

Open Ecosystems: Innovation by Collaboration

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About me

- ▶ 40+ years in industry
 - +3 years with Linux Foundation
 - Oracle engineering VP of Design Enablement
 - Distinguished engineer Sun Microsystems
 - EDA developer at IBM, Magma, Synopsys



The Linux Foundation: A Neutral Territory



A place for interested parties to come together and work on problems of mutual interest

The Linux Foundation: More than Linux

- › **1500+** Members
From 40+ Countries
 - › **100%** of Fortune 100
Tech & Telecom
 - › **30000+** Developers
Contributing Code
 - › **200+** Open Source
Projects
 - › **\$16B+** Shared Value
-  CHIPS ALLIANCE

Security



Networking



Cloud



Automotive



Blockchain



Edge/IoT



Web



AI



Motion Pictures

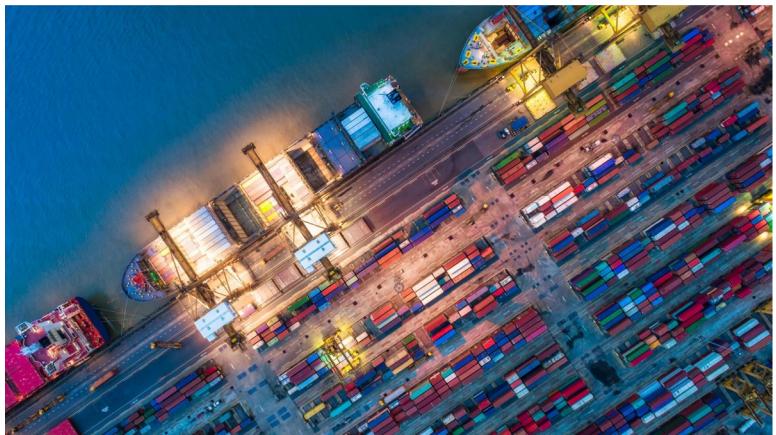


Industrial Evolution: Siloed to Collaboration?



Soup to Nuts Silo: In House

1980's IBM, 90's Intel



**Supply Chain Management:
Overseer**

2000+: Apple, QCOM, NVDA, ORCL...

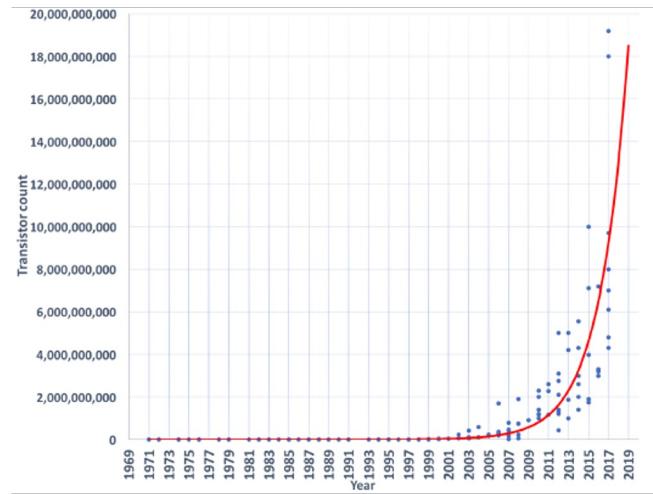


Open Collaboration

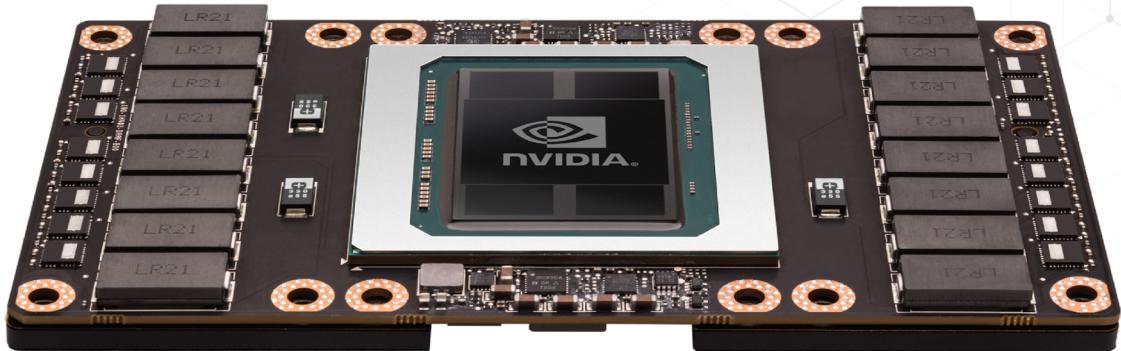
Now...

