Which Practices are Suitable for an Academic Software Project?

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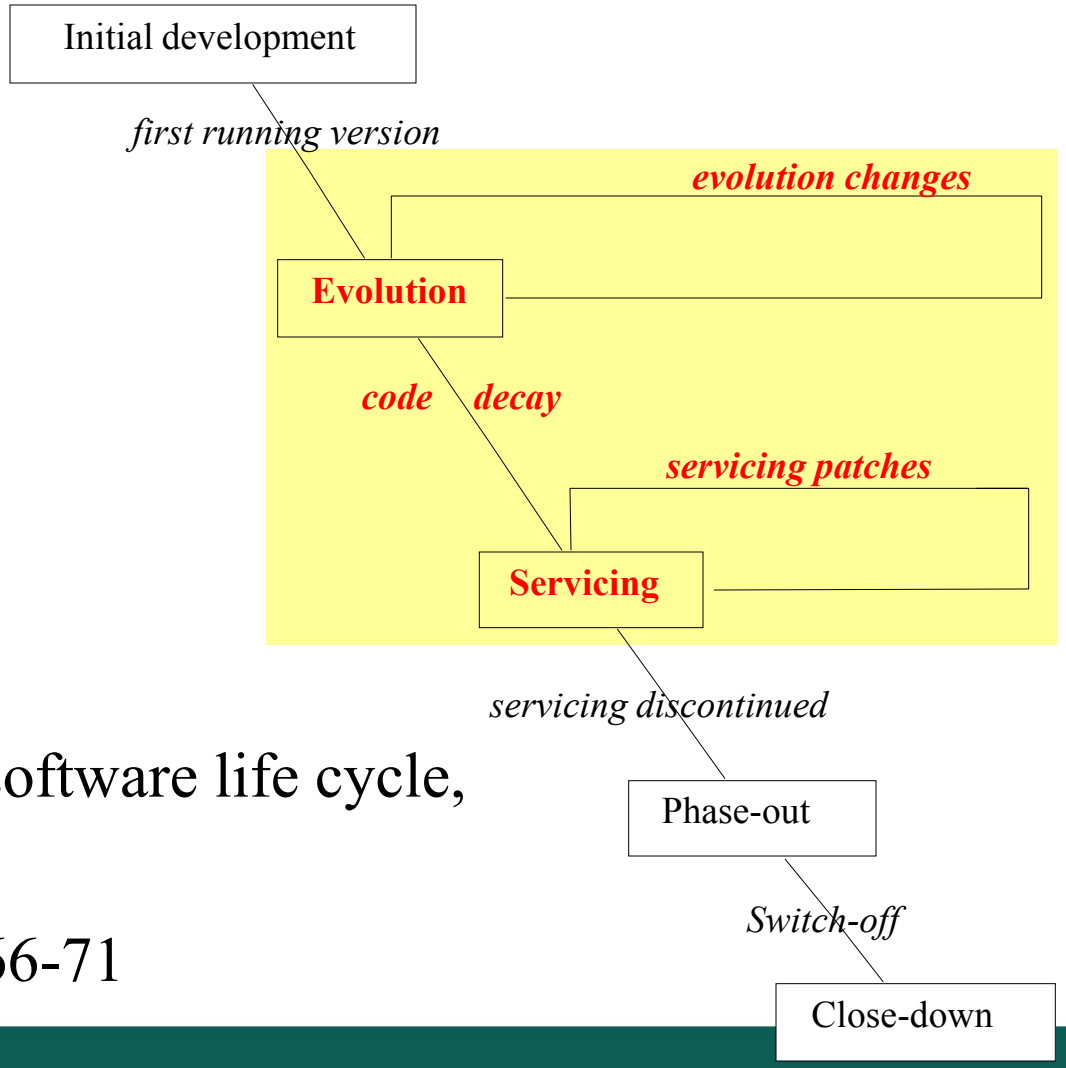
Academic projects

- Numerous software development projects take place within academic environment.
- The managers and developers of these projects are experts in other fields
- They search for suitable project process
- The experience from the other successful academic projects can serve as their guide.

