

Apache PLC4X

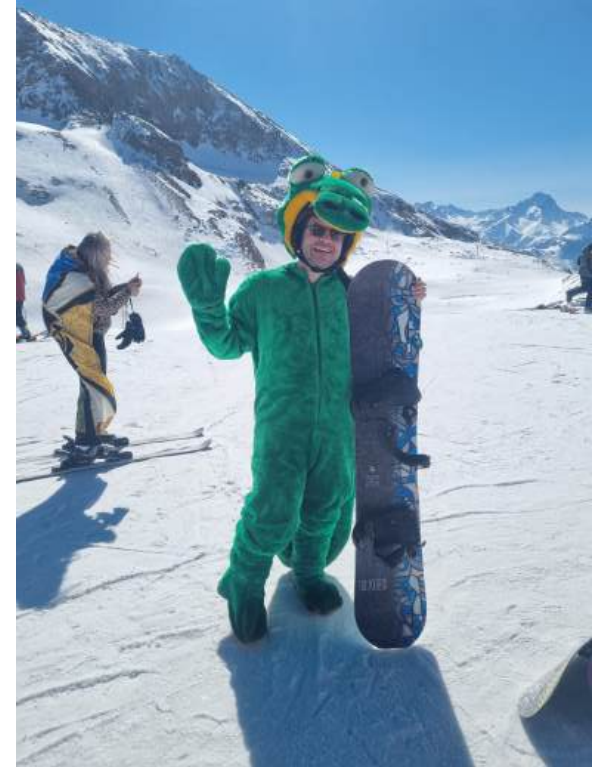
The IT/OT Babelfish

Christofer Dutz, ToddySoft GmbH



ABOUT ME

- Christofer Dutz
- Apache Software Foundation Member
- One of the nine directors of the ASF
- Apache PLC4X: PMC Member
- Founder of ToddySoft GmbH (2025)
- Almost 10 years of full-time + spare-time on PLC4X



AGENDA

- The Industry 4.0 Promise
- What is actually missing
- Apache PLC4X
- The reality of 10 years of "free"
- Q&A

THE INDUSTRY 4.0 PROMISE

- Predictive maintenance
- Overall Equipment Effectiveness
- Golden Batch analysis
- Digital twins
- Energy optimization
- Quality tracking and traceability
- ...and now: AI everywhere

INDUSTRY 4.0 CHALLENGES...

- look like OT challenges:
 - Time-series data
 - Real-time
 - Lots of devices
 - Many protocols
 - Reliability
 - Data quality
- but they are actually IT challenges:
 - Storage
 - Stream processing
 - Distributed systems
 - Analytics
 - Integration
 - Visualization

THE OPEN SOURCE LANDSCAPE (IT SIDE)

- Storage: Apache IoTDB / Cassandra, InfluxDB, TimescaleDB
- Streaming: Apache Flink / Kafka / Pulsar
- Analytics: Apache Druid / Spark, ClickHouse
- Visualization: Apache ECharts / Superset, Grafana
- Integration: Apache Camel / NiFi / StreamPipes
- Messaging: Apache Artemis / BifroMQ (incubating), Eclipse Mosquitto
- AI / ML: PyTorch, TensorFlow, Hugging Face, vLLM, Ollama, llama.cpp

THE OPEN SOURCE LANDSCAPE (OT SIDE)

