CORD and Open Source

Jim Zemlin

Friday, July 29, 2016

THE LINUX FOUNDATION

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Adorable ☑

Adorable ☑

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Genius ☑

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Doesn’t listen to Jim ☑

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Genius ☑

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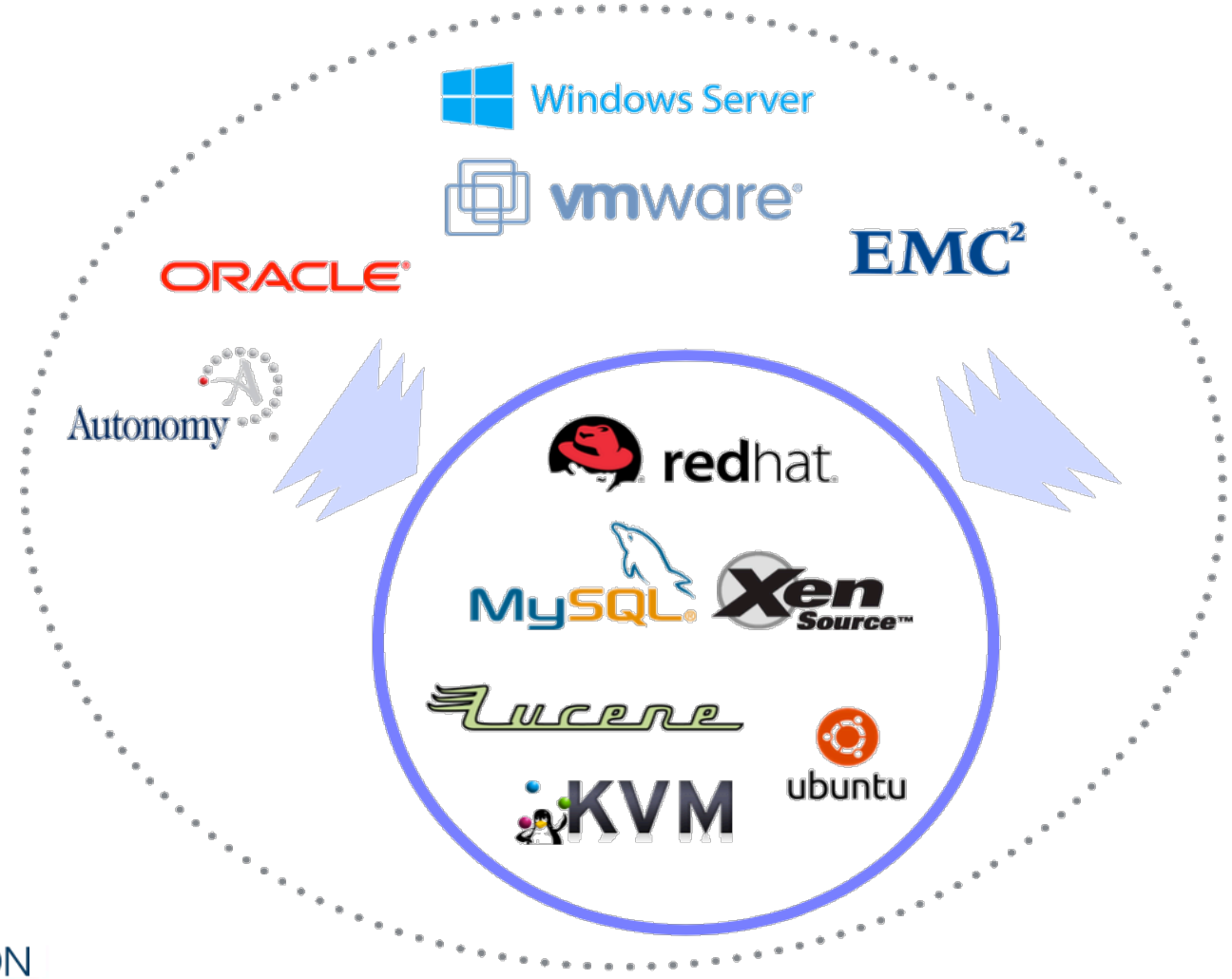
Open Source Market Conditions

First Generation: Emulating Proprietary Software, Smaller Market/Commercial Dollar Potential



