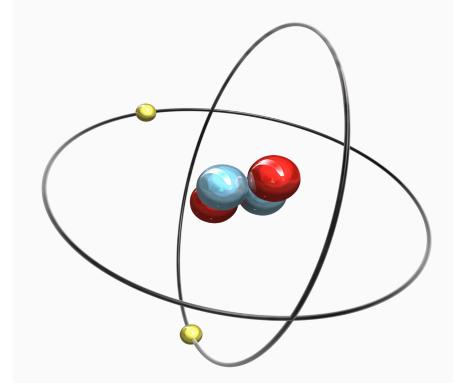
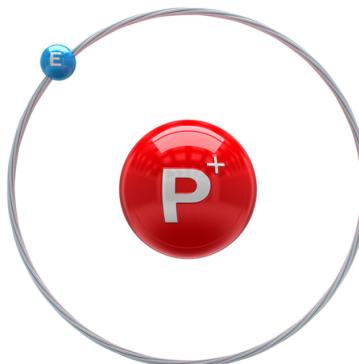




# Learnings from Hydrogen and What's Next for OpenDaylight



David Meyer

CTO and Chief Scientist, Brocade

[dmm@{brocade.com,uoregon.edu,cs.uoregon.edu,1-4-5.net,...}](mailto:dmm@{brocade.com,uoregon.edu,cs.uoregon.edu,1-4-5.net,...})

[@ twitter](https://twitter.com/dmm613)

