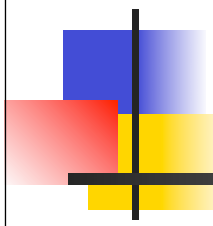
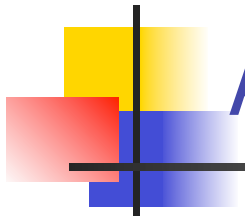


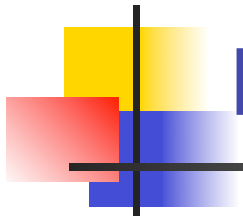
SPA2009
Design Principles – Mining Pattern DNA

Eoin Woods	Barclays Global Investors
Nick Rozanski	Barclays Global Investors
Andy Longshaw	Barclays Bank PLC



Agenda

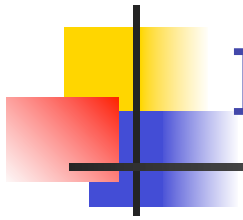
- 00:00-00:15 – Introduction and Overview
- 00:15-00:25 – **Exercise:** Principles vs. Patterns
- 00:25-00:45 – Patterns in Practice
- 00:45-01:30 – **Exercise**: Mining Principles (and Break)
- 01:30-01:40 – Gather Results
- 01:40-01:45 – Overview of Exercise 2
- 01:45-02:30 – **Exercise**: Principles Catalogue (and Break)
- 02:30-02:50 – Gather Results
- 02:50-03:00 – Summary and Wrap Up



Presenters

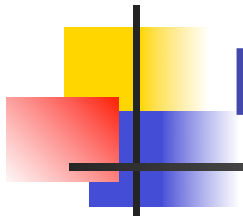
- Eoin Woods
  - software architect at Barclays Global Investors
  - responsible for Apex, BGI's strategic PM system
- Nick Rozanski
  - enterprise architect at Barclays Global Investors
  - leads the global enterprise architecture group
- Andy Longshaw
  - technical architect at Barclays Bank PLC
  - leads the development of enterprise shared services

The shared "Barclays" affiliation really is a coincidence!



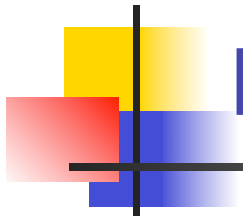
Introduction

- This session is about **design principles** rather than specific patterns or solutions
  - "design principle" to be defined in a moment
- We're using patterns to find principles
  - because people are very familiar with patterns already
  - and they give us something to search
  - but they're just a means to and end
- Aim to unlock the knowledge in the design patterns to allow it to be used directly



Design Principles

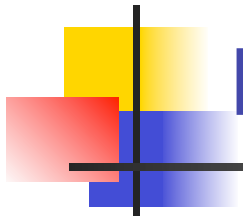
- What is a “principle” ?
  - a fundamental truth or proposition serving as the foundation for belief or action [OED]
  - a comprehensive and fundamental law, doctrine or assumption [Websters]
- So a design principle is a fundamental “truth” or “law” that serves as the foundation for design action (i.e. guides design decisions)



Principles vs. Patterns

- A **principle** is a general piece of design guidance to be applied in order to guide the process of making one or more design decisions
  - e.g. "Program to interfaces not implementations"
- A **pattern** is a concrete solution to a specific problem that can be directly applied in order to identify the design elements to create
  - e.g. Observer

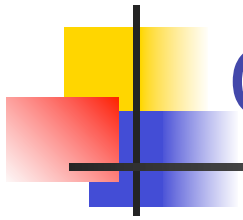
A pattern is the application of design principles



Published Design Principles

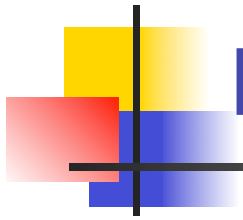
- Classical Design Principles
  - e.g. “minimise coupling” or “hide information” (Parnas)
- Gang of Four
  - e.g. “program to interfaces, not implementations”
- Robert Martin – Principles of OOD
  - e.g. “Single Responsibility Principle”
- Hunt and Thomas – Pragmatic Programmer
  - e.g. “don’t repeat yourself” (DRY)
- Bertrand Meyer – OO Software Construction
  - e.g. “define explicit interfaces”