Source Accel Ventures

New Generation: Novel Functionality - Creating New Value and Opening New Markets

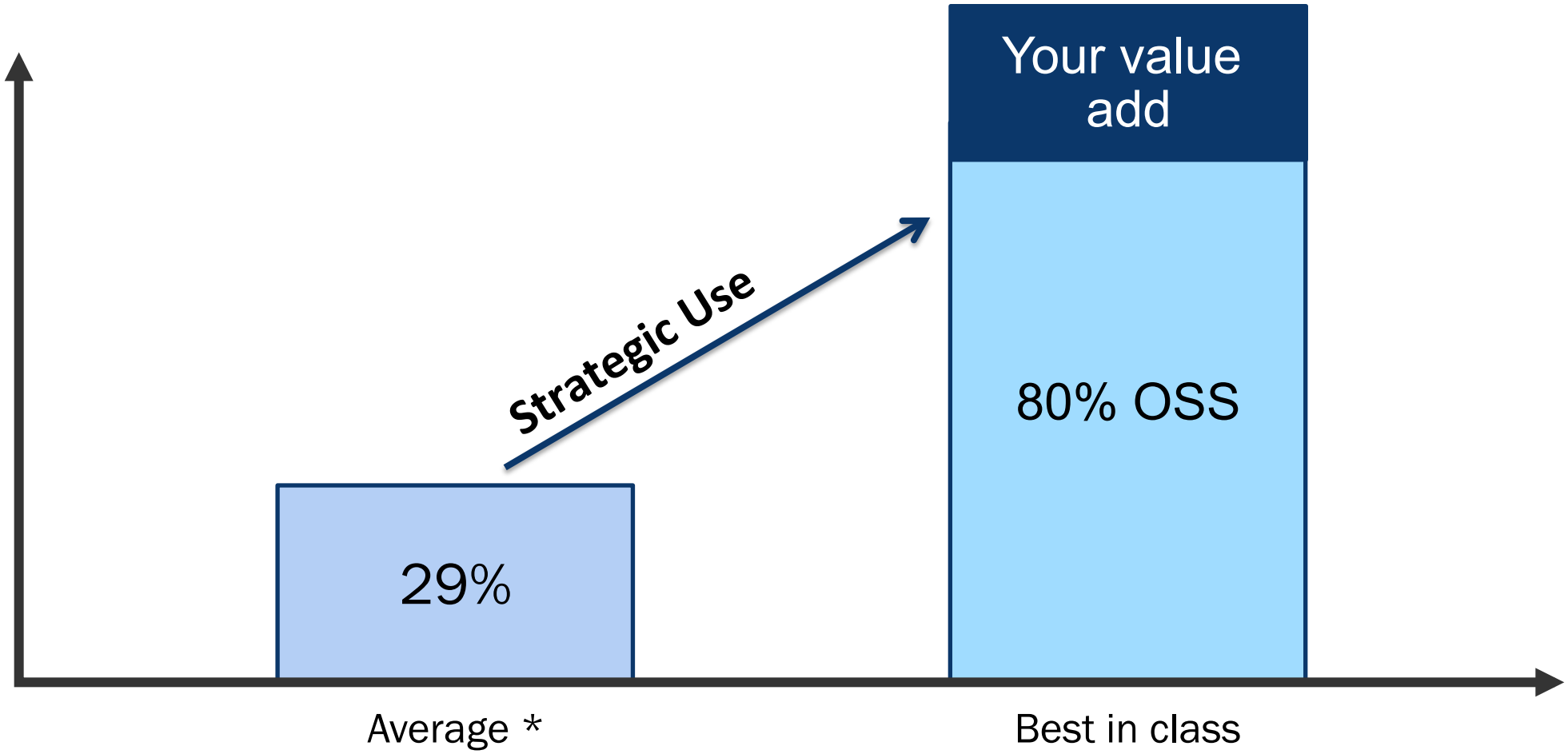
Source Accel Ventures

The move to services favors open source

For Every Dollar Spent on Amazon Web Services, at Least $3-4 are not Spent on Traditional IT.

Source: Baird Equity Research

Open Source Now Dominates ALL Code



* Source: Gartner Group

The Role of the Linux Foundation

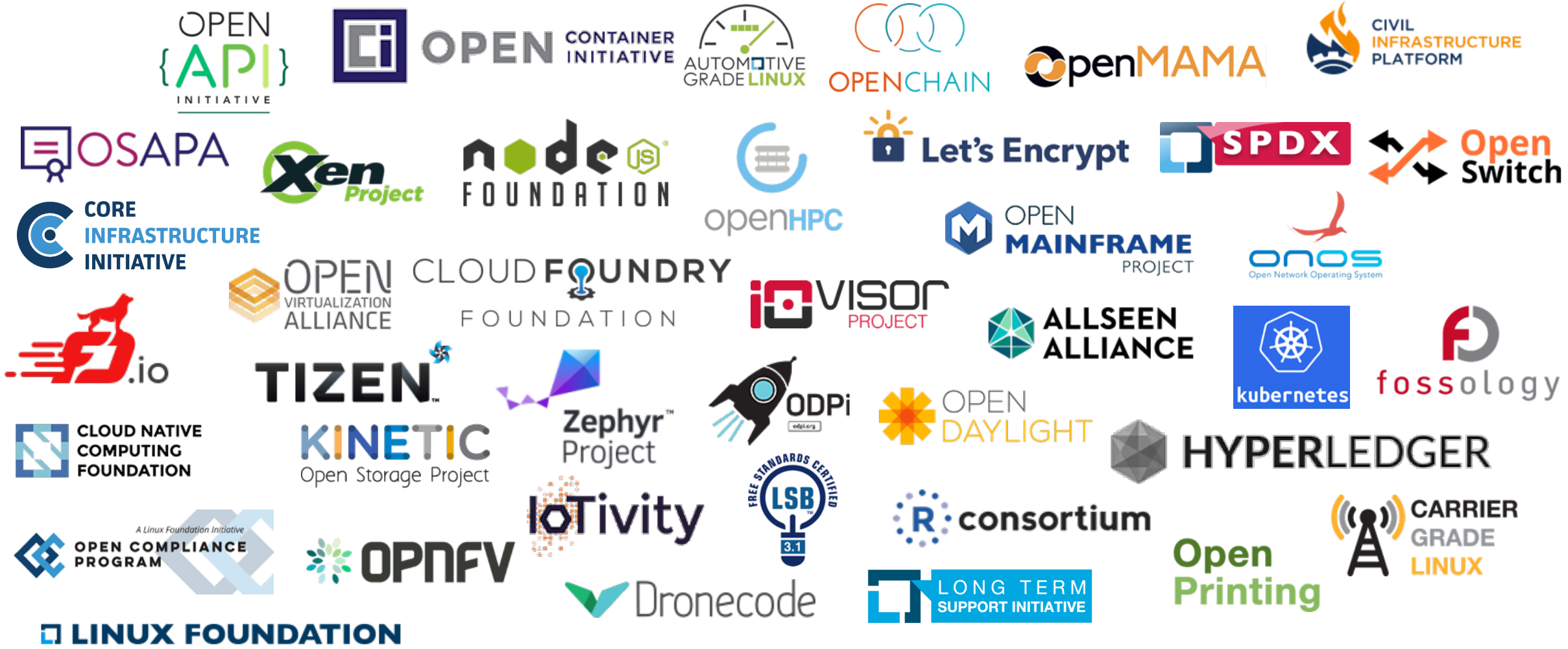
The Linux Foundation

- Home to world's largest open source project: Linux
- Over 650 members in every sector of technology
- Home to key projects in the areas of embedded systems, cloud computing, networking, storage and more
- We help individuals and industry protect and leverage their open source investment

