Software Re-Engineering: Technology Maturation Study

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Professor Mary Shaw
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Why is this important?

- Greater costs spent in maintenance
- Software loses structure
  - Time to market pressures
  - Ignorant maintenance
- Small improvements will go a long way
- Silver bullet?
State of the Art

• Refactoring
  – Re-code/Re-design
  – Now available in popular IDE’s

• Previously
  – Code-level
  – Module-level

• Future
  – Re-Design/Re-Architect
General Model for Software Reengineering

Reverse Engineering (Abstraction)  
Existing System  
Implementation  
Design  
Conceptual  
Requirements  
(Alteration)  
re-think  
re-specify  
re-design  
re-build

Conceptual  
Requirements  
Design  
Implementation  
Target System  
Forward Engineering (Refinement)

General Model for Software Reengineering

Reverse Engineering (Abstraction)

Con-ceptual
Requirements
Design
Implementation
Existing System

(Alteration)

re-design

Design Recovery

Conceptual
Requirements
Design
Implementation

Forward Engineering (Refinement)

Target System

Hybrid Re-engineering

- Software Re-engineering Prepared By: Dr. Linda H. Rosenberg Engineerin. Section head Software Assurance Technology Center Unisys Federal Systems
- [http://satc.gsfc.nasa.gov/support/reengrpt.pdf](http://satc.gsfc.nasa.gov/support/reengrpt.pdf)
Architecture Transformation

Software Re-engineering

1950
- Database Re-structuring
  - AST + Control
  - Flow Graph + Data Flow
  - Graph + …

1960
- Structuring Flowgraphs
  - GOTO less approach

1970
- Design Recovery
  - System Partitioning
- Re-Modularize
- Re-Code

1980
- Architecture Recovery
  - Resource Flow Diagrams (MIL)

1990
- Re-Architect
- Re-Design
- Re-Factor

2000
Papers (pre-1975)

1. Ashcroft, E. and Manna, Z. The translation of 'go to' programs to 'while' programs. 51'ANC5-71-188, Stanford, CA. 1971.


Papers (1975-1979)

Papers (1980-1984)


Papers (1985-1989)


Papers (1990-1994)


Papers (2000 - )


Questions?