See the reference sheets we’ve provided for details



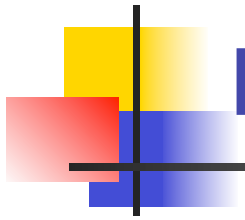
Questions We're Interested In

- What are the most important or common principles?
  - is there such a set?
  - or are principles less general than that?
- Are patterns generally based on the same principles?
- Are there principles that apply in all situations?
  - or are all principles dependent on context?
- What specific principles underpin common patterns?
- Are principles independent? Or do they cluster into related groups like patterns?



Exercise 1 – Principles vs. Patterns

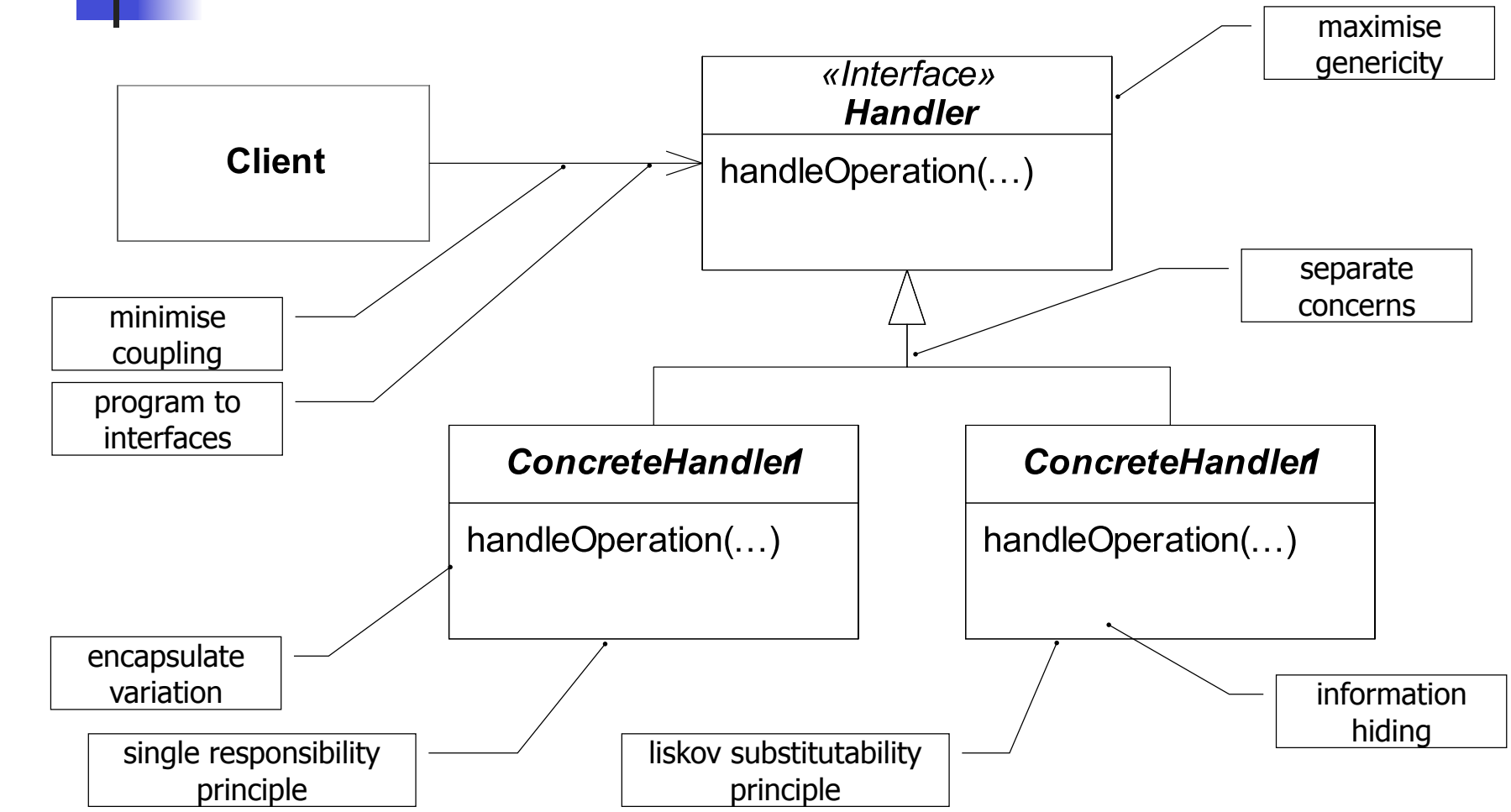
- Goal: break into groups and start thinking
- Break into groups of 3 or 4
  - each group needs at least
  - one person who has been using patterns for 5+ years
  - one person who has used patterns for a couple of years
  - one person who generally knows about patterns
  - and any other people who might prove to be useful!
- In your groups
  - identify the most useful 3 design patterns you know
  - identify 3 design principles



