Xen Project Contributor Training
Part 4 : Culture

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Content

Theory: Open Source Flywheel

The demands on what vendors and users want from Xen Project is changing using the Flywheel to illustrate

The project has a recent history of change

Example: The history of the Security Vulnerability Management Process

Other examples of recent and ongoing changes

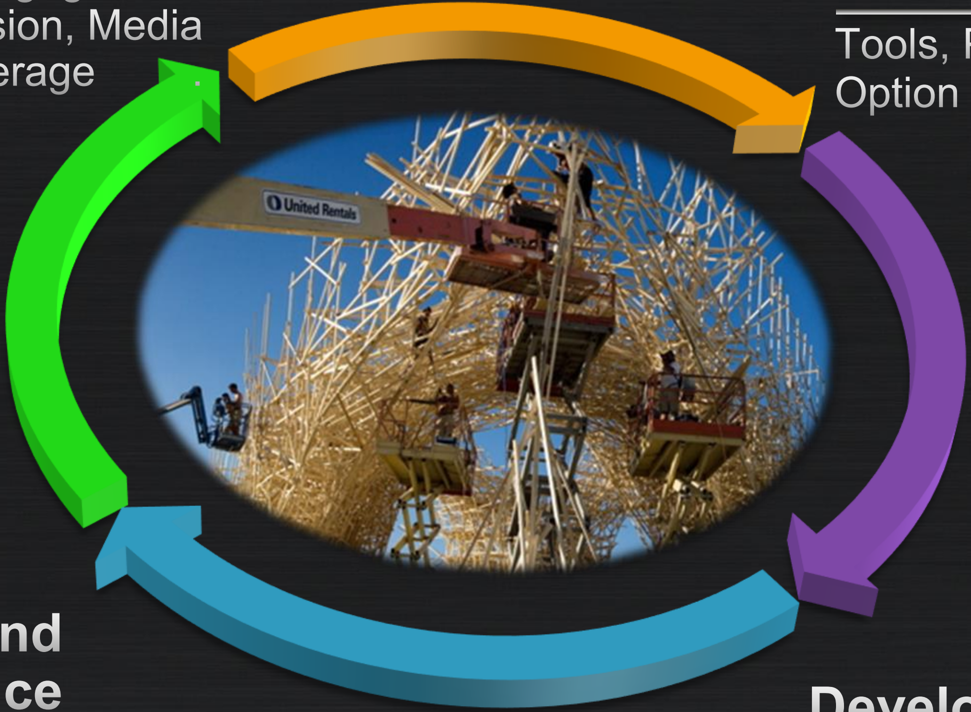
New demands on the project: New Features/Community Growth vs. Review Process and Review Capacity

New demands on the project: New Features/Community Growth vs. Quality and Security

Feature Lifecycle Management and Documentation

Theory:

Open Source Flywheel



Users

Feedback, Engagement
Trust, Passion, Media
Coverage

Open Source Development Model

Tools, Process, Culture
Option Value[1], Modularity

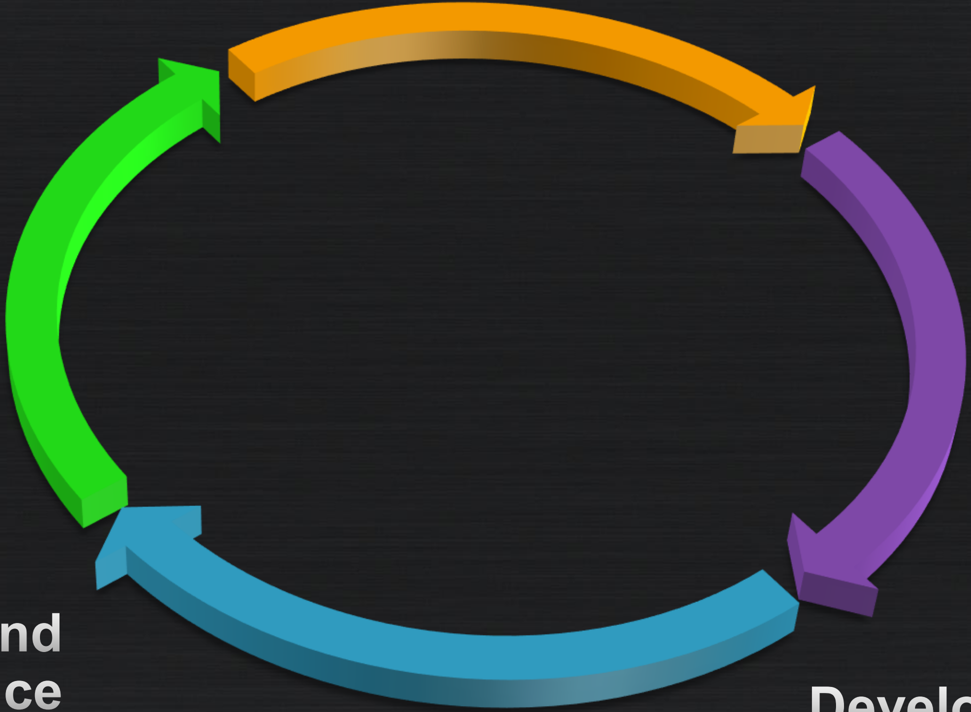
Development Activity

Contributions, Reviews,
Problem Solving, Leadership

Product and Experience

Features, Quality
3rd Party Integrations

[1] bit.do/optionvalue



Users

Open Source Development Model

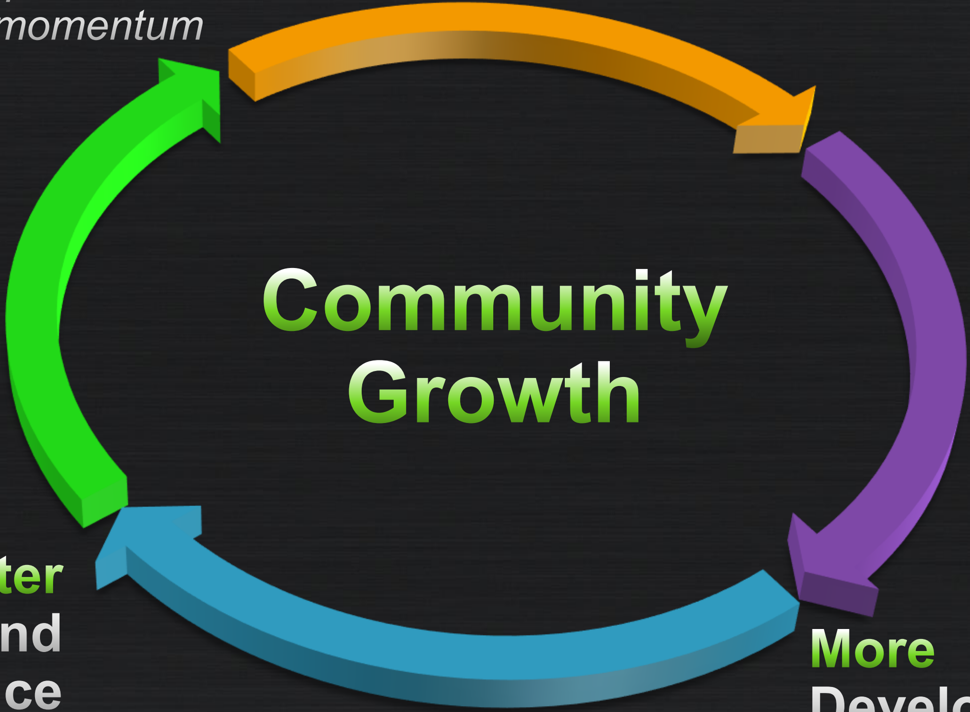
Development Activity

Product and Experience

More Users

More business opportunities and momentum

Open Source Development Model



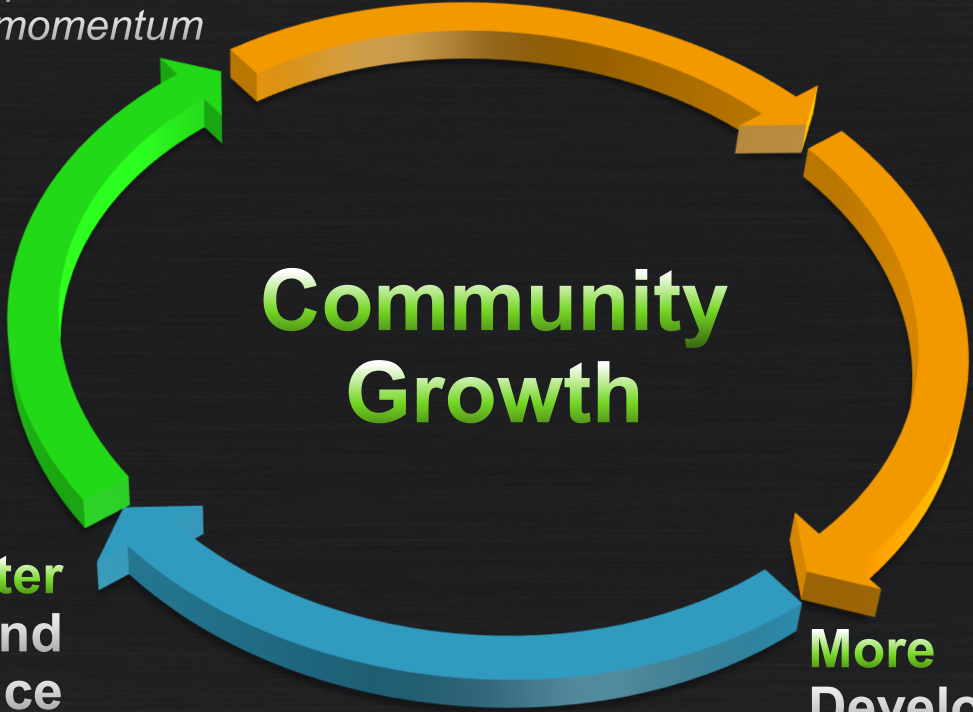
Community Growth

More Development Activity

Lower development cost

Better Product and Experience

Lower deployment cost and risk



Community Growth

Open Source Development Model

More Development Activity