Scalable Open Source Has a Common Set of Requirements

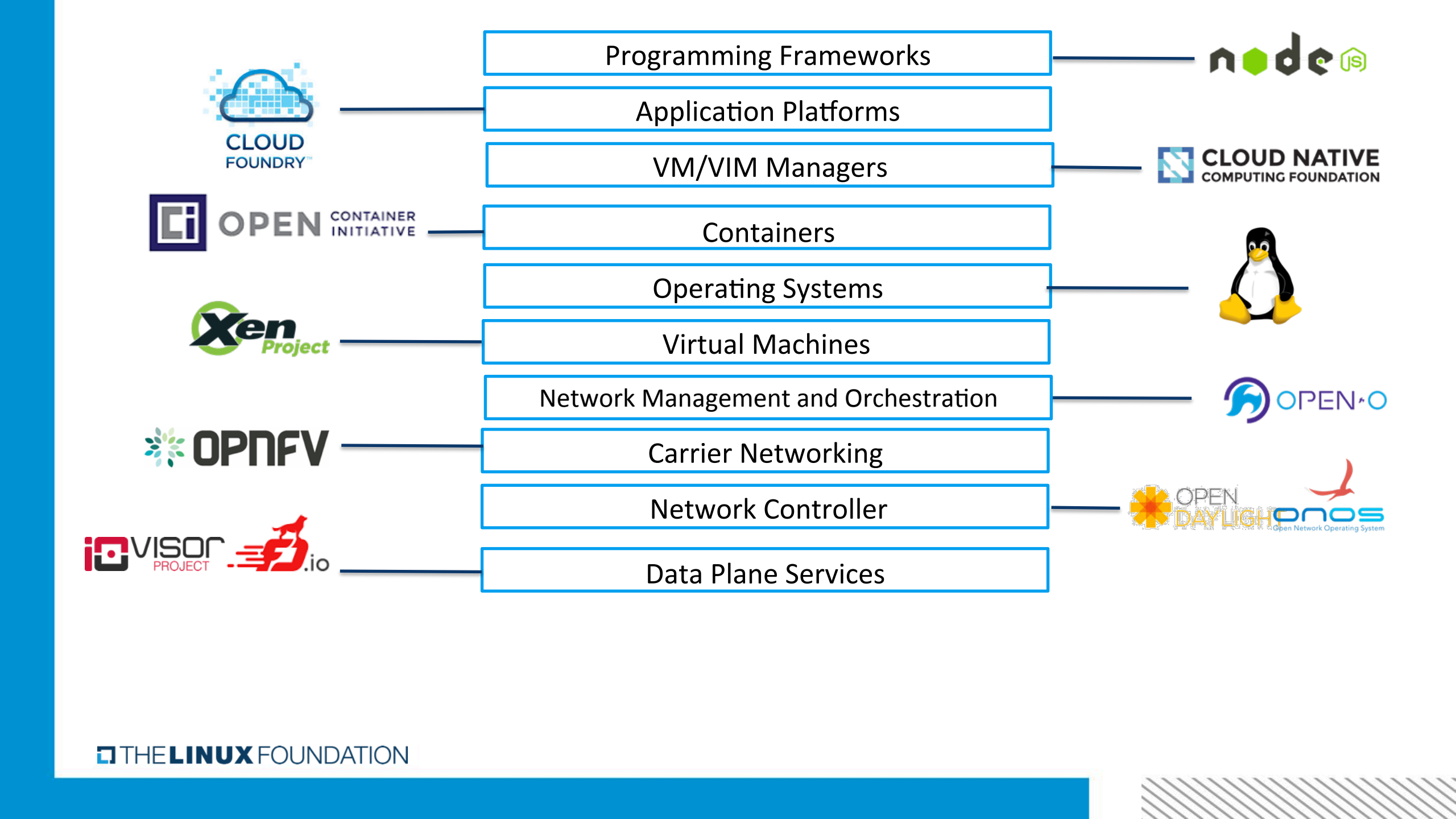
Governance and Membership	• Incorporation, Tax status, Bylaws, Member Agreements, Anti-trust, etc. • Ongoing business development and membership recruitment	
Development Process	• Technical Decision Making • Project Life Cycle	• Release Process
Infrastructure	• Custom infrastructure • Security and reliability	• Open source best practices
Ecosystem Development	• Marketing • Events	• Training • Consulting
IP Management	• Code Provenance • Trademark management • IP Policy	• Legal defense and Collaboration

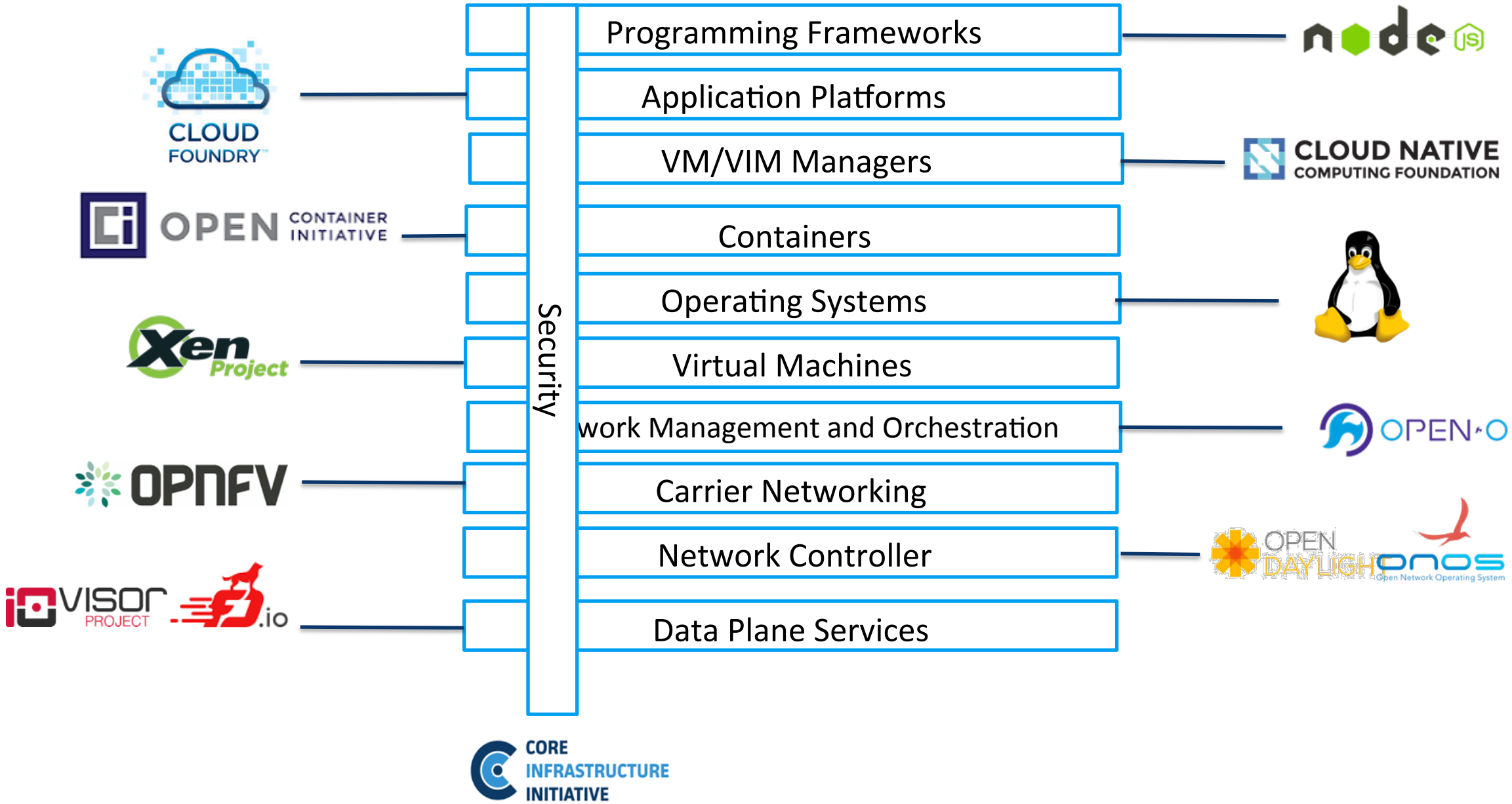
More than Linux: home to many of the largest open source projects in the world