# Universal Laws, Architecture, and the Hidden Nature of Complexity (and what does this have to do with SDN?)



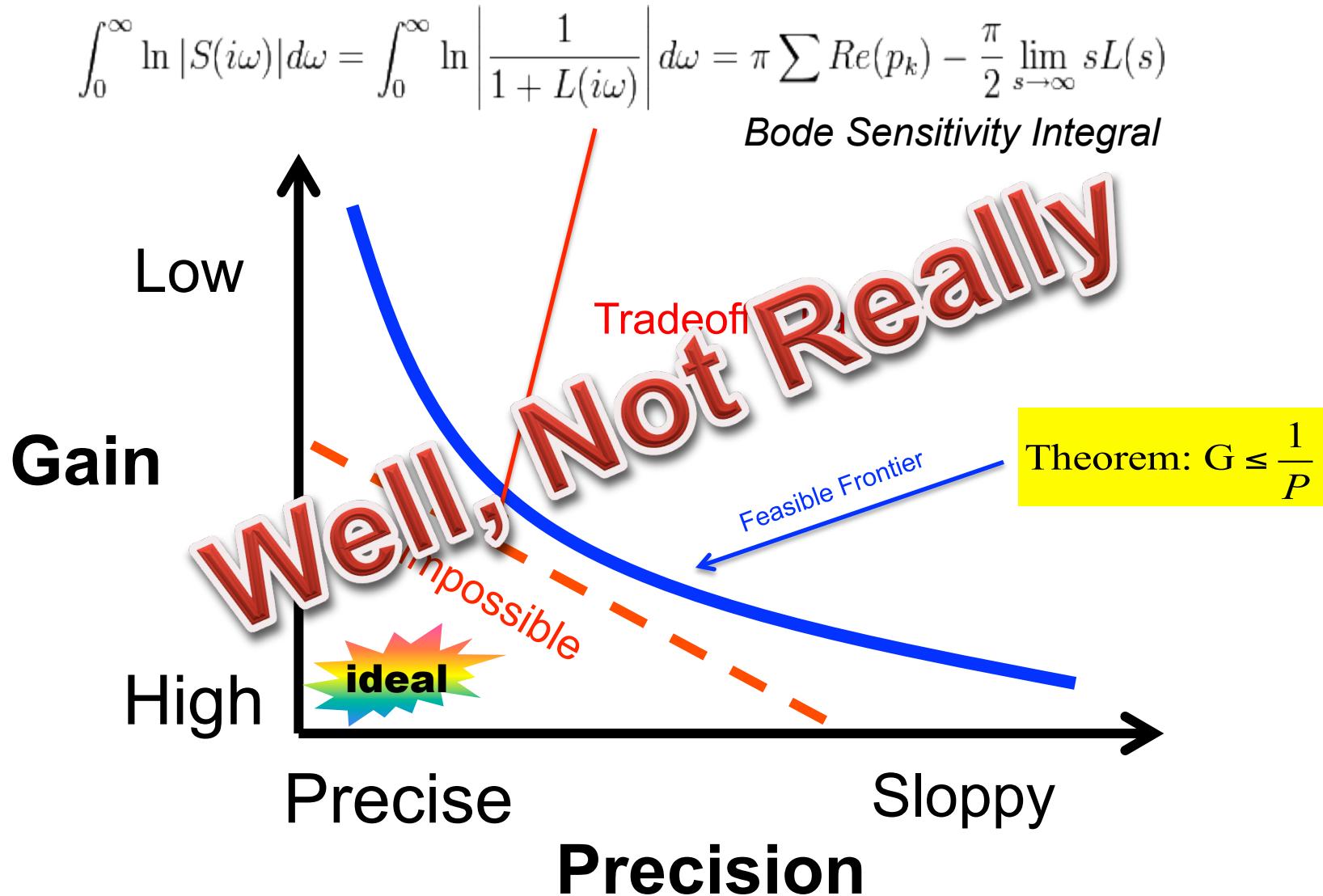
Just Kidding

$$\int_0^\infty \ln |S(i\omega)| d\omega = \int_0^\infty \ln \left| \frac{1}{1 + L(i\omega)} \right| d\omega = \pi \sum Re(p_k) - \frac{\pi}{2} \lim_{s \rightarrow \infty} sL(s)$$

David Meyer  
CTO and Chief Scientist, Brocade  
Director, Advanced Technology Center, University of Oregon  
Senior Research Scientist, Department of Computer Science, University of Oregon  
[dmm@{brocade.com,uoregon.edu,cs.uoregon.edu,1-4-5.net,...}](mailto:dmm@{brocade.com,uoregon.edu,cs.uoregon.edu,1-4-5.net,...})  
[http://www.1-4-5.net/~dmm/talks/macro\\_trends\\_complexity\\_and\\_sdn.pdf](http://www.1-4-5.net/~dmm/talks/macro_trends_complexity_and_sdn.pdf)

# Gain/Sensitivity Tradeoff In Feedback Control

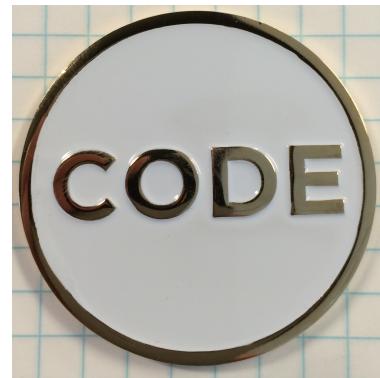
(understanding this is going to wind up being critically important for SDN)



# Agenda

- Key Personal Learnings from a Year Inside ODP
- Quick Level Set: What is Hydrogen
- A Few Hydrogen/ODP Metrics
- What Is Queued up for “Helium”
- Where we’re going

# Key Learnings (at least for me)



- ***Community building*** is a core objective
- ***Code*** is the coin of the realm
- ***Engineering systems*** are as important as artifacts

*Putting this all Together →*

# Engineering artifacts are *no longer* the source of sustainable advantage and/or innovation



Perhaps surprisingly, the “hyper-scale” and open source communities have taught me that actual artifacts (in our case network applications as well as HW/SW) are ephemeral entities and that the only source of sustainable advantage/innovation consists of

- Engineering Systems<sup>1</sup>
- Culture
- People/Process
- Multi-disciplinary Approaches

