Unified Process

Methodology used by IBM Rational
Software Architect and others

Unified Process

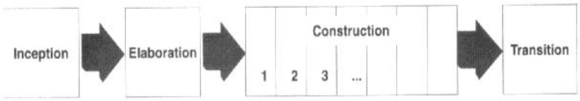
- In fact it is an extensible framework which should be customized for specific organizations or projects
- Grew out of Jacobson’s Objectory became Rational Unified Process (RUP), or as some prefer to call it Unified Process (UP)
- Iterative and incremental (example of spiral or evolutionary model)
- Production quality software released in piecemeal (incrementally) with each iteration

Unified Process

- Four phases
- Nine workflows or activities
- Deliverables
- Milestones

Four Phases

- Inception
- Elaboration
- Construction
- Transition



Inception

- establish business rationale
- decide project scope
- get commitment from sponsor to proceed further
- range from couple of hours chat and spreadsheet plan to a serious feasibility study over a couple of months

Elaboration

- collect more detailed requirements
- do high level analysis and design
- establish baseline architecture
- project planning

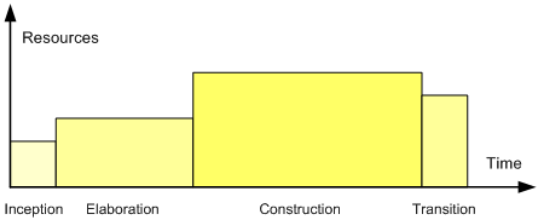
Construction

- key phase for iteration which can be in any phase
- each iteration builds production-quality software
- which is tested and integrated
- which satisfies a subset of the project requirements

Transition

- beta testing
- performance tuning
- user training
- user documentation

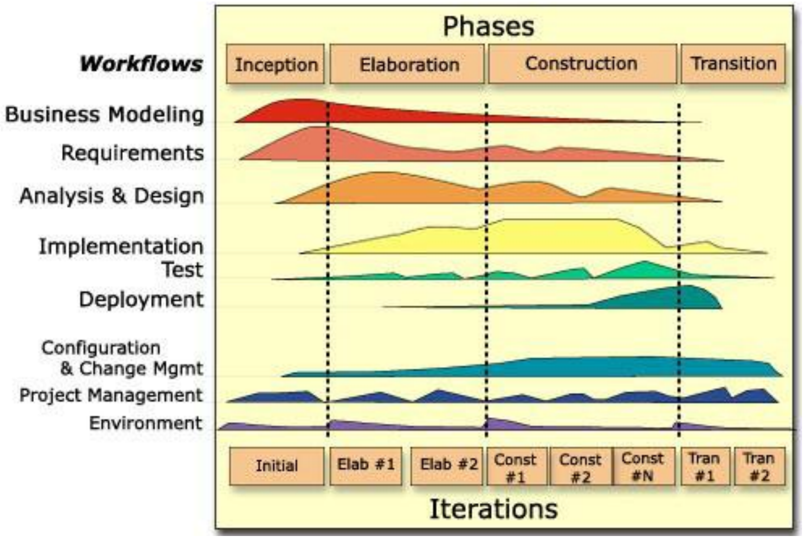
Four Phases - Resources



Process Structure

- Two dimensions.
- Horizontal axis represents time and shows the lifecycle aspects of the process as it unfolds.
- Vertical axis represents core process workflows or activities, which group activities logically by nature.
- 9 activities

Two dimensions of RUP



Phases

- Although most iterations will include work in most of the process disciplines (*e.g.* Requirements, Design, Implementation, Testing) the relative effort and emphasis will change over the course of the project

Unified Process

- Iterative and Incremental
  - Although most iterations will include work in most of the process disciplines (*e.g.* Requirements, Design, Implementation, Testing) the relative effort and emphasis will change over the course of the project.
- Use Case Driven
  - In the Unified Process, use cases are used to capture the functional requirements and to define the contents of the iterations. Each iteration takes a set of use cases or scenarios from requirements all the way through implementation, test and deployment.

Unified Process

- Architecture Centric
  - The Unified Process insists that architecture sit at the heart of the project team's efforts to shape the system.
  - Since no single model is sufficient to cover all aspects of a system, the Unified Process supports multiple architectural models and views.
  - One of the most important deliverables of the process is the executable architecture baseline which is created during the Elaboration phase.
  - This partial implementation of the system serves to validate the architecture and act as a foundation for remaining development.

Unified Process

- Risk Focused
  - The Unified Process requires the project team to focus on addressing the most critical risks early in the project life cycle.
  - The deliverables of each iteration, especially in the Elaboration phase, must be selected in order to ensure that the greatest risks are addressed first.

Agile Unified Process (AUP)

- AUP is a simplified version of the IBM
- RUP developed by Scott Ambler.
- It describes a simple, easy to understand approach to developing business application software using agile techniques and concepts yet still remaining true to the RUP.
- The AUP applies agile techniques including test driven development (TDD), Agile Modelling, agile change management, and database refactoring to improve productivity.