We are Producing Real Economic Value

Just since the inception of each Linux Foundation Projecta through May 31, 2015, a **cumulative 115 million lines of code** have been added. We estimate the total amount of effort required to retrace the steps of collaborative development to be **41,192 person-years**. In other words, it would take a team of around 1,356 developers about 30 years to recreate the code base present in our projects. The value created by this work is estimated at over **$5 billion.**


Programming Frameworks
Application Platforms
VM/VIM Managers
Containers
Operating Systems
Virtual Machines
Network Management and Orchestration
Carrier Networking
Network Controller
Data Plane Services
CLOUD FOUNDRY
OPEN CONTAINER INITIATIVE
Xen Project
OPNFV
IOVISOR PROJECT
.io
node
CLOUD NATIVE COMPUTING FOUNDATION
OPEN-O
OPEN DAYLIGHT
ONOS
Open Network Operating System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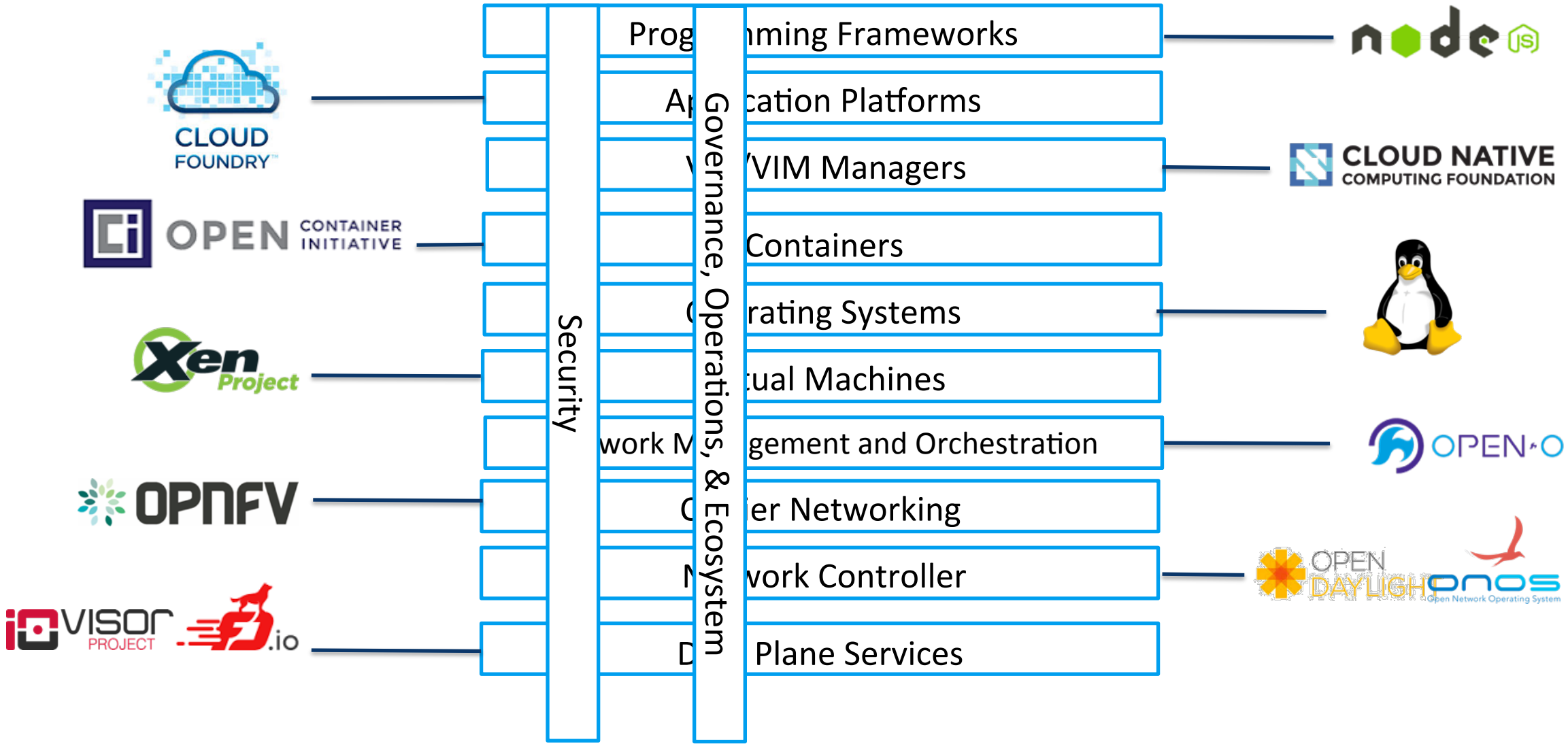
CORE INFRASTRUCTURE INITIATIVE



