



Software architecture – a 20 year check up

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What is the health of software architecture as a discipline?



- Complicated question
 - What is meant by health?
 - How is this measured?
- My take. The software architecture discipline is healthy if
 - There is an accepted body of knowledge suitable for both practitioners and academics
 - The body of knowledge is evolving to meet new challenges

Is there an accepted body of knowledge?



- Possible approaches
 - Look at citations – weighted toward academics and may not reflect breadth of knowledge of a field
 - Look at popularity – weighted toward classroom adoption and may not reflect what is useful to practitioners
- My approach – examine lists of “favorite” books to see if there is a small cluster of books.
 - If so, they should contain the accepted body of knowledge.
 - If not, may need to go into content to decide.
- /Q/ is this a reasonable approach?

Amazon lists



- Amazon has the facility to create lists – totally at the whim of the list maker.
 - I searched for lists within amazon.com (not other Amazon sites) with “software architecture” in title
 - I sorted by date.
 - I ignored lists that had software architecture + other topics
 - I went back until I had ten lists (Dec, 2007)
 - I enumerated the top five items in each list. Two lists had only 1 item, one list had four items.
- /Q/ What should we conclude by the fact that it took 5 years to generate 10 lists?

How many total books? (41 possible)



- /Q/
 - 5-16
 - 17-29
 - 30-41

How many total books? (41 possible)



- /Q/
 - 5-16
 - 17-29
 - 30-41

- /A/ 27

Distribution



- /Q/ What is the maximum number of lists on which a book appeared. I.e. if one book occurs on five lists the answer would be five.

– 2,3

– 4,5

– 6,7

– 8,9

Distribution

- /Q/ What is the maximum number of lists on which any single book appeared
 - 2,3
 - 4,5
 - 6,7
 - 8,9
- /A/ Documenting Software Architecture appeared on 8 lists. No other book appeared on more than 4 lists and most books only appeared once.

Is there an accepted body of knowledge?



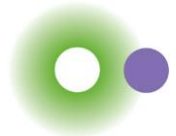
- /A/ according to the Amazon list creators – yes.

Has the field evolved?



- Possible approaches
 - Analyze tables of contents for books
 - Examine other keywords for papers that use software architecture as a keyword.
- My approach
 - Examine WICSA session titles to determine overlap
 - If 100% overlap then no evolution
 - If 0% overlap then revolutionary changes in the field.
- /Q/ A reasonable approach?

WICSA conference session titles



CTA

1998	2012	
Architecture models and descriptions (2 sessions)	Product Lines	Architectural Decisions
Analysis and assessment of software architecture (2 sessions)	Case Studies and Architectural models	Service Oriented Architectures
Techniques and methods for software architecture (2 sessions)	Architectural Knowledge and Decision Making	Evolution and Variability
Architectural Patterns and styles (2 sessions)	Architecting for the Enterprise	Architectural Methods and Techniques
Interoperability, integration and evolution of software (2 sessions)	Documenting Software Architectures	Architecture and Requirements
Domain specific architectures and product families (2 sessions)	Non-Functional Attributes	

Analysis of session titles

- Dropped from 1998
 - Architecture Patterns and styles
- Four are the same or similar
 - Architectural Methods and Techniques
 - Product Lines
 - Evolution
 - Documenting Software Architecture
 - Analysis and Assessment/Non-Functional Qualities
- New in 2012
 - Architecture for XXX
 - Architecture Knowledge and Decisions.

Has the field evolved?



- /A/ Yes. A mix of new topics, new or refined topics, and some topics no longer with us.
- The field is healthy
 - Coherent body of knowledge
 - Evolution

Moving forward



- How do we maintain the health of our community in the future.
 - Eat right
 - Exercise
 - Kick bad habits
 - New research areas
 - Tool chain
 - Inadequate quality attribute models

Tool chain



- One virtue of architecture is that it allows reasoning at a more abstract level than code.
- When moving to code the connection to the architecture is generally lost.
- Code is updated, architecture is not and architecture becomes disconnected from the code.
- Need to have a means for moving between code and architecture in both directions with relatively low overhead.
 - MDA is a start but there is no connection with architecture in MDA.

Quality attribute models.



- In order to perform trade offs among various quality attributes must be able to model them.
- Models for performance, reliability, and modifiability are reasonably mature.
- There are limited (or no) models for other attributes important to the design of architecture
 - Distributability of development
 - Business considerations
 - Upgradability
 - ...

Conclusion



- We are a healthy community
- We have challenges for the future