Accelerating with More than Moore...Collaboration

Traditional Scaling



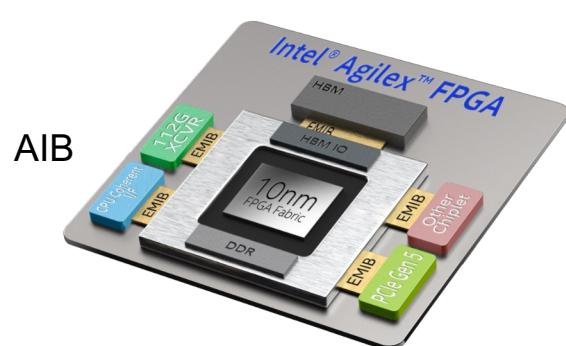
Domain Specific Architectures (DSA) : DAX, GPU, AI, FPGA



Packaging



MCM



AIB

Software: Compilers and Libraries



Collaboration: CHIPS Alliance

- Organization which develops and hosts:
 - Open source hardware specification, implementation, verification
 - Interconnect IP (physical and logical protocols)
 - CPUs
 - I/O (memory, SERDES, network...)
 - ML Accelerators
 - Open source ASIC & FPGA development tools
 - Design, verification, simulation
 - Composition, electrical verification
 - A barrier free environment for collaboration
 - Standards organization for collaboration and development
 - Legal Framework: Apache v2 license or other open source license
 - IP contribution encouraged but not required for membership/participation
 - Shared resources (\$ and time) which lower cost of hardware development
- Based on Apache 2.0 and other permissive licenses

CHIPS Members



Platinum Members



Gold Members



[UC San Diego](#)

Silver Members



[Western Digital](#)