CORE INFRASTRUCTURE INITIATIVE

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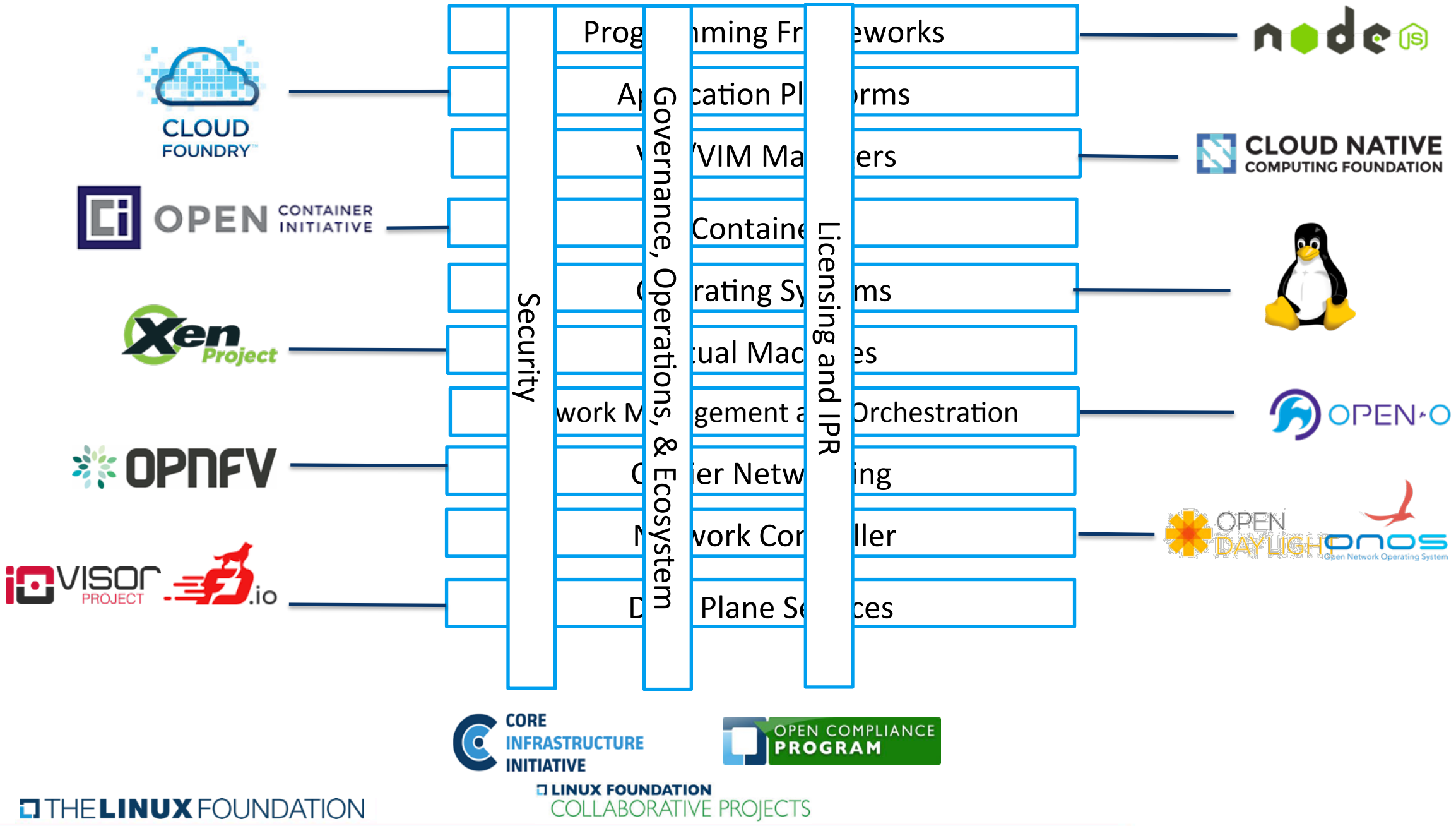
LINUX FOUNDATION COLLABORATIVE PROJECTS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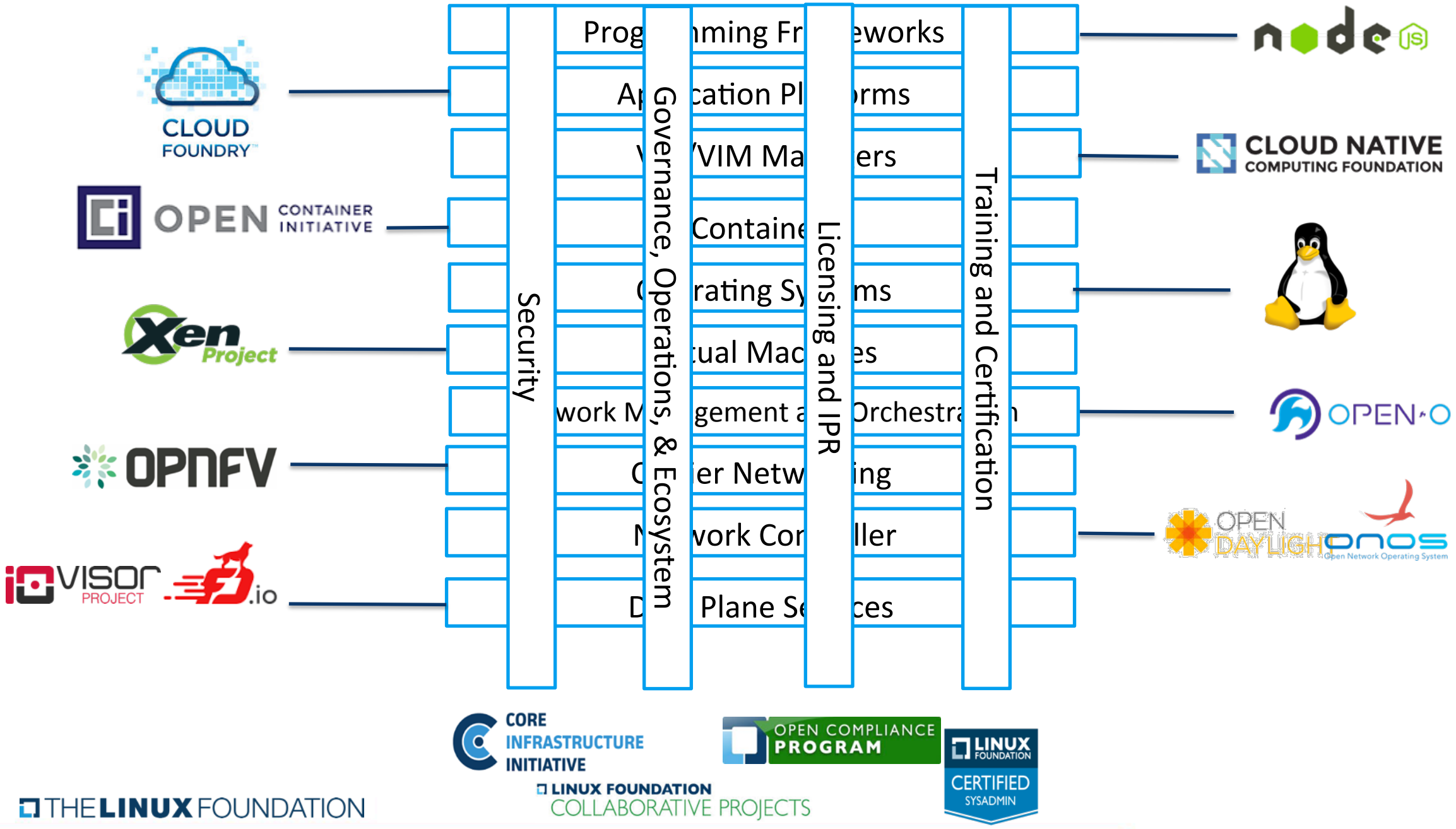
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Open Source Networking Efforts

Major Open Source Networking Efforts:

