

# 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



Security



Networking



Cloud



kubernetes



Automotive



Blockchain



HYPERLEDGER

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**

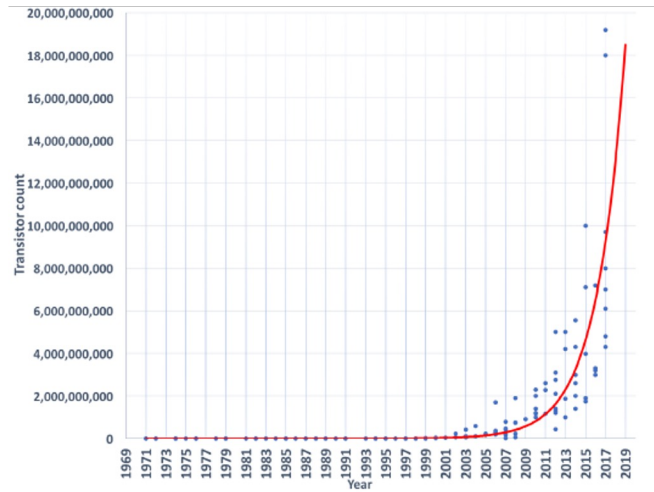
Now...



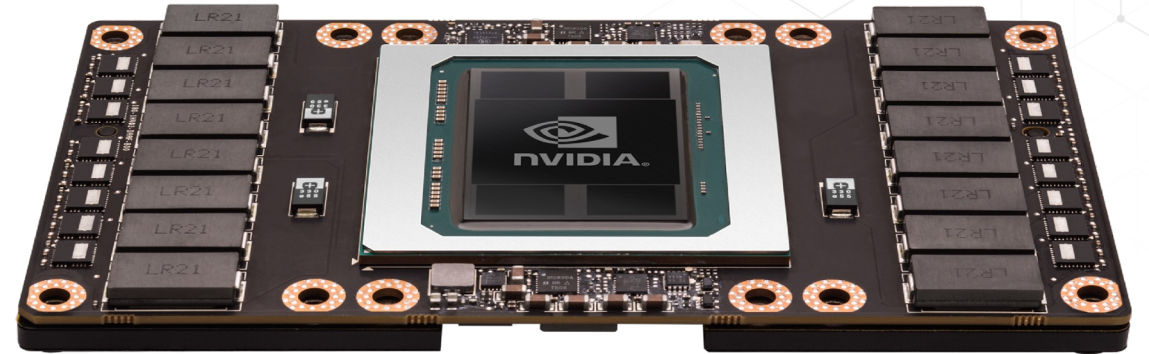
Surfing Moore's Law. A new process node every ~18 months  
*But this is slowing down, and also expensive*

