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Time to Rethink Collaboration and Competition

A Study on the Role of Open Source Software in Enabling Tomorrow's Automotive Industry

OSS is an established part of company strategies

- OSS is today an established part on among companies in the industry
- Recognized tool for value creation in overarching business and software strategies
- Collaboration on common infrastructure and platforms expedites innovation, boosts development efficiency
- Driven by move towards software-centricity

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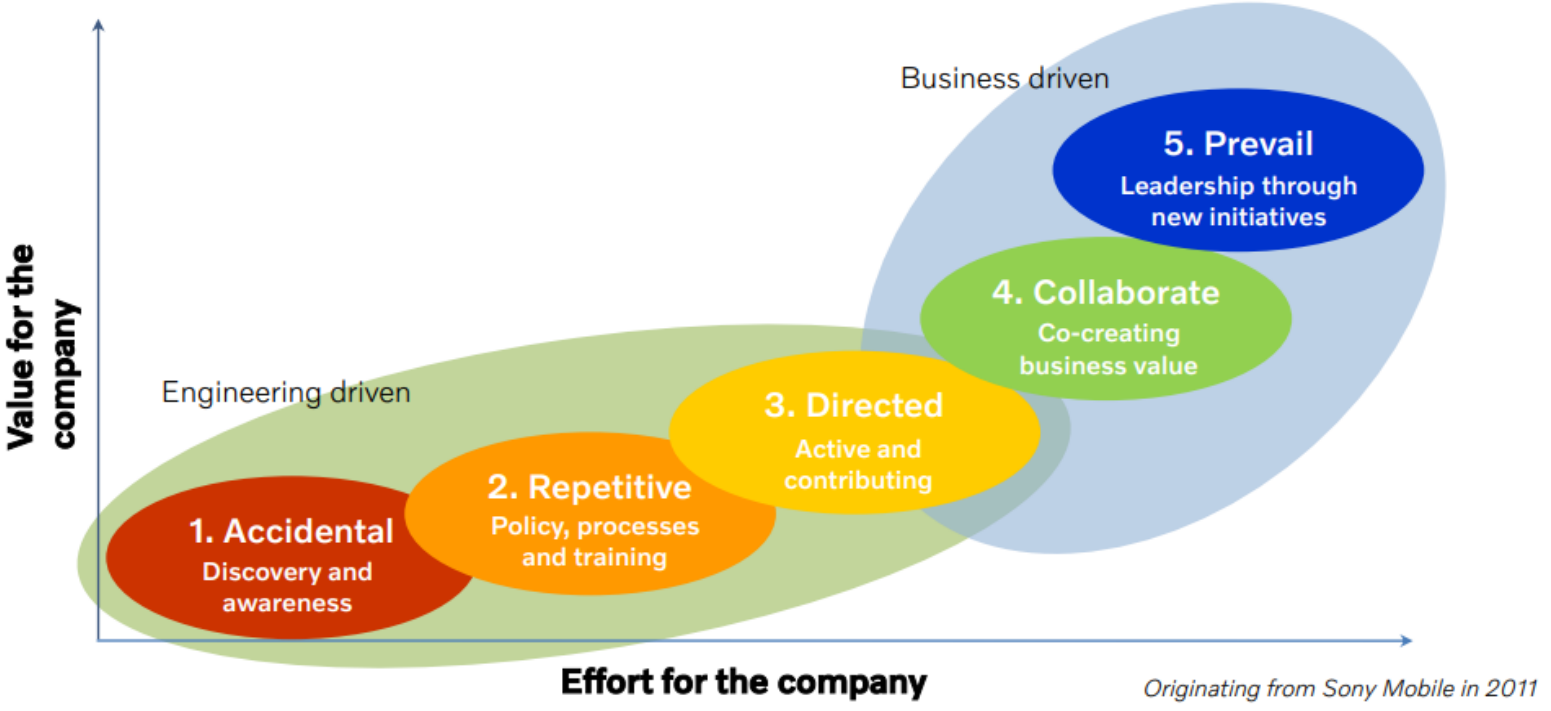
Slowly maturing as an industry



Originating from Sony Mobile in 2011

Adoption higher outside than inside the vehicle

- Inside:
  - Infotainment systems
  - Increasing in other ECUs, mainly communication and connectivity
- Outside areas includes
  - Development tools and infrastructure,
  - Simulation and quality assurance,
  - Connectivity and service provisioning