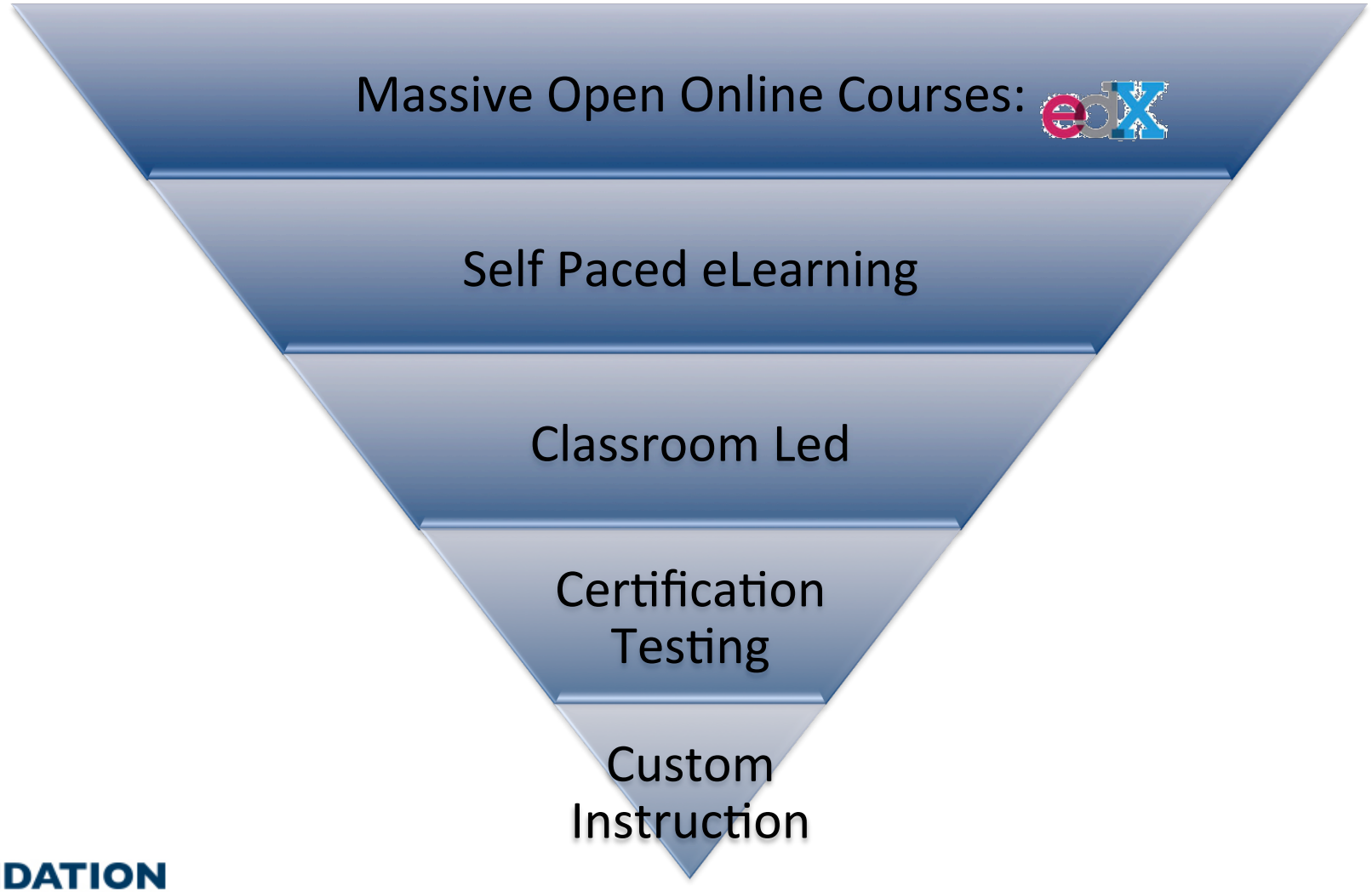
We are proud of our newest project

Our Challenges

Training will be a bottleneck

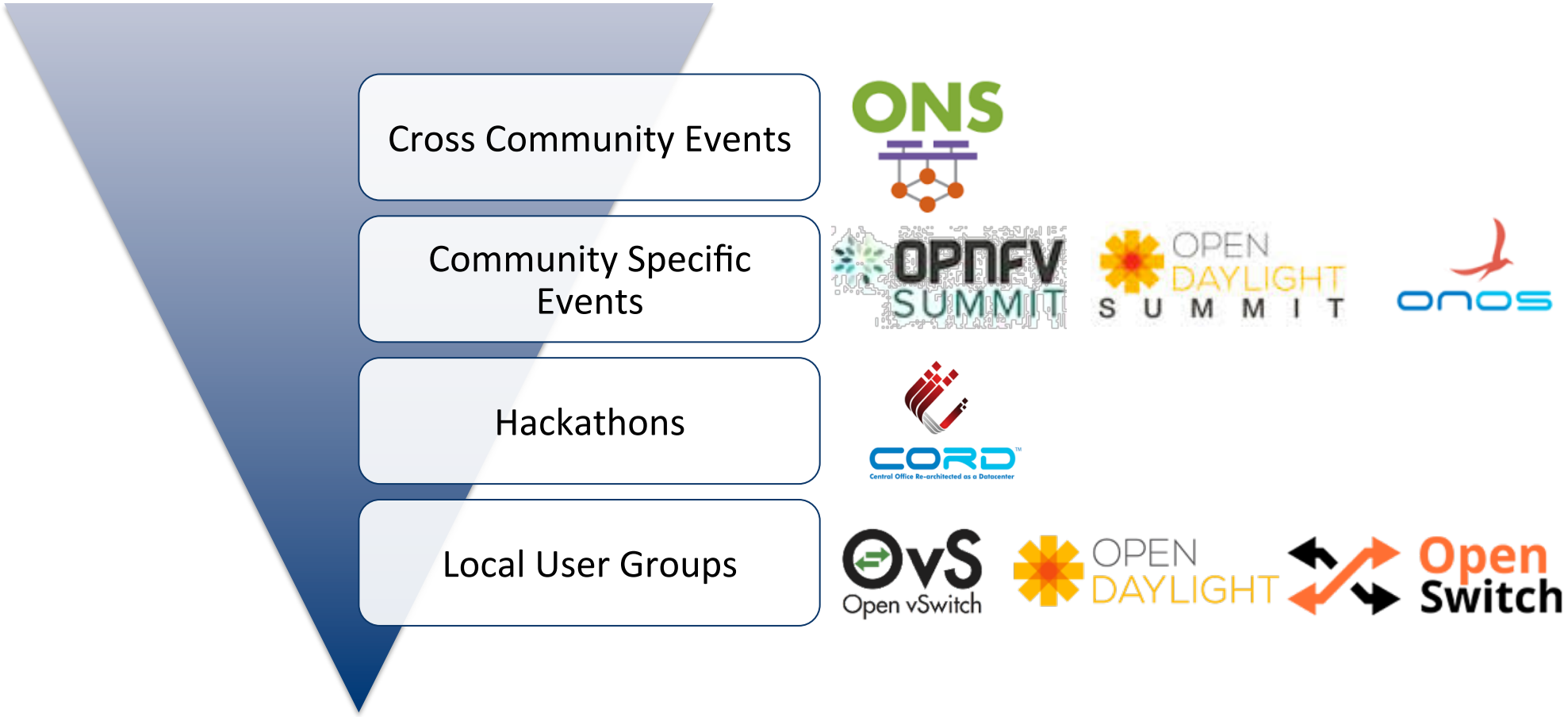
- This year code is maturing, proof of concepts are succeeding and more layers of the networking stack are open source.
- Lack of trained developers and practitioners are now a restraining factor to market adoption.
- Because we have the source code we can begin training programs now even before we see products in the market.

