“It is wrong to suppose that if you can’t measure it, you can’t manage it - a costly myth”

W. Edwards Deeming

> “If you can’t measure it, you can’t improve it”
>
> Lord Kelvin

Technical Debt for Linux-based distributions: Estimating what you are missing

Linux Foundation Open Source Leadership Summit
Tahoe, CA (USA)
February 14th 2017

Jesus M. Gonzalez-Barahona (URJC & Bitergia)
Paul Sherwood (Codethink)
speakerdeck.com/bitergia

Outline

Some context

Why debt for distros

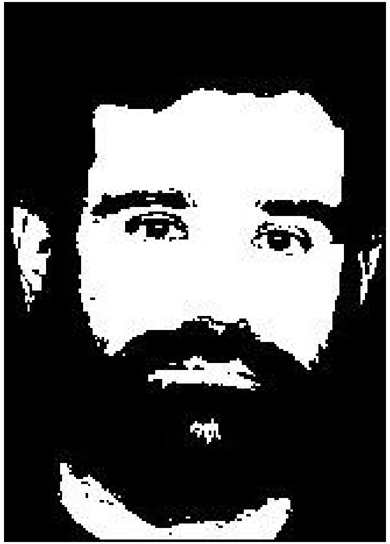
Approach

Current results

Next steps

Some context

/Jesus



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My two hats:

Like five years ago I was having coffees with the gang of Bitergia founders

Involved in the company since then

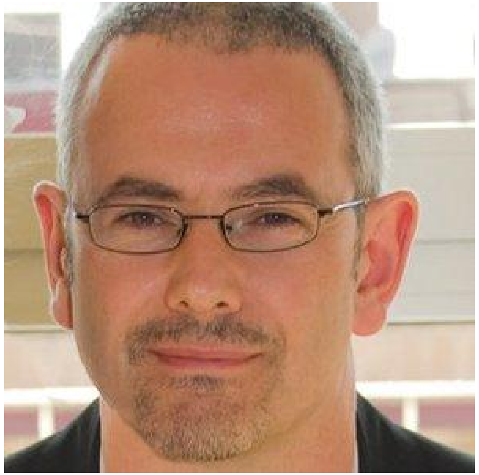
bitergia.com

I work at Universidad Rey Juan Carlos...

...researching about software development

gsyc.es/~jgb

/Paul



Currently…

Codethink CEO and shareholder

Consultant + troubleshooter

Baserock contributor

Previously…

Teleca Founder

cmdline tools + VCS

Project Manager

“The Software Commandments”

Why debt for distros

Context

(Paul’s POV)

- Develop/integrate/test software
- Employ/fund others to do that too
- Offer teams to large customers

- Advise on business impacts of FOSS
- Recommend *using* FOSS
- See lots of projects *misusing* FOSS
  - EOL versions
  - Long local forks, not upstreamed

- Notice Year 1 practices hurt Year 2..Year 20
- Wonder why… maybe because
  - Year 1 metrics are obvious (developer costs vs delivery date)
  - Later metrics are a mystery...

Unanswered: when should we update?

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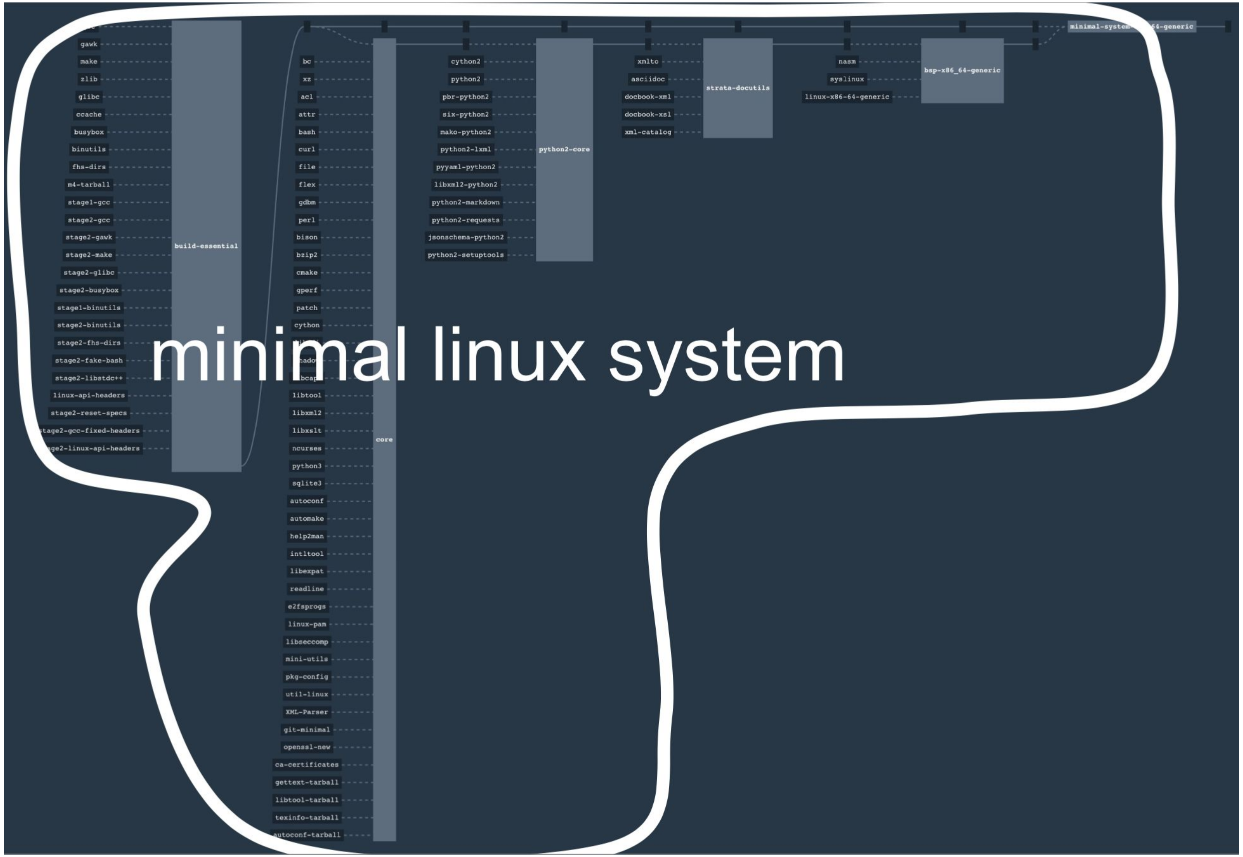
Unanswered: when should we update?

We’re not talking about updating just a few components...



