



Universität
Zürich^{UZH}

Institut für Informatik

Software Quality

Lecture 6 – Human Aspects

Thomas Fritz

Martin Glinz

Announcement

Next week:

Continuous Integration
guest lecture by **Beat Fluri**

Overview

- Introduction to Human Aspects in Software Development
- Information Needs in Collocated Software Development Teams
- Code Bubbles
- [Coping with the Information Overload]
- Exercise Discussion

Learning Goals

- Describe why human aspects are important for achieving high software quality
- Describe information needs developers have and how they can affect the work
- Explain how Code Bubbles can support developers
- Be able to analyze and discuss a research paper

Human Aspects in Software Development

- Software is built by humans
 - To ensure adequate quality in the final product, humans need to be able to understand and reason about the system
- How can we help the human to build better software?

Research on Human Aspects

- Defect prediction based on source code metrics can be improved significantly using developer's micro interaction metrics, such as number of edits for low DOI elements [Lee et al.. *Micro Interaction Metrics for Defect Prediction.*]
- Ownership can correlate with defects; changes by minor contributors tend to cause more failures; changes by minor contributors should be reviewed with more scrutiny [Bird et al. *Don't touch my code! Examining the effects of ownership on software quality.*]

Information Needs in Collocated Software Development Teams

- Observed 17 software developers at large companies for 90-minute sessions
- Transcribed sessions to identify information needs and quantified them
 - Writing Code, *e.g. How do I use this data structure of function?*
 - Submitting a Change, *e.g. Did I follow my team's conventions?*
 - Triaging Bugs, *e.g. Is the problem worth fixing?*
 - Reproducing a Failure, *e.g. What does the failure look like?*
 - Understanding Execution Behavior, *e.g. What's statically related to this code?*
 - Reasoning about Design, *e.g. What is the purpose of this code?*
 - Maintaining Awareness, *e.g. What have my coworkers been doing?*

Class Activity: Questions to Discuss

- What are the major contributions/points of the paper?
- What do you like about the paper/approach?
- What do you not like about the paper/approach?
- How does the paper/approach relate to Software Quality?

+ 1 extra question per group

Code Bubbles

The image shows a screenshot of an IDE with several code bubbles overlaid on the source code. The bubbles are labeled with letters A through Q. The IDE interface includes a menu bar at the top with options like 'Menu', 'DrawDemo3 - CodeBubbles', 'Fix Bug 987', 'Look at Menu Crash', 'Code Review w/ Clark', 'Bug Back', and 'M3 Planning'. A toolbar with icons for undo, redo, and other actions is visible. The main workspace contains Java code for a drawing application. The code bubbles provide additional information, such as bug details, descriptions, code snippets, and method signatures. A red bug icon is also present in the center of the workspace.

Bubble A: Bug #987 (OPEN)
Bubbles using FlowDocument have unnecessary border padding
Reported: 5/12/2009 9:04:00 AM by Andrew Bragdon
Last Modified: 5/24/2009 8:58:00 PM
View full history
Assigned To: Jorloux Kaplan
QA Contact: jka@cs.brown.edu

Bubble B: Description
+++ This bug was initially created as a clone of bug #455932+++
Mozilla/5.0 (X11; U; Linux i686; en-US; rv:1.9.0.8ppv) Gecko/20080916/20090516 Firefox/3.0/sgpre

Bubble C: Closing the last tab of a window now closes the window instead of disabling the last tab. This was caused by bug #49680. I know it was intentional, but I'm filing this bug for people who don't like the new behaviour.
This was the original summary of bug #455932 before it was merged

Bubble D: Ideas
- it might not be creating the object at the right time
- the input temp file might be corrupted
- ...it may be only partially initialized

Bubble E: Toolbar Code
DrawDemo+MainPanel+
private static final long serialVersionUID = 1L;
private ShapeButton _lines;
private JButton _statsButton;
private JButton _deleteShape;
private ButtonHolder _holder;
private DrawingPanel _dp;
private ShapeInfoPanel _shapeInfoPanel;
DrawDemo+ShapeButton+
public void makeButtonInactive() {
this.setFocusable(false);
}

Bubble F: DrawDemo
buttonHolder private ShapeButton _currentSelection, _nextSelection;
currentSelection private ShapeButton _currentSelection, _nextSelection;
ButtonHolder public ButtonHolder(ShapeButton b) {
setSelected public void setSelected(ShapeButton button) {
DrawingPanel;
DrawDemo+DrawingPanel+
public boolean isSpecifyDimensions() {
return ShapeButton.isSpecifyDimensions();
}