Filling the funnel of qualified professionals:



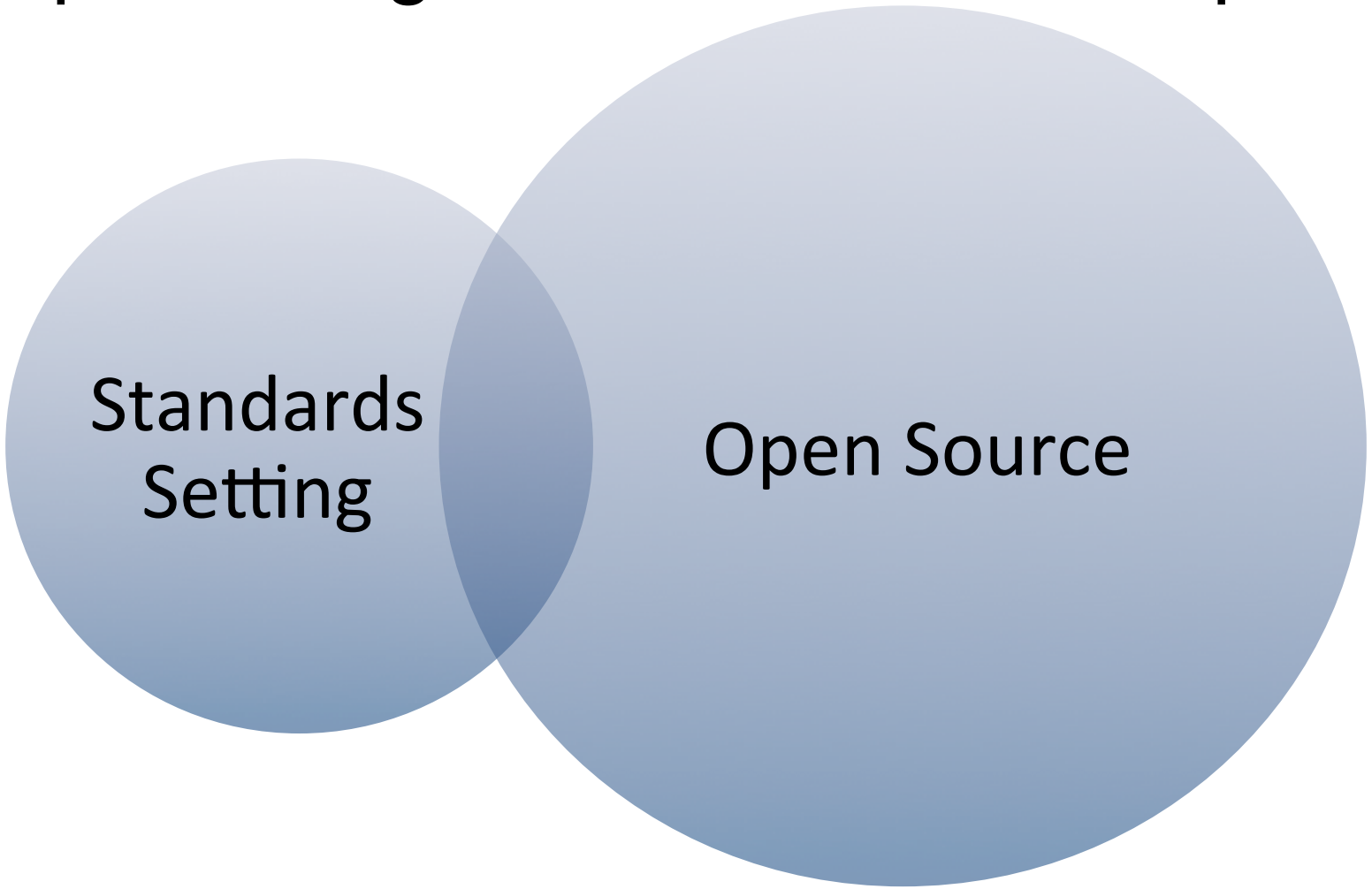
Global events also help develop an ecosystem.

Events: The open networking community must come together



Open Source and Open Standards

We continue to see a collision of standard development organization work and open source



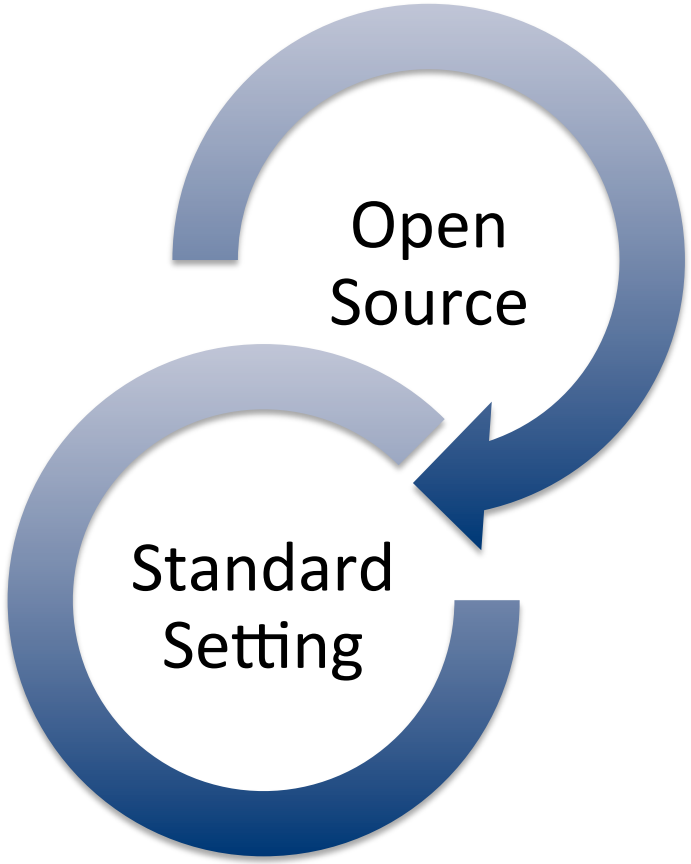
What's Going On?