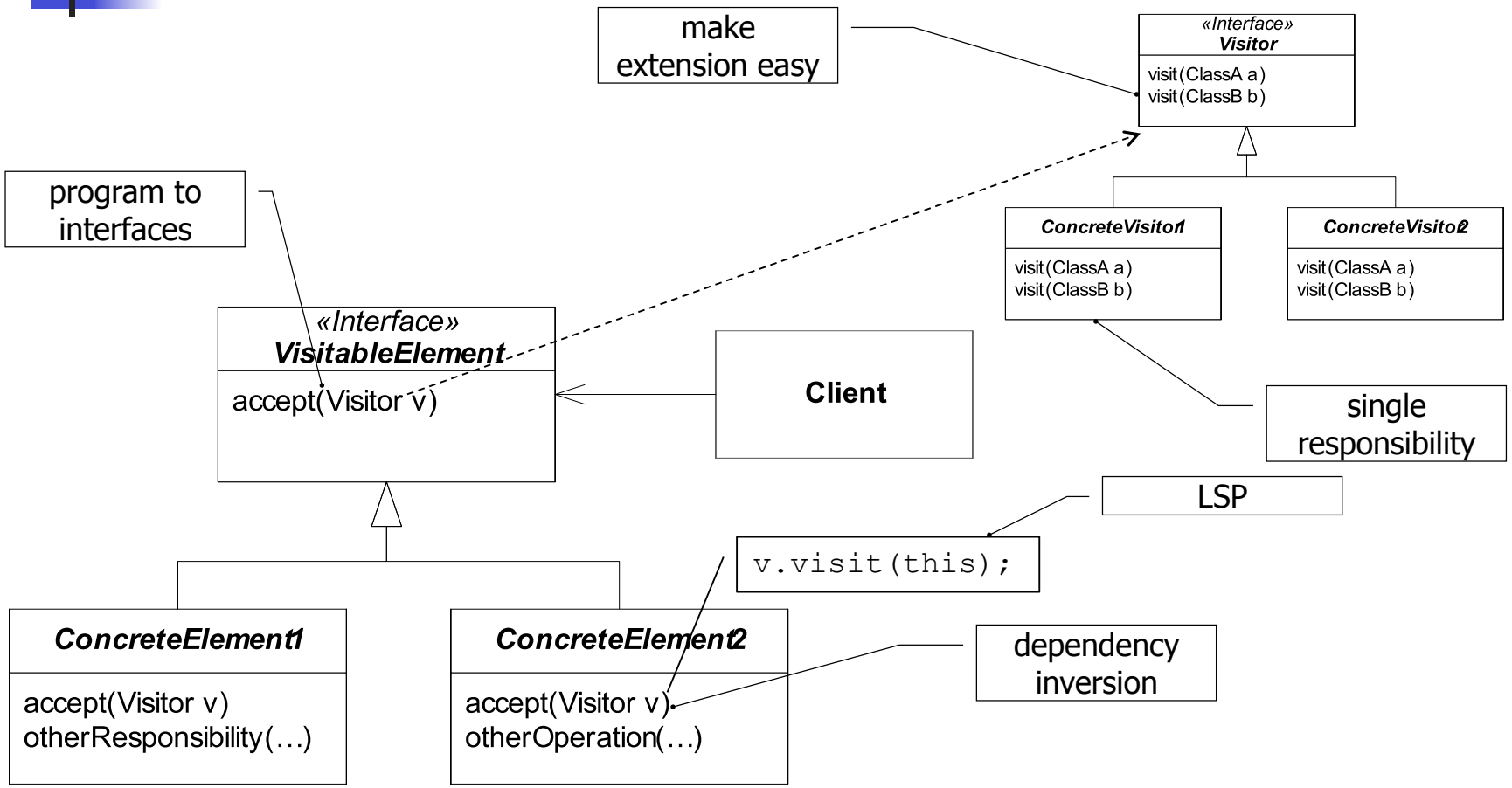
Patterns & Principles in Practice

- Many designers today know about design patterns
- But people understand patterns at different levels:
  - level 1: can name them
  - level 2: can copy them directly
  - level 3: understand them and can apply them fluently
  - level 4: understand the underlying rationale and can reuse it
- Few people seem to consciously understand why patterns work (level 3 and 4)
- This may be because patterns are considered independently of the underlying principles