Bubble G: MainPanel
private ShapeButton _lines;
MainPanel() {
ShapeButtons[] shapeButtons = this.createShapeButtons();
createShapeButtons public ShapeButtons() {
ShapeButtons[] shp = new ShapeButtons(4);
ShapeButton[] shp = new ShapeButton(4);
shp[0]=ShapeButton.getInstance("Line",this);
}

Bubble H: Add Class...
App
AreaHolder
ButtonHolder
CenterOfMassMenuItem
ClearGridMenuItem
DeleteButton
Top of File
Member Variables
Add Method...
getDistance
handleClick
setPanel
DrawingPanel
GridMenuItem
HighlightsMenuItem
LoadMenuItem
MainPanel
MakeHouseMenuItem
Top of File
Member Variables
Add Method...
createButton
handleClick
OrganizationButton
PasswordCommandListener
PasswordConfirmButton
PasswordFrame
PasswordHelpButton
QuitButton
Top of File
Member Variables
Add Method...
makeQuitButton
setFillColorFrame
setStatisticsFrame
RandomMoveMenuItem
Top of File
Member Variables
Add Method...
getDistance
handleClick
setPanel
RandomShapeButton
RestoreLocalsButton
ShapeInfo
ShapeInfoPanel

Bubble I: javax.swing.JButton
void add(PopupMenu popup)
Adds the specified popup menu to the component.
Parameters
popup (PopupMenu) the popup menu to be added to the component.
Throws
Method inherited from java.awt.Component

Bubble J: DrawDemo+MainPanel+
public void createPropertyButtons() {
_deleteShape=deleteButton.getInstance(this);
_deleteShape.setFocusable(false);
}

Bubble K: DrawDemo+MainPanel+
public MainPanel(JFrame mainFrame) {
this.setLayout(new BorderLayout());
this.createPropertyButtons();
JButton featureButton=SpecialFeatureButton.getInstance(this);
JButton randomShapes=this.createRandomShapeButton();
String[] messages = this.generateStatisticsMessages();
this.handleStatisticsGUI(messages);
MenuBar menuBar=this.createMenuBar();
ShapeButton[] shapeButtons = this.createShapeButtons();
JPanel shapePanel = this.makeShapeButtonPanel(shapeButtons);
this.createShapeHandler();
JPanel moreFunctionsPanel=new JPanel(new GridLayout(6,4));
JLabel moreFunctionsLabel=new JLabel("More Functions",JLabel.CENTER);
moreFunctionsPanel.add(moreFunctionsLabel);
moreFunctionsPanel.add(randomShapes);
moreFunctionsPanel.add(deleteShape);
moreFunctionsPanel.add(statsButton);
moreFunctionsPanel.add(featureButton);
_shapeInfoPanel = new ShapeInfoPanel();

Bubble L: DrawDemo+MainPanel+
public JMenuBar createMenuBar() {
JMenu menu1 = new JMenu("Image/Text Input");
JMenu menu2 = new JMenu("Ordering Features");
JMenu menu3 = new JMenu("Extra Features");
JMenu menu4 = new JMenu("World Features");
menuBar.add(menu1);
menuBar.add(menu2);
menuBar.add(menu3);
menuBar.add(menu4);
this.createMenu(menu1);
this.createMenu(menu2);
this.createMenu(menu3);
this.createMenu(menu4);
return menuBar;
}

Bubble M: DrawDemo+MainPanel+
private void createMenu(JMenu m) {
m.add(load);
m.add(separator);
m.add(testInput);
}

Bubble N: main shell
MainPanel
Top of File
Member Variables
Add Method...
createRandomShapeButton
createShapeButtons
getShapeButton
makeQuitButton
public JButton createRandomShapeButton() {
JButton button=RandomShapeButton.getInstance(this);
button.setFocusable(false);
return button;
}

Bubble O: DrawDemo+MainPanel+
public static JButton getShapeButton() {
return button;
}

Bubble P: DrawDemo+MainPanel+
public JButton createRandomShapeButton() {
JButton button=RandomShapeButton.getInstance(this);
button.setFocusable(false);
return button;
}

Bubble Q: DrawDemo+MainPanel+
public static JButton getShapeButton() {
return button;
}

