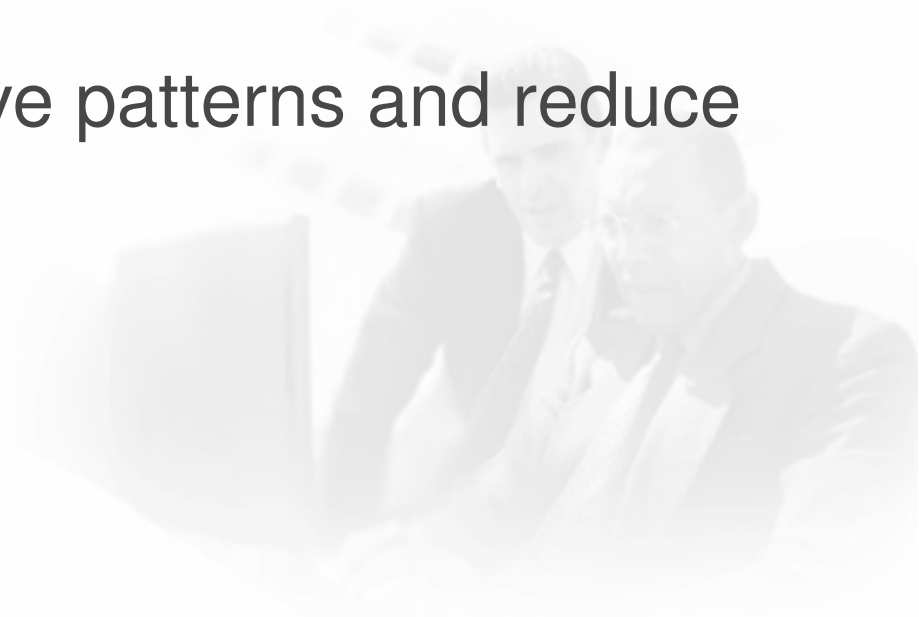


Software Management



Software Management

- Strengths
  - Good overview of the evolution of a system
  - Potential to compare the evolution of different systems
  - Glyphs use preattentive patterns and reduce eye movement

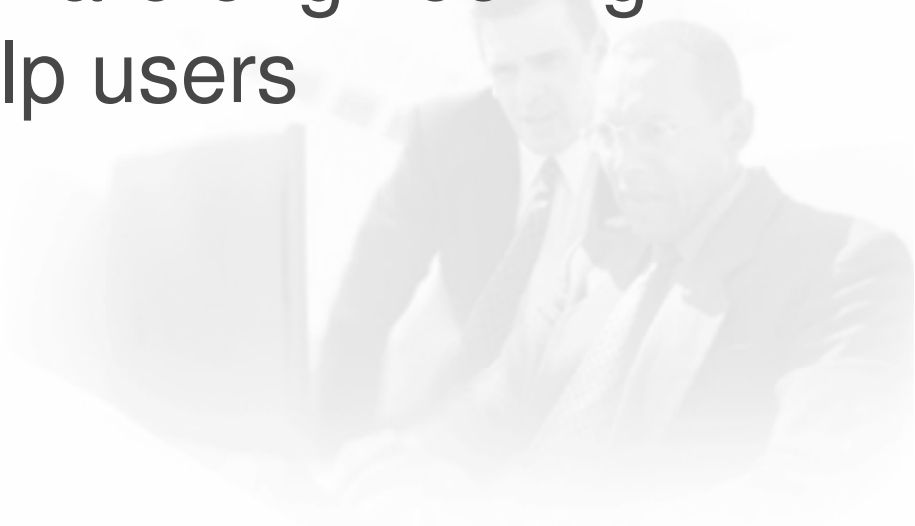


Software Management

- Weaknesses
  - No way to get detail (no interaction)
  - No mention of how to get this data
    - CVS I assume
  - InfoBug can be complicated
  - Different classes of resources available, but visualization only really dealt with code
    - How would the other types of data be managed and tracked?

Conclusion

- Missing user studies
- Information Visualization has always been used to show system structure
- Different areas of software engineering being visualized to help users



References

Visually Encoding Program Test Information to Find Faults in Software James Eagan and Mary Jen Harrold and James A. Jones and John Stasko Proc InfoVis 2001 pp. 33-36.

Managing Software with New Visual Representations, Mei C. Chuah, Stephen G. Eick, Proc. InfoVis 1997.