Lower development cost

Better Product and Experience

Lower deployment cost and risk

More Users

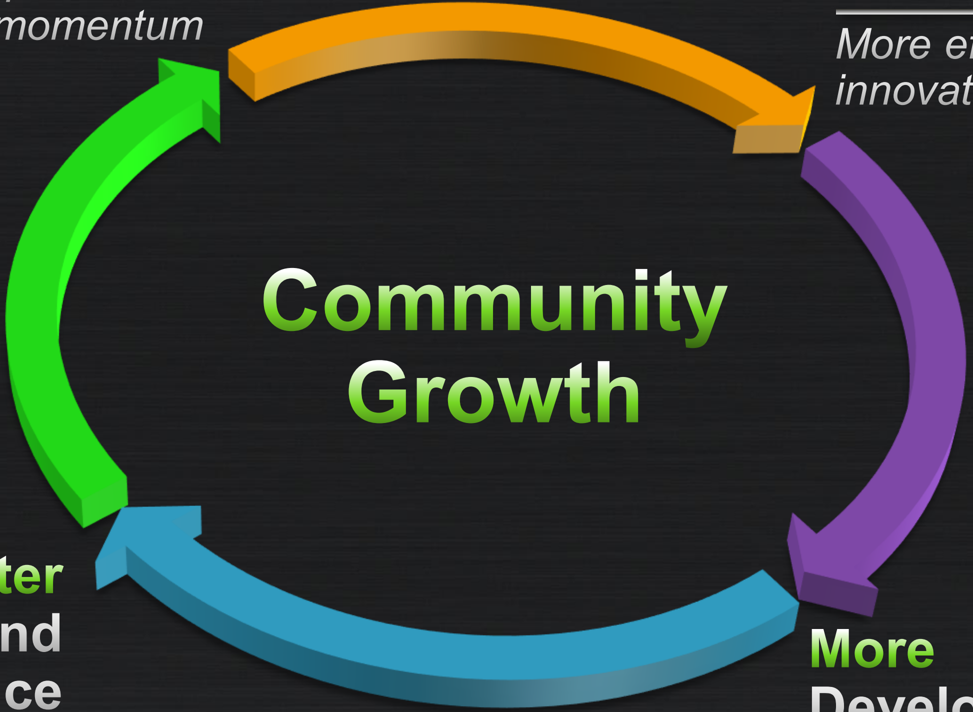
More business opportunities and momentum

More
Users

More business opportunities and momentum

Better
Open Source Development Model

More efficiency and innovation



Community Growth

More
Development Activity

Lower development cost

Better
Product and Experience

Lower deployment cost and risk

War Stories:

Tragedy of the Commons

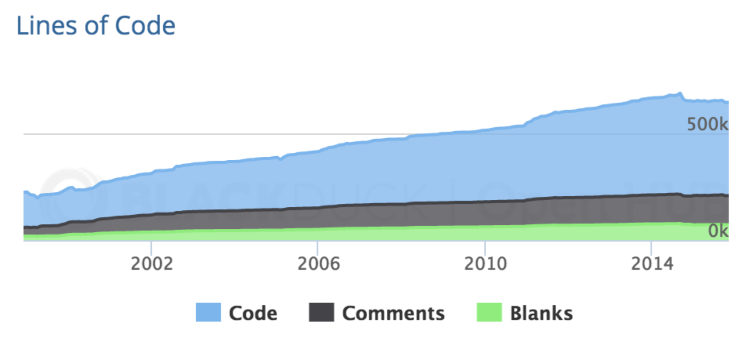
(sort of)

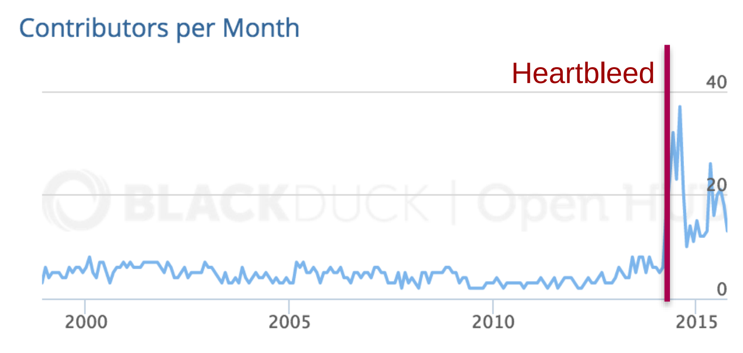
Moyan Brenn @ Flickr

snoopsmouse @ Flickr

So what happened and why?

OpenSSL Stats





Prior to Heartbleed

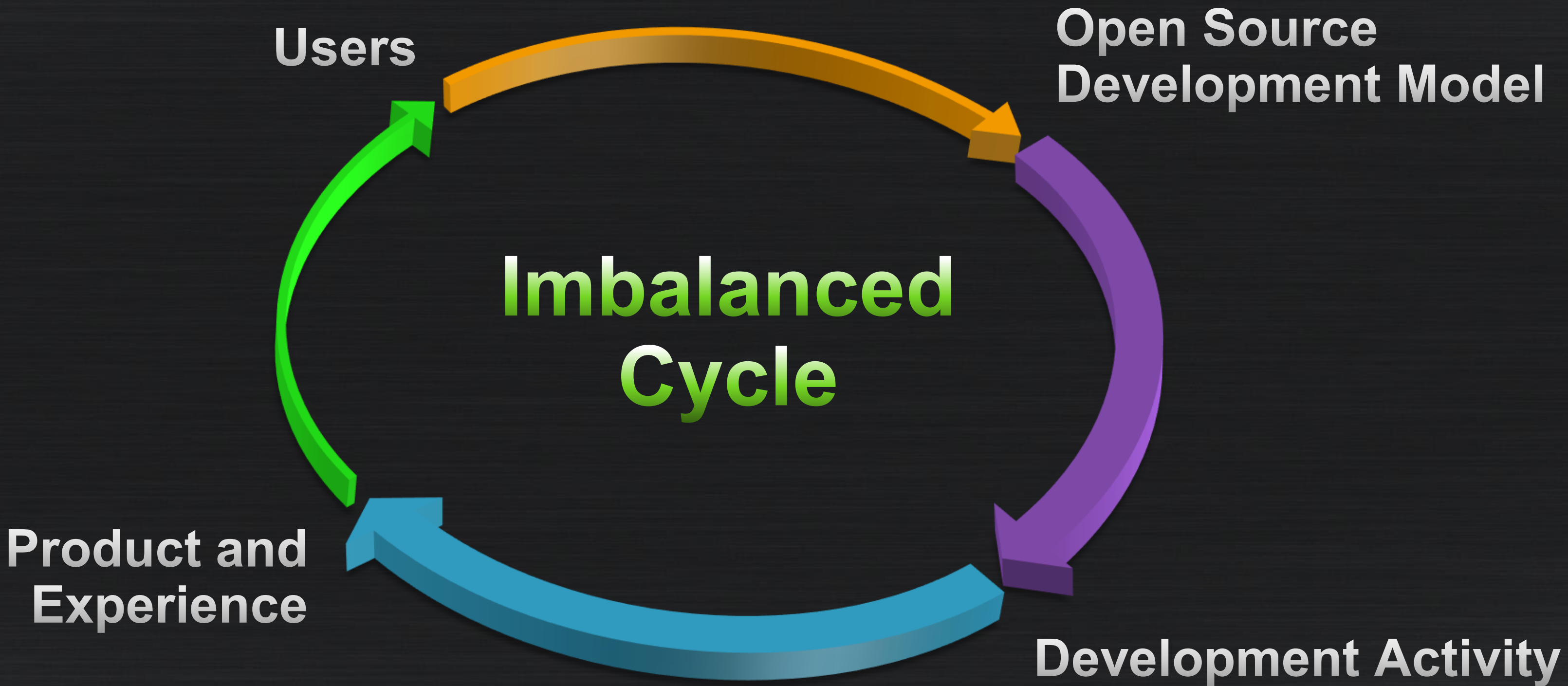
Growing Codebase

Static and small contributor base
1 person maintaining 100 KLoC = Underinvestment