# Accelerating with More than Moore... Collaboration

## Traditional Scaling



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

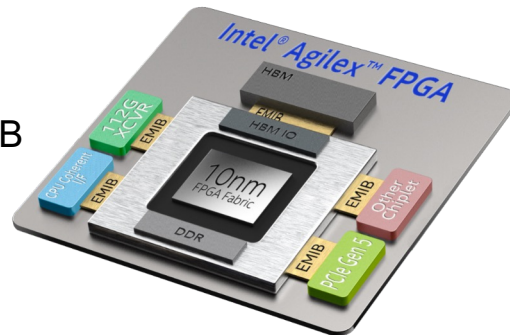


## Packaging

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



## Auditor Members

## Associate Members

## Gold Members



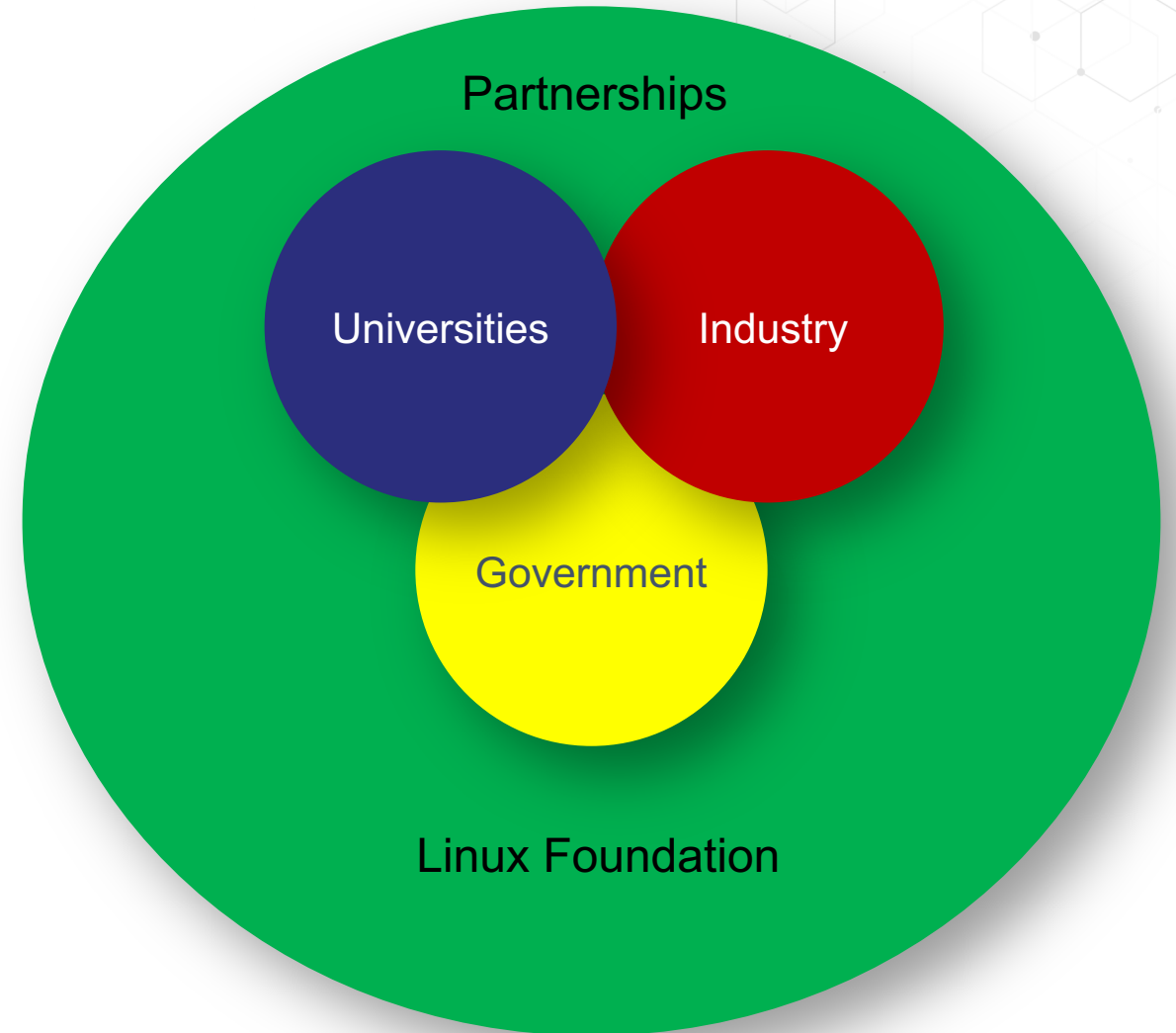
## Silver Members



# 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



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





## Are we in the Age of AI Wonder?

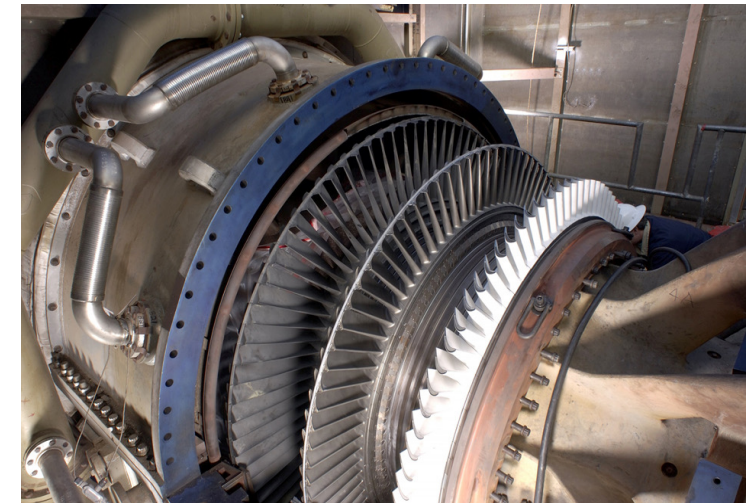
- *It seems to be...*
- How many have experienced a toddler?
- How many have watched a young child learn?
- How do you become a 'good parent'?
  