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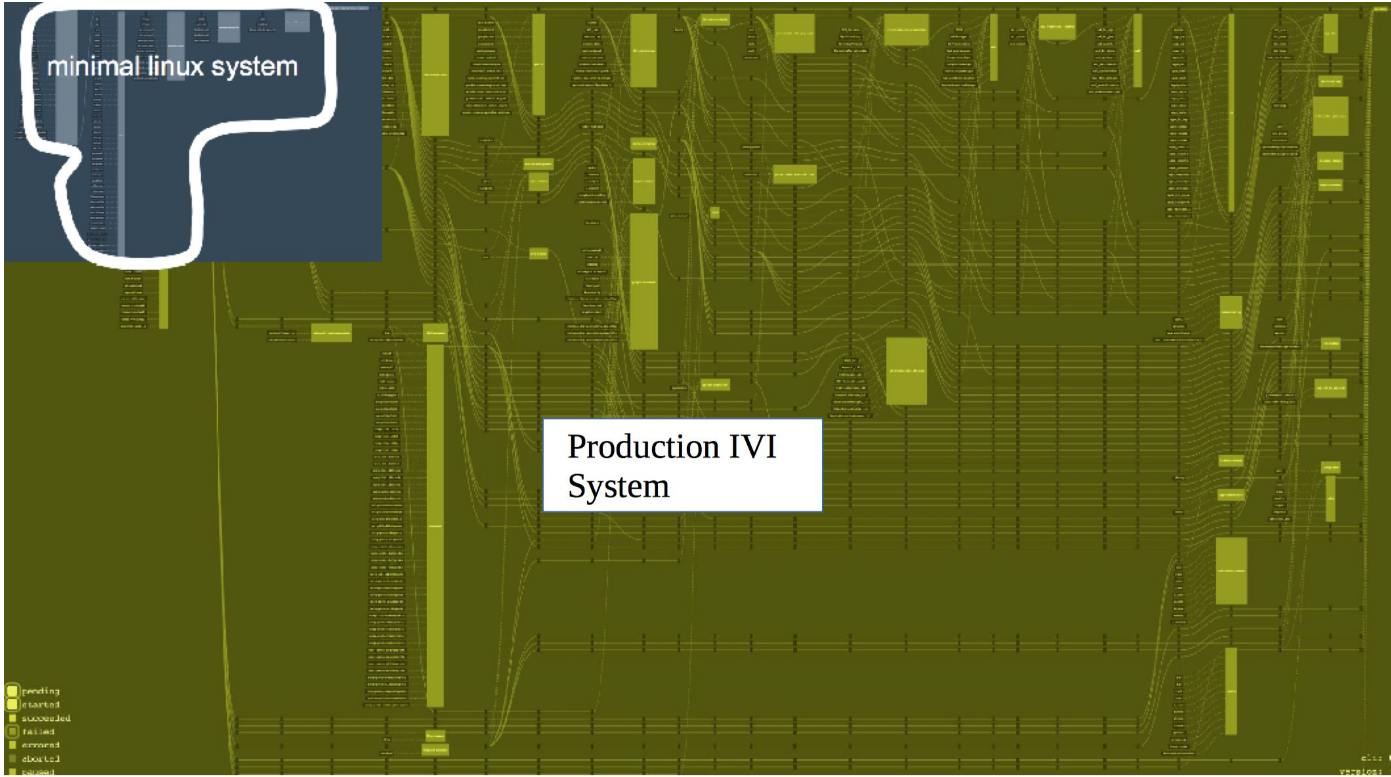
Typical IVI project approaching 1000...

Which ones do we need to upgrade?

How often do we need to re-decide?

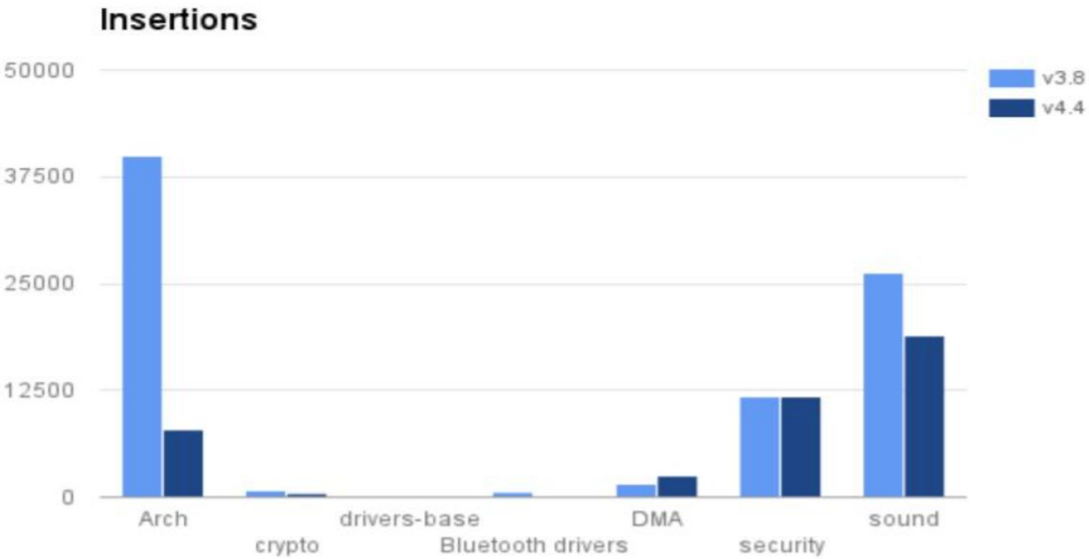


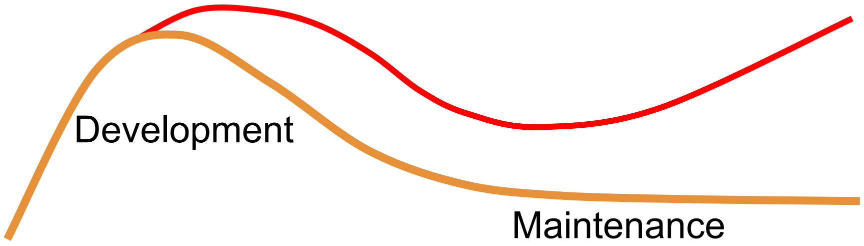
Example

- Project started on 3.8.x kernel in 2012
  - Plus custom drivers
- Went live three years later on same 3.8.x
  - Plus custom functionality
  - Plus thousands of fixes backported
- As the years go by
  - Developers move on - no-one understands the custom stuff
  - Cost of backporting increases
- New variants need new features (eg virtualization)
  - Cost of backporting from later kernels increases

Eventually one of the releases DEMANDS an update

Example continued





When to update

What you risk by upgrading

What you risk or lose by not upgrading

When to update

The balance may change suddenly over time

Rationale

- Technical debt is a popular concept
- … but not for third-party software
- … and not for FOSS

- Distros are large third-party software sets
- Distros update constantly
- Distro users often do not