Extremely large user base
Critical infrastructure component
Thus impact of Heartbleed is huge

Large user base did not translate into developer community growth

Source: Ohloh.net



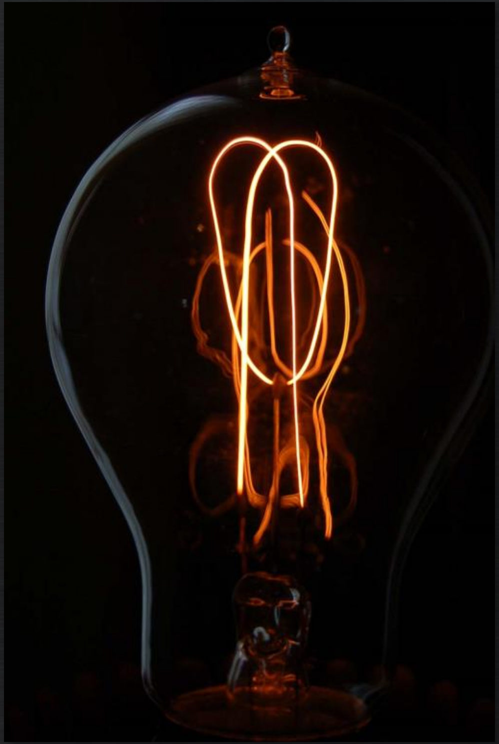
Imbalanced Cycle

Users

Open Source Development Model

Development Activity

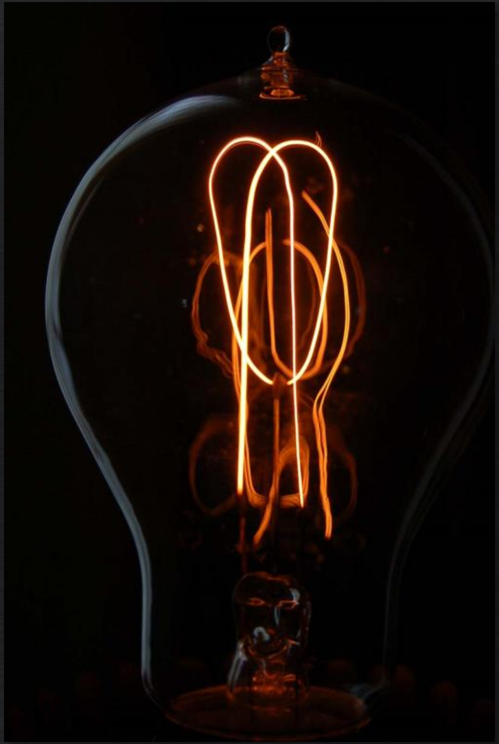
Product and Experience



Lesson for Xen Project

Stay vigilant to sustain a balanced Flywheel

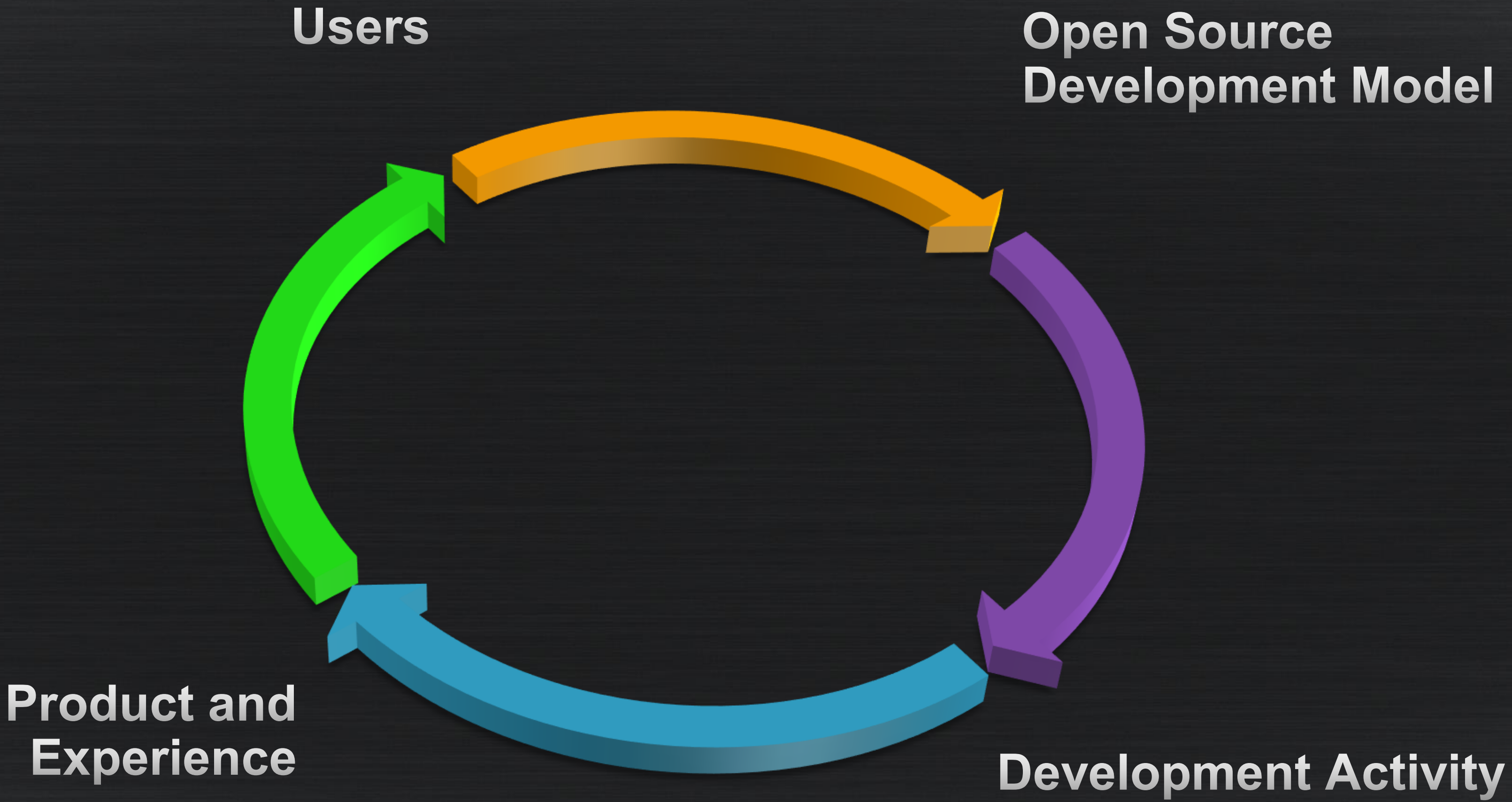
Vinovyn @ Flickr



Drivers for Change

The Demands on what vendors and users want from Xen Project is changing

Vinovyn @ Flickr

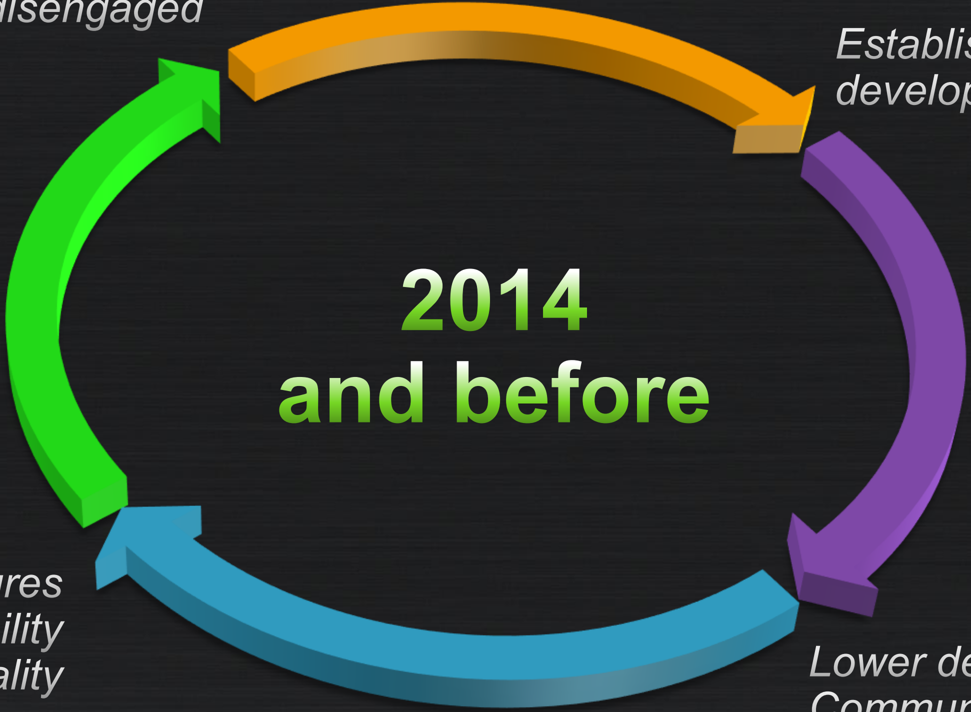


Users

Open Source Development Model

Development Activity

Product and Experience



2014 and before

Little scrutiny by the tech press
Mostly happy
Fairly disengaged

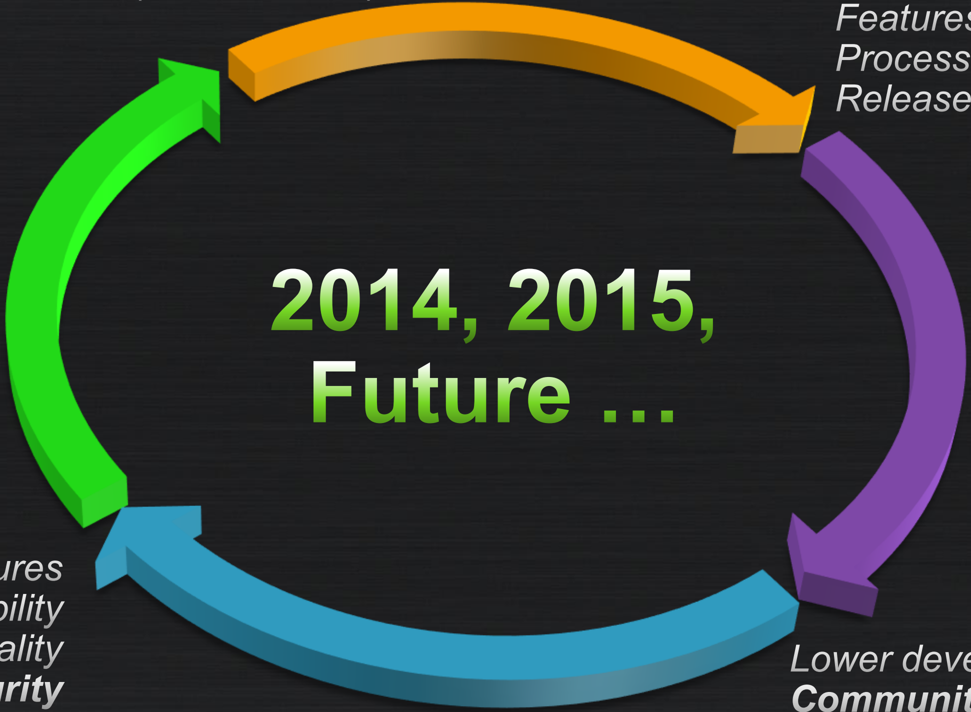
Established and stable
development model

Lower development cost
Community Growth

Features
Performance/Scalability
Quality

Huge amount of scrutiny *by the tech press*
(security, process, releases, …)
Some users unhappy *(status quo vs. change)*
Vocal users and vendors *(the odd “rant”)*

<u>Community is forced to change:</u>
Training, Test Lab(s), Review vs. Features, Security Management Process, Security vs. Features, Release Process, …

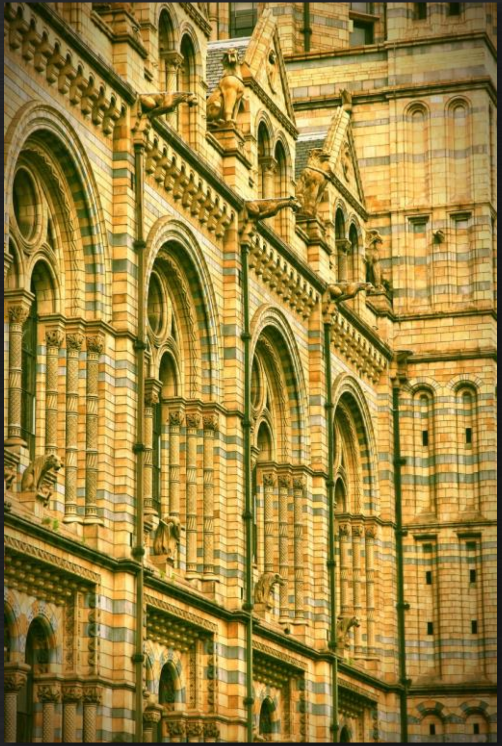


2014, 2015, Future …

Features
Performance/Scalability
Higher *Quality*
Security
Usability / Integrations

More competition
(e.g. Containers, Docker, …)

Lower development cost
Community Growth *(not at all cost)*
New Players: *Security, Embedded, …*
New Regions: *e.g. China & Ukraine*
More aggressive product roadmaps



Xen has a history of recent change

External factors are accelerating the amount of change

Example:

Evolution of
Xen Project Security Vulnerability Process

xenproject.org/security-policy.html

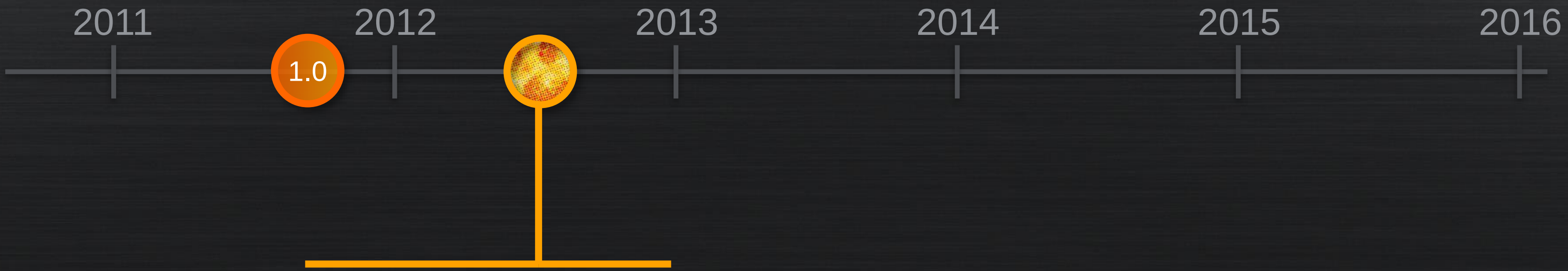
2011 2012 2013 2014 2015 2016

1.0

V1.0 : Modelled on Debian

Goals:
Allow fixing, packaging and testing;
Allow service providers to prepare (but not deploy) during embargo

Pre-disclosure:
Membership biased towards distros & large service providers
No predefined disclosure time