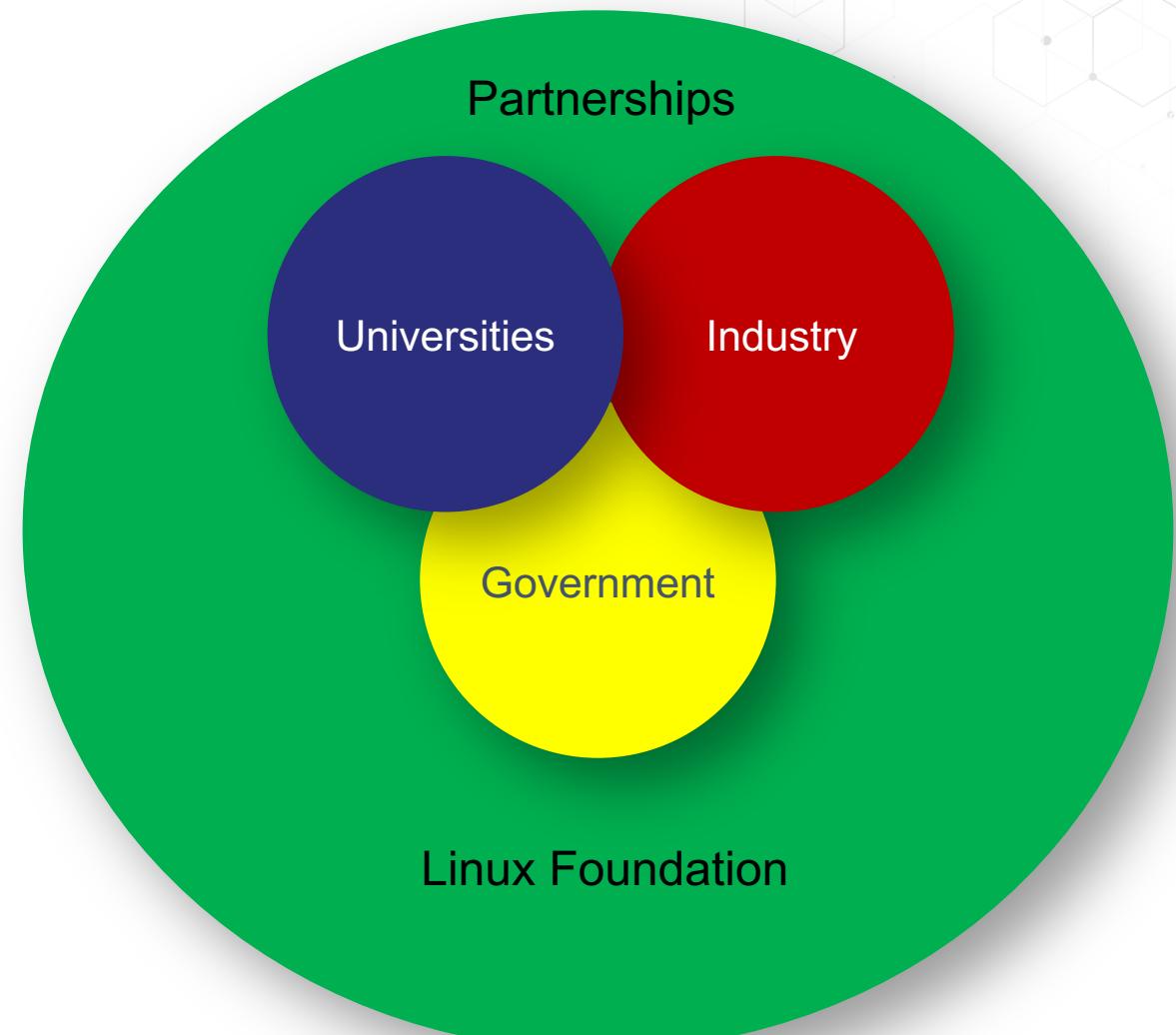


[Yale University](#)

What does it take to make collaboration work?

It's not easy

- Shared common technical challenge
- Realization stronger together than apart
 - Leverage strengths
 - Willingness to share IP to move project forward
- Shared objectives
- A degree of trust
- Alignment of business, legal, engineering
- The above enables successful collaboration
- Linux Foundation is a safe harbor to collaborators to join together to solve challenging problems



Will Collaboration Happen or Inter / Intra Continental Bastions?



U.S. : CHIPS Act. Export Controls & New Restrictions
New fabs in NY, Ohio, Arizona, Texas...

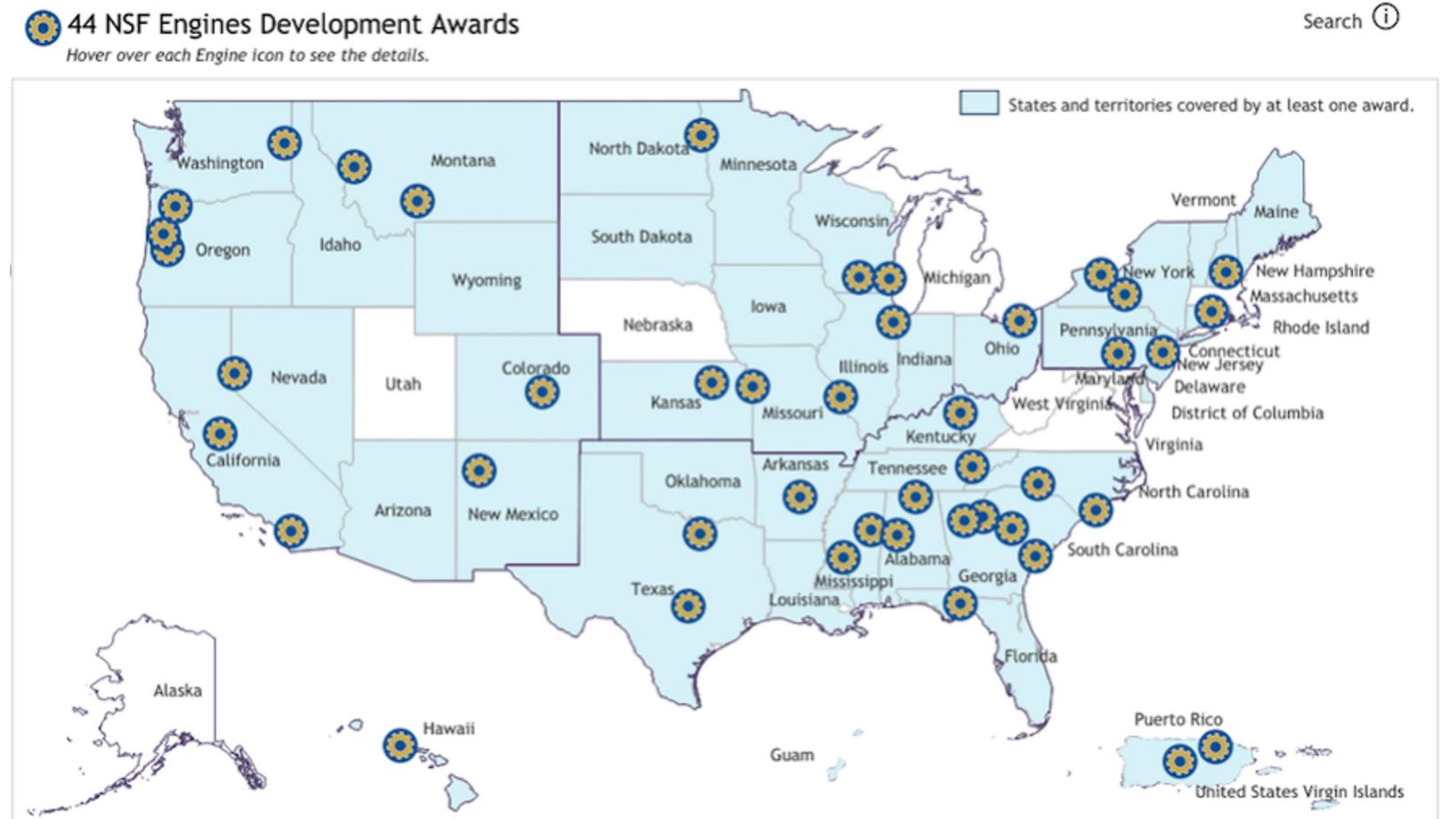
EU Sovereignty in Open Source HW, SW,
EDA, RISC-V
Cyber Resilience Act



