How to Deliver High Quality Commercial Products with Open Source Software

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Agenda

- Introductions
- Companies and Open Source Projects
- The OSS-specific elements in product development
- Summary

The Linux Foundation Consulting

- Multiple decades of open source consulting experience
- Over 300 engagements assisting companies from start-ups to the world's largest corporations
- Deep operational experience in executive management, marketing, finance, sales, business development and software development

Companies and OSS Projects

Product Companies
Industrial Process

Top-Down Management

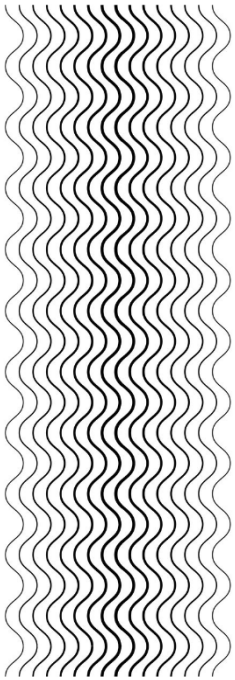
Formal Methodology

Processes Metrics

Revenue Contracts SLAs

Customer Organizations

Conceptual Divide



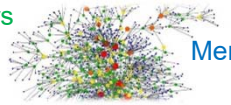
Open Source Projects
Collaborative Process