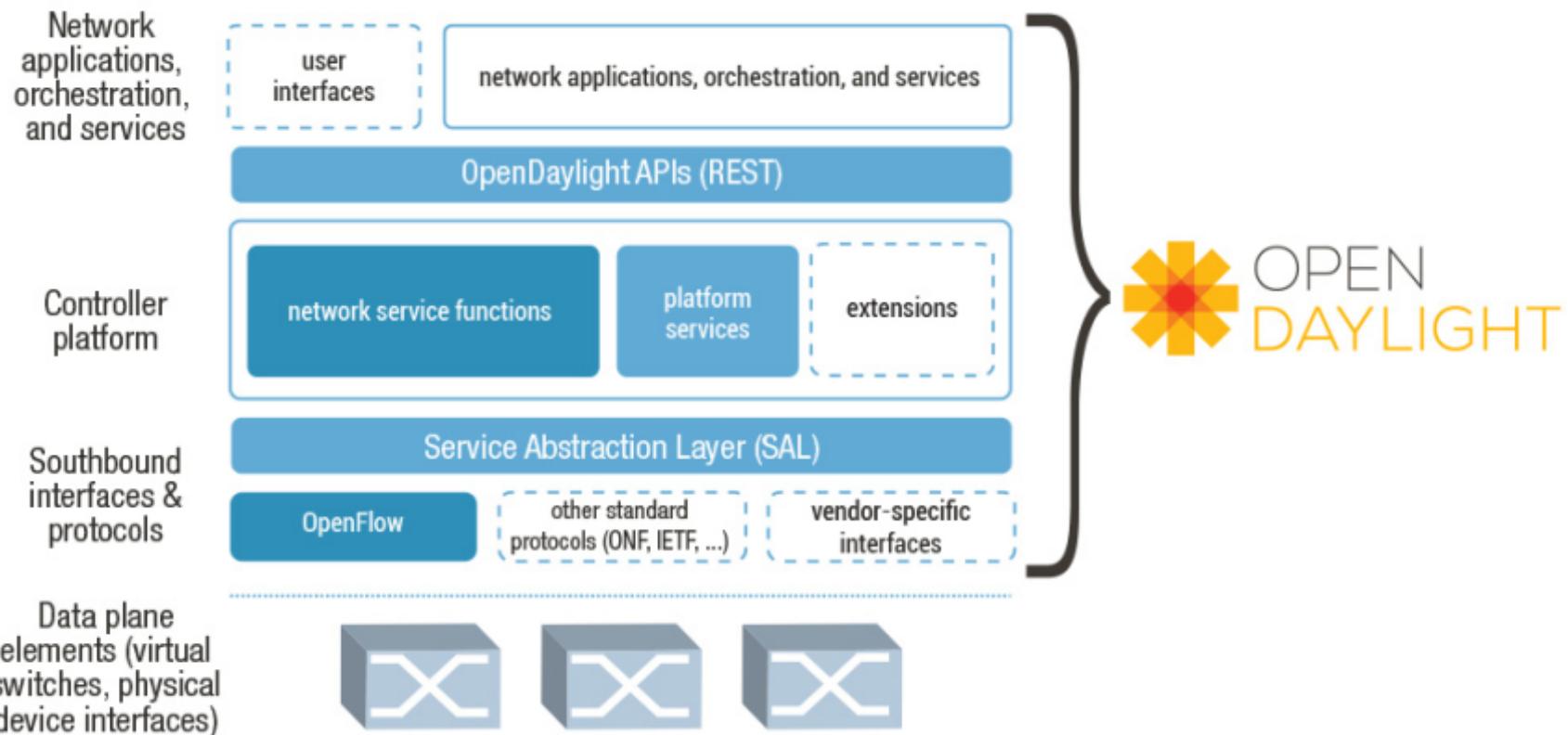
<http://en.wikipedia.org/wiki/Aeroelasticity - Flutter>

<sup>1</sup> Note that our *Engineering Systems* evolve using the same mechanisms that are used to build artifacts. This is architecturally analogous to Horizontal Gene Transfer (HGT) and the acquisition of anti-bacterial resistance in the bacteria biosphere; the same mechanisms used to create the artifact (plasmid) are used to evolve the “Engineering System” (transcriptional network). Consider: Horizontal Application Transfer?

