Avancier Methods (AM)

Adaptive Architecture

A first draft or manifesto v8

There is an address for comments at the end

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Q) So what are the prices for adaptive architecture?

- A large and complex system *can* be grown quickly and cheaply

- However, adaptive architecture requires you to
  - commit to the resources needed for continuous change.
  - quickly and cheaply improve discrete Components
  - allow some temporary inconsistencies
  - refactor the overall structure of Components now and then
  - apply intelligence to the design at every level

Again - of course

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- Man-made systems cannot evolve without any up-front design
- Executive-level forces demand some executive-level strategies and top-down direction
- Dependencies between systems can be deeply buried or hidden
- Documentation will always be needed to
  - explain complex systems, and
  - direct attention to where change impacts might be

- But agility implies if not demands
  - Division of an enterprise into loosely-coupled systems
  - Division of a system into loosely-coupled components
  - A willingness to change to one system/component at a time and tolerate inter-system/component inconsistencies *for a while*

Q) Does adaptive architecture suit all kinds of system?

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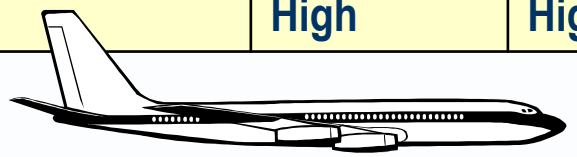
- It does not suit systems where component costs are high, and change costs and/or risks are high

Kind of system	Kinds of process	Typical component costs	Typical change costs	Typical change risks
Living system	Biological / chemical processes	---	---	High
Documentation	Human read, write and publish processes	Low	Low	Low
IS - software system	Structured data processing	Low	Low	Medium
Human activity system	Human-capable processes	Medium	Medium	Medium
IT - hardware system	Devices with computer and network operating systems	High	Medium	Medium
Safety-critical system	Airplanes, bridges	High	High	High



Q) Does generalisation count as adaptability?

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- In a limited way, a B747 has an adaptive architecture
- It exists in many different versions
- But that kind of flexibility is based on
  - Specialisation by *extending* a generalisation
  - Adding components to a basic structure
  - Adding operations to base set of behaviours
- The additions must not compromise the generalisation

- Full adaptability means the ability to
  - Change a base structure
  - Change base operations
- You can't do that to an airplane without going back to the drawing board

Different kinds of system configuration

- Different systems - different kinds of Component:
  1. a read-only web site – web pages
  2. a requirements catalogue - requirements
  3. an enterprise architecture description – architectural entities
  4. a software system – modules or classes
  5. a hardware system – computing and network devices

- The first four are all kinds of description or specification, and made of cheap Components. Descriptions are abstract; they can be replaced and refactored quickly and cheaply.

- The fifth is a concrete system made of expensive Components. Concrete things and expensive things cannot be so readily replaced and refactored.

Q) How does adaptive architecture relate to traditional systems thinking?

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- Adaptive architecture is about encapsulating and separating the Components of a system (which must remain coordinated)
- The Components should of course be
  - cohesive internally, and
  - loosely-coupled externally.
- Skilful modularisation of a system into Components is essential if we want to manage any large and complex system.

Q) Is adaptive architecture new?

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- Mostly not new
- It repackages some ideas of “systems thinking” in the context of
  - change management in general
  - EA change management in particular.
- It employs content management principles and techniques
  - Cf. techniques used (consciously or not) in the construction and maintenance and large and complex web sites.

Q) How does adaptive architecture relate to Conway's law?

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- Adaptive architecture includes the suggestion that
  - two loosely-coupled systems are best crafted and maintained by two different groups.

- This particular suggestion may be seen as a corollary to Conway's law:
  - "...organizations which design systems ... are constrained to produce designs which are copies of the communication structures of these organizations."

- http://en.wikipedia.org/wiki/Conway%27s_law
  - an adage named after computer programmer Melvin Conway, who introduced the idea in 1968:

Q) How does adaptive architecture relate to TOGAF?

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- TOGAF is elastic, and interpretable in many ways
- But it is fair to say that it
  - represents a top-down command and control school of thinking
  - promotes compliance to goals, principles and standards declared at the top most level of the enterprise

- Adaptive architecture allows (might even encourage) innovation and deviation

Q) How does adaptive architecture relate to Agile Development?

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- Agile software development is also a broad church
- But it is fair to say that it
  - represents a bottom up school of thinking
  - promotes empowerment of small software development teams to do what they see fit

- Adaptive *enterprise* architecture must expect bottom level teams will refer upwards for any
  - General design principles and standards
  - Overarching structure
  - Authority to proceed.
- But must also assume that higher level EA structure(s) may be re-factored to reflect the evolution of lower level Components

Q) Are discrete silo systems anathema to EA?

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- EA does regard the enterprise as a system
- The components within a system
  - cannot be *entirely* discrete, else the systems is not a system
  - must be consistent with critical integrity requirements
- Components that are unacceptably out of step should be recognised, and realignment put on the agenda.
- Adaptive architects must design with a view to integrity and interoperability within whatever wider scope is under management.

Q) Is adaptive architecture like biological evolution?

"Evolution is cleverer than you are"
Leslie Orgel

- Only by comparison with top-down command and control

- Adaptive architecture is different from true evolution
- Adaptive architecture depends on designers who continually apply intelligent design - in the light of whatever higher structure or principles are in place
- The overall structure is designed and refactored by architects.

Q) How does bottom up design work?

- Q) Can we architect Components before the higher level system architecture is complete?
  - Yes.
- Q) Can we identify *all* bottom-level Components before higher level abstractions are designed?
  - No
  - You must expect that components will be replaced, and
  - The structure that contains them will be refactored.

Q) What are the human resource implications?

- Q) How do we minimise the need for documentation?
  - By using the power of the human mind to study and recall the configuration of a component
  - By assigning each Component to a responsible architect or designer
- Q) How do we minimise impact analysis time?
  - Ditto
- Q) How do we minimise dependence on individuals?
  - Cooperative working (cf. “peer programming”)
  - Also, common design patterns

Q) What does valuing the human mind mean?

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> "One doesn't have to be a Marxist to be awed by the scale and success of early 20th century efforts to transform strong-willed human beings into docile employees."
> Gary Hamel

- It means delegating responsibility for
  - Understanding a Component
  - Changing a Component
- What if an individual is under employed?
  - Give them larger or more Components to maintain
  - Maximise the complexity a single person manages
- What if a Component exceeds the capacity of an individual?
  - Then divide it
  - Scope and limit the complexity a single person has to deal with

Q) What can be done about our badly-designed systems?

- Is your system is over complex and not divided into Components that can be managed individually?
- Then the only way forward is to incrementally factor out Components that can be encapsulated and separated.

Q) How does adaptive architecture relate to agile change management?

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- The former helps the latter
- Q) Does adaptive architecture require agile change management?
  - Yes, you cannot wait to ensure all impacts are understood
- Q) Does agile change management require adaptive architecture?
  - No, but it helps

The end

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- The challenge
- Adaptive architecture techniques
- **20 Questions about adaptive architecture**
- Relaxing version control

Most of the quotes are taken from "Adapt" by Tim Harford 2011

Send comments to grahamberrisford@gmail.com