Consensus around Technical Merit

Sponsors

Members

Developers



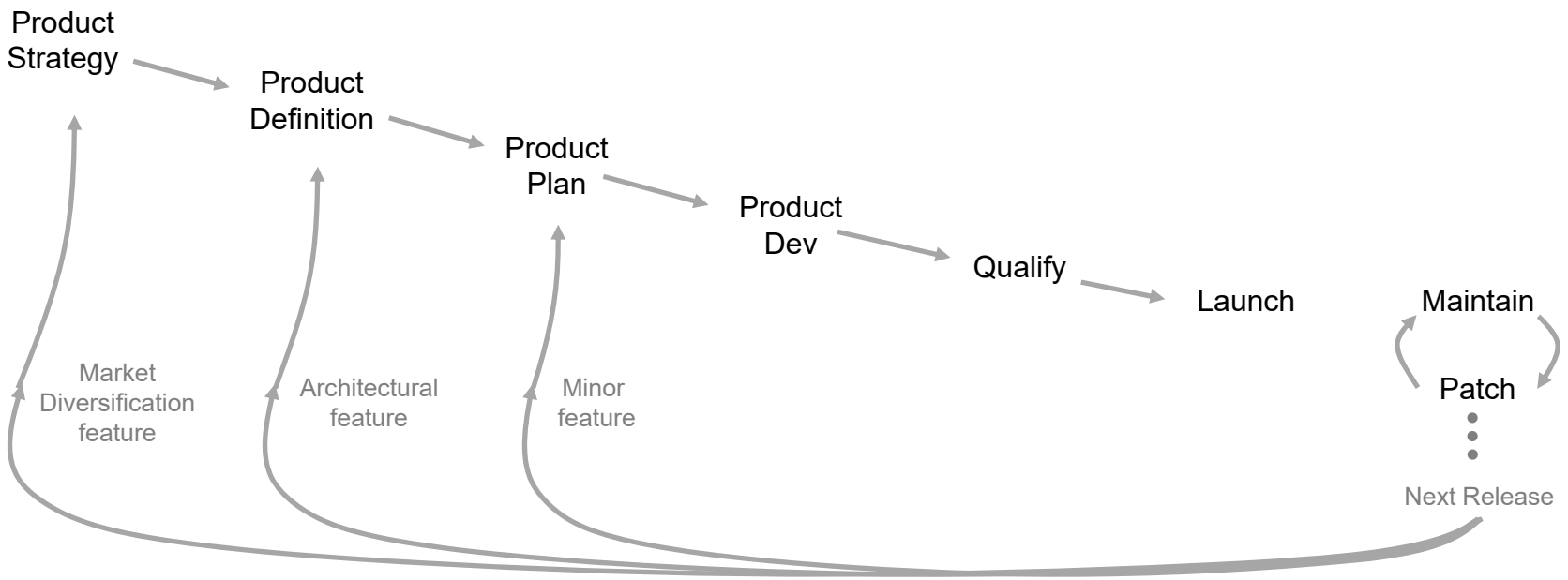
Diffuse Processes

Tools Scripts

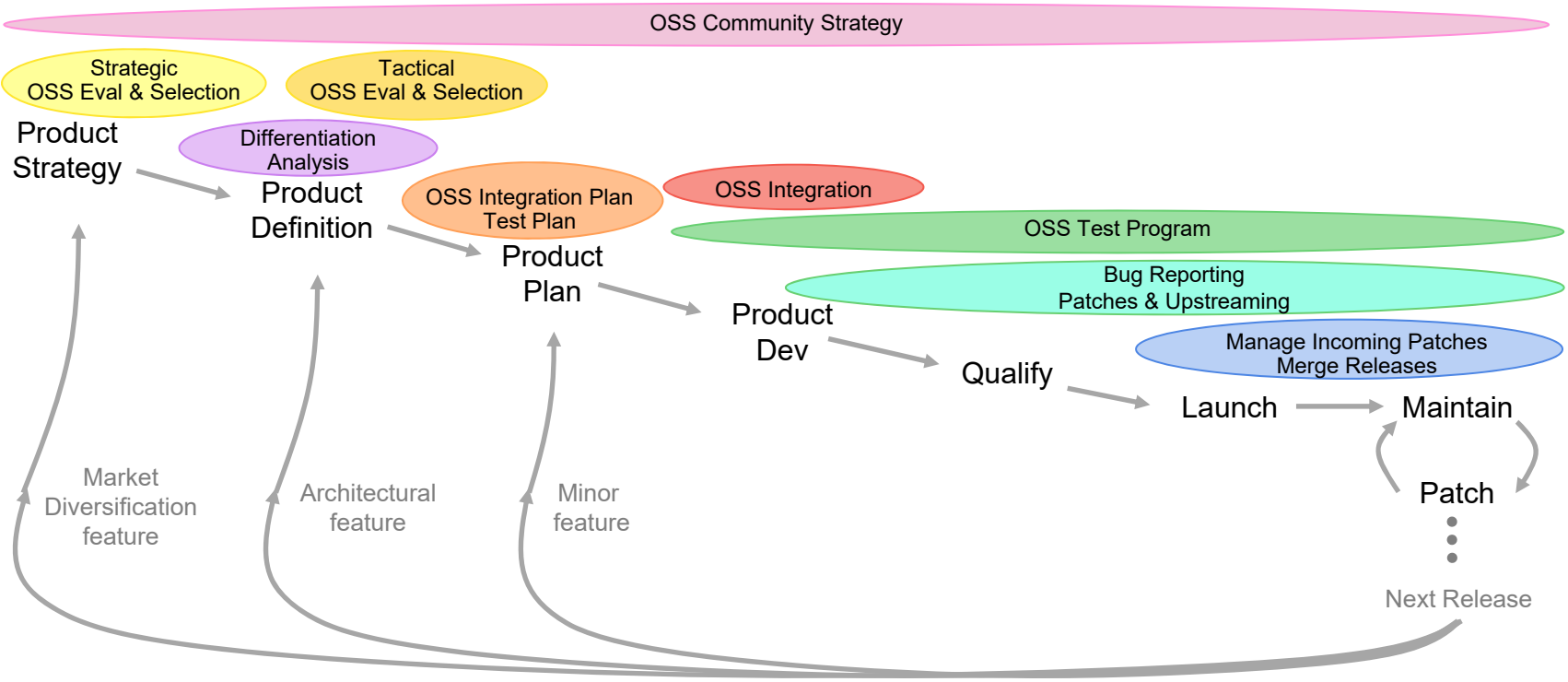
Repository Wiki Lists

Users

Typical Commercial Product Development Cycle



Product Development with OSS



OSS-Specific Dimensions of Product Development

1. OSS Community Strategy
2. OSS Evaluation & Selection
3. Differentiation Analysis (Proprietary or OSS)
4. OSS Integration & Test Plan
5. OSS Integration
6. OSS Test Program
7. Bug Reporting, Patches and Upstreaming
8. Manage Incoming Patches and Releases