- Cost of updating is perceived high
- Cost of not updating is unknown

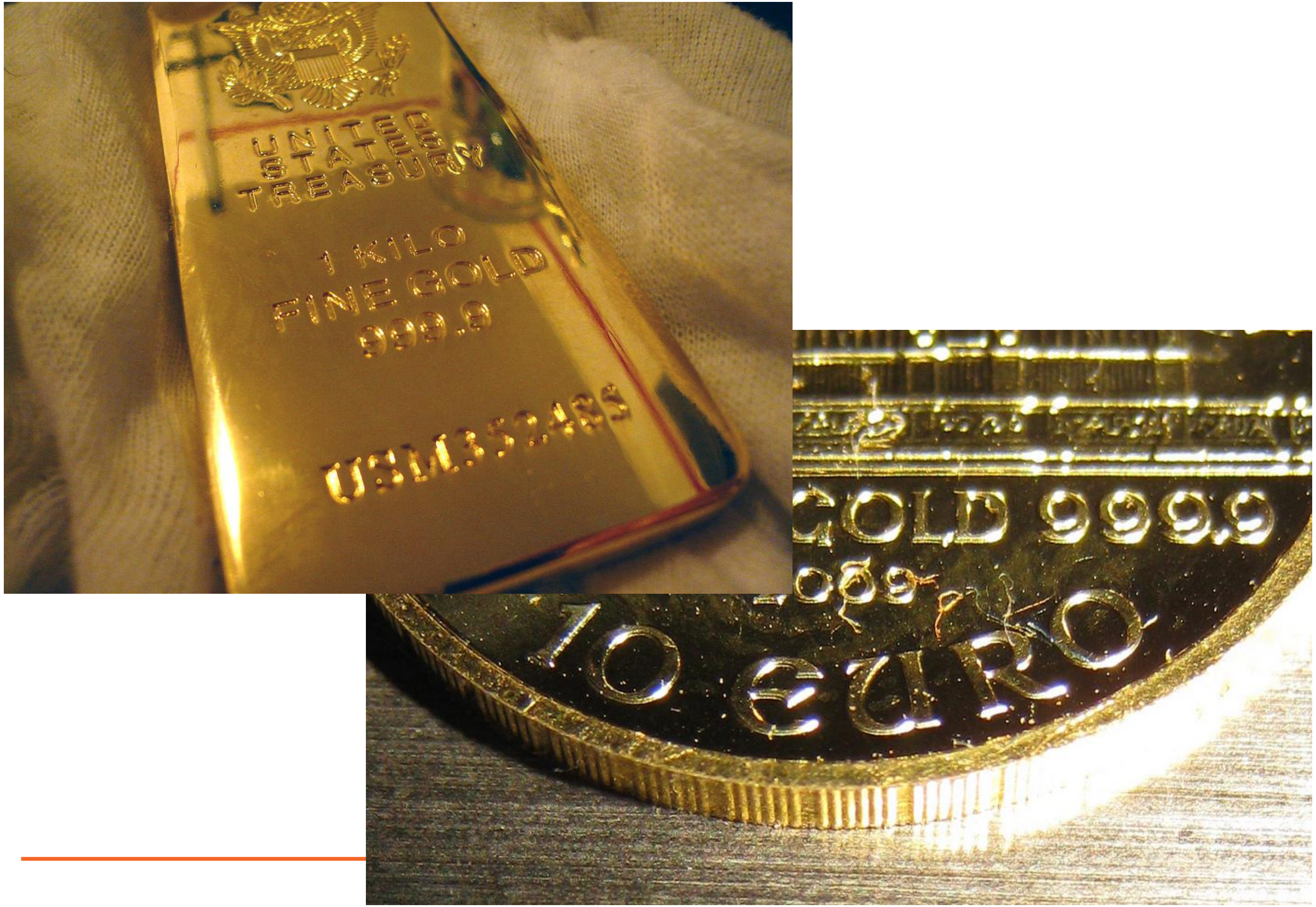
Can we even **find** metrics for this?

Approach

What to measure?

- Delta vs mainline
- For individual components, and
- For whole stack:
  - distros
  - custom assemblies/stacks

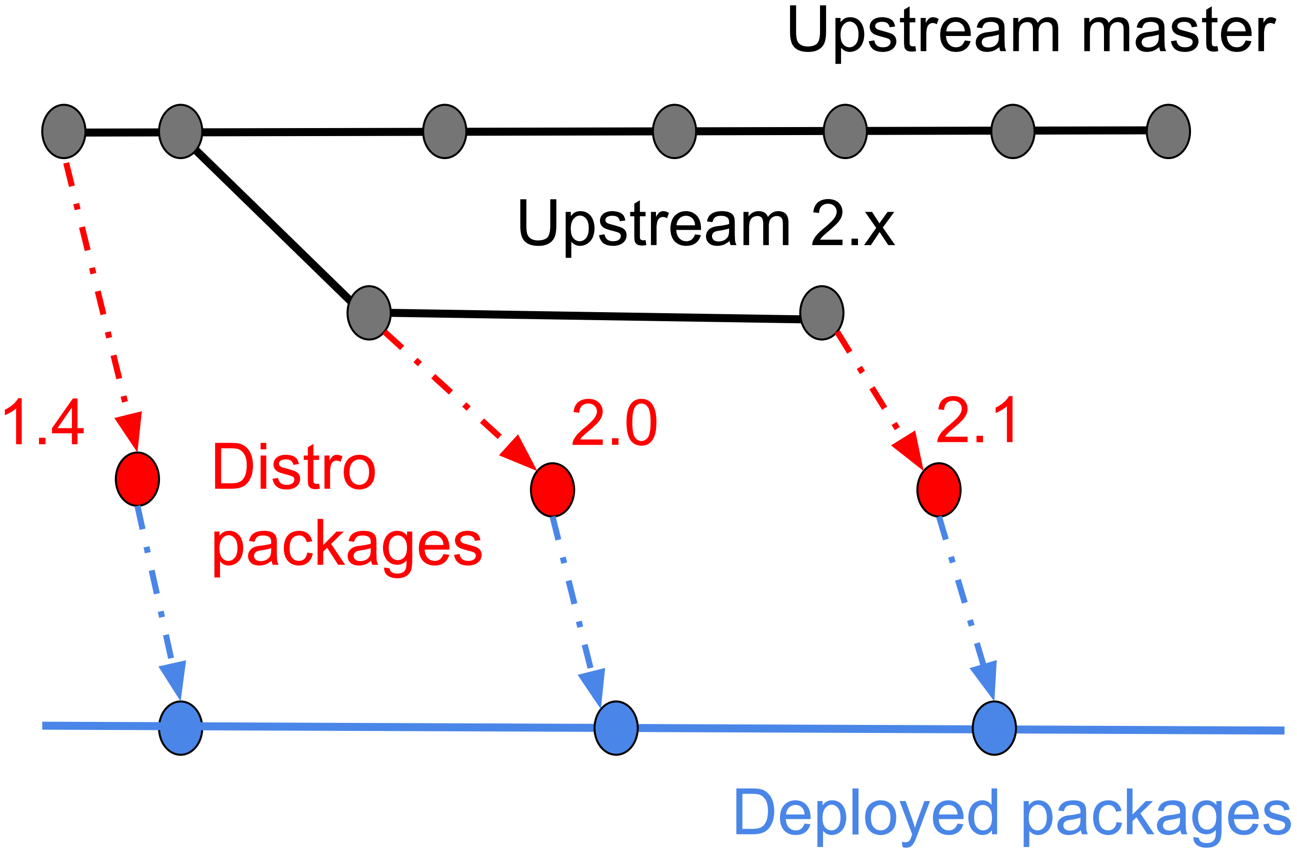
Defining "Gold standard"