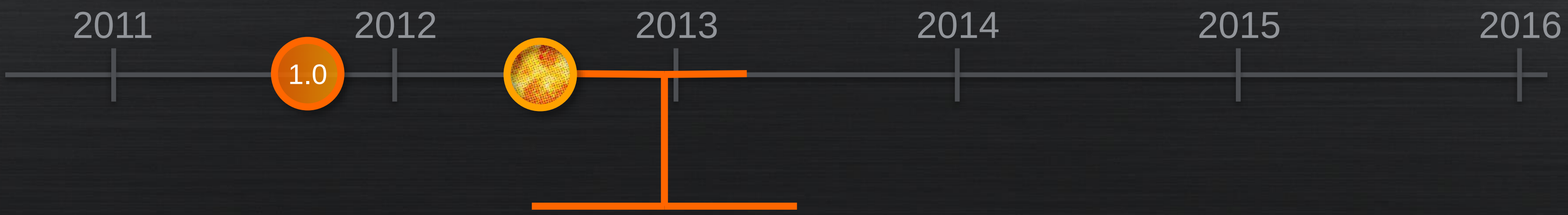


July 2012: CVE-2012-0217, Intel SYSRET

Affected FreeBSD, NetBSD, Solaris, Xen and Microsoft Windows

A large pre-disclosure list member put pressure on key members of the Xen Project Community to get an embargo extension

They eventually convinced the discoverer to request an extension

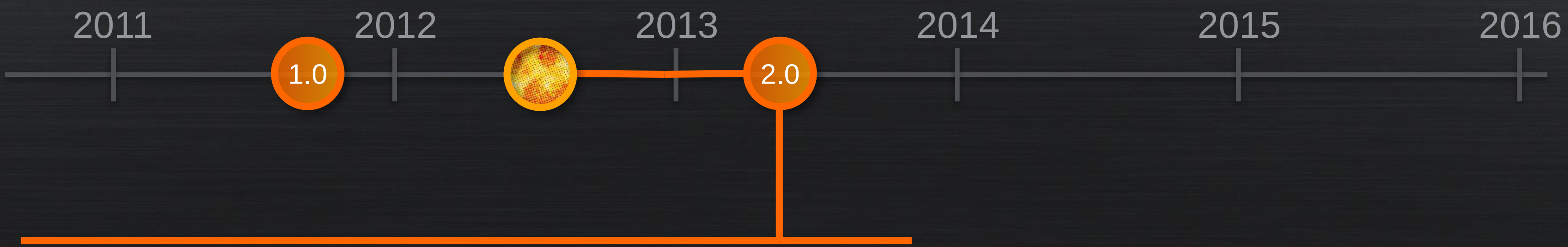


Community Consultation to improve our process

Centered on:

Predetermined disclosure schedule: 1 week to fix, 2 weeks embargo

Who should be allowed on the pre-disclosure list
Fairness issues between small and large service providers
Direct vs. indirect Xen consumers
The risk of larger pre-disclosure list membership



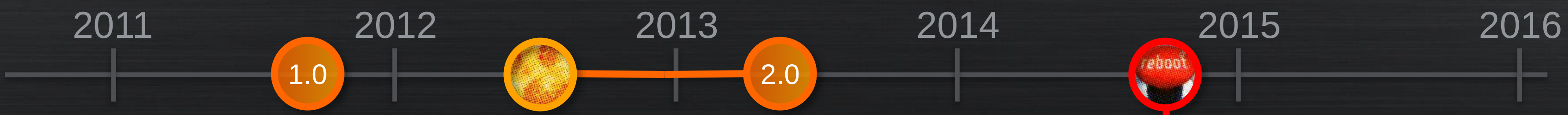
2011 2012 2013 2014 2015 2016

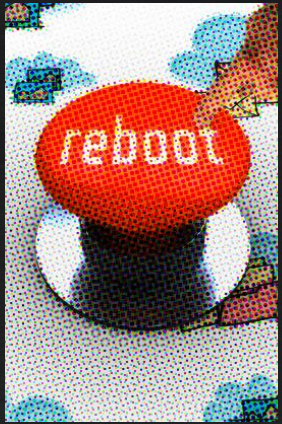
1.0

2.0

V2.0 : Clarifications

Strongly recommended disclosure schedule
Inclusive pre-disclosure list membership
Changes to application procedure (based on checkable criteria)



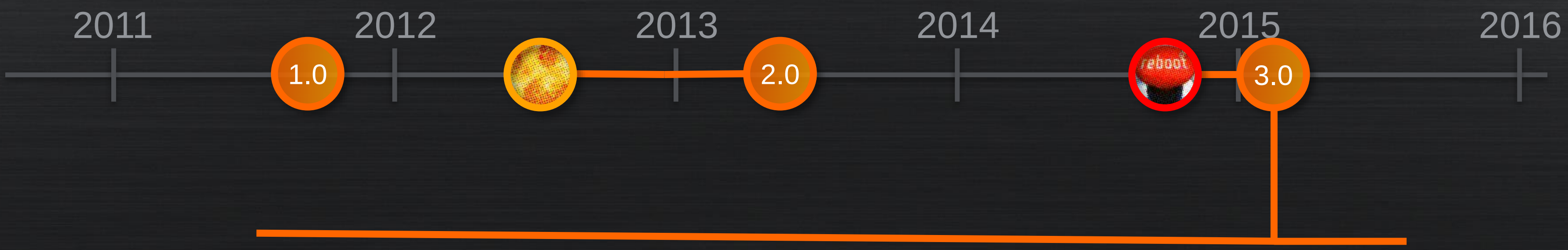


Sept 2014: CVE-2014-7118

Leading to the first Cloud Reboot

AWS pre-announced cloud reboot to their customers
Other vendors didn’t.
Policy was interpreted differently by vendors.

This highlighted ambiguities in the project’s security policy
(what can/can’t be said/done during an embargo)



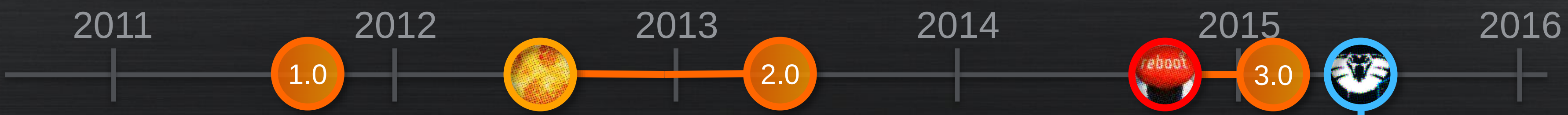
V3.0 : Deploy & Optimizations

Goals:

Allow fixing, packaging and testing
Allow service providers to prepare (and normally to deploy) during embargo

Pre-disclosure:

Clearer application criteria
Public application process (transparency)
Clear information on what is/is not allowed during an embargo (per XSA)
Means for pre-disclosure list members to collaborate



May 2015: CVE-2015-3456

First time we were affected by a branded bug

QEMU bug, which was handled by several security teams: QEMU, OSS Distro Security, Oracle Security & Xen Project

From a process perspective: were not able to provide a fix 2 weeks before the embargo date ended

Conducted XSA-133 Retrospective upon request
Process change: Earlier embargoed pre-disclosure without patches

Examples:

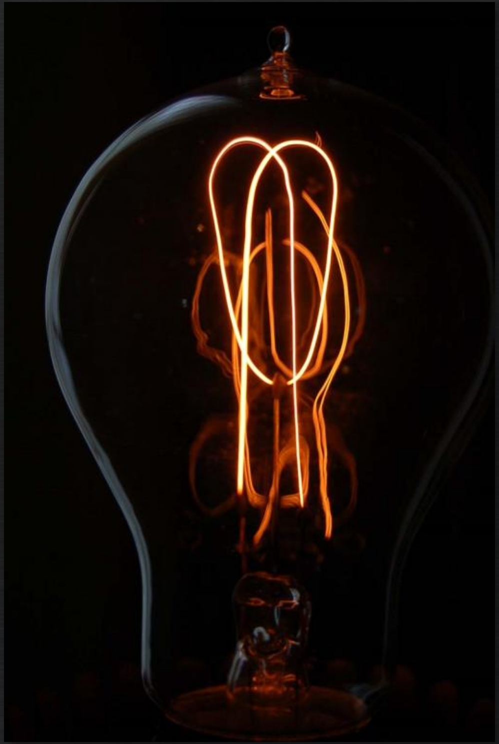
Of other recent changes
And changes under discussion

Other Changes in the last 2 years

Change	Description
Design Reviews **Design Docs** **API Docs**	More focus on design reviews, designs as specs, in-code API docs • Avoid disagreement later in the review cycle • Create a “knowledge base” for new developers
Test Lab **OSSTEST**	Increased Focus on Quality Share the cost of testing (Past: everyone tested independently)
Release Management 4.6	Slightly shorter release cycle Harder freeze dates Branch master earlier ➔ longer active development period
Release Management 4.7	Short and fixed release cycle (June and December) Even harder freeze dates: no feature freeze exceptions • Make it easier for consumers of Xen to plan their products • Decrease the impact of features not making it into Xen x.y