1. Community Strategy

- Community strategies typically evolve organically but benefit from conscious planning
- Identified Best Practices
  - Select strategically important OSS projects for focus
  - Seek committer / maintainer roles in identified project communities
  - Organizations adapt to OSS project culture, practices and tools to succeed with their strategically important projects
    - Each project is somewhat unique in this regard
    - Adapt on a project by project basis

2. OSS Evaluation & Selection

- There is tremendous leverage in choosing the right OSS project and community at the outset
- Most survey respondents required at least some of “due diligence”
- In most cases engineers discover and request an OSS project
  - Criteria are predominantly technical
- Licensing is also reviewed carefully in most companies
- Support and maintenance dimensions are often neglected in the evaluation processes of technology vendors.

3. Differentiation Analysis

- Deciding whether each feature is proprietary or open source is a constant activity with proprietary products built upon or coupled with OSS distributions
  - What best supports your company's product and market strategies?
  - Even previous decisions should be re-evaluated periodically to accommodate changes in product landscape and competitive strategies.
- Note that any features or customizations not likely to be accepted by the OSS Project are inevitably proprietary
- Good decisions require a multi-dimensional evaluation (next slide)

4. OSS Integration and Test Planning

- When most of the code for a product is sourced from a single OSS project, normalizing your own engineering practices with those of that project
  - Seamless interoperability with code repo, bug tracking, release process, etc.
  - Faster on-boarding of contributors to the relevant OSS project
- Primarily test and QA OSS code during/post integration together with dependencies and value-added product software and hardware
  - Utilize OSS project test code when available
  - Develop some in-house tests directed specifically at OSS where customer or market requirements dictate

5. OSS Integration

- Research results indicate
  - Respondents integrate high percentages of OSS code into products
  - Large and small organizations integrate directly from OSS trees
    - Product teams given large degree of freedom to choose appropriate versions
  - Strictly minimize customization of OSS to keep patch loads manageable
  - Modularize changes, extensions to the OSS wherever possible
  - Leverage automated continuous integration to
    - Minimize pain from update and merge
    - Track OSS project trees most closely

6. OSS Test Program

- Need to test OSS standalone and as integrated code
  - OSS module unit testing
  - OSS project / sub-system and/or platform testing
  - Final product testing with integrated open source code
- Successful organizations integrating open source
  - Aggressively contribute test code to projects so that releases arrive pre-tested
  - Develop relationships with OSS project leaders to facilitate upstreaming

7. Bug Reports, Patches and Upstreaming

- Research reveals common core practices for upstreaming
  - Most successful organizations invest in upstreaming early
    - Build community / maintainer relationships
    - Retain minimal forked code as “value-added”
  - Large Orgs (Samsung, Red Hat et al.)
    - Company ID does not guarantee upstream patch acceptance
    - Able to dedicate more resources on upstream interface
  - Small Orgs (smaller OEMs and integrators)
    - Patches reviewed on merit, as with large contributors
    - Even more important to consider project style, roadmaps, etc.

8. Manage Incoming Patches/Releases

- Simultaneous development by OSS projects and by product development and support teams must be reliably and efficiently merged and tested
- Complexity of the problem often leads to slow and expensive processes
- Best practices and research findings dictate to
  - Strictly minimize customizations in order to keep the patch load manageable
  - Keep retained changes small and modular to streamline merging
  - Cultivate OSS project relationships to enhance communication and minimize skew
  - Invest in project test code to minimize quality issues in OSS updates
  - Use available tools merging capabilities (patch, git/github, etc.)

Summary

- Our research suggests a number of ways that companies can structure their development processes to improve
  - Quality of its OSS-based product releases
  - Quality of support and mean time to fix critical issues
  - Predictability of their OSS development resource requirements
  - Efficiency of their OSS development and management