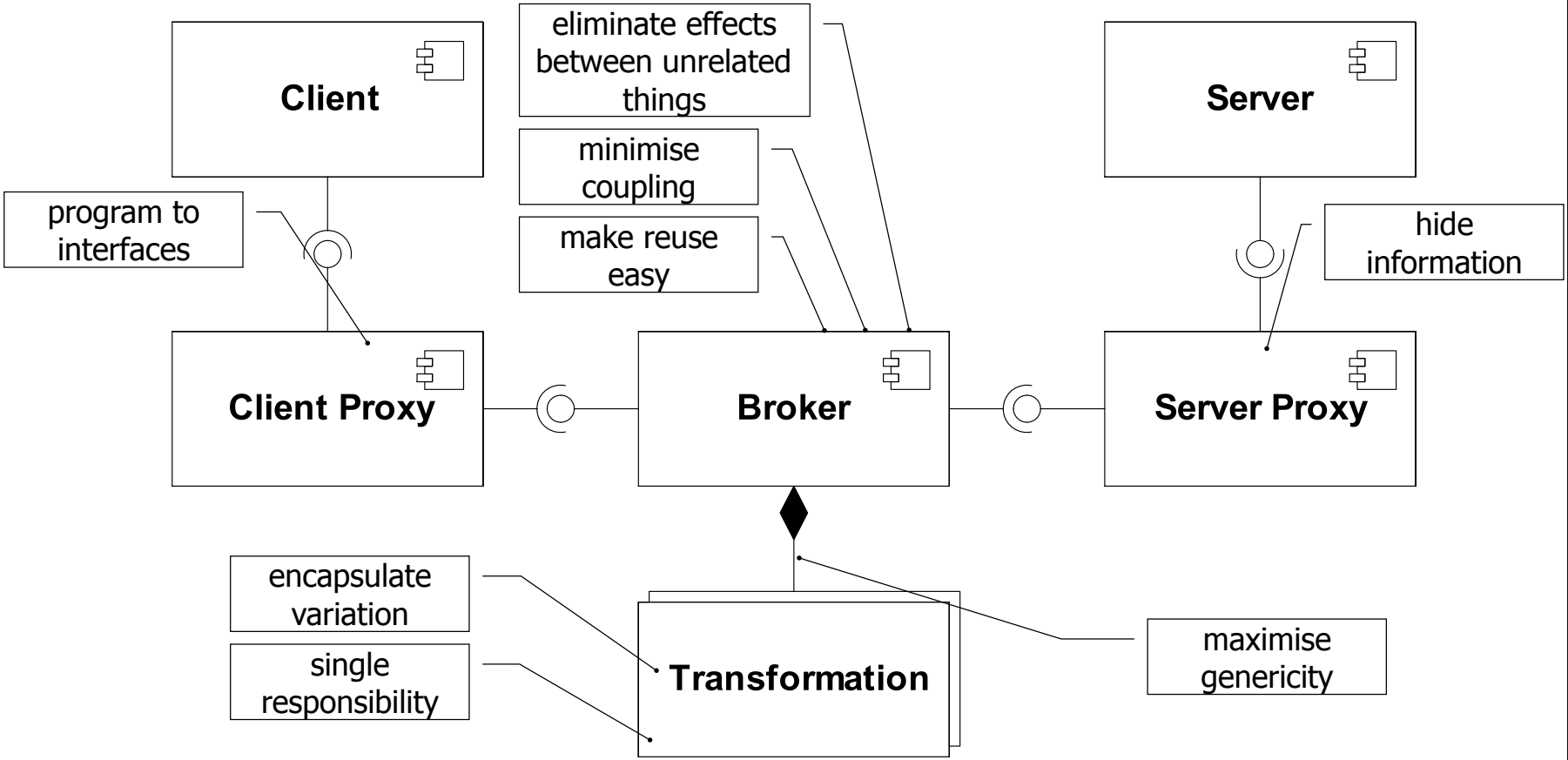
Example: Chain of Responsibility

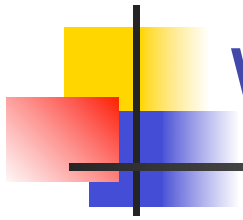


Example: Visitor



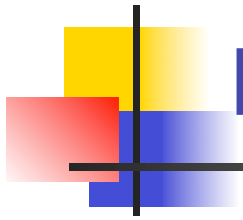
Example: Broker





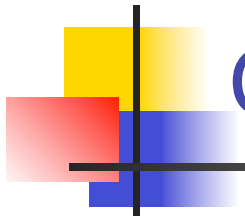
Why is this a problem?

- Like language syntax without semantics
- Prevents deep understanding of the patterns
  - what is "good" about them
  - when to use them
- Hinders effective application of the patterns
  - why they work
- Makes evaluation of design options difficult
  - intuitive feeling of "goodness" without clear rationale
  - results in "smorgasbord" application of patterns



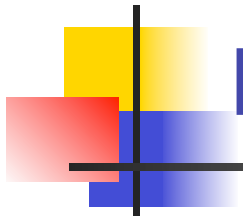
Exercise 2 – Mining Principles

- Goal: find the principles in common patterns
- Inputs:
  - pattern descriptions from GoF, PoSA1 or PoEAA
  - a list of descriptions of candidate design principles
- Process:
  - select 3 or 4 patterns you're familiar with as a group
  - identify principles in each pattern (yours or from the list)
  - classify the principles as of primary or secondary importance
  - note any relationships (e.g. depends or conflicts)
- Outputs:
  - Capture conclusions on flipcharts



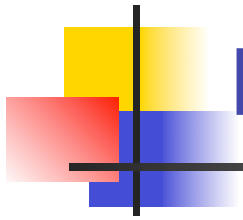
Gather Results

- Each group to report back
- Produce a consolidated, themed principles list



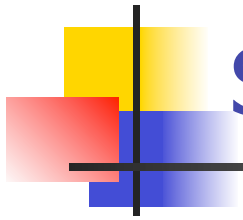
Exercise 3 – A Catalogue of Principles

- Goal: classify and organise the principles we have
- Inputs:
  - the results of exercise 1 and the lists of candidate principles
  - your experience of design
  - the name of a "theme" (we'll suggest one)
- Process:
  - design the content of that "theme" in a principles catalogue
  - identify and organise the principles that should be in it
  - identify the relationships between the principles
  - provide any guidance for those using your catalogue section



Results Gathering

- Each group to report back
- Identify a set of principles that support your theme
  - enumerate the principles
  - identify the relationships between them (if any)
  - something like a pattern language



Summary and Conclusions

- Principles are generally accepted rules to guide the process of design
- Patterns are reusable concrete design solutions for specific problems
- Understanding the principles helps to improve our application of patterns and makes the knowledge more reusable
- We've identified principles in common patterns
  - we'll publish the results in some form online

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