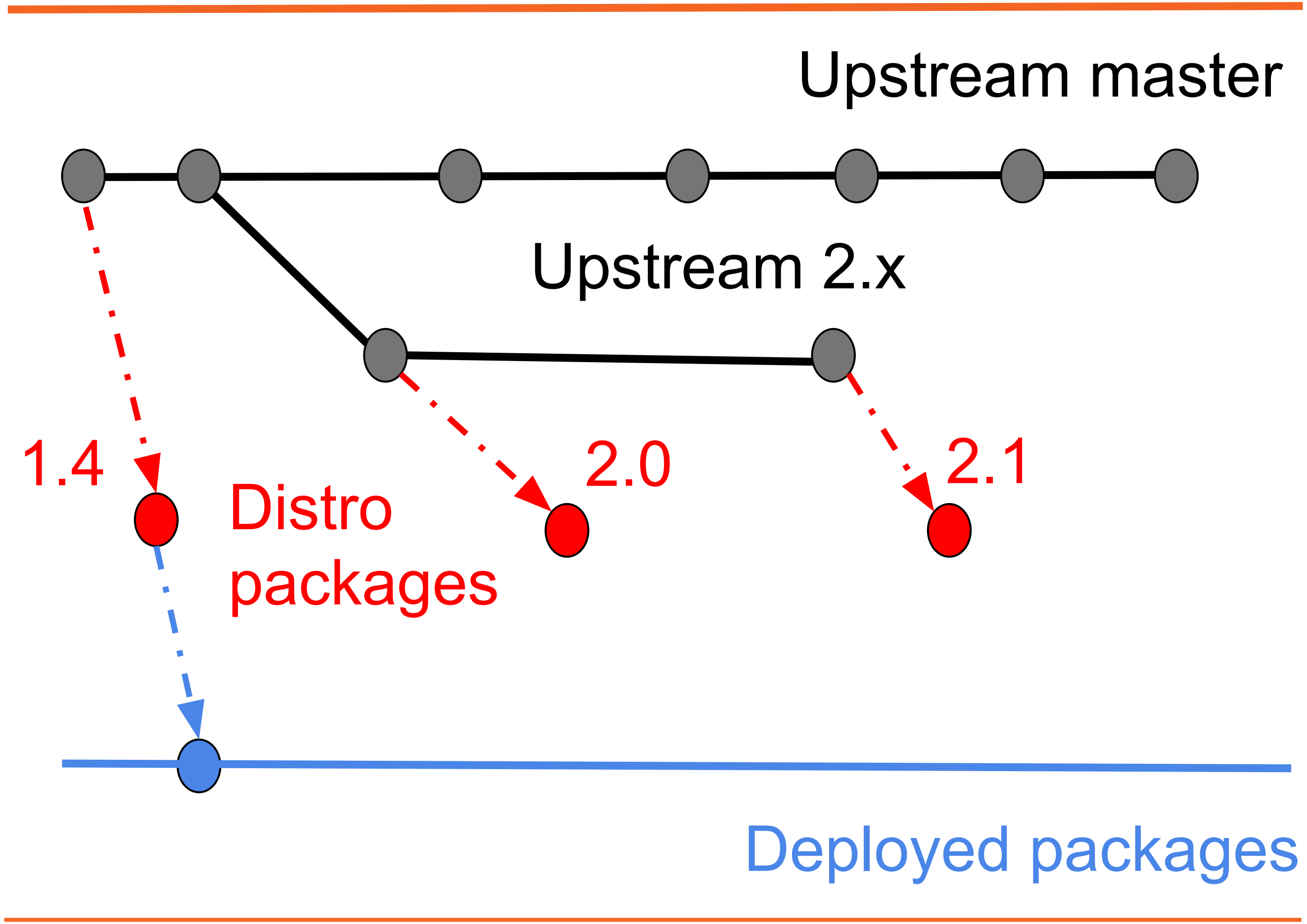
The different kinds of gold (examples)

Goals	Scenarios	Candidates
Stability	Isolated system, frozen functionality	Debian stable
Functionality	Cloud application	Latest upstream
Security	Upgradable embedded	Stable upstream