Changes proposed/under discussion

Change	Goals
Feature Maturity Lifecycle	• Better understanding of feature maturity for users • Encourage more testing: only tested features can be "supported" • Find a way to classify non-core features
Decision Making	• Not optimized for "process and convention changes" • Make the process clearer and streamline it
Review Process **Review Criteria**	• Contributing to Xen has become harder • This just happened, without being discussed, and came as a surprise • Caused issues because of mismatching expectations
Contribution Reporting	• Find better ways to high-light non-code contributions • Encourage more code reviews and tests
Roles / Project Leadership	Conducted a survey in Q3'15: still early days • Highlighted different expectations by different people • Have a range of options to improve things



Vinovyn @ Flickr

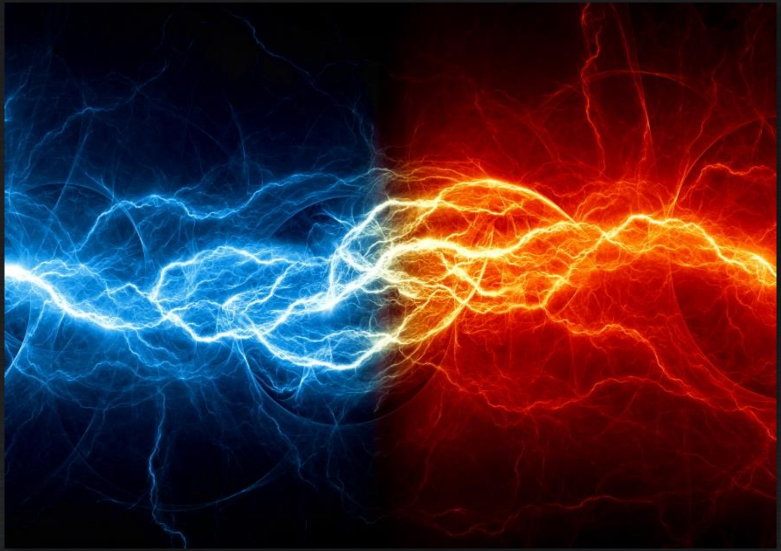
Lesson

The project is adapting to a changing environment

Don’t get caught out by changes

Participate in discussions

We are facing new tensions, that require to make <u>conscious</u> trade-offs

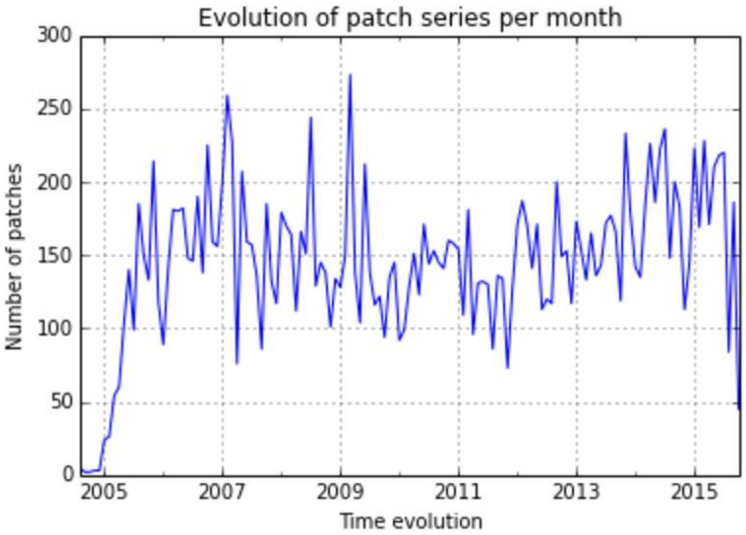


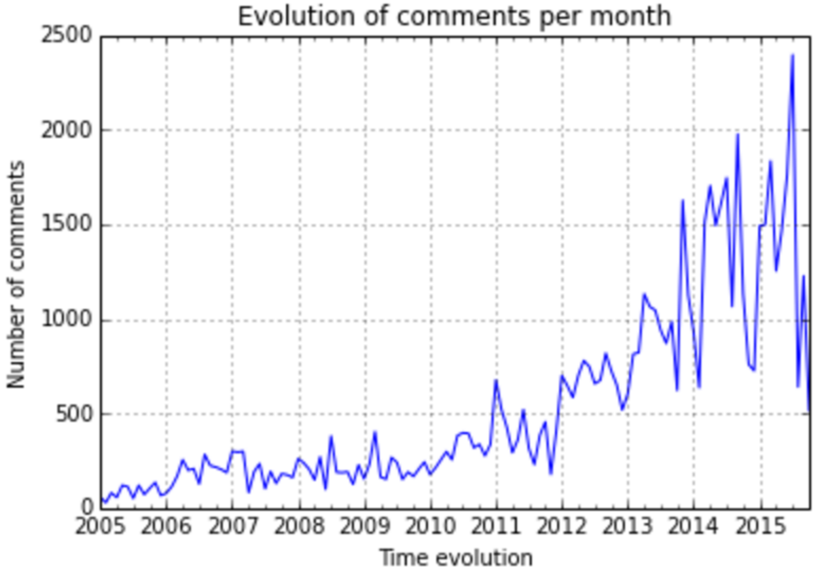
New Features
Community Growth

Review Capacity
Review Criteria

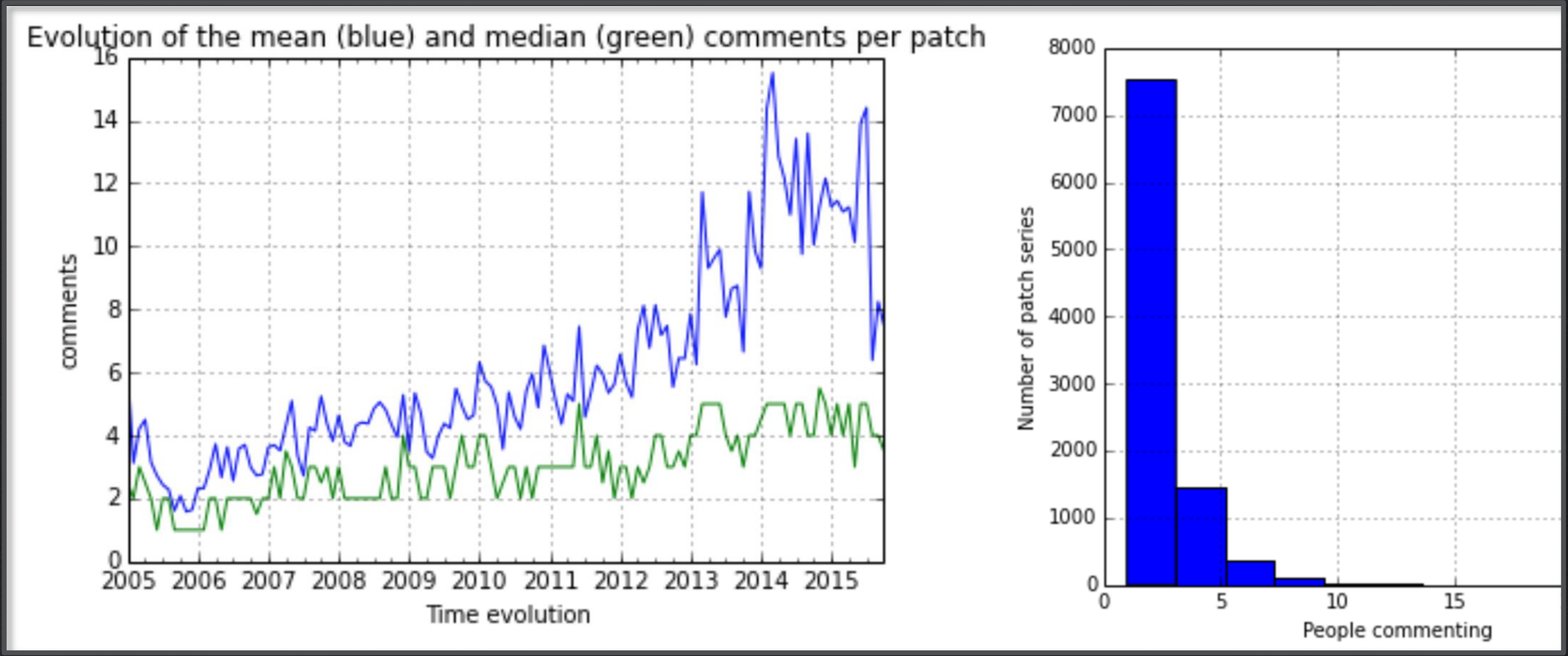
Goal: Better Quality & Security
Contributor – Maintainer Interaction