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# Quick Level Set



# Simultaneous Release Plan

Milestone	Offset 0 Date	Offset 1 Date	Offset 2 Date	Events
M0	6/24/2013	6/26/2013	6/28/2013	Simultaneous Release Open
M1	7/22/2013	7/24/2013	7/26/2013	1. Projects must have declared intent to participate in Simultaneous Release 2. Participating Projects must have published a candidate Release Plan for public comment
M2	8/19/2013	8/21/2013	8/23/2013	Participating Projects must have declared their final Release Plan
M3	9/16/2013	9/18/2013	9/20/2013	Latest possible Continuous Integration Test Start
M4	10/14/2013	10/16/2013	10/18/2013	1. API Freeze 2. Latest possible Continuous System Test Start
M5	11/11/2013	11/13/2013	11/15/2013	Code Freeze (bug fixes only from here) String Freeze (all internationalizable strings frozen to allow for translation) Latest possible date for commencing User Facing Documentation
RC0	11/18/2013	11/20/2013	11/22/2013	
RC1	11/25/2013	11/27/2013	11/29/2013	
RC2	12/2/2013	12/4/2013	12/6/2013	Participating Projects must hold their Release Reviews, including User Facing Documentation.
Formal Release	12/9/2013			

Well



# What Hydrogen Delivered

- OpenDaylight is multi-project
  - 14 projects
  - Project diversity v. mono-culture
- *Simultaneous Release*
- Release Date: Dec 9, 2013 ~ Feb 03 2014
- Various Issues/Learnings

# Impressive List of Projects in H<sub>2</sub>

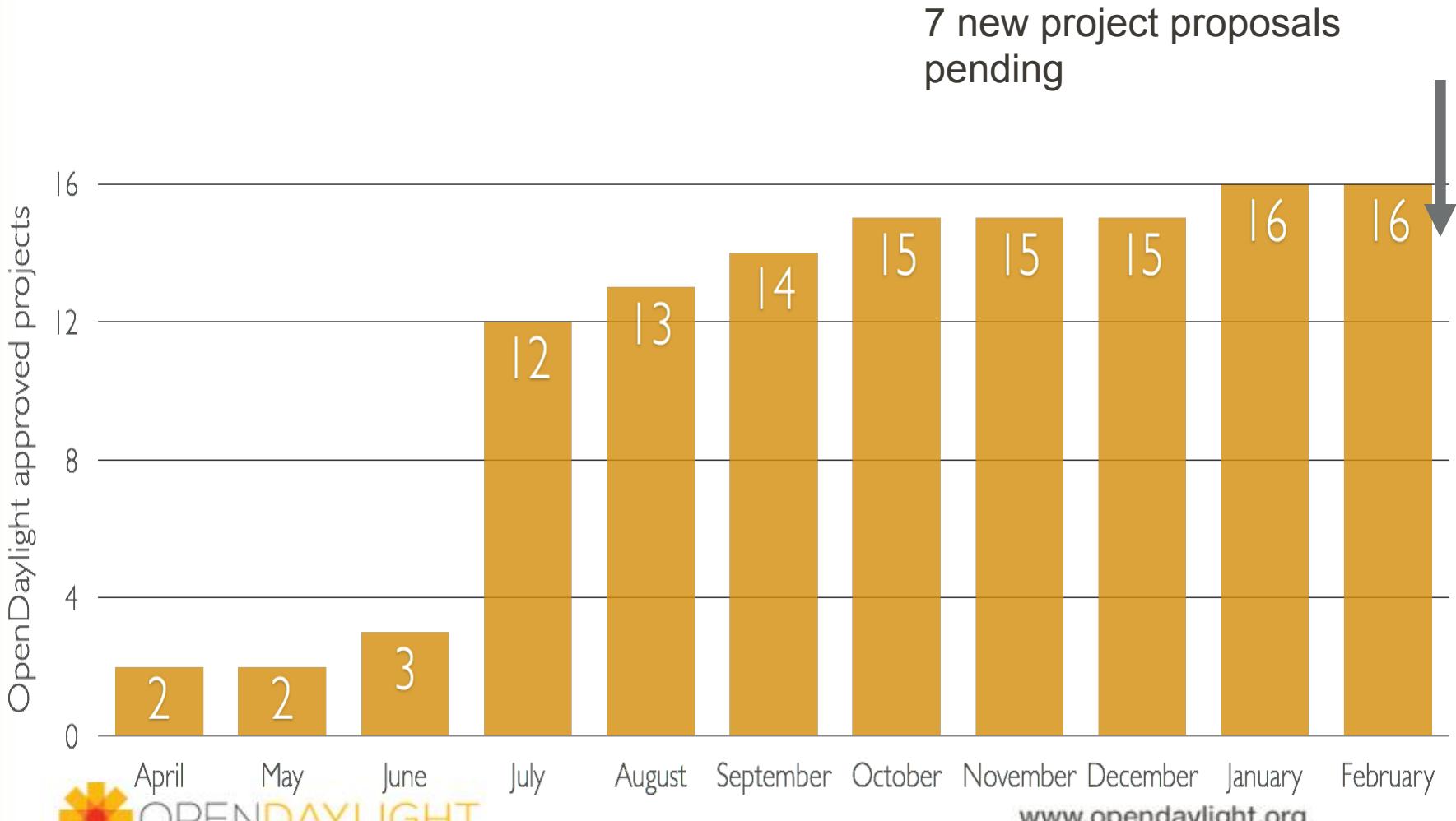
- [Controller](#)
- [VTN](#)
- [OpenDove](#)
- [Affinity Management Service](#)
- [LISP Mapping Service](#)
- [Yang Tools](#)
- [Defense4All](#)
- [BGP-LS/PCEP](#)
- [OpenFlow Protocol](#)
- [OpenFlow SB Plugin](#)
- [OVSDB](#)
- [SNMP4SDN](#)
- [DLUX](#)
- [STI](#)