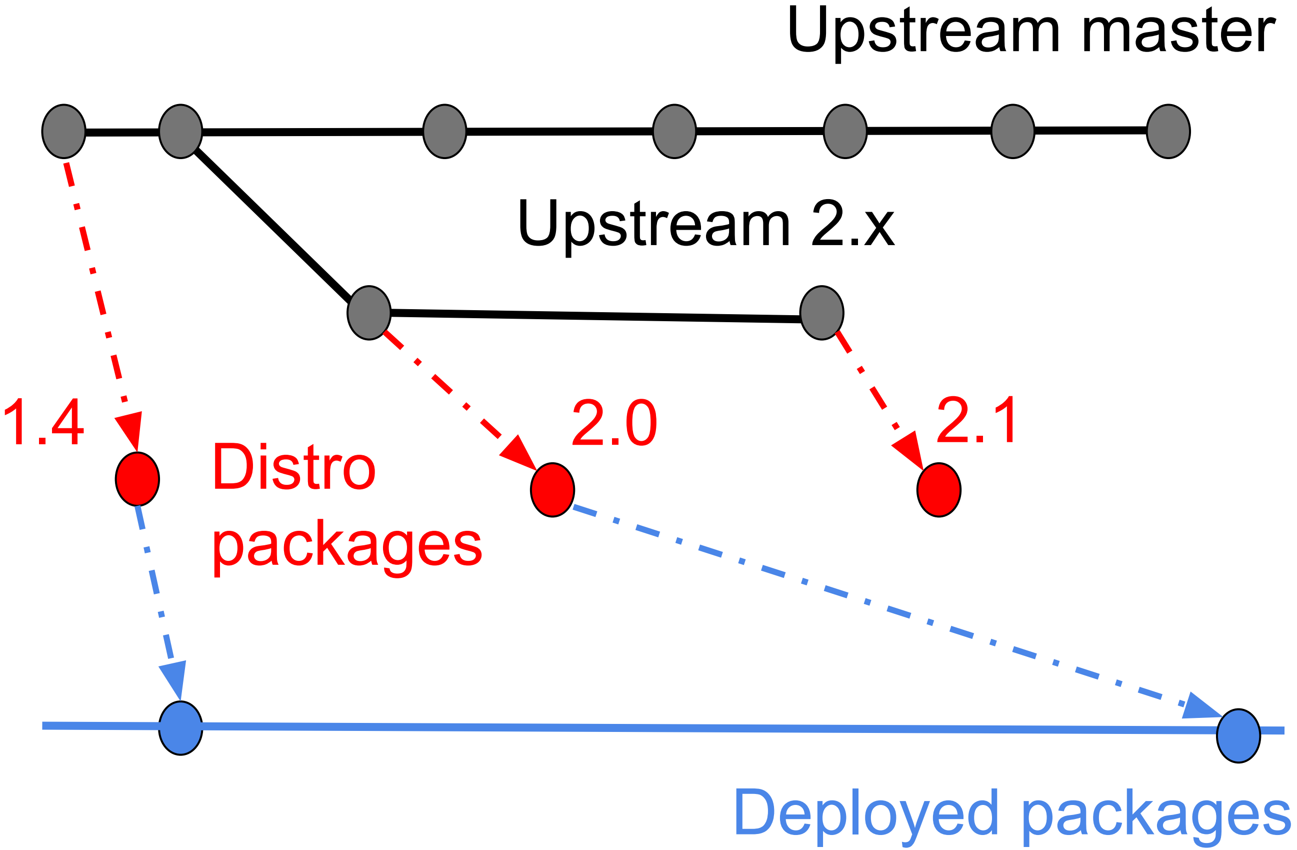
Comparing with upstream



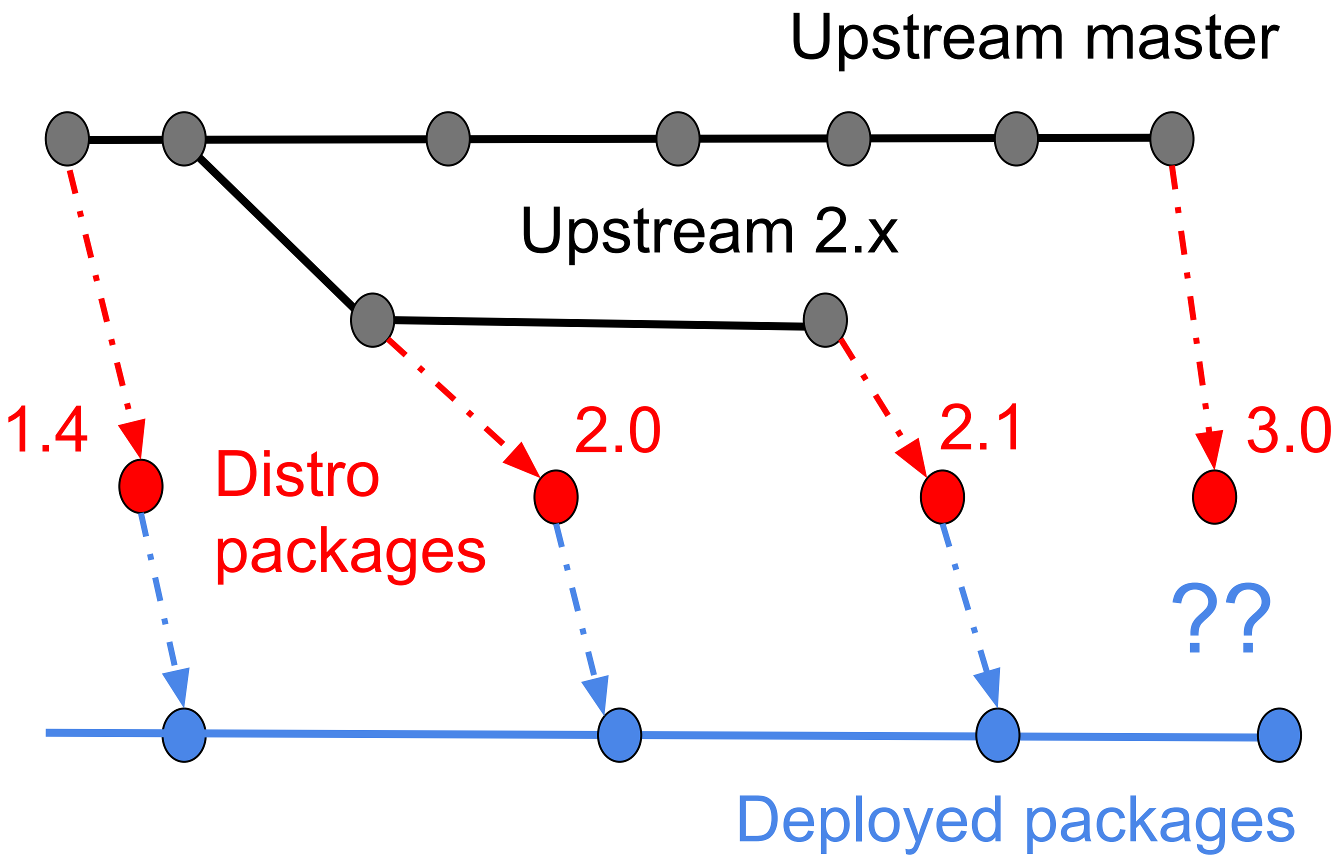
Comparing with upstream (no updates)



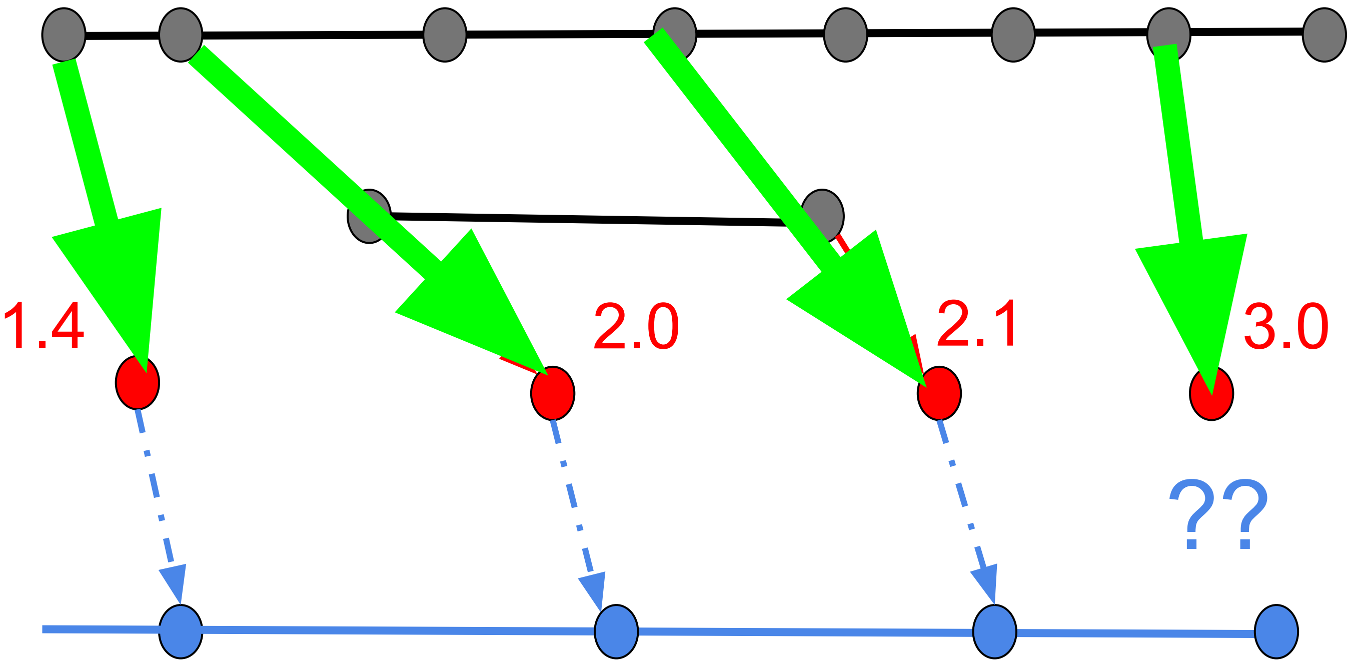
Comparing with upstream (late updates)



