COMP160: Software Engineering

1: Software Quality

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Software Quality and Quality Assurance

Learning Outcomes

In this section you will learn how to...

- **Explain** what 'quality' is
- **Explain** what 'quality assurance' is
- **Discuss** the role of quality assurance in software engineering

Further Reading

- Pressman, R.S. (2009) *Software Engineering: A Practitioner's Approach*. 7th Edition. McGraw-Hill.
- Kaner, C., Falk, J. And Nguyen, H.Q. (1999) *Testing Computer Software*. John Wiley and Sons.

Software Quality

"Bad software plagues nearly every organisation that uses computers, causing lost work hours during computer downtime lost or corrupted data, missed sales opportunities, high IT support, and maintenance costs, and low customer satisfaction" (ComputerWorld, 2005)

Software Quality

"The Sorry State of Software Quality—quality has gotten worse!" (InfoWorld, 2006)

Software Quality

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- Quality may relate to several aspects of games:
  - **the quality of the design**: the aesthetic is specified to accurately meet the desires and pleasures of the target audience; provides a distinctive experience; etc.
  - **the quality of the implementation**: the game mechanics are able to achieve the intended aesthetic; the game is well-implemented...

Software Quality

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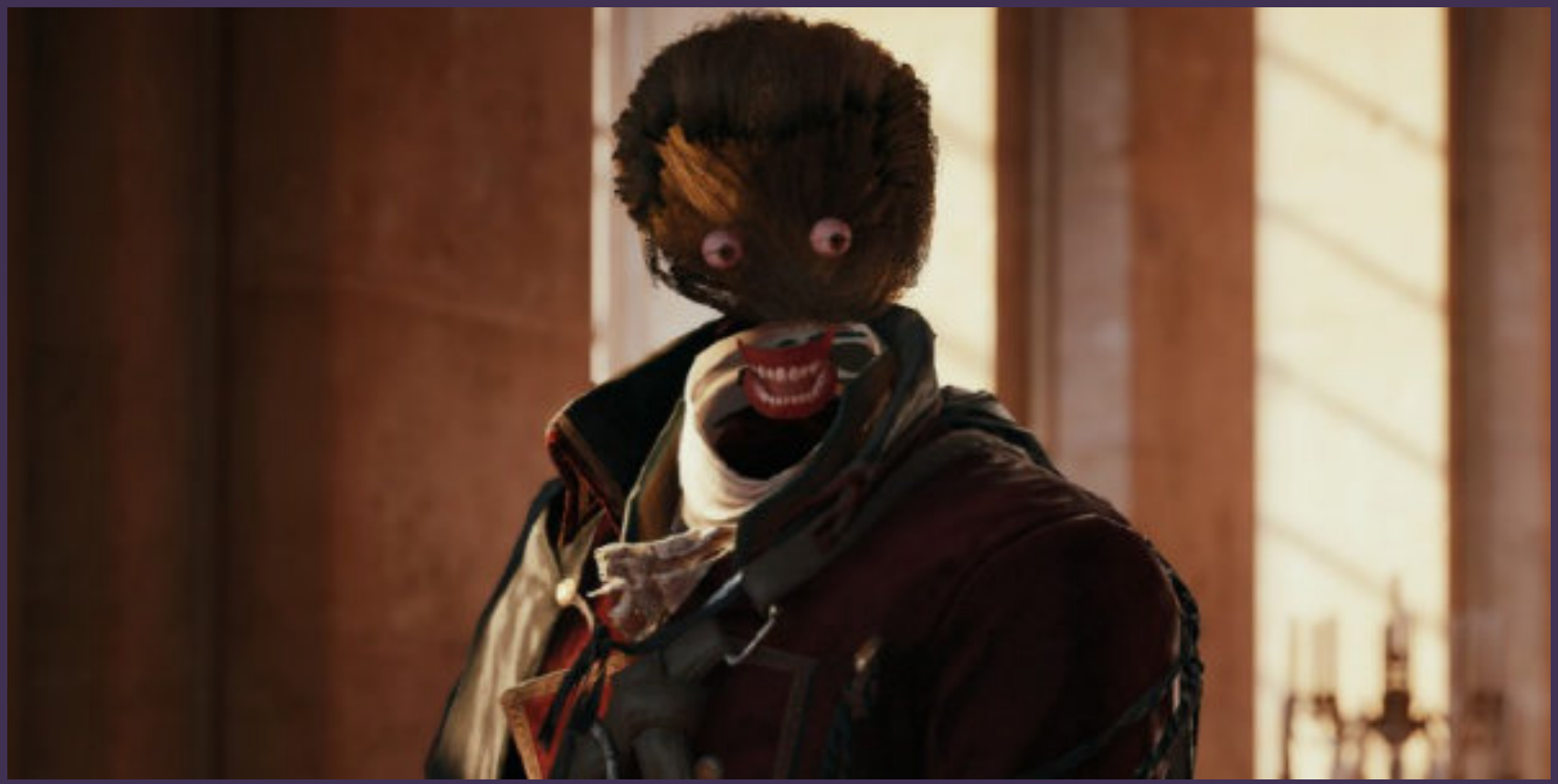

Software Quality

https://www.youtube.com/watch?v=VhenntkfAgU

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- Players blame developers, arguing that sloppy practices lead to low-quality software.
- Investors blame developers for not understanding what players want and what is `good enough' to maximise profit.
- Developers blame the design team and their publisher, arguing that irrational delivery dates and continuous change force them to deliver software before it can be adequately tested.