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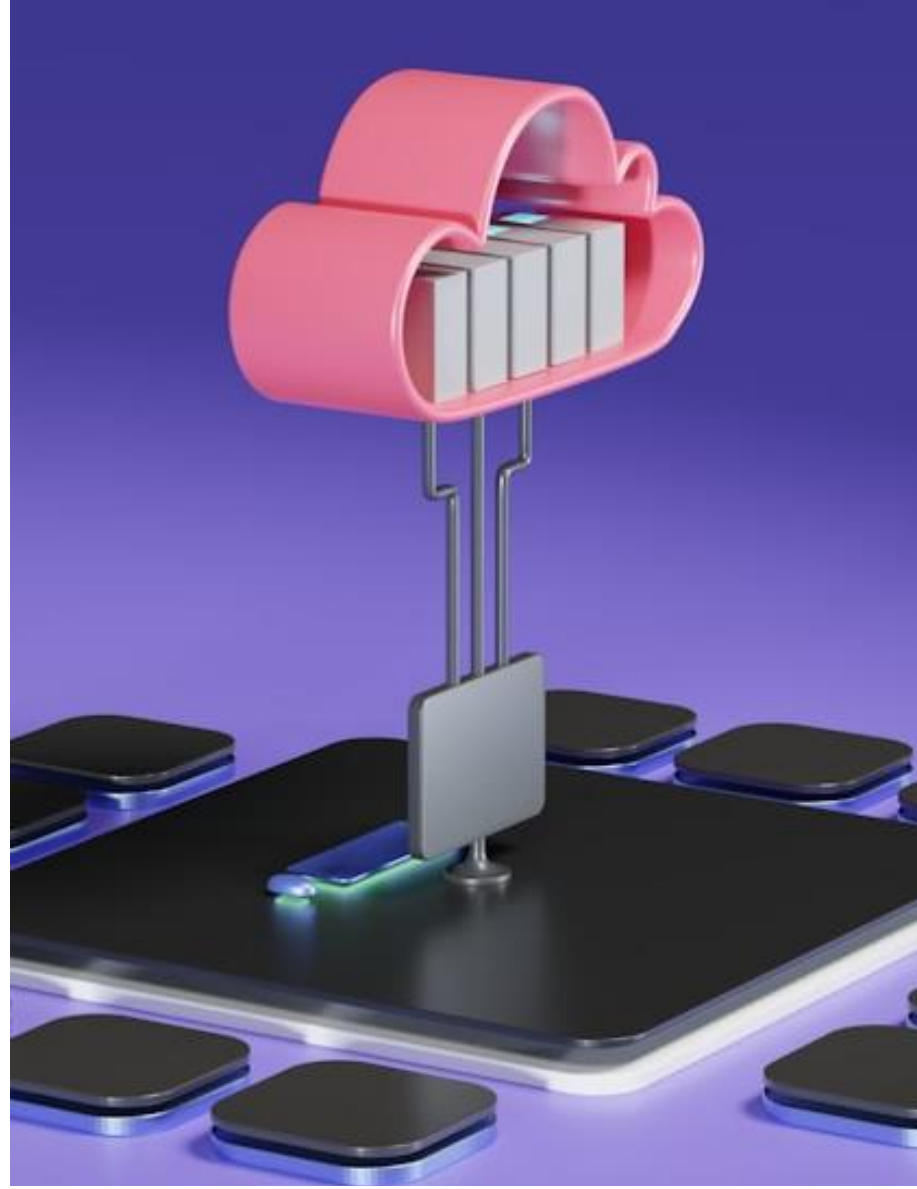
Centralisation of in-vehicle computing

- General mote towards a centralised computing architecture
- Presently, most cars come with 150-250 ECUs, and trucks around 90. Notable exceptions, like Tesla, employ 2-3 main computing units
- Puts higher demands on performance and security, e.g., separating processes through virtualization and containerization



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Towards a common yet decoupled SDV platform

- A modular architecture with exchangeable building blocks, OSS and proprietary
- Several layers of middleware and infrastructure for containerization and parallelization of different services and operations.
- Abstraction layer to cloud and connectivity-based services, along with data transmission critical

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Standarization key for interoperability and breaking complexity

“Standardisation is crucial to ensure interchangeability and accelerate development for automakers.

