On the trail of Code Smells

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„IF it stinks change it.” – Martin Fowler

Content

- Definition
- Bad smells
- Refactoring
- Conclusion

Definition

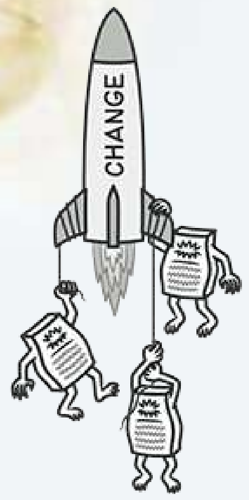
What are code smells?????

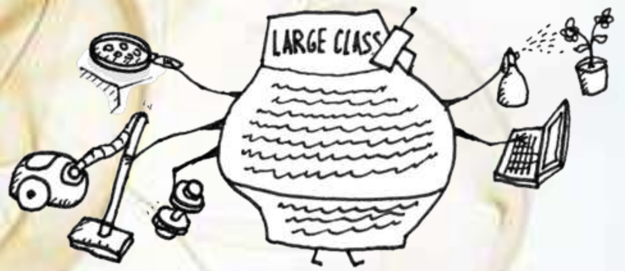
The term was popularized by Kent Beck in the late 90s and its usage increased after appearing in the well known Martin Fowler's book ***Refactoring*.**

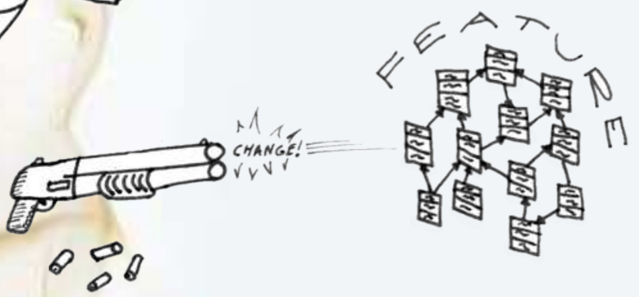
Code Smells are indicators that something **may** be wrong in a piece of code. They are not a problem just because they are a smell, a deeper analysis is needed to determine if there is a problem or not.

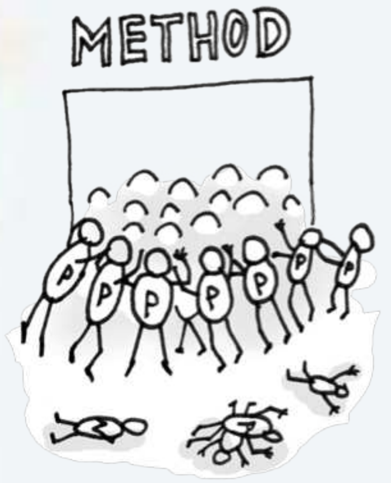
Bad Smells: Classification

- Class/Method organisation
  - Large Class, Long Method, Long Parameter List, Lazy Class, Data Class, …
- Lack of loose Coupling and Cohesion
  - Inappropriate Intimacy, Feature Envy, Data Clumps, Shotgun Surgery, …
- Too much or too little delegation
  - Message Chains, Middle Man, …
- Non Object-Oriented control or date structures
  - Switch Statements, Primitive Obsession, …
- Other confusing Smells:
  - Comments, Code Duplication, Dead Code …