Comparing with upstream (new package)



Compare “most likely upstream equivalent”



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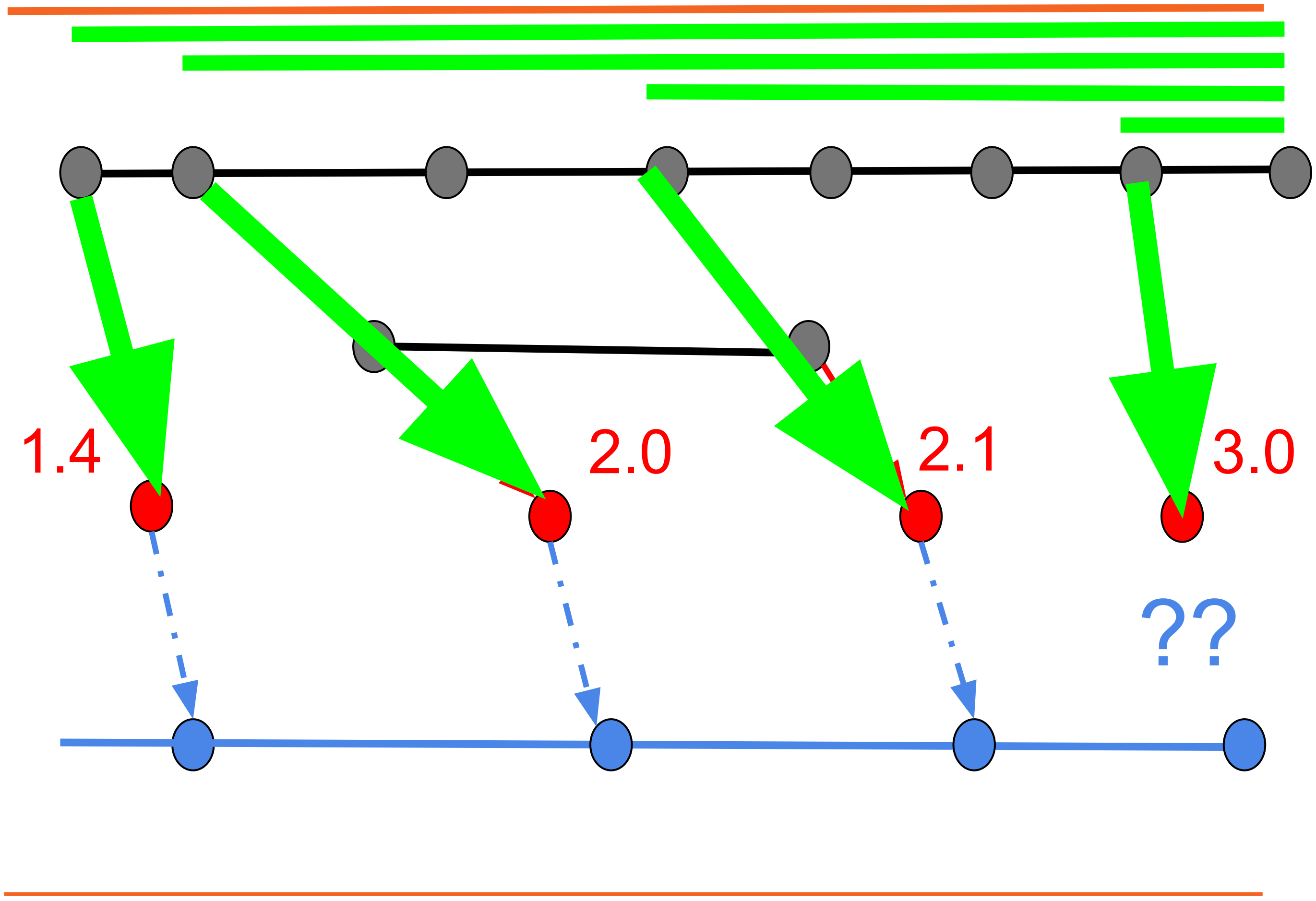
Compare “most likely upstream equivalent” with HEAD