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# OpenDaylight project creation



[www.opendaylight.org](http://www.opendaylight.org)

# OpenDaylight code volume ([ohloh.net](http://ohloh.net))

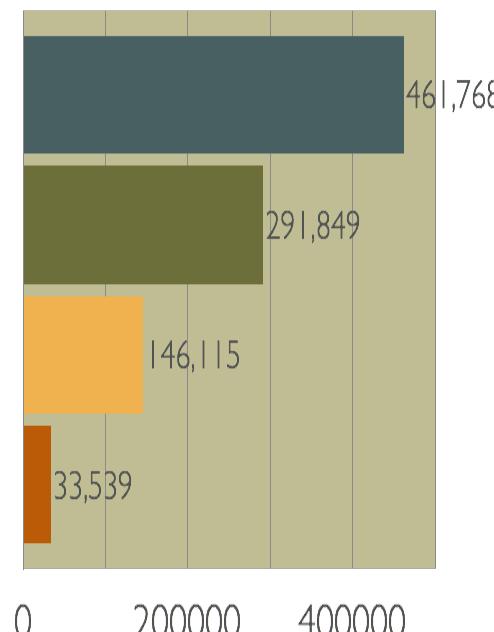
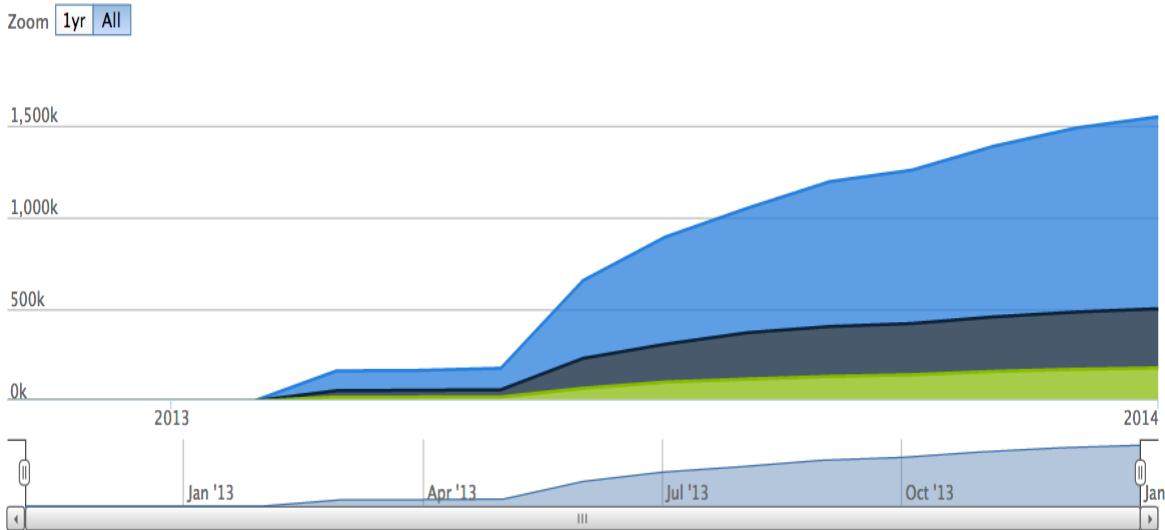


