

Hand in hand for tomorrow



Clash of Cultures closed versus open environments for robotics

ICRA 2023



- 1. A brief retrospective on the computer revolution**
- 2. Snapshot on today's industrial robotics**
- 3. Closed versus open environments**

[...] most of you steal your software. Hardware must be paid for, but software is something to share.



**Bill Gates, February 3 1976
"Open Letter to Hobbyists"**

A brief retrospective on the computer revolution



Open letter to Hobbyists
Bill Gates



First GNU / GPL
license

1976

1989

1991

First Linux
kernel



1995

4.4BSD-Lite2



1998

Microsoft
Halloween documents
Embrace, extend, extinguish

1999

FreeBSD3.2
Darwin (Apple) Vo.1



2001

"Linux is a cancer"
Steve Ballmer
former CEO Microsoft



2007

Microsoft started
contributing to
Apache, PHL,
Eclipse

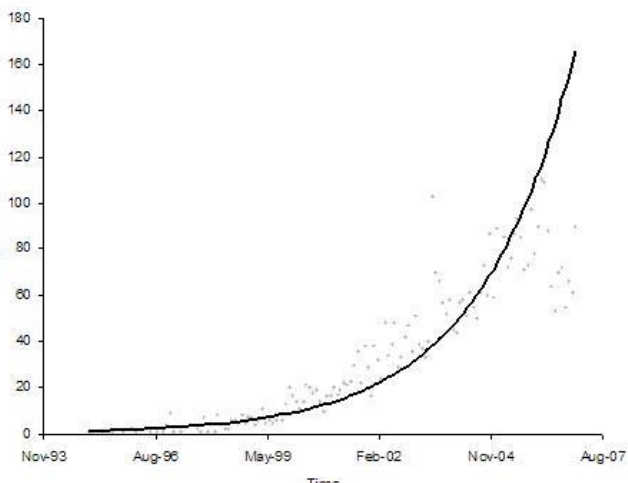
2015

Microsoft Linux
Foundation
Platinum
Member



2016

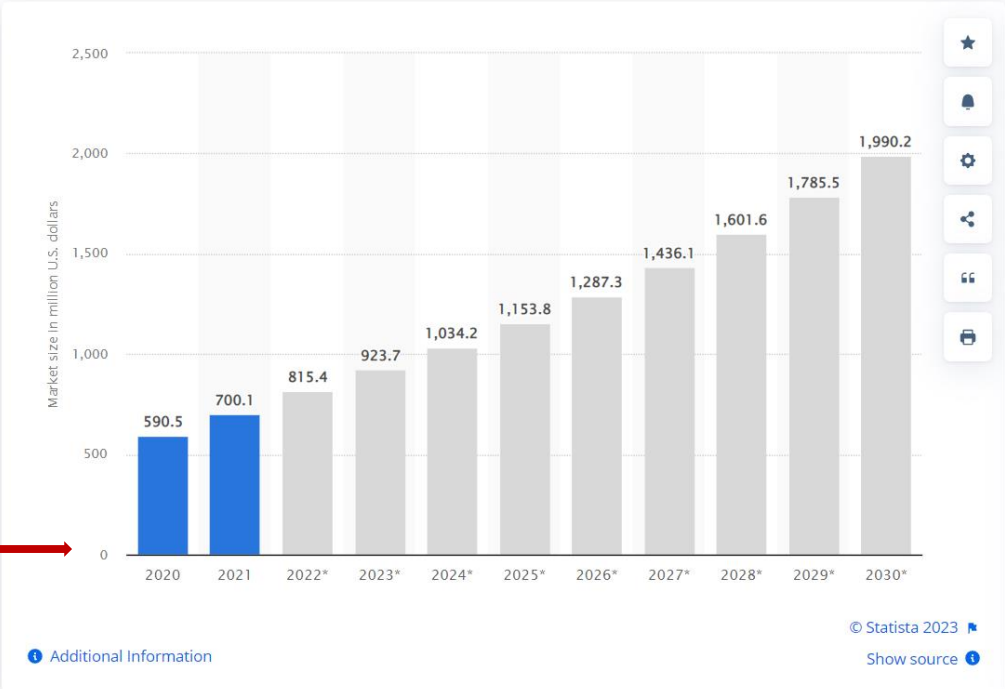
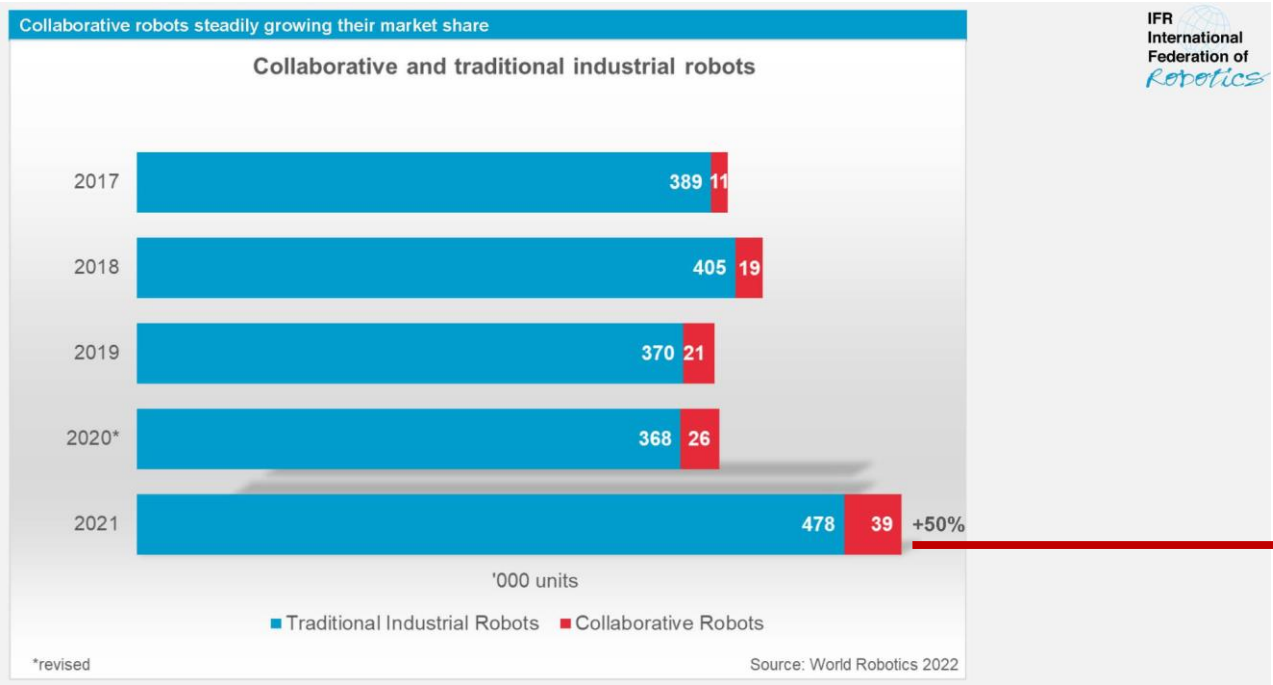
Microsoft Strategy
Enable, integrate, release,
contribute
Mark Russinovich
CTO Microsoft Azure



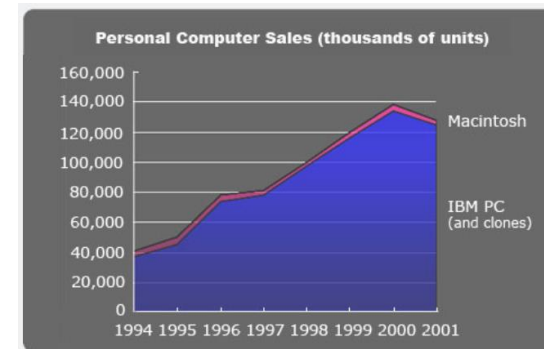
A brief retrospective on the computer revolution