The software complexity is skyrocketing now, and we need to make its development easier. “ - Intellias-representative

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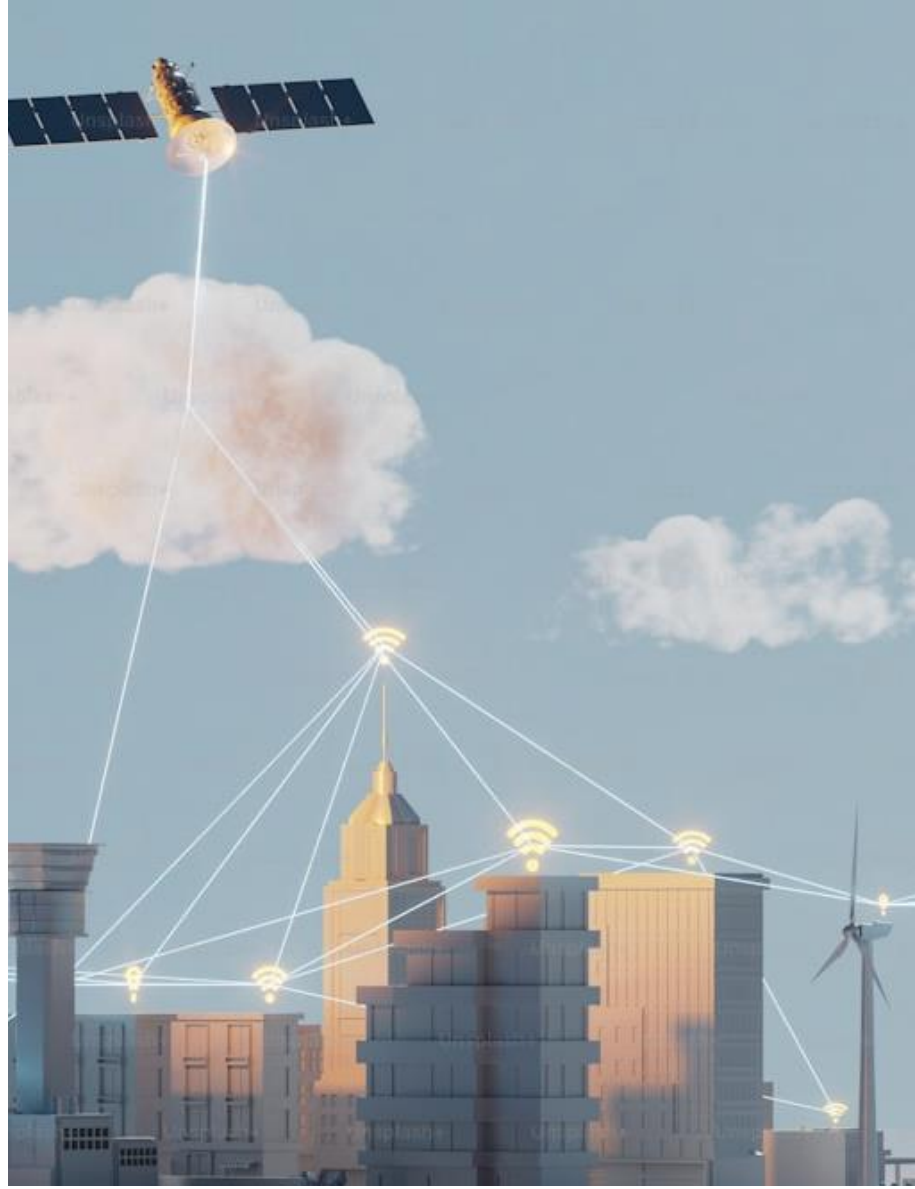
New technologies driving the transition

- Electrification, Autonomous driving Connectivity, and the transition towards service-oriented models driving the change
- Increases complexity and need for common platforms and standardized safety certified technology
- Beyond what any actor alone can or should manage alone.



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Moving from hardware to software-centric

“We're becoming a software company, less of a hardware company as we've been in the past. We're still building a foundry, but most of the new developments are on the software side.