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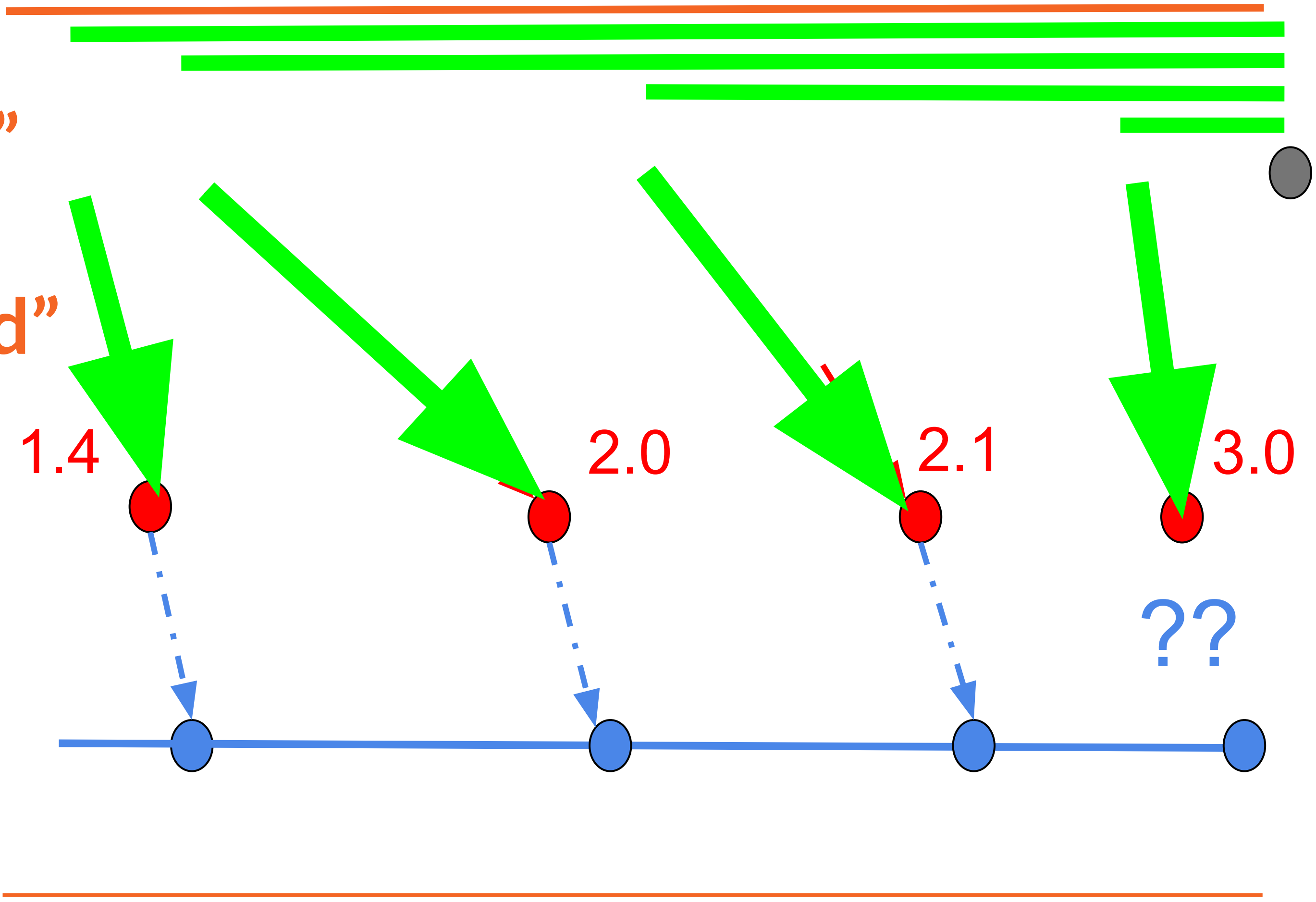
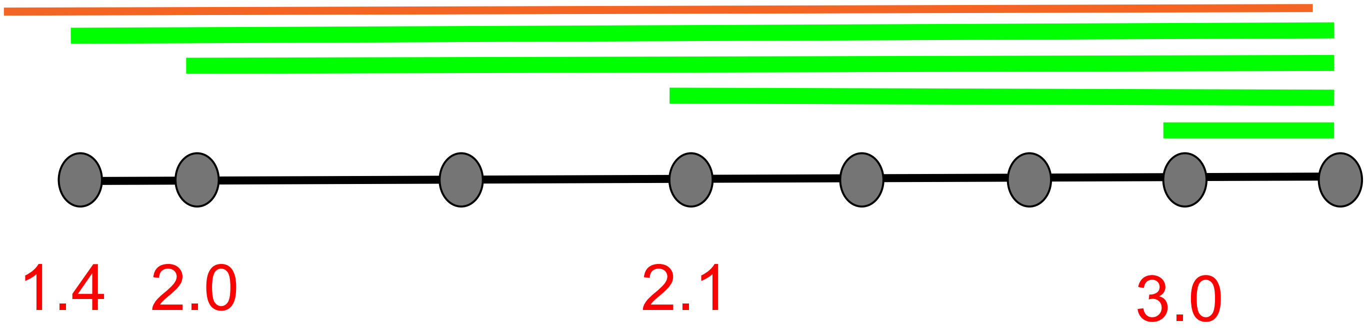
Difference is "technical lag" with "gold standard"



How to measure difference

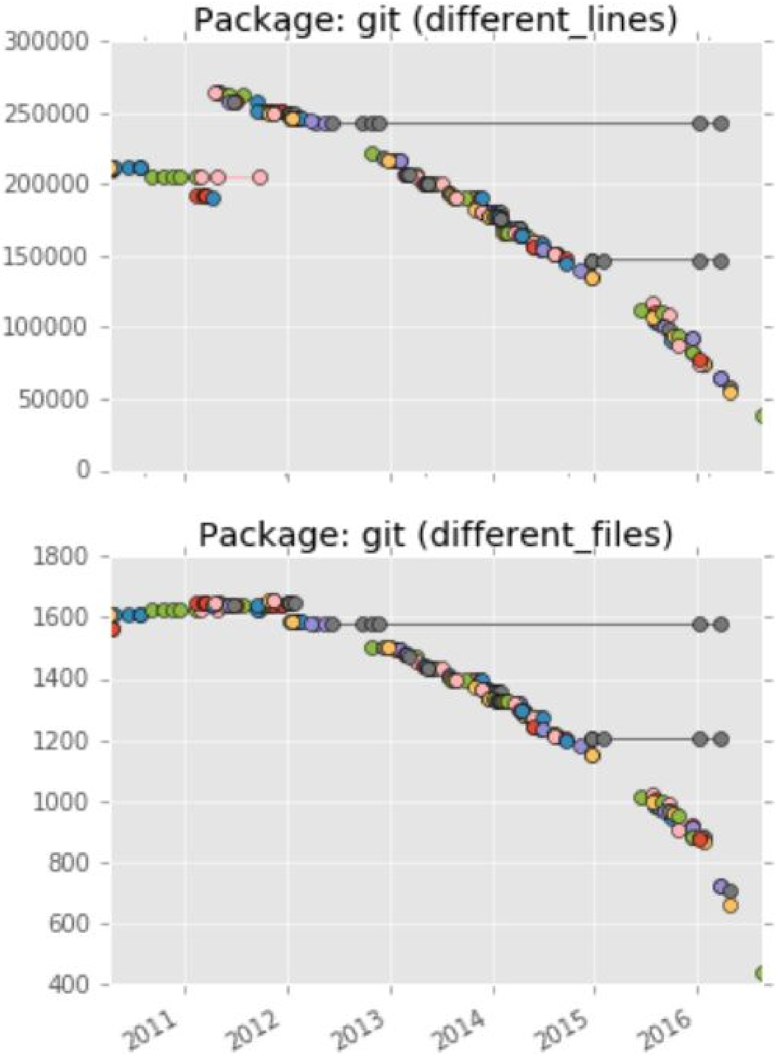


Lines of code
Number of functions, classes
Number of bugs fixed
Number of security bugs fixed
Number of issues closed
Time for benchmark runs
Unit test coverage
Results in integration tests

...

Current results

Debian Git releases, lag in November (lines, files)