Socrative `6E8NSW3IN`

So, who is responsible?

- In pairs.
- Discuss for 2-minutes whether designers, developers, or publishers are responsible for software quality.
- **Suggest** which parties are responsible **and justify** your answer.

Socrative `6E8NSW3IN`

But wait...what exactly is quality?

- In pairs.
- Discuss for 2-minutes what `software quality' means in the context of game development.
- **Give** a definition for `game software quality'.

Software Quality

"Quality...you know what it is, yet you don't know what it is. But that's self-contradictory. But some things are better than others, that is, they have more quality. But when you try to say what the quality is, apart from the things that have it, it all goes poof! There's nothing to talk about. But if you can't say what Quality is, how do you know what it is, or how do you know that it even exists? If no one knows what it is, then for all practical purposes it doesn't exist at all. But for all practical purposes it really does exist. What else are the grades based on? Why else would people pay fortunes for some things and throw others in the trash pile? Obviously some things are better than others...but what's the betterness?...So round and round you go, spinning mental wheels and nowhere finding anyplace to get traction. What the hell is Quality? What is it?"

(Robert Persid, 1974)

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- **pragmatic view**: relative to utility and specific goals. If something meets our goals, it exhibits quality.
- **commercial view**: the specification is key. If the specification is sound and the product conforms to the specification, it exhibits quality.

Software Quality

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- **value-based view**: quality is based on how much a customer is willing to pay.
- In practice, perception of quality tends to combine these different views in subtle and nuanced ways.

Software Quality

"An effective software process applied in a manner that creates a useful product that provides measurable value for those who produce it and those who use it." (Bes, 2004)

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Can we now construct a better definition of software quality in games?

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- The management aspects create checks and balances to help avoid project chaos—a key contributor to poor quality.
- Software engineering practices empower developers to analyse and review their product.
- Umbrella activities, such as project management and code reviews, are key factors in determining quality and have just as an important role as any other specific source code quality assurance practice.

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- **features**: does the software provide features that surprise and delight first-time end-users?
- **reliability**: does the software deliver all features and capability without failure? Is it available when it is needed? Does it deliver functionality that is error free?

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- **conformance**: does the software conform to local and external software standards that are relevant to the application? Does it conform to de facto design and coding conventions? For example, does the user interface conform to accepted design rules for menu selection or data input?
- **durability**: Can the software be maintained (changed) or corrected (debugged) without the inadvertent generation of unintended side effects? Will changes cause the error rate or reliability to degrade with time?

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- **socio-cultural context**: In some situations, you have a set of prejudices that will influence your perception of quality.

Quality Assurance

Other definitions to explore and factors to consider in your own time:

- McCall's Quality Factors
- ISO 9126 Quality Factors
- Targeted Factors
- IEEE 610.12 Software Assurance

Socrative `6E8NSW3IN`

Why are these factors important in games?

- In pairs.
- Discuss for 2-minutes why quality assurance is important to game development.
- **Illustrate TWO** reasons why quality assurance is important. Use examples to support your answer.

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- Either you missed the market window, or you simply exhausted all your resources.

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- Large companies can get away with serious bugs at launch (e.g. Activision-Blizzard and Diablo 3)—but, smaller indies risk permanent damage to their reputation.

Activity

- Organise into your COMP150 groups
- Read `http://blog.codinghorror.com/code-smells/`
- As a group, identify **three** code smells that are present in your COMP150 game code
- Discuss how you might go about refactoring to remove the smells

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Test driven development

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- The following might be unit tests for a `factorial` function:
  - `factorial(1)== 1`
  - `factorial(2)== 2`
  - `factorial(3)== 6`
  - `factorial(4)== 24`

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- **Bottom-up** testing — if the **parts** work properly, it's easier to make the **whole** work properly
- When code is **changed**, can verify that nothing was broken

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- Can give a false sense of security
  - Unit tests can't cover 100% of a complex program — **not a substitute** for other forms of testing

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  2. **Green**: write code to make the new test **succeed** (without causing the other test cases to fail)
  3. **Refactor**: **improve** the code, ensuring that all tests still **succeed**

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  - **KISS**: Keep It Simple, Stupid
  - **YAGNI**: You Aren't Gonna Need It

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  - Maybe your unit testing code is broken?

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  - (you **did** commit before you started, right?)

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