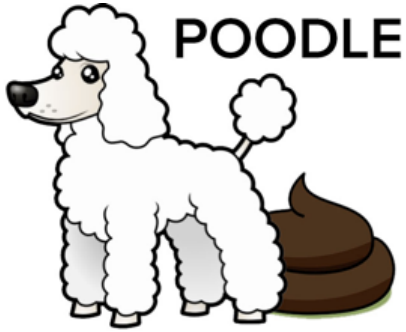
Here's where we are with open source security

… and here's what we need to do about it

Nicko van Someren, Core Infrastructure Initiative

2014 was a bad year for FOSS security

Shellshock

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Core Infrastructure Initiative Mission

- The CII aims to substantially improve security outcomes in the FOSS projects that underpin the Internet
- The CII funds work in security engineering, security architecture, tooling, testing and training on key FOSS projects, as well as supporting general development on security-specific projects (such as crypto libraries)

Security Is Hard For Open or Closed Source - These Are Complex Systems

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FOSS Security Is Different

FOSS is not more or less secure, but it ***is*** different

- Typically there are many more people contributing
- Sometimes (often?) there is a culture of “code is more important than specification”
- Processes are often more ad hoc
- There may be less market pressure to put security first

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What if you don’t have enough eyeballs?

Where is FOSS security in 2016

- Things are better than 2014

  … but we still have a long way to go
- Heartbleed, Shellshock, Poodle, ntpd DDoS etc. were a wake-up call to the open source projects as well as for users and the technology industry
- Security has become a higher priority for many projects

The state of affairs is still highly variable

- Some projects have excellent security process and outcomes
- Many are OK
- Some are terrible

- Quite a lot simply don’t have anyone working on them

Identifying potential sources of risk

- Orphan code in deployment is a problem
  - Ubuntu has nearly 50,000 packages recursively dependent on zlib; the last release was in 2013
- Some projects have higher bug densities than others
- Code that runs with privileges is potentially more dangerous
- Code in memory-unsafe languages is more prone to certain types of dangerous bug

Identifying at risk projects

Census Results

Title	Risk index	CVE count	Contributor Count	Popularity
libexpat1	13	5	10	174,625
procmail	13	2	4	153,379
unzip	13	5	2	137,931
libpcre3	12	6	4	174,907
locales	12	47	12	174,513
multiarch-support	12	47	12	148,819
rsync	12	3	15	102,393
bsd-mailx	12	1	1	151,075
libc-bin	12	47	12	168,914

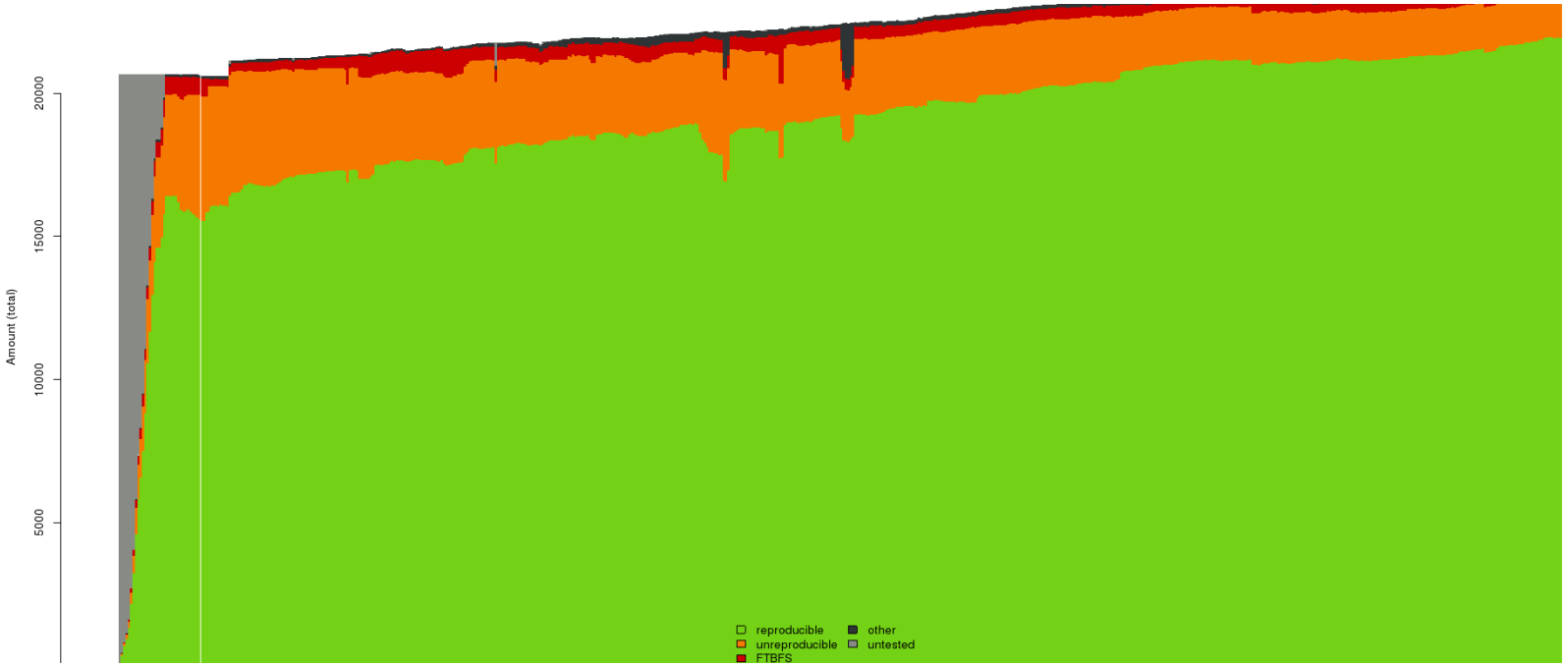
Making progress

- Direct investment has improved bug security process and security outcomes in many projects:
  - OpenSSL, GnuPG, OpenSSH and many more
- NTPSec fork has removed 75% of the code in ntpd without compromising the functionality
- Census project has allowed us to identify and target packages that are at risk
- Reproducible builds is allowing users to check binaries
- Badging has improved security process in 100s of projects