## Languages

① Analyzed 10 days ago based on code collected 12 days ago

Total Lines :	1,548,552	Code Lines :	1,045,938	Percent Code Lines :	67.5%
Number of Languages :	18	Total Comment Lines :	322,675	Percent Comment Lines :	20.8%
		Total Blank Lines :	179,939	Percent Blank Lines :	11.6%

## Code, Comments and Blank Lines



[www.opendaylight.org](http://www.opendaylight.org)

# Project comparisons ([ohloh.net](#))

## In a Nutshell, OpenDaylight...

... has had 4,759 commits made by 154 contributors representing 1,045,938 lines of code

... is mostly written in Java with an average number of source code comments

... has a young, but established codebase maintained by a very large development team with stable Y-O-Y commits

... took an estimated 292 years of effort (COCOMO model)

## Quick Reference

**Project Links:** [Homepage](#)

**Code Locations:** (14 Locations)

**Licenses:** EPL-1.0

**Similar Projects:**  CDO Model  Centreon

Re...



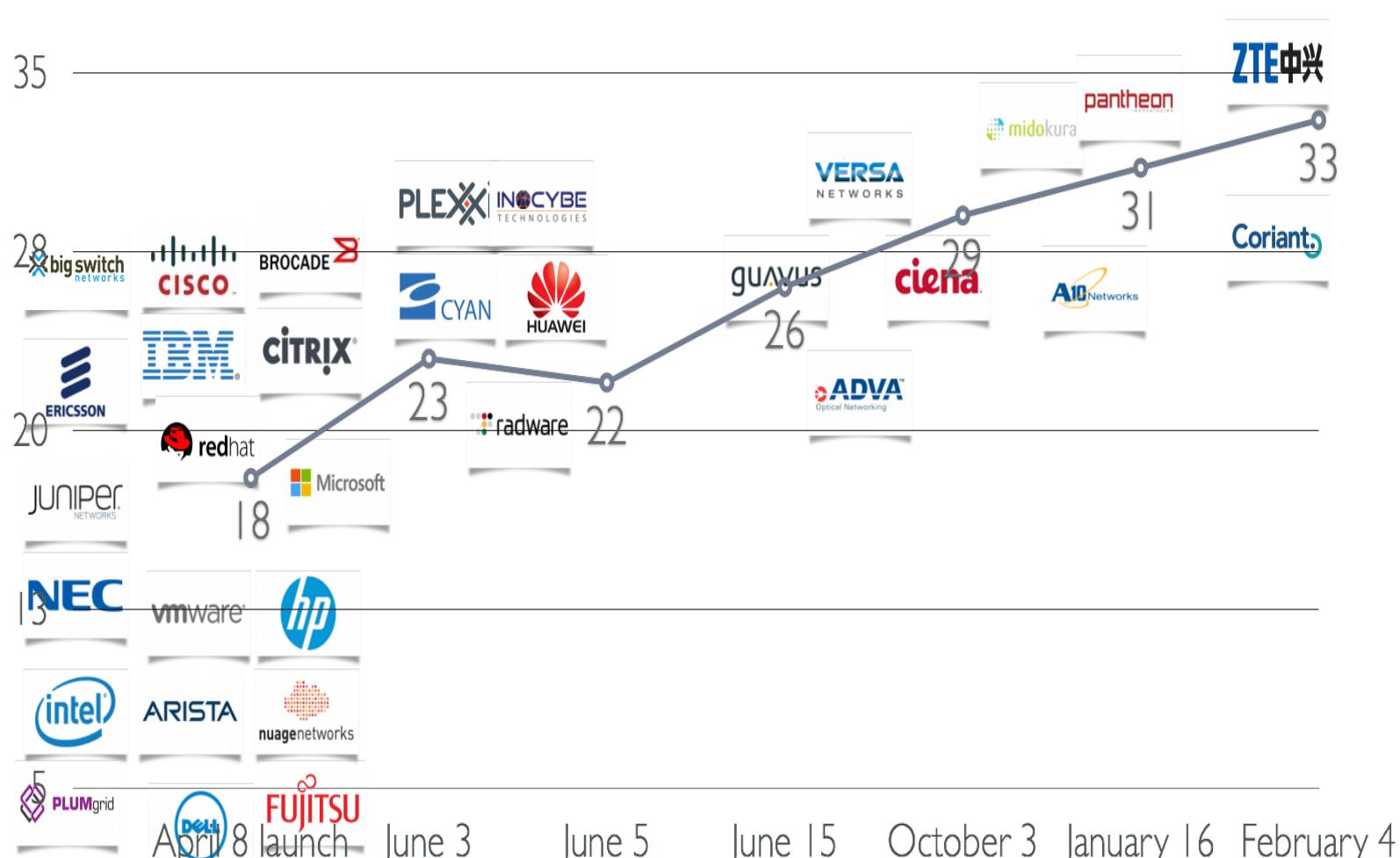
Netty  OpenNMS

**Managers:** mavenugo

	LOC	contributors
OpenStack	1.67M	1,974
CloudStack	1.5M	250
Eclipse platform	2.67M	404
OpenDaylight	1.05M	154
Floodlight	97K	52
contrail-vrouter	19K	15
contrail-controller	258K	53

[www.opendaylight.org](http://www.opendaylight.org)

# membership — who wants to play



[www.opendaylight.org](http://www.opendaylight.org)

CONEXSTREAM

QOSMOS  
Your Network is Information

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# What's in the queue?

[https://wiki.opendaylight.org/view/Project\\_Proposals:Main](https://wiki.opendaylight.org/view/Project_Proposals:Main)

- Application Policy Plugin
- DPDK vSwitch
- Python OpenDaylight Client
- Packet Cable PCMM Manager
- Dynamic Resource Reservation
- SDN Simulation Platform
- Data Persistence

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# Quasi-technical things we want to work on (necessarily incomplete list)

- Continue to build/refine our community
  - Including increasing committer diversity across the projects
  - Code Quality and Coverage
  - Distributed Systems Issues (Inifinspan)
- “Staffing”
  - Release engineering
  - Documentation
- Continue to refine our engineering systems
  - Thanks Andrew!
  - Fewer humans in the loop
- We need more code that writes code
  - MD-SAL is an example
  - Fewer humans in the loop

# And of course

- Sustaining Engineering
  - No end to the number of bugs we find
- Performance and scalability
- Again, Code Quality
- New Projects
  - I mentioned a few
  - Several others were informally proposed at the Summit



# Thanks!