Inception Objectives

- Establish software scope and boundary conditions.
  - operational concept.
  - acceptance criteria.
  - descriptions of what is and what is not included.
- Discriminate critical Use Cases of the system.
  - primary scenarios of behaviour.
- Exhibit at least one candidate architecture.
- Estimate overall cost.
- Estimate risks.

Outcome of Inception

- A ‘vision’ document, i.e., a general vision of the core projects requirements, key features and main constraints.
- A Use-Case model survey – all Use Cases and Actors that can be identified so far.
- An initial project glossary.
- An initial business case including business context, success criteria and financial forecast.
- Initial risk assessment.
- Project plan, with phases and iterations.

Other Artifacts Produced

- Initial Use Case model (10%-20% complete)
- A domain model *static picture of scope.*
- A business model (if necessary)*workflow.*
- A preliminary development case description to specify the process used.
- One or several prototypes.
  - Behavioral, Structural, Exploratory or Evolutionary.

Elaboration Objectives

- To analyse the problem domain.
- Establish a sound architectural foundation.
- Develop the project plan.
- Eliminate high-risk elements.

Elaboration objectives

- Define, validate and agree the architecture as quickly as possible.
- Agree the vision that came from the inception phase.
- Agree a plan for the construction phase.

Elaboration activities

- The vision is elaborated and a solid understanding is established of the most critical Use Cases that drive the architectural and planning decisions.
- The Process, the infrastructure and the development environment are elaborated, and the process, tools and automation support are put into place.

Elaboration activities

- The architecture is elaborated and components are selected.
  - Potential components are evaluated.
  - make / buy / reuse decisions determine the construction phase cost and schedule.
  - Architectural components integrated and assessed against primary scenarios.
  - This is done iteratively.

Outcome of Elaboration

- Use Case model (at least 80% complete).
  - All Use Cases identified.
  - All Actors identified.
  - Most Use-Case descriptions developed.
- Supplementary requirements.
  - (non-functional or not associated with a Use Case)
- Software architecture description.

Outcome of elaboration

- Executable architectural prototype.
- Revised risk list and revised business case.
- Development plan for overall project.
  - coarse grained project plan, with iterations and evaluation criteria for each iteration.
- Updated development case that specifies process to be used.
- Preliminary user manual (optional).

Evaluation criteria at end

- Is the vision of the product stable?
- Is the architecture stable?
- Does the executable demonstration show that major risk elements are addressed?
- Is construction phase sufficiently planned?
- Do all stakeholders agree that current vision is achievable, using current plan with current architecture?
- Is the cost acceptable?

Construction

- All remaining components and application features are developed and integrated into the product.
- All features are tested thoroughly.
- *Emphasis is placed on managing resources and controlling operations to optimise cost, schedules and quality.*
- Parallel construction can accelerate the availability of deployable releases.

Construction

- categorise the use cases
- customer divides uses cases according to business value:
- high, medium and low
- developers divides use case according to risk, e.g. high risk means very difficult to do, may have big impact on system design or not well understood

Construction

- next, developer estimates time for each use case to nearest person-week including time for all stages analysis, design, coding, unit testing, integration and documentation
- high risk use cases involving a lot of project time may require more elaboration

Construction objectives

- Minimise development costs by optimising resources and avoiding unnecessary scrap and rework.
- Achieve adequate quality as rapidly as possible.
- Achieve useful versions (alpha, beta or other test releases) as rapidly as practical.

Construction activities

- Resource management, resource control, process optimisation.
- Complete component development and testing against the defined evaluation criteria.
- Assessment of product releases against acceptance criteria for the vision.

Outcome of construction

- A product ready to put into the hands of end users.
- The software product integrated on the adequate platforms.
- The user manuals.
- A description of the current release.

Evaluation criteria at end

- Often called the beta release, is it ready?
  - Is the product release stable and mature enough to be deployed in the user community?
  - Are all stakeholders ready for the transition into the use community?
  - Are the actual resource expenditures v planned expenditures still acceptable?
- ***Transition may have to be postponed by one release if the project fails to reach this milestone.***

Transition

- This moves the software project to the user community.
- After release, issues usually arise that require new releases, either to correct problems or finish features that were postponed.
- This phase is entered when a baseline is mature enough to be deployed in the end-user domain.
- This means that some usable subset of the system has beem completed to an acceptable level of quality and that user documentation is available.

Transition phase includes

- Beta testing to validate the new system against use expectations.
- Parallel operation with the legacy system that the project is replacing
- Conversion of operational databases.
- Training of users and maintainers.
- Rollout of the product to the marketing, distribution and sales teams.
- It concludes when the deployment baseline has achieved the completed vision.

Transition objectives

- Achieve user self-supportability.
- Achieve stakeholder concurrence that deployment baselines are complete and consistent with the evaluation criteria of the vision.
- Achieve final product baseline as rapidly and cost-effectively as practical.

Transition activities

- Deployment-specific engineering, i.e. cutover, commercial packaging and production, sales rollout, and field personnel training.
- Tuning activities, including bug fixing and enhancement for performance and usability.
- Assessing the deployment baselines against the vision and the acceptance criteria for the product.
- *The activities depend on the goal*
  - *For fixing bugs, implementation and testing are usually enough.*
  - *For new features, iteration is similar to construction phase.*