You control things with software, you don't change the hardware, you reconfigure using software.” - Scania representative

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Development ongoing but slow-paced

- Predictions about the establishment of a common SDV platform diverge within industry circles.
- Vehicles are safety-critical products with demands on functional safety
- Long life-spans lasting over a decade putting high demands on sustainability
- 100y+ industry with long-standing conservative and competitive nature
- Hierarchical supply-chains

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Knowledge and capacity needed to enable change

- Enhancing internal skills and knowledge is crucial for accelerating the cultural and software evolution in the automotive industry.
- Both engineering teams and management require training and empowerment
- Forerunners and OSS foundations can support and lead by example

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Availability and attraction of skilled personnel

- Fierce demand outweighs availability
- Technical and cultural legacy impacts attractiveness
- Adoption of OSS and transition towards SDVs can help but needs the drums and pipes

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OSPOs: enablers for OSS adoption and culture

- Internal centers of competency and support
- Helps to leverage OSS strategically and grow the culture, knowledge and processes needed to implement
- Increasing trend among OEMs and Tier 1s in alignment with other verticals and sectors

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Hierarchical supplier structure incompatible with interdependent systems and actors

“We need to move from this classical OEM - tier one supplier working with a contract with a tier two supplier, and so on, into ecosystems and partnerships.” - Continental-representative

Moving to a collaborative ecosystem structure

- Challenging to maintain overview and engagement across the initiatives
- Complementary and increasingly integrating and collaborating with each other

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Government facilitation and funding a driver for change

- Governments and public institutions (e.g., EC) provides neutral grounds and trusted facilitation
- Directed funding can help development of neutral platforms
- Critical for pushing strengthening competitiveness and sovereignty

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OEMs and Tier 1 pushing and pulling each other

- Tier 1 suppliers play a pivotal role in driving OSS adoption and collaboration in the automotive industry.
- OEMs seek greater control over their software stack and align with upcoming regulations, they too are progressively embracing OSS.

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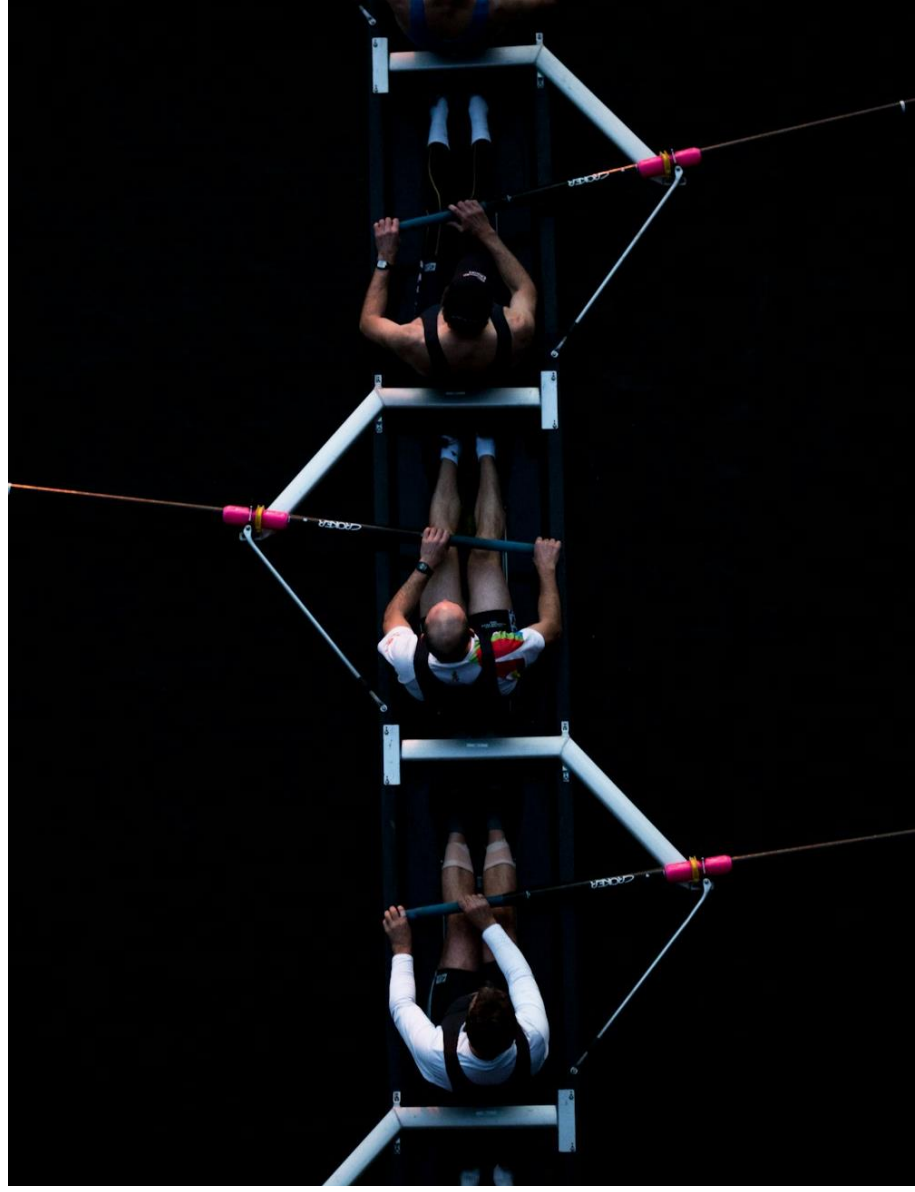
Strategic partnerships complementing internal capabilities