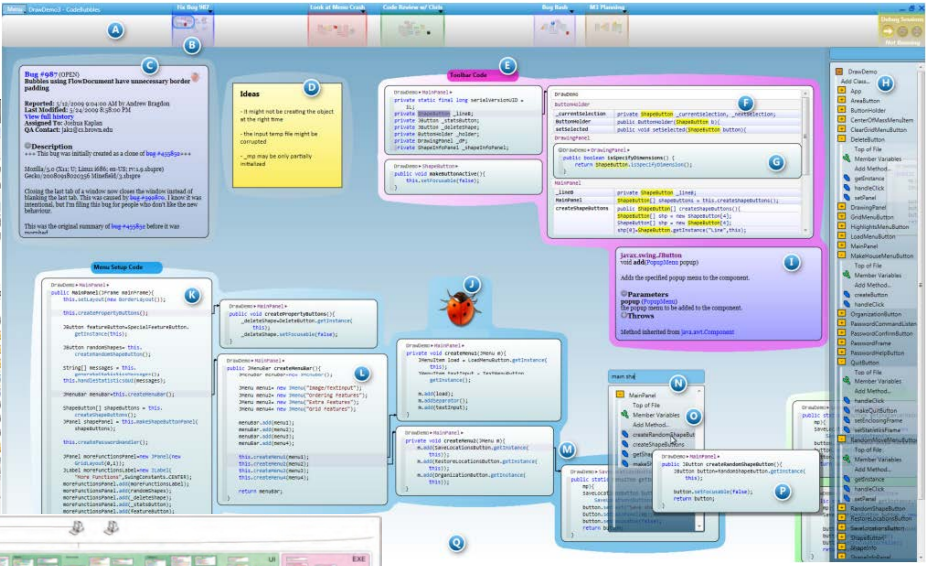
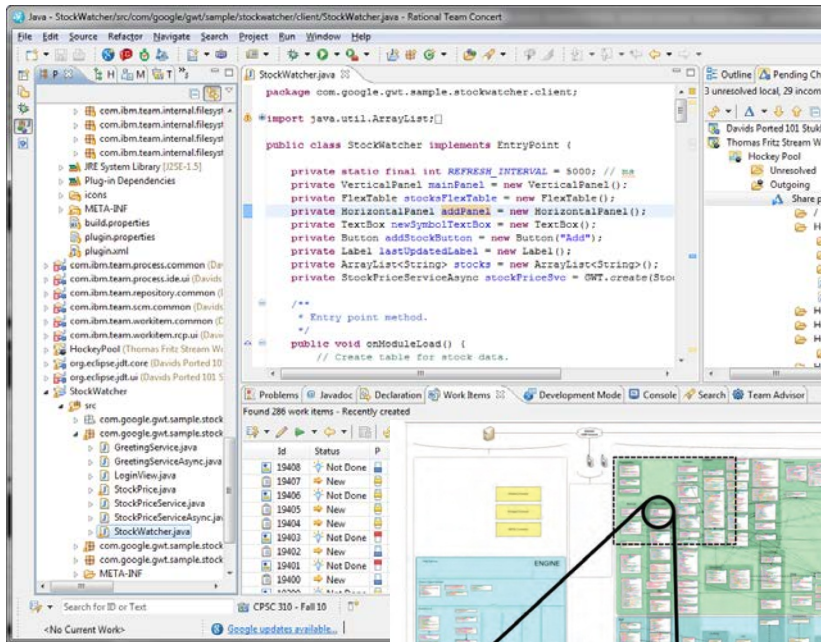
Class Activity: Questions to Discuss

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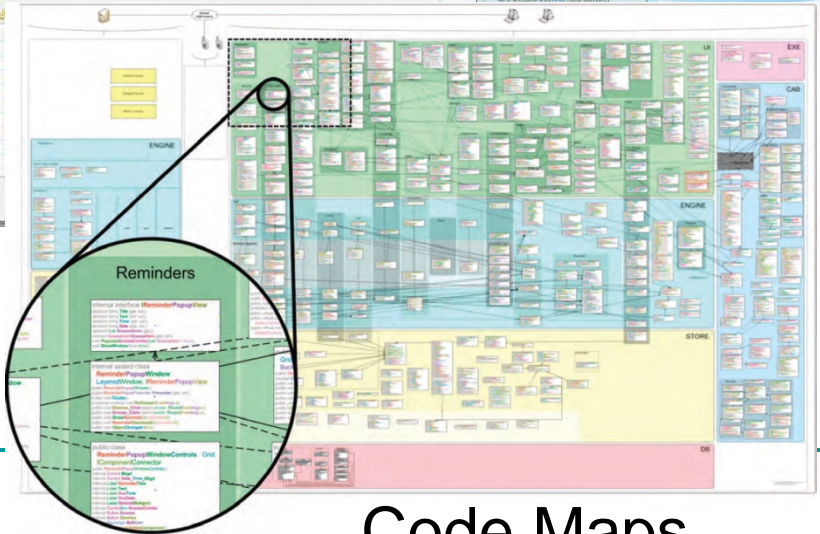
To Do:

