

Patterns in Software Architecture

“Do We Know Them All?”

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19 June 2003

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Agenda

- Architects & Patterns
- Implementational Architectural Patterns – review
- Organisational Architectural Patterns – review
- But wait, there's more ...
- Summary
- Q & A
- Experiences – an open discussion

Architects & Patterns

- Pssst “architect(ure)”
 - Our role not sufficiently acknowledged by the business – technicians only
- To succeed we **must** have two faces
 - Organisational (business face)
 - Technical (implementation face)
- Use patterns as tools to deliver solutions
 - Implementational – better solutions
 - Organisational – to deliver solutions at all



Architects & Patterns contd...

➤ Implementational Patterns

- We are pretty familiar with them
- Solve implementation problems

➤ Organisational Patterns

- Many are not aware of them
- Solve our managerial problems
- May have higher impact on the overall success of the architecture



Implementational Patterns

- Definition: An architectural pattern expresses a fundamental structural organization or schema for software systems. It provides a set of predefined subsystems [components], specifies their responsibilities, and includes rules and guidelines for organizing the relationships between them

Buschman, et al, Pattern-Oriented Software Architecture, A System of Patterns, 1996

- Well documented and defined
- Valid in a given problem context only

Implementational Patterns – However ...

- Before we can use them the ground work has to be done
- System direction, qualities and functionality have to be defined
- We have to analyse the results of the previous steps to define the architecture and use patterns to our advantage

Implementational Patterns – Classification

Shaw and Garlan, Software Architecture, 1996

➤ Independent Components

- Communicating Processes
- Event-Driven

➤ Data Flow

- Batch
- Pipes & Filters

➤ Data – Centric

- Repository
- Blackboard

➤ Call & Return

- Layered
- Object Oriented
- Main Program & Subroutine

➤ Virtual Machine

- Interpreter
- Rule-Based

Implementational Patterns – Classification

Buschman, et al, System Of Patterns, 1996

➤ Distributed Systems

- Broker

➤ Interactive Systems

- MVC
- PAC

➤ Adaptable Systems

- Microkernel
- Reflection

➤ Mud to Structure

- Layers
- Pipes & Filters
- Blackboard

Implementational Patterns – Classification

Dana Bredemeyer, SA Workshop, 2002

- System Structuring
 - Pipes & Filters
 - Layers
- Decoupling Patterns
 - Façade
 - Bridge
- Interconnection Patterns
 - Broker
 - Mediator

Implementational Patterns - Examples

- Rose model with examples
 - http://www.rationalrose.com/models/architectural_patterns.htm

Organisational Patterns

- More often than not obstacles are organisational rather than technical in nature
- Example: PHONE DOES NOT RING
- Not only for architects, but also for executives (it is upon us to make them understand these)

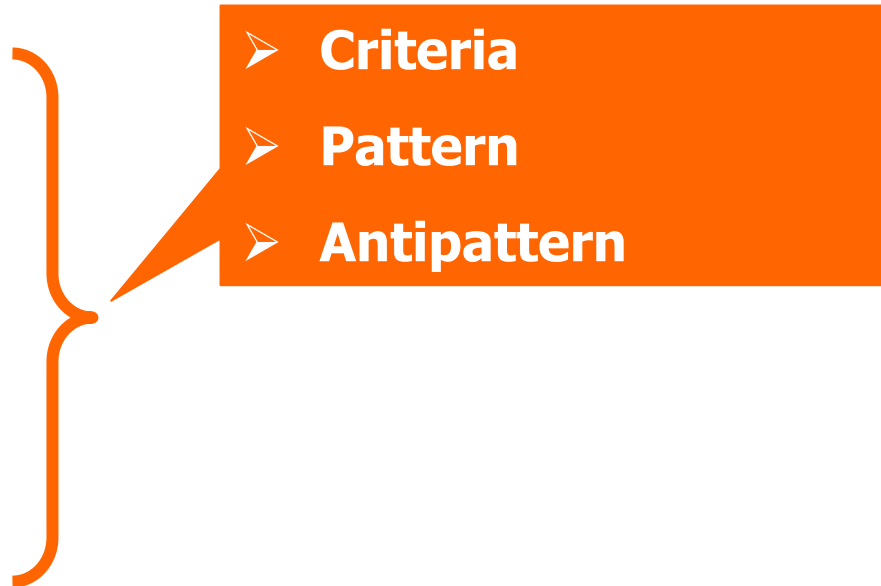


Organisational Patterns – Classification

- Based around support for organisational principles
- Guide an architecture to succeed in organisational space