- Strategic alliances with tech giants are crucial for automotive entities
- Notably, Google's Android Automotive platform serves as a recurring example of this trend.
- Significant concern among several stakeholders is the looming threat of over-dependence on singular platform providers.



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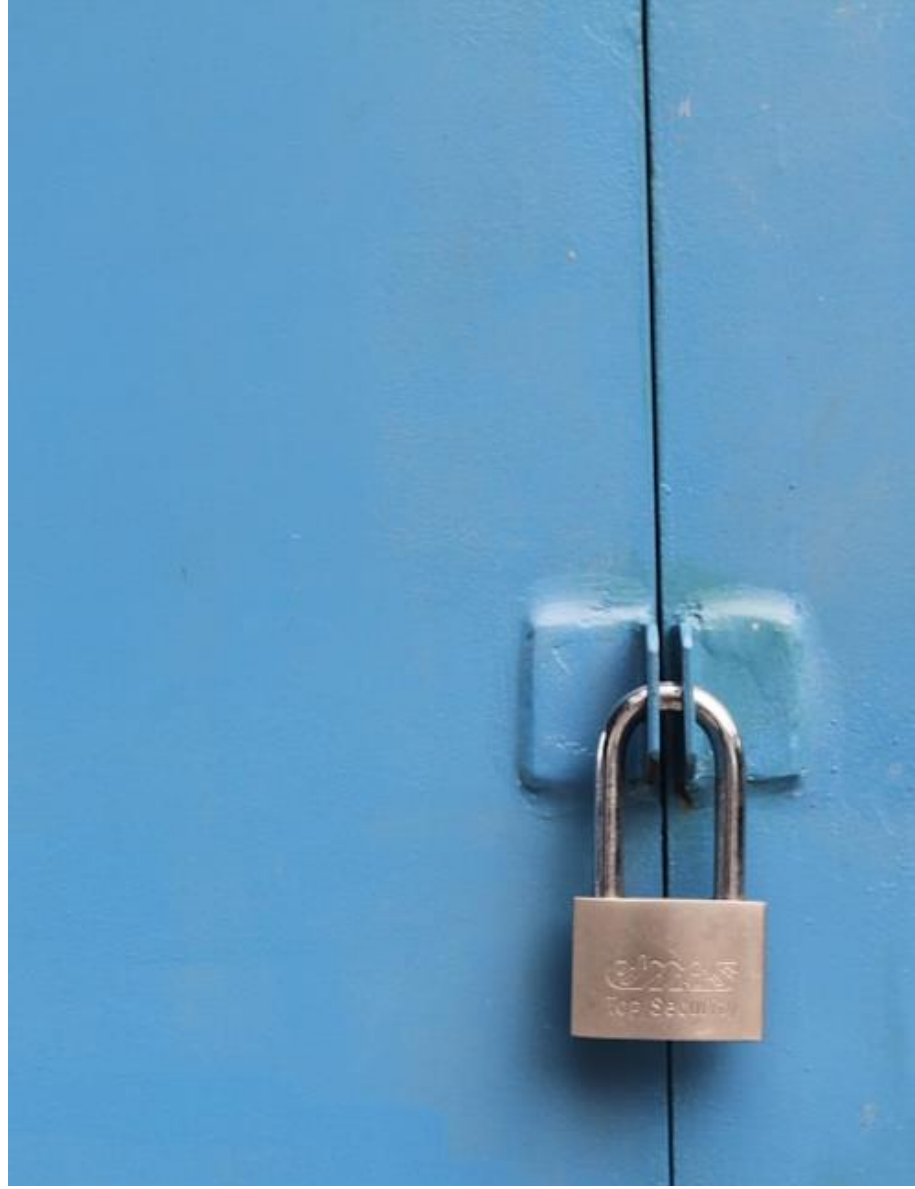
Finding and Collaborating on commodity technology