- Dramatic increase in formation of highly resourced open source projects
- Fundamental shift to using open source development to solve many problems that standards used to solve
- Demands to quickly introduce products and solutions to market require working code without time to debate specifications
- Concurrent efforts continue in existing and new standards organizations (e.g., IoT, Cloud)
- Evolution of IPR rules and policies that do not optimally interface with SSO IPR rules

How Many new Tier One Projects?

Year	New Open Standards Consortia	New Major OSS Projects
2015	10	17
2014	11	8
2103	8	5
2012	8	4

Open Source and Standards Development are not mutually exclusive: they are complementary



“Open source development” according to standards professionals

“Standards development” according to open source software professionals…

Open Source projects need standards, standards need open source implementations

- Many open source projects implement standard protocols
- Many standards are implemented using open source projects
- The standards development cycle needs feedback from development/testing
- The open source community needs agreement on certain deployment options (green or red)
- Open source projects welcome architecture direction (often resolved in standards bodies)

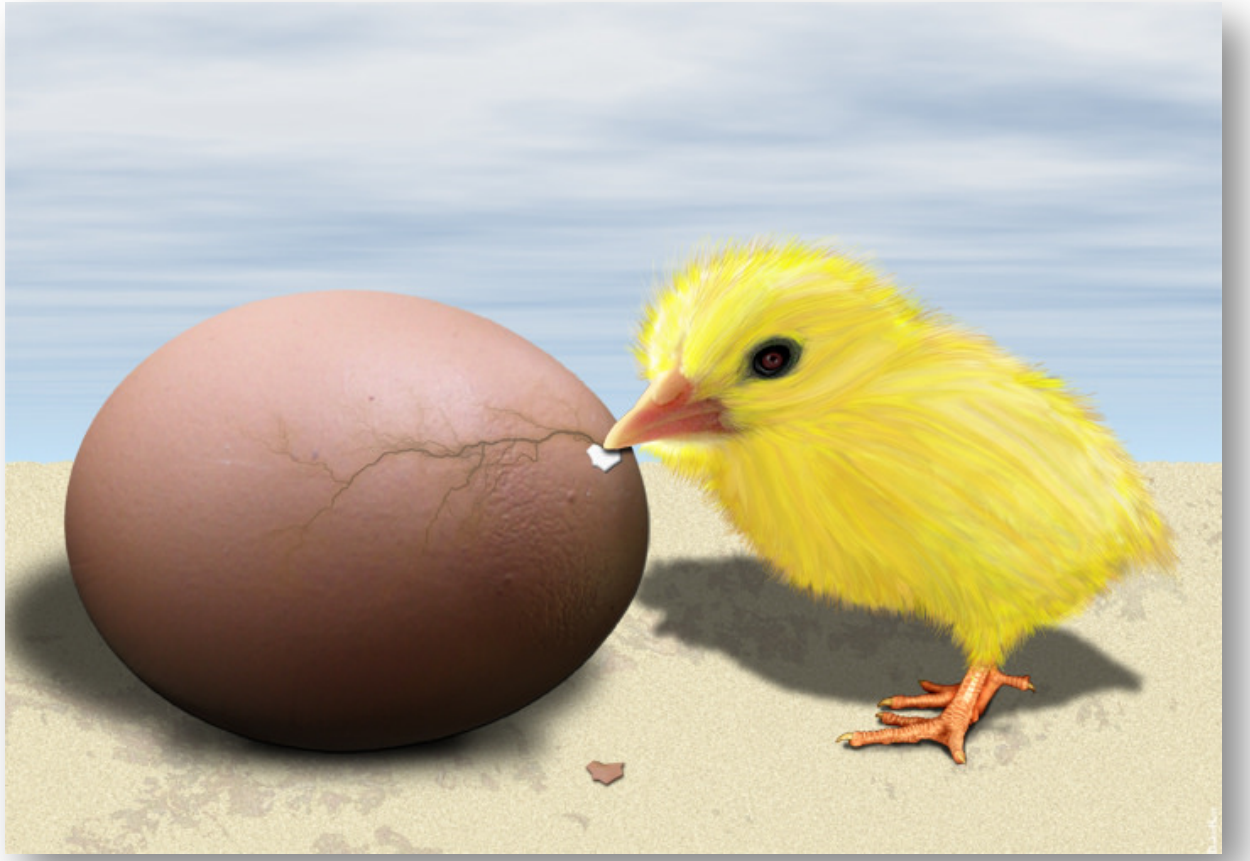
Reality: SDOs and open source projects have similar characteristics

- Broad participation
- Clarity and control around intellectual property commitments and terms for usage
- Shared dependence / vulnerability on results
- User confidence in interoperability / compatibility
- Participants may not like each other and often compete

Reality: the activities of standards and open source creation do have differences

- Scope: clearly defined vs evolving
- Time: rapid, iterative vs slower, deliberate
- Confidentiality: confidential vs open
- Sequence: code vs spec
- Participation: closed vs open
- Developer-driven vs Architect-driven

The Great Debate



Reality: communities will often eventually create both

- Open source projects that want interoperability across production deployments end up testing / certifying products and solutions to a set of interfaces and/or behaviors.
- Standards projects need to test their efforts in real deployments

How communities are self-remedying IP concerns

- Some projects include additional grants beyond the source code license to cover implementations of specifications
- Many projects are adding “architecture” committees, sub-projects to help define structure and approaches to create an internal standard
- Some are trying to do both standards and open source in same body… with a degree of challenge
- Most open source projects develop their code independent of the standards body activity, loose alignment with the standard
- Greater coordination of feedback from open implementations to the standards community
- Common / shared dependency on the project is often a natural deterrent; issues more likely to arise from NPEs.

What to watch in 2016 and 2017

- Open Source Orchestration Technology will mature and accelerate. We expect consolidation in this area.
- Data analytics will grow in importance as more virtual infrastructure is deployed.
- Data Plane Services will produce extremely performant open source code on general purpose hardware.
- More organizations will emerge to provide commercial support open source SDN projects such as CORD, Open Daylight, ONOS, OPNFV, OpenStack, and more.

Thank you.