- positive points about the paper/approach on green
- Critical/negative points on red
- Questions / further discussion points on yellow

Topic – Tools and Environments for Development



Code Bubbles



Code Maps

Topic – Code Search



Search public source code

Search via [regular expression](#), e.g. `*java/**.java$`

Search in

- [Android](#)
- [Chromium](#)
- [ChromiumOS](#)

Search Options

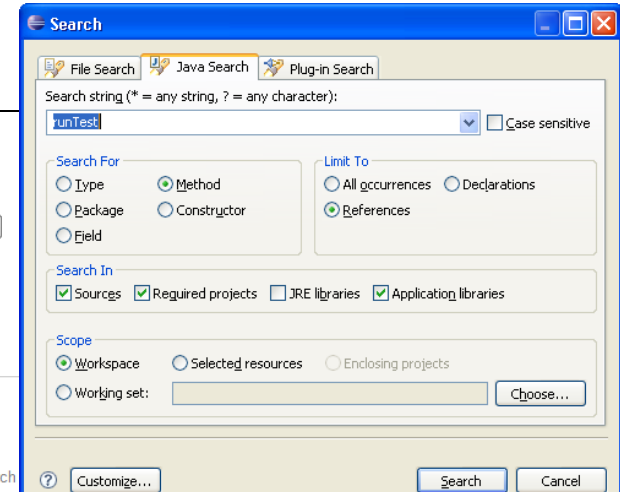
Package: In Search Box

Language: lang:c++

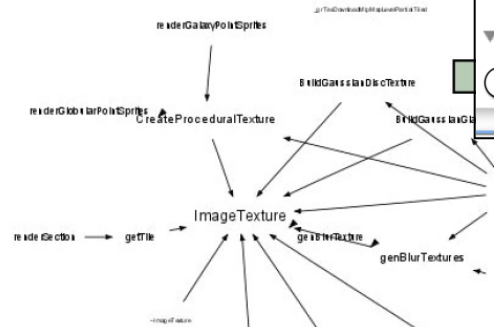
File Path:

Class:

Function:



Function Name	Project
ImageTexture	celestia
drawPrimitive	Wine
CreateProceduralTexture	celestia
IDirect3DTexture8Impl_PreLoad	Wine
TiledTexture	celestia
CreateTextureFromImage	celestia
genBlurTextures	celestia
genBlurTexture	celestia
BuildGaussianGlareTexture	celestia
BuildGaussianDiscTexture	celestia
loadTileTexture	celestia
getFile	celestia
renderGalaxyPointSprites	celestia
renderSection	celestia
renderGlobularPointSprites	celestia
IDirect3DTexture8Impl_GetPriority	Wine
grTexDownloadMipMapLevelPartialTiled	driglide



Ask a question: what are the callers of addC... the caller of addChart?

what where which white (1)

accesses are argument arguments attribute attributes (2)

the type types (3)

calls callers classes (4)

of (5)

addCategoryLabelToolTip (7)

addChangeListener (7)

addChart (7)

addChartMouseListener (7)

addChoosableFileFilter (7)

addCornerTextItem (7)

org.jfree.chart.servlet - src - JFreeChart 1562

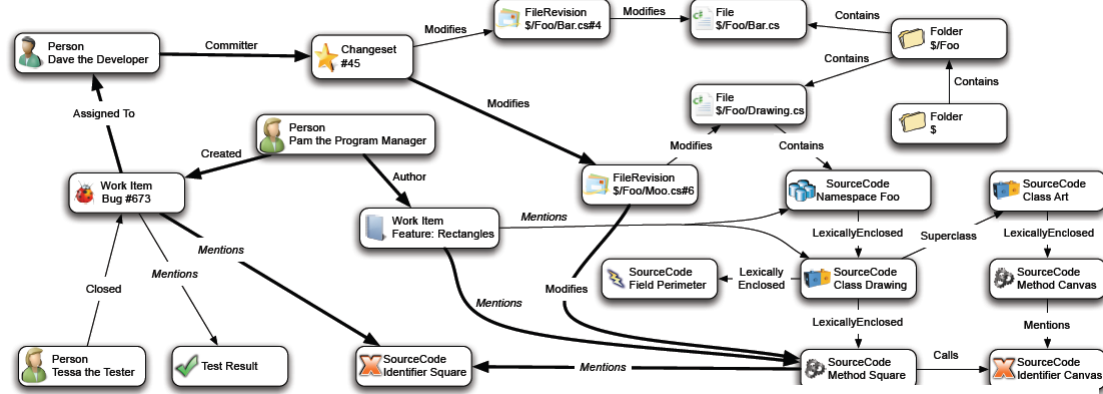
ServletUtilities 1562

registerChartForDeletion(File, HttpSession)