- ⊕ The struggle of open versus closed environments has been part of the computer revolution from the beginning
- ⊕ Open source and free software have forged open standards, open environments and open ecosystems
- ⊕ Today's technology of the internet, operating systems, cloud architectures and the progression of machine learning systems are heavily based on open standards and environments
- ⊕ Even the biggest players in the field of commercial software and antagonists of open standards contribute to open source initiatives today

Snapshot on today's industrial robotics



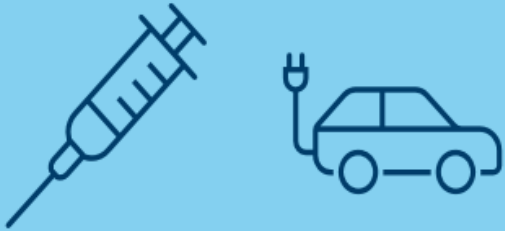
- + Significant growing market, especially for collaborative robots
- + New market players release robots and ecosystems rapidly
- + Most ecosystems are relatively closed from the developers perspective



In 2021, worldwide personal computer sales reached ~341 mio units

Trends in Robotics & Automation

Growth in new industries



Sustainability



Sensors, SW, Data & AI
enable applic. & services



Increased flexibility and
skills shortage



Labour shortages
Rising wages



Improved ease of use
DIY, Cobots, Distributors



Closed versus open environments

- ⊕ The rapidly growing market for industrial robots needs open environments to sustain its momentum
- ⊕ Component application developers, suppliers and researchers need to be able to adapt to new products and technologies very fast
- ⊕ Closed ecosystems may be successful on the short term but on the long run they will restrict growth
- ⊕ Our industry needs to support open source initiatives to foster open standards and open environments

We need a democratization of robotics

Open standards and platforms create a foundation for success. They enable interoperability of technologies and encourage innovativeness and healthy competition, which in turn increases consumer choice and opens entirely new markets



Jorma Ollila

Former CEO of Nokia

Closed versus open environments

- ? Which open source projects can create the biggest impact on our industry?
- ? How are we able to initiate and drive open source & open environment initiatives?
- ? How do we include all players to focus on opening ecosystems without losing differentiating capabilities?
- ? What opportunities may ROS / ROS2 create?



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Meet us at the SCHUNK booth G30



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- [1] [Bill Gates' Open Letter to Hobbyists \(blinkenlights.com\)](https://blinkenlights.com)
- [2] [Altair BASIC – Wikipedia](https://en.wikipedia.org/wiki/Altair_BASIC)
- [3] [GNU und die Freie-Software-Bewegung](#)
- [4] [Halloween documents \(slideshare.net\)](https://www.slideshare.net)
- [5] [Linux – Wikipedia](https://en.wikipedia.org/wiki/Linux)
- [6] [FreeBSD – Wikipedia](https://en.wikipedia.org/wiki/FreeBSD)
- [7] [Darwin – apfelwiki.de](https://apfelwiki.de)
- [8] [Nach 34 Jahren: Steve Ballmer verlässt Microsoft endgültig – Unternehmen – FAZ](#)
- [9] [Linux Foundation – Decentralized innovation, built with trust](#)
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- [12] [Cobotinstallations WR2022.jpg \(2945×1639\) \(ifr.org\)](#)
- [13] [Collaborative robot market size worldwide 2020–2030 | Statista](#)
- [14] [Total share: 30 years of personal computer market share figures | Ars Technica](#)
- [15] [Canalys Newsroom – Global PC shipments pass 340 million in 2021 and 2022 is set to be even stronger](#)
- [16] [Open standard – Wikipedia](https://en.wikipedia.org/wiki/Open_standard)