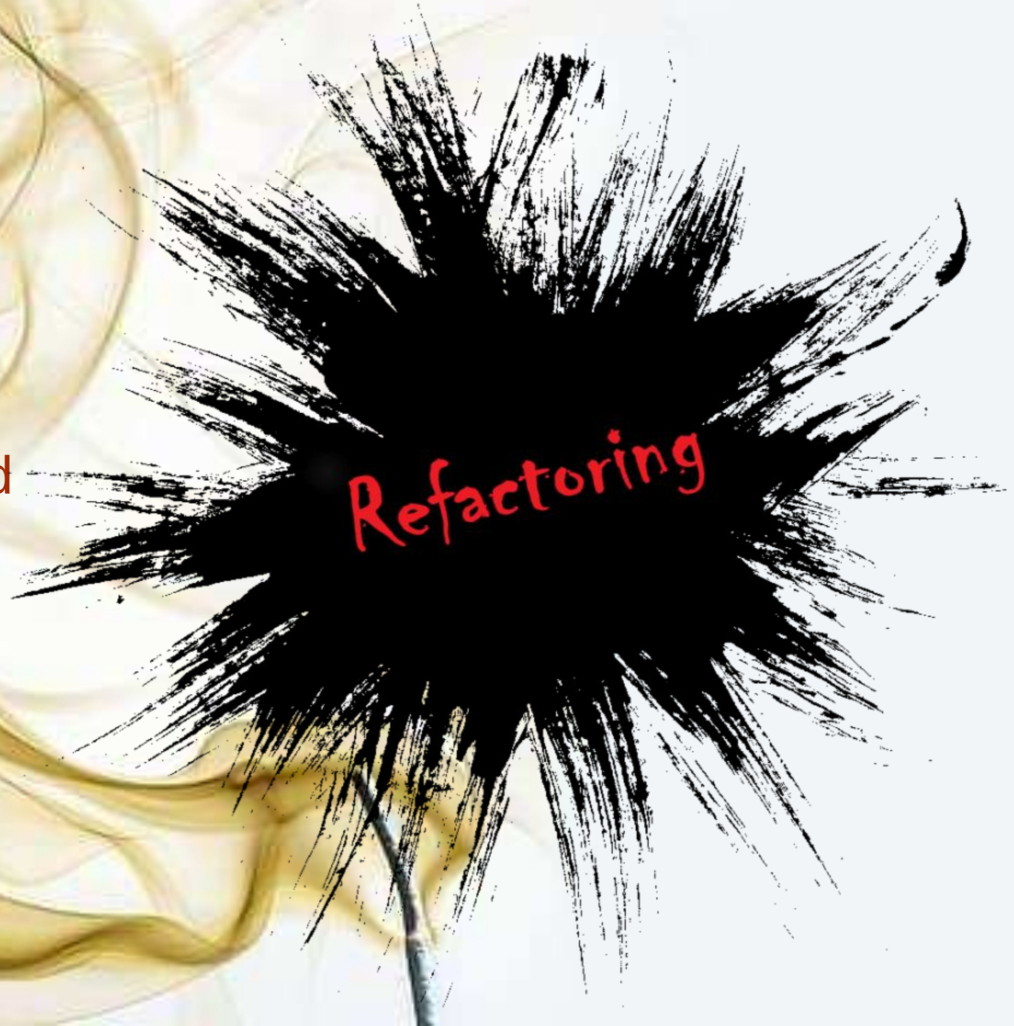


Cartoons borrowed from: https://sourcemaking.com/refactoring/smells

- ✓ They are not bugs
- ✓ They are not technically incorrect
- ✓ They do not block a working program

- ➢ Indicators of weaknesses in design
- ➢ Indicators of slow development
- ➢ Indicators of high risk of introducing new bugs and errors

It’s time to refactor!

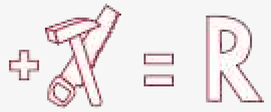


Refactoring

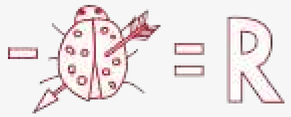
Refactoring is the process of changing a software system in such a way that it does not alter the external behavior of the code yet **improves** its internal structure.

When to refactor ?

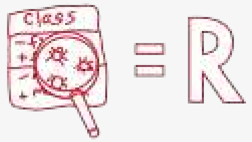
- when adding a feature



- when fixing a bug



- during a code review



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The main Refactoring Techniques

- Red-Green-Refactor → used in TDD
- Refactoring by Abstraction
- Composing Method
- Simplifying Methods
- Moving Features Between Objects
- Preparatory Refactoring → This is done when a developer notices the need for refactoring while adding a new feature

Encapsulated Field

Generalize Type

Pull Up Field/Method

Push Down Field/Method

Inline Class/Func./Variable

Extractions(Class, Method…)