Staged model



A **staged model** for the software life cycle,

V Rajlich, K Bennett,

Computer 33 (7), 2000, 66-71

Evolutionary/Agile development

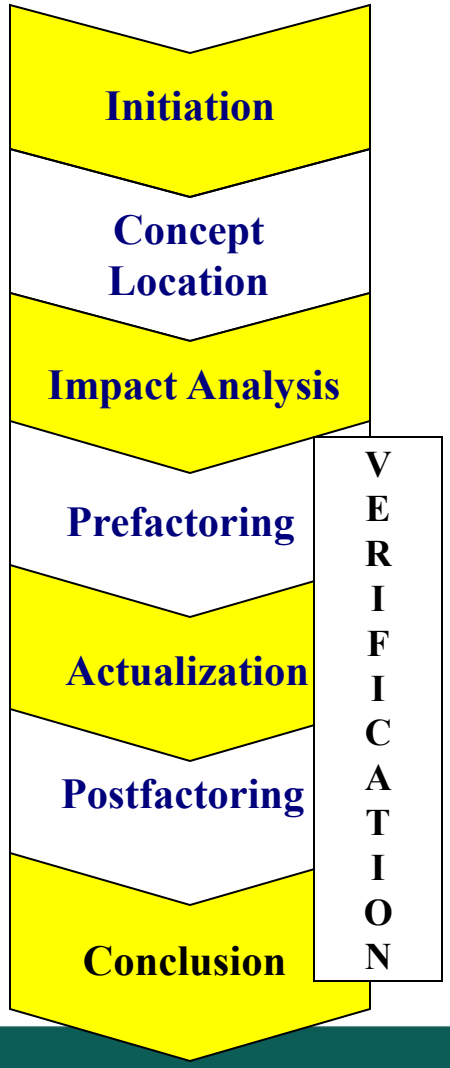
- Evolutionary software development
  - Add one feature (concept) at a time
  - There is always a running version of software available to all stakeholders (may be incomplete)
  - No late big surprises
  - Made waterfall obsolete
- Agile processes are the best-known variants of evolutionary processes
  - Well-defined process roles, practices, values, measurements

Limits of Agile

- Bundled set of practices
- "One size fits all" kind of processes
  - Scrum, XP
- Not suitable for exploratory development
  - Not suitable for academic projects

Software change

- **Phased model** of software change (PMSC)
- Enactment of software change consists of some or all phases



Future development process

- Academic projects need tailored processes
- The selected project practices are answers to the project problems
- Examples:

Problem	Solution (practice)
exploratory programming	developers are domain experts
gap between programmer capability and expected quality	permission to commit
frequent turnover	concept location techniques

Survey of scientific processes

	feniCS	Dalton	BrainSpace
roles	equal peers, core team, participants choose how much effort, dedicated tester	board, lab supervisors, students	supervisor (varying availability), project leader, advanced students (research assistants 50% involvement), beginners
coordination, monitoring	LaunchPad tool, distributed team	ad hoc, occasional meetings, distributed team	weekly meeting during academic year, monitoring by project leader
domain knowledge	developers are domain experts	developers are domain experts, users also provide expertise	developers are domain experts, users (physicians) also provide expertise
initiation	exploratory specifications, personal initiative	exploratory specifications, participating lab priorities	both defined and exploratory, selection based on funding and stakeholder needs
concept location		solved by code ownership	solved by code ownership
impact analysis			estimated by supervisor and project leader
actualization	undisclosed	ad hoc	ad hoc
refactoring	yes	no	very few
verification	inspections, regression tests	regression tests	functional tests, efficiency tests, inspections
conclusion	Buildbot used for build, test, and release	four releases since 1997	irregular iterations, based on funding and academic schedule, releases about 6 months

Software change (cont.)

- Substantial research of all phases is available
  - Hundreds of peer-reviewed papers for each phase
- Challenge: To organize and transfer that knowledge