- *Similarly...*
- How do we become good stewards of AI?
- Analogous to becoming a 'good parent'
- That is: raise responsible, productive, ethical adults
- 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 3<sup>rd</sup> parties articulate design requirements?
  - Can neutral 3<sup>rd</sup> parties observe and inspect?
  - Is it ethical?
- where ethics are constructed/monitored by a neutral body of interested stakeholders

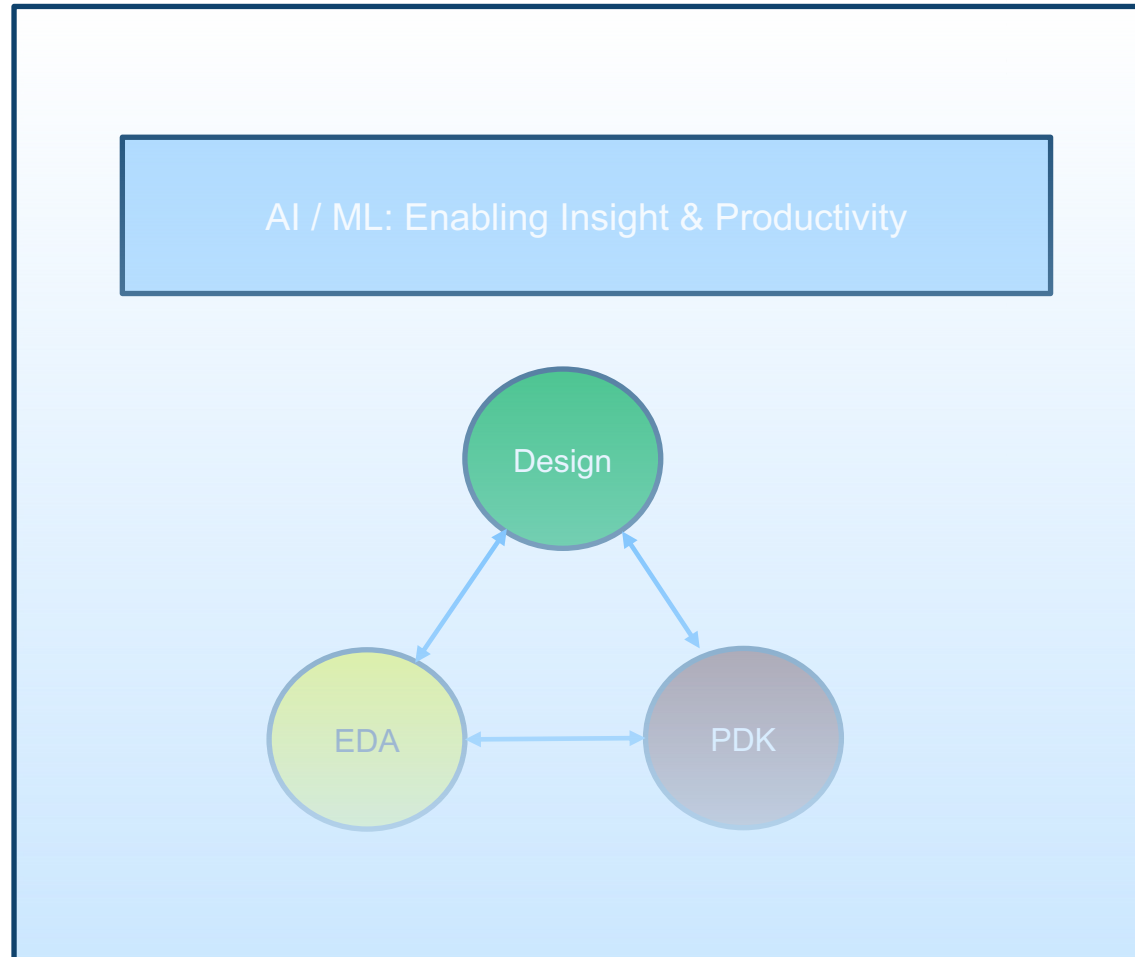




# What about Chip Design?

## The Classic Triad to the New Quad of Hardware Development

The 'New Kid'



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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