China

*Silos and Fortresses
on each continent
Smoot – Hawley Style Tariffs?
Security Concerns...*

Intracontinental Competition: U.S. State Development & Education Initiatives



Competition is good, but can have undesirable results. Will this work? Does it build trust?
Or
Is it Dog Eat Dog?

Are we in the Age of AI Wonder?

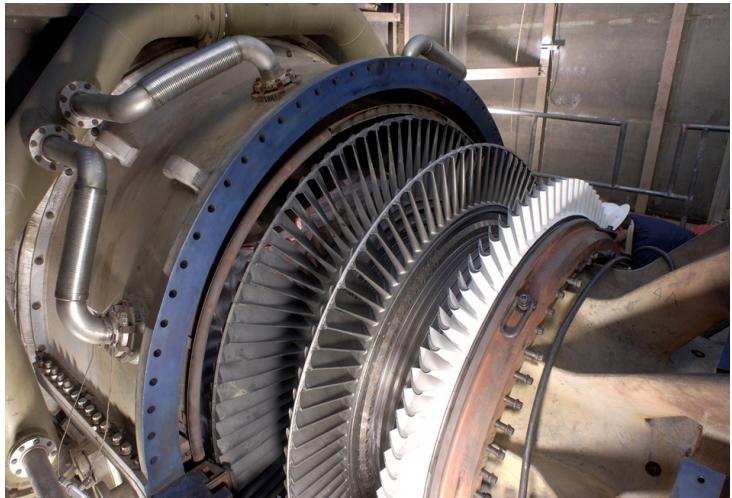
- *It seems to be...*
 - How many have experienced a toddler?
 - How many have watched a young child learn?
 - How do you become a ‘good parent’?
- *Similarly...*
 - How do we become good stewards of AI?
 - Analogous to becoming a ‘good parent’
 - That is: raise responsible, productive, ethical adults
 - How do we ‘teach’ children or build AI models?
 - How are values imparted?
 - Can this be regulated?
 - Should teaching/learning be regulated / supervised?
 - Should it be open, closed, or a hybrid?



Star Child from '2001: Space Odyssey'

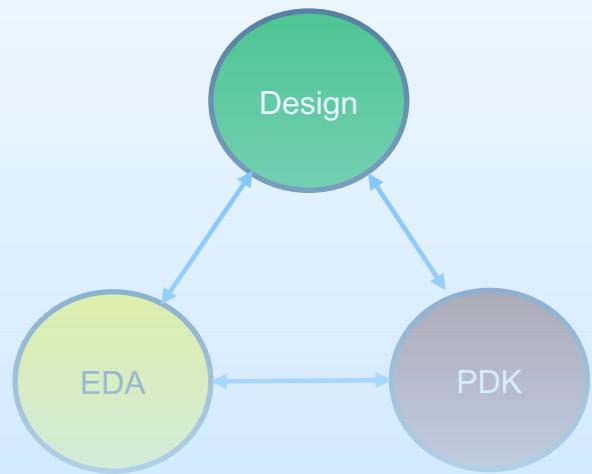
Do we know how AI & its Model's work?

- Is it understandable?
- Were the models trained on a diverse set of data?
- Are its states observable and controllable, hence inspectable?
- Can neutral 3rd parties articulate design requirements?
- Can neutral 3rd parties observe and inspect?
- Is it ethical?
----where ethics are constructed/monitored by a neutral body
of interested stakeholders



What about Chip Design? The Classic Triad to the New Quad of Hardware Development

The 'New Kid'



AI / ML: Enabling Insight & Productivity

The Classic Partners in Crime



Aha!

Questions to Contemplate & Discuss

- Do we need open ecosystems?
- How do we build trust?
- How do we break down barriers?
 - › Intercompany
 - › Intra-national
 - › International
- Do Governments help or hinder? What needs to change?
- Can there be a mix of open, semi-open, closed source IP?
- Can we have a shared repository of information with collaboration amongst educators & increase global knowledge of engineering?
- Can we build open AI systems that are ethical, understood, predictable, & governable?

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