Natural Language Queries

Portfolio

Topic – Social Media and Awareness

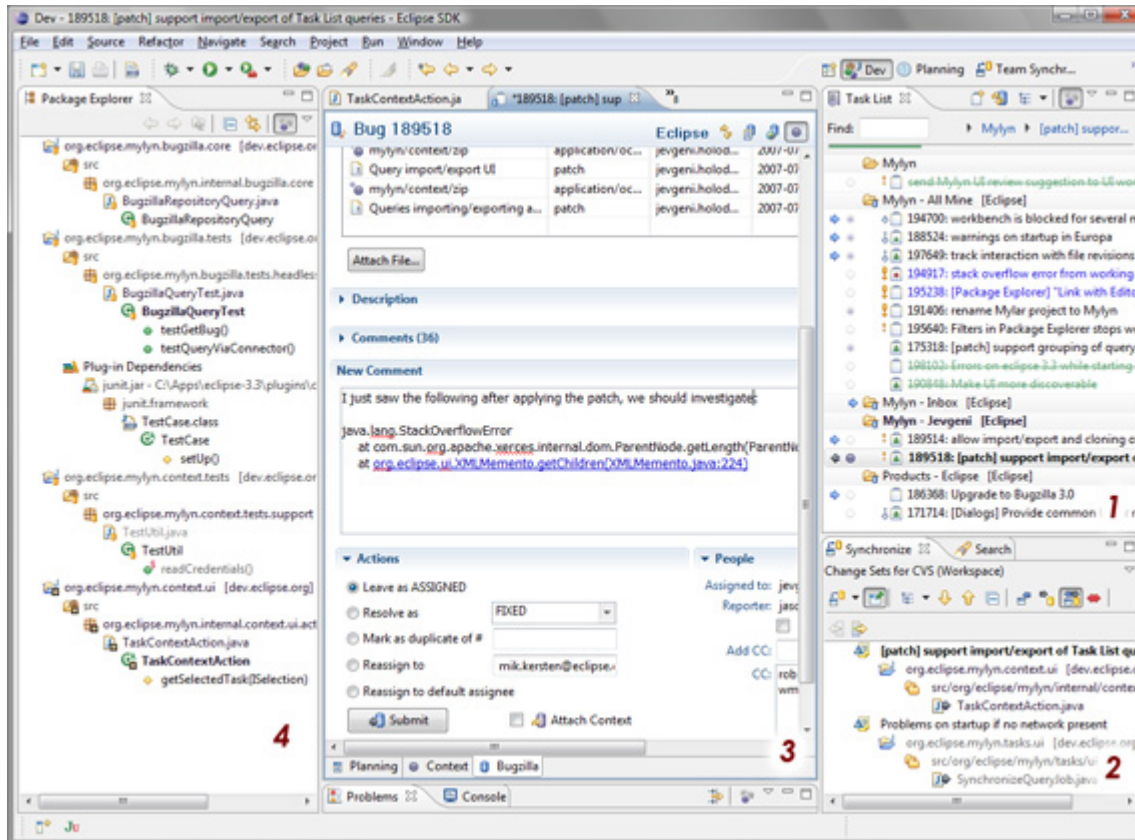


Severity	Date	Committer	Source File	Source Loc.	Ratio	Codebook / Bridge
🟠	11-Oct	tod	IProgressService	---		Implements new interface.
🟡	27-Aug	caniszyzk	XMLerrReport	---		RESOLVED - bug 201306 .
🔴	13-Aug	mpawlonsk	IDocumentNode	getNodeAtt..()		Return Type Changed.
🟢	4-Jun	---	---	---		New tag in SCM: R3_3_1.
🟠	20-Mar	obesedino	Platform	getAuthInfo(...)		Required method deprecated.
🟢	7-Mar	sbrandys	IFolder	---		Javadoc updated.

Mylyn Feed. 128,479 changes filtered.

Customized Awareness

Topic – Improving the Software Development Process with Developer Information



Using Task Context (DOI)

Summary

- Human aspects play an important role for a high software quality
- Research has looked into the information needs of the developer as well as how to support developers in their daily work more concretely