- Identifying differentiating technology, and position in commoditization cycle a challenge
- Need to align on infrastructure technology and push to commodity layer faster to stay competitive
- Establishing standardized interfaces and common building blocks is seen as key
- Twitching on specific ECUs stifles innovation



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Functional safety and OSS development

- Functional safety standards require stringent development processes for automotive software
- Beyond exceptions like infotainment systems employing Android Automotive or Automotive Grade Linux, the application of OSS components is largely restricted.
- Anticipation is growing around imminent launches of functional safety-certified Linux-based OS and associated middleware.

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Ensuring a sustainable and healthy OSS supply chain

- The assurance of safety and security through OSS necessitates a comprehensive understanding and proactive management.
- For the benefit of systems longevity, it is pivotal for OSS projects to be actively sustained.
- Requires prolonged commitment and investment from the automotive industry.

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"Open source software is indispensable. It is not just vital to the software industry, it is vital for the automotive industry; it is vital for every sector that uses software.

The entire European industry needs to champion open source to maintain digital sovereignty, increase efficiency, and remain competitive with the rest of the world."

- Representative from Mercedes-Benz Tech Innovation

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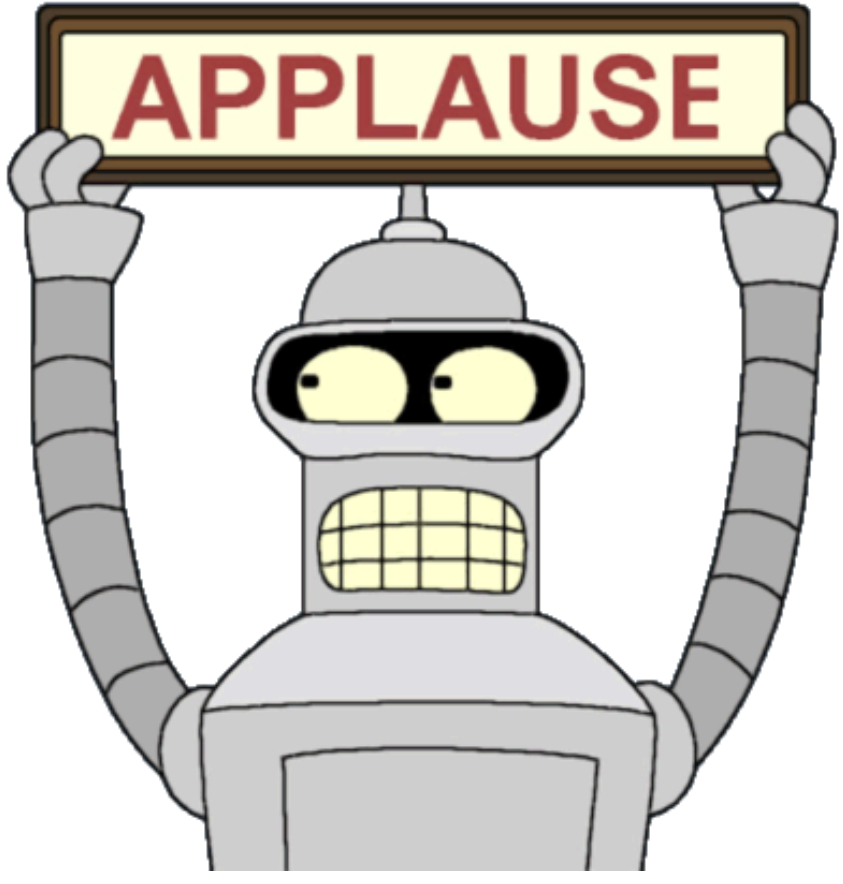

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