How Microsoft Builds Software

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Communications of the ACM, June 1997, vol. 40, no. 6
Microsoft is the world’s largest producer of PC software
- In June 1996
  - 20,500 employees
  - 250 products
  - Windows 95
    - 11 million lines of code
    - 200 designers, programmers and testers
- What development process do they use?

Main Philosophy

- Does not use adopt too many of the structured software-engineering practices
- “scaled-up” a loosely structured small-team style (hacker philosophy?)
  - Small parallel teams of 3 to 8 developers each or
  - Individual programmers
  - Working together as a large team

Philosophy

- Each team has the freedom to evolve their design
  - Evolve features and whole products incrementally
  - Occasionally introduce new concepts and technologies
- However
  - Since teams have so much freedom
  - There is a danger that products may become incompatible
  - They synchronize their changes frequently

Synch-and-stabilize

- Terms describing the process
  - “daily-build”
  - “nightly build”
  - “zero defect”
  - “milestone”
- Build
  - Putting together partially completed or finished pieces of the software
  - Goal
    - To determine what works and what doesn’t
  - Done by completely recompiling the source code and executing automated tests

Process: Planning

<table>
<thead>
<tr>
<th>Planning Phase</th>
<th>Define product vision, specification, and schedule</th>
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<tbody>
<tr>
<td>Vision Statement</td>
<td>Product and program management use extensive customer input to identify and priority-order product features.</td>
</tr>
<tr>
<td>Specification Document</td>
<td>Based on vision statement, program management and development group define feature functionality, architectural issues, and component interdependencies.</td>
</tr>
<tr>
<td>Schedule and Feature Team Formation</td>
<td>Based on specification document, program management coordinates schedule and arranges feature teams that each contain approximately 1 program manager, 3–8 developers, and 3–8 testers (who work in parallel 1:1 with developers).</td>
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Process: Development

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<tr>
<th>Development Phase</th>
<th>Feature development in 3 or 4 sequential subprojects that each results in a milestone release</th>
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<tr>
<td>Program managers coordinate evolution of specification. Developers design, code, and debug. Testers pair with developers for continuous testing.</td>
<td></td>
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<tr>
<td>Subproject I</td>
<td>First 1/3 of features (Most critical features and shared components)</td>
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<tr>
<td>Subproject II</td>
<td>Second 1/3 of features</td>
</tr>
<tr>
<td>Subproject III</td>
<td>Final 1/3 of features (Least critical features)</td>
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Process: Stabilization

**Stabilization Phase** Comprehensive internal and external testing, final product stabilization, and ship

- **Internal Testing** Thorough testing of complete product within the company
- **External Testing** Thorough testing of complete product outside the company by “beta” sites, such as OEMs, ISVs, and end users
- **Release preparation** Prepare final release of “golden master” disks and documentation for manufacturing

Milestones in sync-and-stabilize (2-4 months)

**Milestone 1** (first 1/3 features)
- Development (design, coding, prototyping)
- Usability Lab
- Private Release Testing
- Daily Builds
- Feature Debugging
- Feature Integration
- Code Stabilization (no severe bugs)
- Buffer time (20%-50%)

**Example: Excel/Graph**

Bug Data & Daily Builds

Comparing Processes

<table>
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<tr>
<th>Synch-and-Stabilize</th>
<th>Sequential Development</th>
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<tr>
<td>Product development and testing done in parallel</td>
<td>Separate phases done in sequence</td>
</tr>
<tr>
<td>Vision statement and evolving specification</td>
<td>Complete “brown” specification and detailed design before building the product</td>
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<tr>
<td>Feature prioritized and built in 3 or 4 milestone subprojects</td>
<td>Trying to build all pieces of a product simultaneously</td>
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<td>Frequent synchronizations (daily builds) and intermediate stabilizations (milestones)</td>
<td>One late and large integration and system test phase at the project’s end</td>
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<td>“Free” release and ship dates and multiple release cycles</td>
<td>Aiming for feature and product “perfection” in each project cycle</td>
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<tr>
<td>Customer feedback continuous in the development process</td>
<td>Feedback primarily after development as inputs for future projects</td>
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<td>Product and process design so large teams work like small teams</td>
<td>Working primarily as a large group of individuals in a separate functional department</td>
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