Patches and Comments posted


Evolution of patch series per month

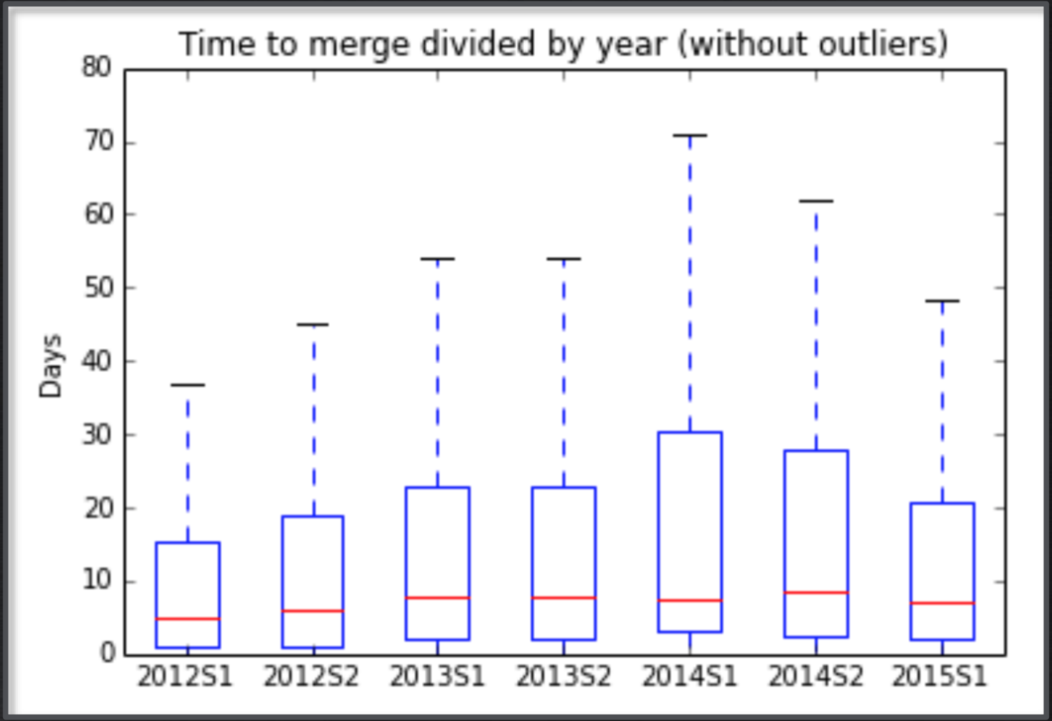

Evolution of comments per month

Comments per patch / Reviewers

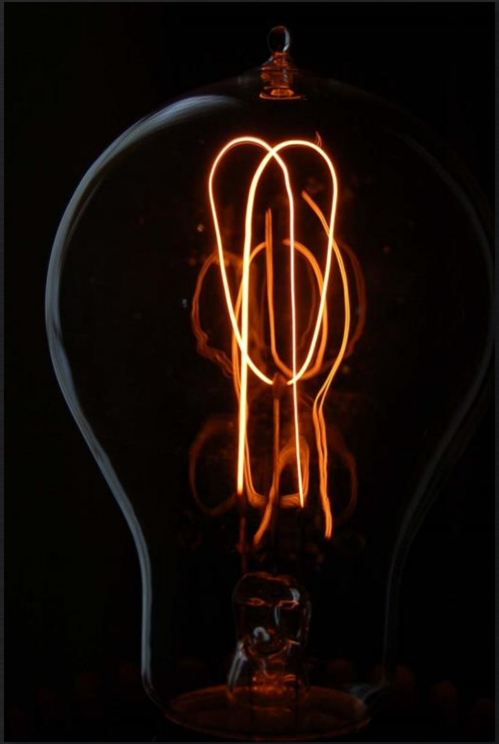


We have a problem: more contributions, tougher contribution requirements, same number of reviewers, number of patches under review is growing

It takes longer to get changes into Xen



We managed to part-fix this through training of new contributors, process changes, better co-ordination



Tougher requirements on Quality gradually happened

There was **no discussion about the quality-contribution trade-off**, which led to surprises and some contributors having wrong expectations

In fact: we didn't know this was happening until recently

Vinovyn @ Flickr

Implications for Contributors

For new contributors contributing up to smaller 10-15 patches per year:

- None

For new contributors planning to contributing complex and 15+ patches per year:

- Reviewers are less willing to review patches without getting something in return

At a minimum:

- Engage with the Roadmap Process : Communicate your priorities
- Submit early in the review process and submit designs early for complex code
- Have realistic expectations

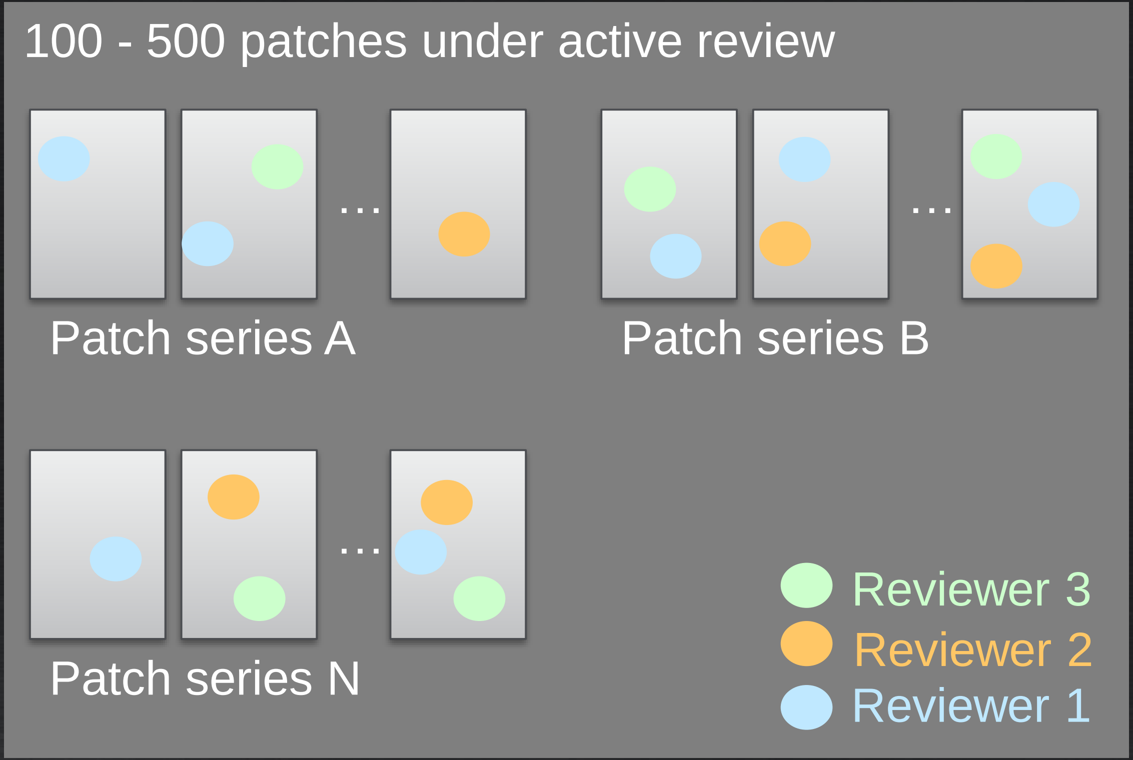
Ideally:

- Observe patch reviews on xen-devel@ and help with patch reviews of other people's code
- Help with testing (test days, test reports, test code)
- Long term: work towards maintainership of components/features you care about

100 - 500 patches
under review at any given time

Larger patches need
ACKs from 3-5 people

Coordination: The paint-gun problem



100 - 500 patches under active review

…

Patch series A

…

Patch series B

…

Patch series N

● Reviewer 3

● Reviewer 2

● Reviewer 1

Reviewers review according to their own schedule and own priorities.

There is no centralized priority list.

You may need to ping reviewers: overdoing this is counter-productive (may be considered as hassling).