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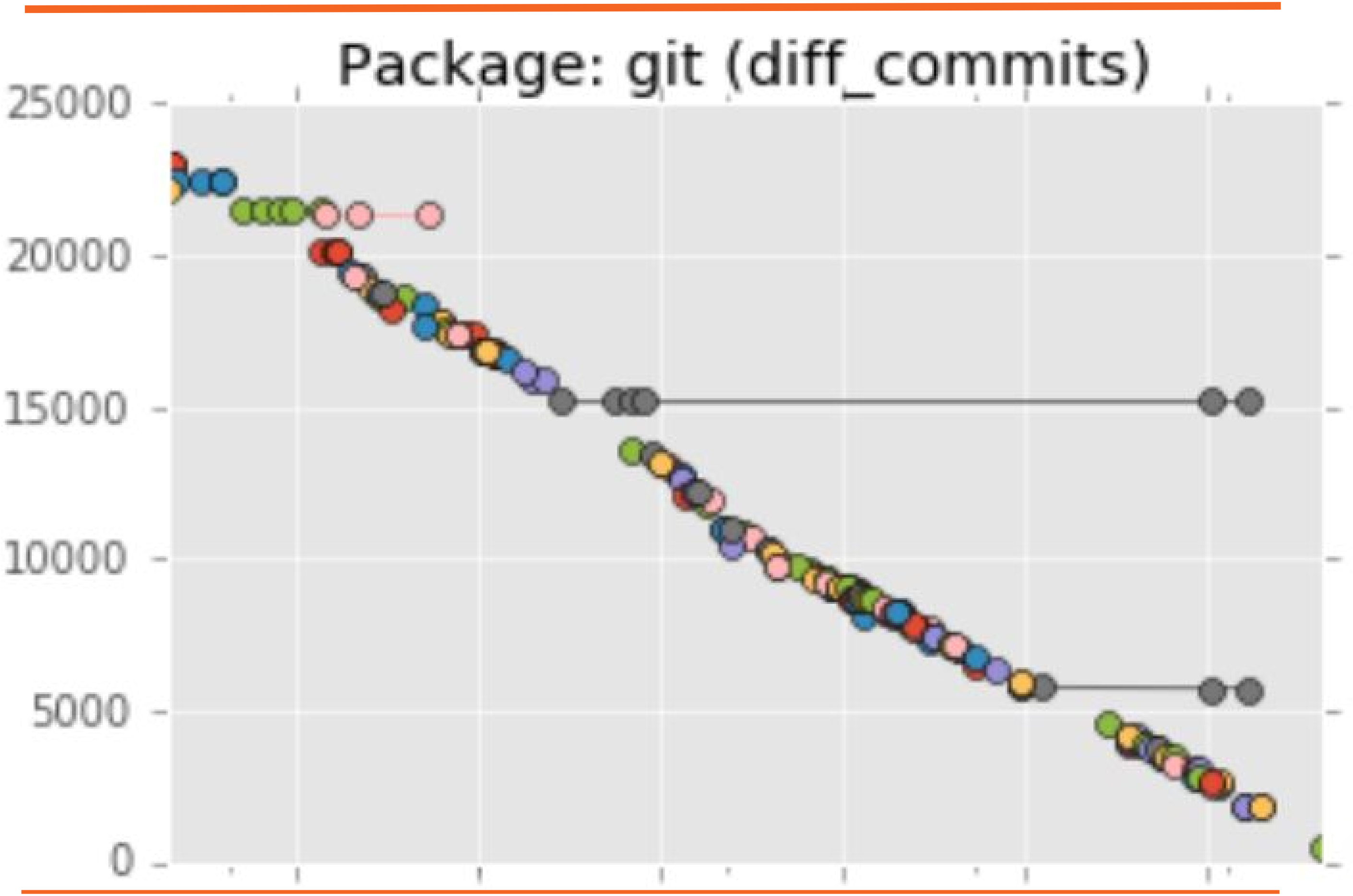
Debian Git releases, lag in Nov. (commits)



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Normalized effort (in days)

For each developer:
number of days with at least one commit

For a project:
sum for all developers

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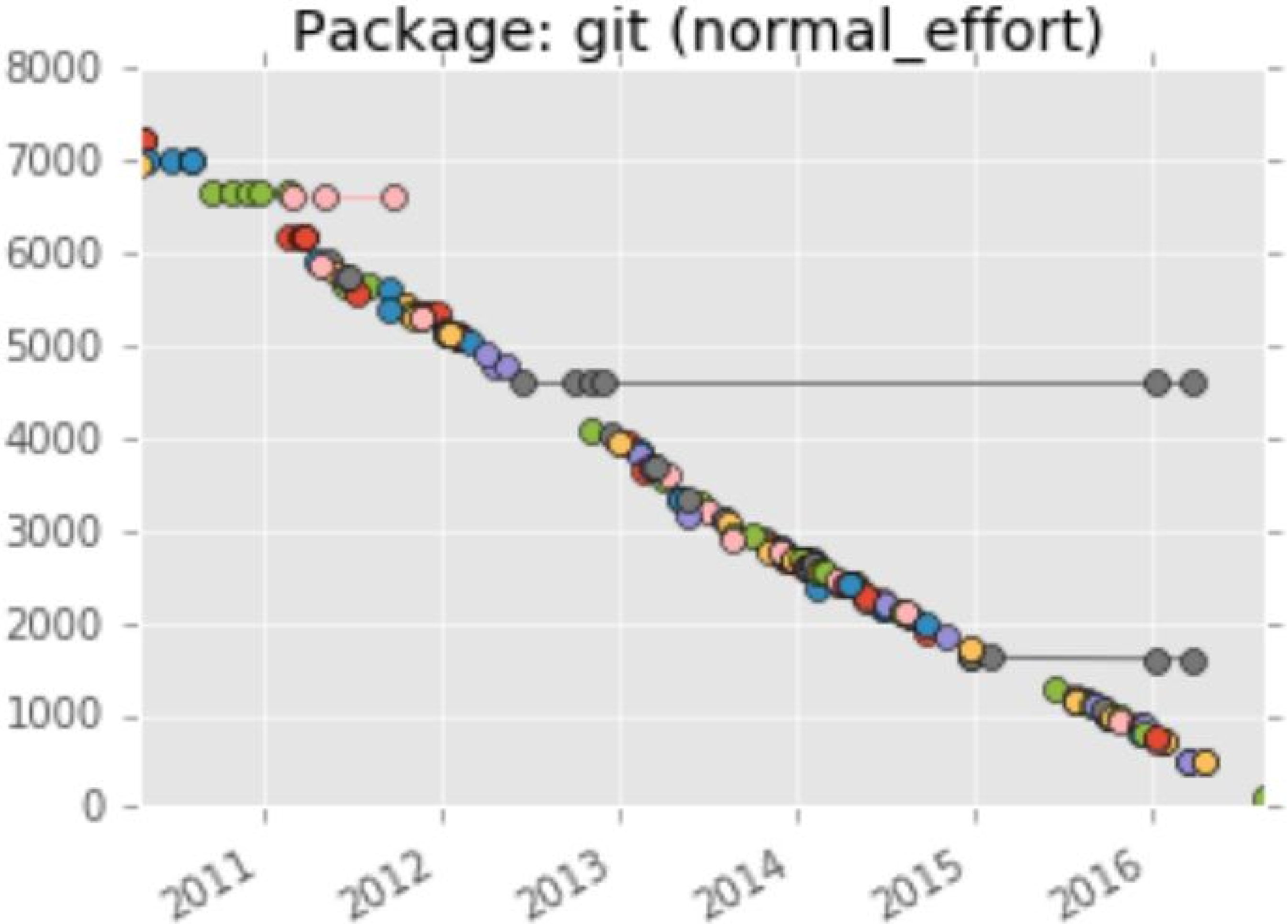
Debian Git releases, lag in Nov. (normalized effort)



Next steps

Application to many domains

Debian packages in a virtual machine

Python pip packages in a deployed container

JavaScript npm modules in a web app

Yocto packages in an embedded system

Definition of details, according to requirements

Different "golden standards"

Different metrics for lag

Different aggregations

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Software for automated computation of lag per component (and dependencies?)

Credits

Images

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