Crosscutting concerns are often blamed to hinder...  
- design modularity  
- program comprehension  
- robustness, stability, etc.

Crosscutting concerns manifest themselves in many different ways.

Some Crosscutting Concerns

Crosscutting "shapes"
- Black Sheep and Octopus

Inheritance relationships
- Climbing Plant and Hereditary Disease

Concern-based coupling connections
- Tree Root and Tsunami

Structure of crosscutting code
- Copy Cat and Behavioral Concern


Flat Crosscutting Shapes

**Black Sheep** touches very few elements in distinct places

**Octopus** is partially well modularised, but also spreads across a number of other components
Some Crosscutting Concerns

Crosscutting “shapes”
- Black Sheep and Octopus

Inheritance relationships
- Climbing Plant and Hereditary Disease

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- Tree Root and Tsunami

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- Copy Cat and Behavioural Concern

E. Figueiredo, B. Silva, C. Sant'Anna, A. Garcia, J. Whittle, and D. Nunes.

Crosscutting Patterns and Design Stability: An Exploratory Analysis.
In proceedings of the 17th International Conference on Program Comprehension (ICPC), 2009.

Inheritance-wise Concerns

Climbing Plant affects the root of an inheritance tree and all descendants

Hereditary Disease affects the root of an inheritance tree and some descendants

Hereditary Disease

Concern Connections

Tree Root composed of many feeders which connect to a trunk

Tsunami composed of a wave source which connects to many waves

Some Crosscutting Concerns

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Structure of Crosscutting Code

Copy Cat is implemented by replicated pieces of code in different places

Behavioural Concern is only composed of methods, i.e., it has no associated attribute

Research Question

How can we identify, visualise, and reason about all the different forms of crosscutting concerns?

Visualising Inheritance

Visualising Coupling
Visualising Shapes


Research Question

How can we identify, visualise, and reason about all the different forms of crosscutting concerns?

Answer

Multiple Concern Views