New Features
Community Growth

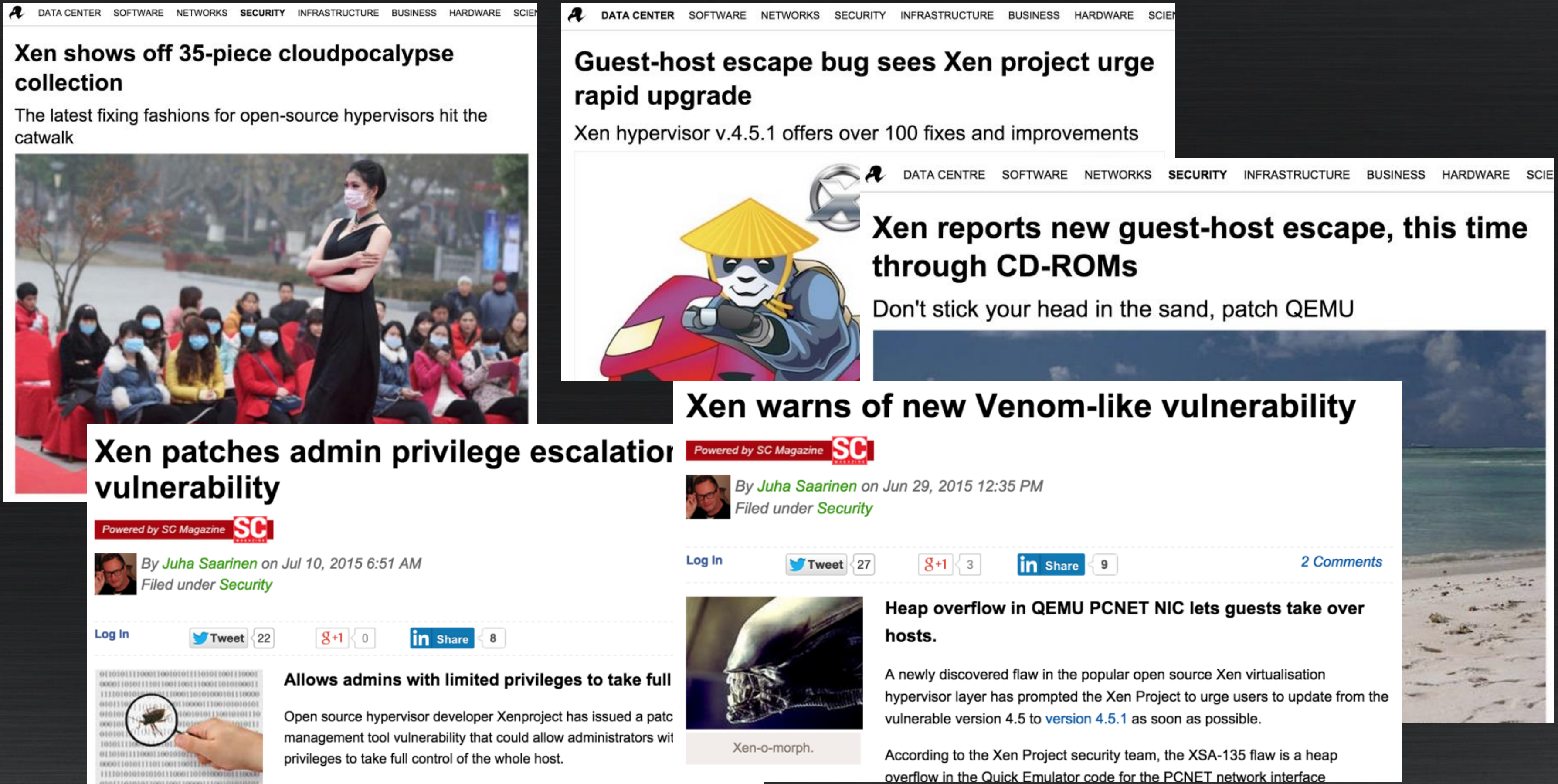
Quality, Security
Different use-cases

Conflicting Requirements

e.g.

cloud / enterprise vs. security vendor
cloud / enterprise vs. embedded vendor

Security Scrutiny



DATA CENTER SOFTWARE NETWORKS **SECURITY** INFRASTRUCTURE BUSINESS HARDWARE SCIEN

Xen shows off 35-piece cloudpocalypse collection

The latest fixing fashions for open-source hypervisors hit the catwalk

DATA CENTER SOFTWARE NETWORKS SECURITY INFRASTRUCTURE BUSINESS HARDWARE SCIEN

Guest-host escape bug sees Xen project urge rapid upgrade

Xen hypervisor v.4.5.1 offers over 100 fixes and improvements

DATA CENTRE SOFTWARE NETWORKS **SECURITY** INFRASTRUCTURE BUSINESS HARDWARE SCIE

Xen reports new guest-host escape, this time through CD-ROMs

Don't stick your head in the sand, patch QEMU

Xen patches admin privilege escalatior vulnerability

Powered by SC Magazine SC

By Juha Saarinen on Jul 10, 2015 6:51 AM
Filed under Security

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Allows admins with limited privileges to take full

Open source hypervisor developer Xenproject has issued a patc management tool vulnerability that could allow administrators wit privileges to take full control of the whole host.

Xen warns of new Venom-like vulnerability

Powered by SC Magazine SC

By Juha Saarinen on Jun 29, 2015 12:35 PM
Filed under Security

Log In Tweet 27 g+1 3 in Share 9 *2 Comments*

Xen-o-morph.

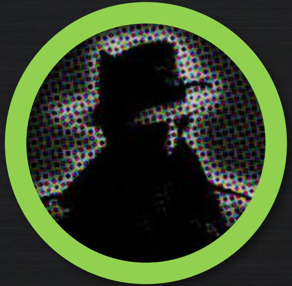
Heap overflow in QEMU PCNET NIC lets guests take over hosts.

A newly discovered flaw in the popular open source Xen virtualisation hypervisor layer has prompted the Xen Project to urge users to update from the vulnerable version 4.5 to version 4.5.1 as soon as possible.

According to the Xen Project security team, the XSA-135 flaw is a heap overflow in the Quick Emulator code for the PCNET network interface

Security Scrutiny

Media coverage is just a side-effect.



We care about …

- There are people out there trying to break Xen
- And use exploits against Xen users

This means …

- Code is reviewed with security in mind
- Think about security when designing a feature
- Think about security before submitting a patch
- You may be asked to modify related code that is related to your patch (often reviewers code “surrounding” your patch)

Easy Ways to get Involved

Fix some Coverity Scan Issues

- You can get access : see xenproject.org/help/contribution-guidelines.html
- Small, bite-size issues to practice contributing to Xen

New

Feature Maturity Lifecycle (FML) and Documentation

Proposal @ http://lists.xenproject.org/archives/html/xen-devel/2015-11/msg00609.html

FML Requirements

	Implemented	Maintained	Tested	Stable	Documented
Preview	Part				
Experimental	Core				
Complete (New)	Full	Yes	Yes	Yes	Yes
Supported (New)	Full	Yes	Yes	Yes	Yes
Supported-Legacy-Stable	Full	Yes		Yes	

FML Effects

	Bugs	Critical bugs block release	Security Support
Preview	Dev*	No	No
Experimental	Dev*	No	No
Complete (New)	Dev*	No**	No
Supported (New)	Yes	Yes	Yes
Supported-Legacy-Stable	Yes	Yes	Yes

This is a state which has not existed in the past. It is aimed at larger new features, which may only be in use or of interest to a small number of contributors, or where not enough expertise exists in the community to treat the feature as Supported.

*) At developer(s) discretion

**) At Release Managers discretion

FML Goals

Complete is aimed at non-core use-cases

- Defuse tensions for non-core features
- Cover for the case where we loose the capability to support

Supported requires **automated** testing or **manual** testing during RC phase (otherwise it may be downgraded to Complete)

Supported-Legacy-Stable accounts for the fact that many features that existed for a long time, may not be documented or automatically tested

- Phase out over time

FML Status (Nov 26, 2015)

- Too many similar states
  - Need to simplify
- Some Open Questions
  - Templates and Exact Format of Feature Status
  - Location of files
  - How to handle legacy

Treating Designs Reviews like Code Reviews

Traditionally we treated designs review different to code reviews

- Using PDFs and Text Designs on xen-devel@
- **Issues:** Agreements and changes are not tracked

Emerging Alternative

- Post designs as patches in xen.git @ docs/… folders
- Example: xen.git @ docs/misc/xsplice.markup with discussion at lists.xen.org/archives/html/xen-devel/2015-11/msg00244.html
- Using pandoc markdown language and templates (see pandoc.org/README.html#pandocs-markdown)
- **Advantages:**
  1. ACKs are tracked ➔ It is clear who agreed with the design
  2. Design evolves with the code ➔ Change the design doc with patches (include into series)
  3. Easy to read and write ➔ Can generate html, pdf's, etc.