Remove Middle Man

Replace Control Flag with Break

Replace Conditional with Polymorphism

Introduce Assertion

Replace Inline Code with Function Call

Move Field/Function/Method

Remove Dead Code

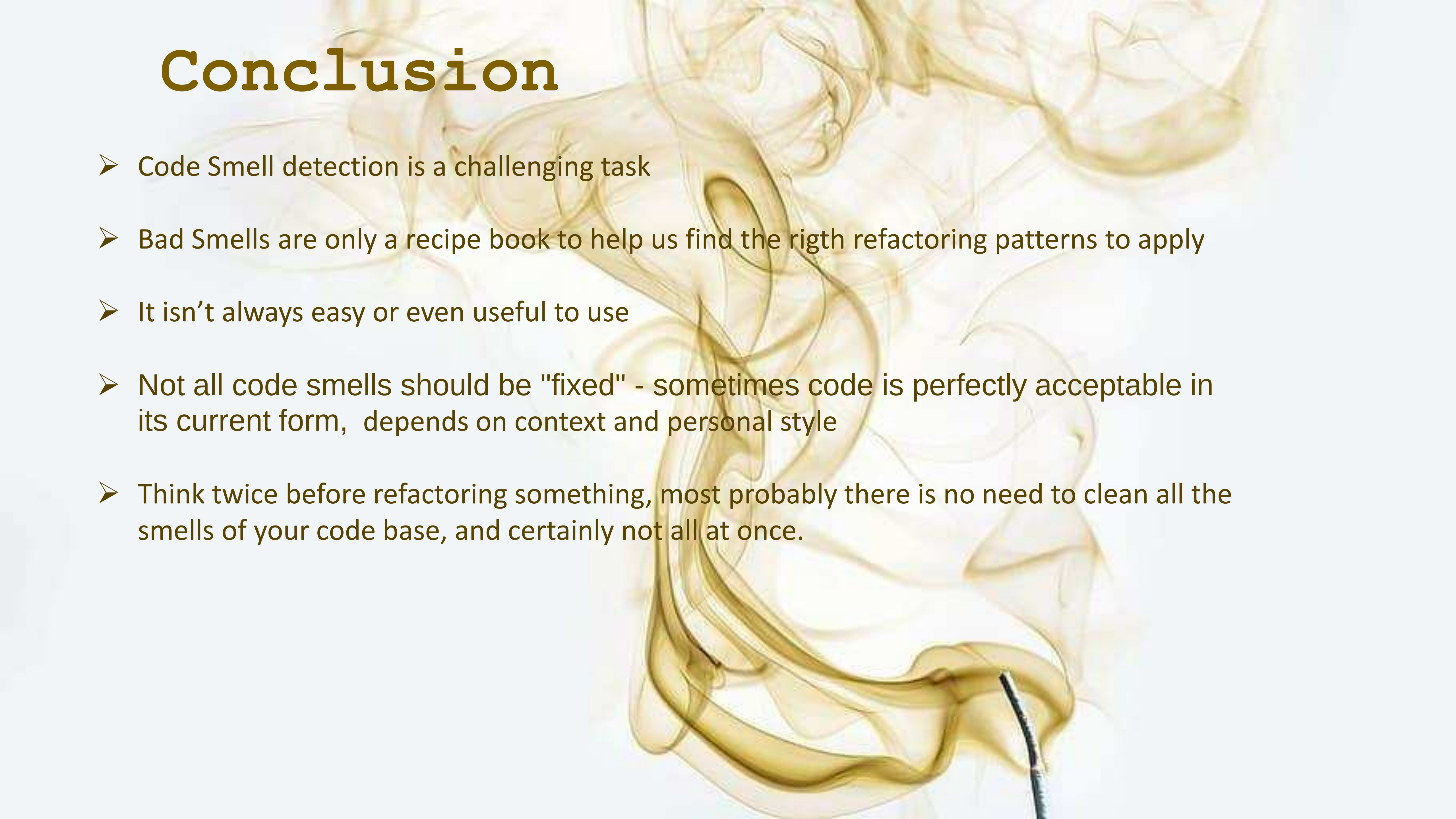
…and others…

My experience with Sonar

- I think that most of the Code Smells in our Sonar System are not real code smells like the ones we learned about here

- They are mainly Clear Code cases:

    - Unused variables
    - Unused imports
    - Commented code
    - Expected { after „if” condition
    - Unreachable code
    - Missing semicolon
    - Not immediatly returned value
    - …..

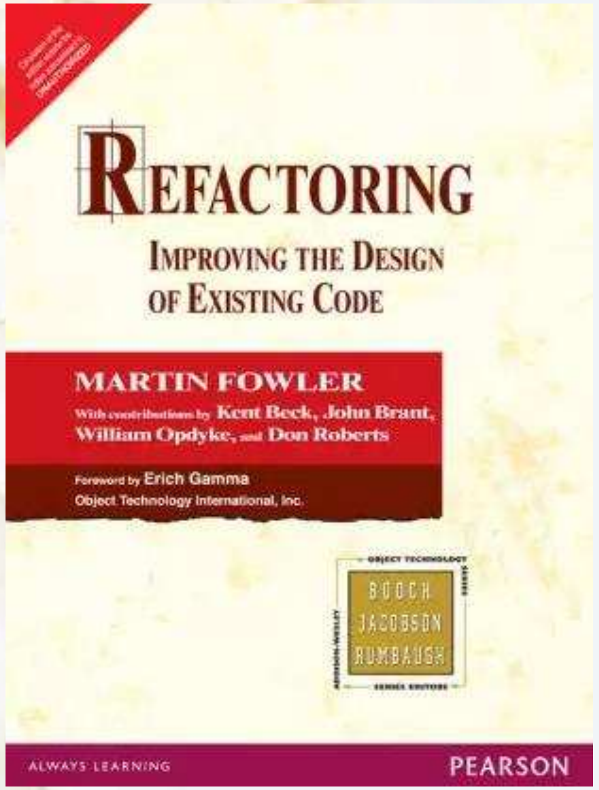


Conclusion

- Code Smell detection is a challenging task
- Bad Smells are only a recipe book to help us find the rigth refactoring patterns to apply
- It isn’t always easy or even useful to use
- Not all code smells should be "fixed" - sometimes code is perfectly acceptable in its current form, depends on context and personal style
- Think twice before refactoring something, most probably there is no need to clean all the smells of your code base, and certainly not all at once.

References:

M. Fowler, K. Beck, J. Brant, W. Opdyke, and D. Roberts: **Refactoring: Improving the Design of Existing Code**. Addison-Wesley, 1999.
A quick intro to code smells
https://dev.to/jmir17/a-quick-intro-to-code-smells-3eie
Bad Code Smells - Course „Software Maintenance and Evolution”, given by Prof. Kim Mens at UCL, Belgium
https://www.slideshare.net/kim.mens/bad-code-smells
Refactoring Catalog - Martin Fowler
https://refactoring.com/catalog/


REFACTORING
IMPROVING THE DESIGN OF EXISTING CODE
MARTIN FOWLER
With contributions by Kent Beck, John Brant, William Opdyke, and Don Roberts
Foreword by Erich Gamma
Object Technology International, Inc.
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Thank you for your attention!