The impact of the CII

- The CII has directly invested in dozens of projects
  - Typical distributions have 20,000+ packages
  - We are only scratching the surface in direct investment
- Some of our projects have very wide reach
  - The Fuzzing Project has tested and reported bugs on hundreds of projects
  - Reproducible Builds has tested ALL 23,931 Debian ‘testing’ source packages

Reproducible Builds: Debian at 91.5%



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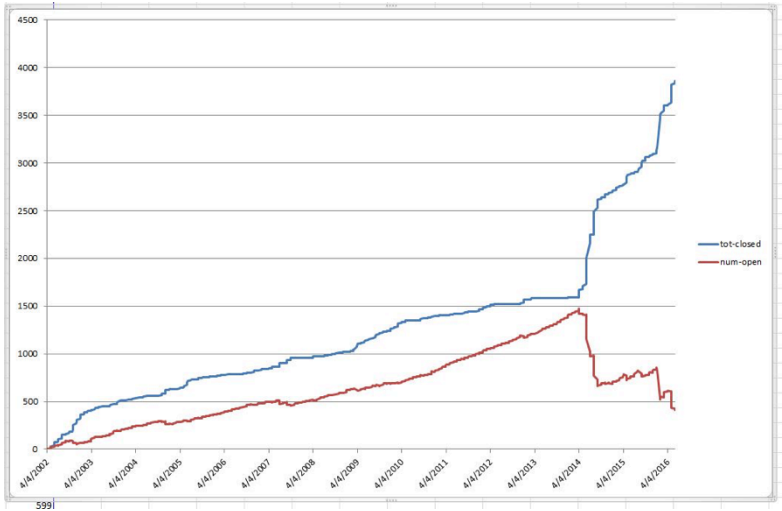
Successes with OpenSSL Governance

- Bugs are found faster **and** closed faster
- More progress on security roadmap items
- New release policies mean security updates are being deployed more quickly

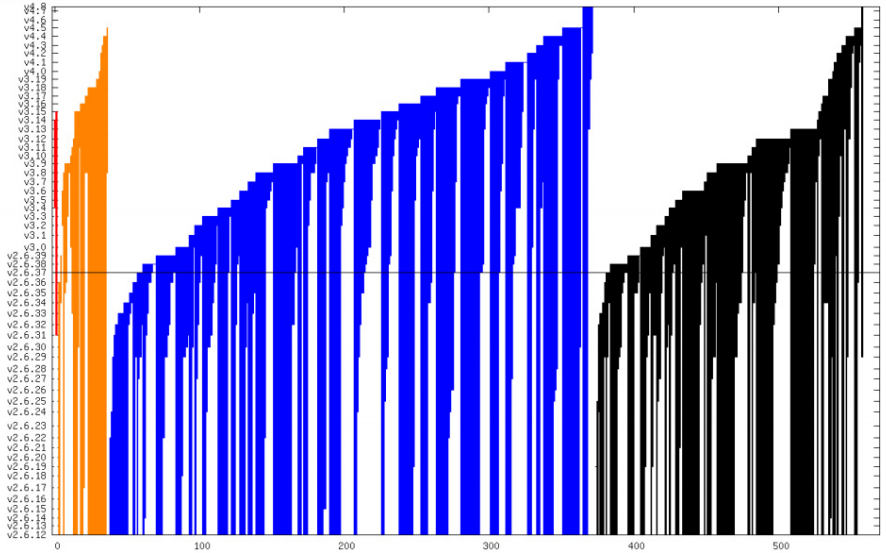


Where do we go next?

- Many bugs are staying unfixed for too long
- Many projects still resist any security improvements that impact performance
- Still too much orphan code in use

Kees Cook's Linux bug time line

Critical and high-severity security bugs in the upstream kernel have lifespans from 3.3 to 6.4 years between commit and discovery.



A cost worth paying

- Many of the well known and well understood ways to mitigate against the impact of security vulnerabilities have performance costs
- Deploying techniques for isolation and self-protection can significantly reduce the risk of harm from whole classes of bug, not just from individual, identified bugs
- Projects (and users) need to realise that these costs are worth paying

Security is a process, not a product

- Projects like the CII Best Practice Badge have been encouraging projects to think more about their security process
- Even mature, well-run projects have been benefitting
- This requires buy-in from the whole project community

Scaling up the impact of the CII

- Tools for testing
  - OWASP ZAP
- Tools for assessment
  - Fuzzing
- Tools for promoting best practices
  - Badging
- Tools for training

The future of FOSS security

- Need to win hearts and minds
- No one size fits all

- Find the projects that matter
- Assess their status
- Work out what they need
- Provide it

Conclusions

- In short, things are getting better but we still have a long way to go
- If Open Source software is to become the dominant force in corporate IT then security ***must*** be a core selling point
- Security ***must*** be something that projects thing about early and often and they ***must*** be willing to prioritise it as highly as other features

Thank you.

https://www.coreinfrastructure.org