➤ Principles

- **V**ision
- **R**hythm
- **A**nticipation
- **P**artnering
- **S**implification



Organisational Patterns – Vision Principle

Criterion How to measure	Antipattern What not to do	Pattern What you can do
Architect's vision aligns with what his or her sponsors, users, and end customers are trying to accomplish	Antigravity Module	Front-End Alignment
Practitioners trust and use the architecture	Trendsurfer	Generative Vision
Tacit knowledge about the architecture and components is visible and accessible to users	Following Orders	Rotation

Organisational Patterns – Rhythm Principle

Criterion How to measure	Antipattern What not to do	Pattern What you can do
Managers periodically reevaluate, synchronise, and adapt the architecture	Killer Feature	Release Committee
Architecture users have high level of confidence in the timing and content of the architecture releases	Short Cut	Drop Pass
Explicit activities are coordinated via rhythm	Broken Loads	Synchronise Releases

Organisational Patterns – Anticipation Principle

Criterion How to measure	Antipattern What not to do	Pattern What you can do
Architecture capability is regularly enhanced to respond to: <ul style="list-style-type: none"> ➤ Anticipated risk and requirements of architecture customers and their customers ➤ Market-driving standards and evolving technology, and ➤ Changes in strategic business directions 	Missing Piece	Pilot
Technical and business risks and opportunities are evaluated through quick cycles of review and development	Bleeding Edge	Architecture View
Features, budgets, plans, or schedules are adapted when it is recognised that critical estimates or assumptions are incorrect	Tunnel Vision	Outsource

Organisational Patterns – Partnering Principle

Criterion How to measure	Antipattern What not to do	Pattern What you can do
The architect continually seeks to understand who the most critical stakeholders are, how they contribute value, and what they want	Phone Doesn't Ring	Know Thy Stakeholders
Clear, compelling agreements exist between stakeholders	Lip-Synching	Reciprocity
Both policies and informal rules of social conduct enforce cooperation	Personal Time	No Surprises Promote The Network

Organisational Patterns – Simplification Principle

Criterion How to measure	Antipattern What not to do	Pattern What you can do
Developers continue to use architecture over time, reducing overall cost and complexity	Cloning	Slow Down To Speed Up
The architecture group clearly understands the essential minimal requirements and builds them into core elements that are shared across one or more applications	Banyan, Root Bound Venus Fly Trap	Migration Path
Long-term budget & action ensure that elements are removed from the core when: <ul style="list-style-type: none"> ➤ They are not shared, or add unnecessary complexity ➤ There is a clear business case 	Loan Shark	Whirlpool Whatch

But wait, there's more

➤ IBM e-Business Patterns

- Driven from the high Business Patterns
 - ➔ Self Service, Collaboration, Information Aggregation, Extended Enterprise
- A choice of possible architectures for a given business pattern

➤ Vijay Seetharaman – EDS

- System, Application, Technology Patterns
- Focus on supporting architectural properties
- Availability – Cluster, Scalability – Tiers & Layers

Summary

- We must focus on both sides of equation
- Patterns as an invaluable tool
 - Implementational – keep using them
 - Organisational – keep promoting them
 - Share with executives
 - Detect and point out to executives (be in charge)

References

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- Software Architecture: Organisational Principles and Patterns, Dikel, Kane, Wilson, Prentice Hall, 2001
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- Solution Architecture Patterns - Vijay Seetharaman, EDS New Zealand, Presentation to WWISA NZ Chapter – Wellington, 2002



Questions & Answers

Experiences

An Open Discussion