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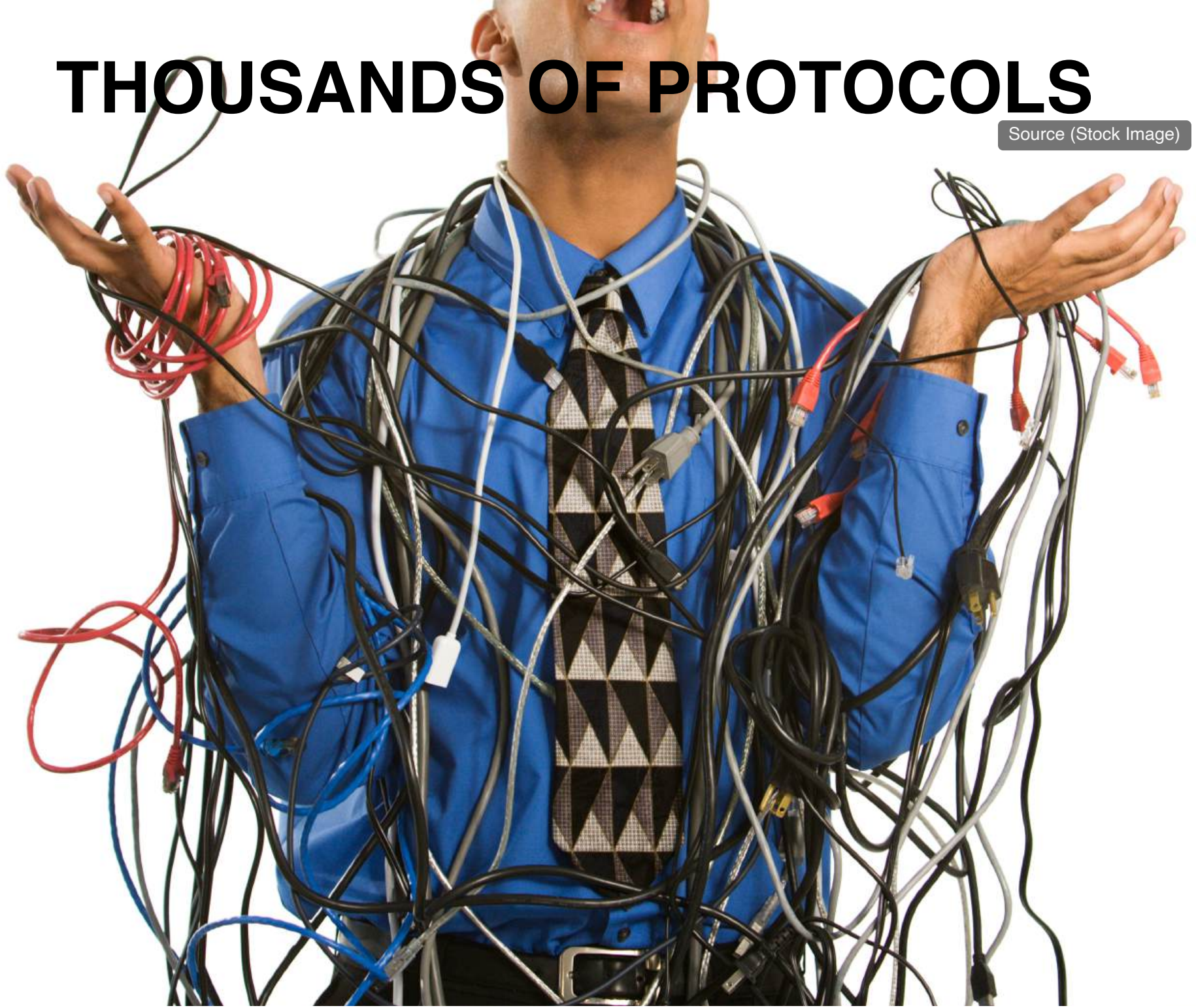


THE MISSING PIECE

- All these wonderful IT tools...
- ...need **data** to work with.
- The data lives in:
 - PLCs (Siemens, Beckhoff, Rockwell, Mitsubishi, Schneider, ...)
 - SCADA systems
 - Field-bus devices
 - Proprietary historians
- No common, open, multi-language way to **get to that data**.

THOUSANDS OF PROTOCOLS

Source (Stock Image)



ANALOGY: HOW IT SOLVED THIS FOR DATABASES

- In IT, we don't program against a different API for every database.
- Vendors ship drivers; applications code against JDBC, ODBC, ADO.NET.
- One API, many backends.
- **That** is what industrial automation is missing.
- That is the original idea behind Apache PLC4X.



- Toddy (our Mascot)
- **PaLm Civet** (Aka Toddy Cat)

APACHE PLC4X

- Top-Level Project at the Apache Software Foundation
- First commit: 2017
- Apache 2.0 licensed
- Vendor-neutral, community-driven
- **"Universal protocol adapter for industrial protocols"**
- Intentionally chose the **ASF** over other foundations
 - At Apache, **companies have no formal say** - only individuals do
 - No "platinum membership buys a board seat"

THE PLC4X API

- Discover
- Browse
- Read
- Write
- Subscribe
- Publish (in progress)

THE "X" IN PLC4X

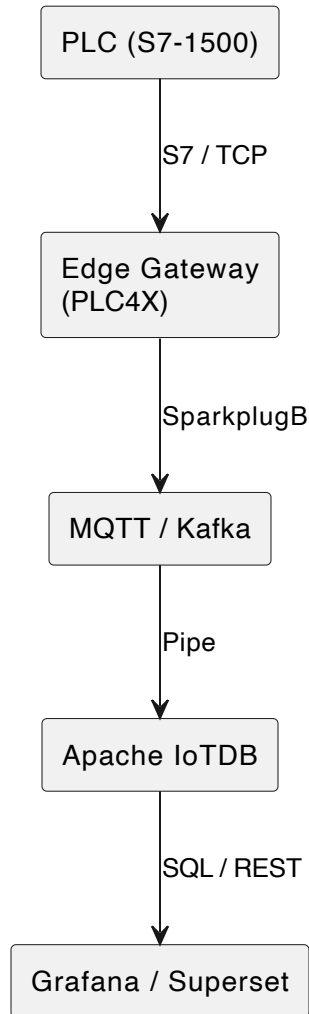
CURRENTLY SUPPORTED DRIVERS

- **Siemens S7** (S7comm)
- **Modbus TCP / RTU / ASCII**
- **Beckhoff ADS**
- **EtherNet/IP** (CIP / Rockwell)
- **OPC UA**
- **UMAS** (Schneider)
- **KNXnet/IP**
- **BACnet/IP**
- **CANopen**
- **Firmata** (Arduino)
- **simulated** (testing & demos)
- ...and more

OPERATIONS MATRIX

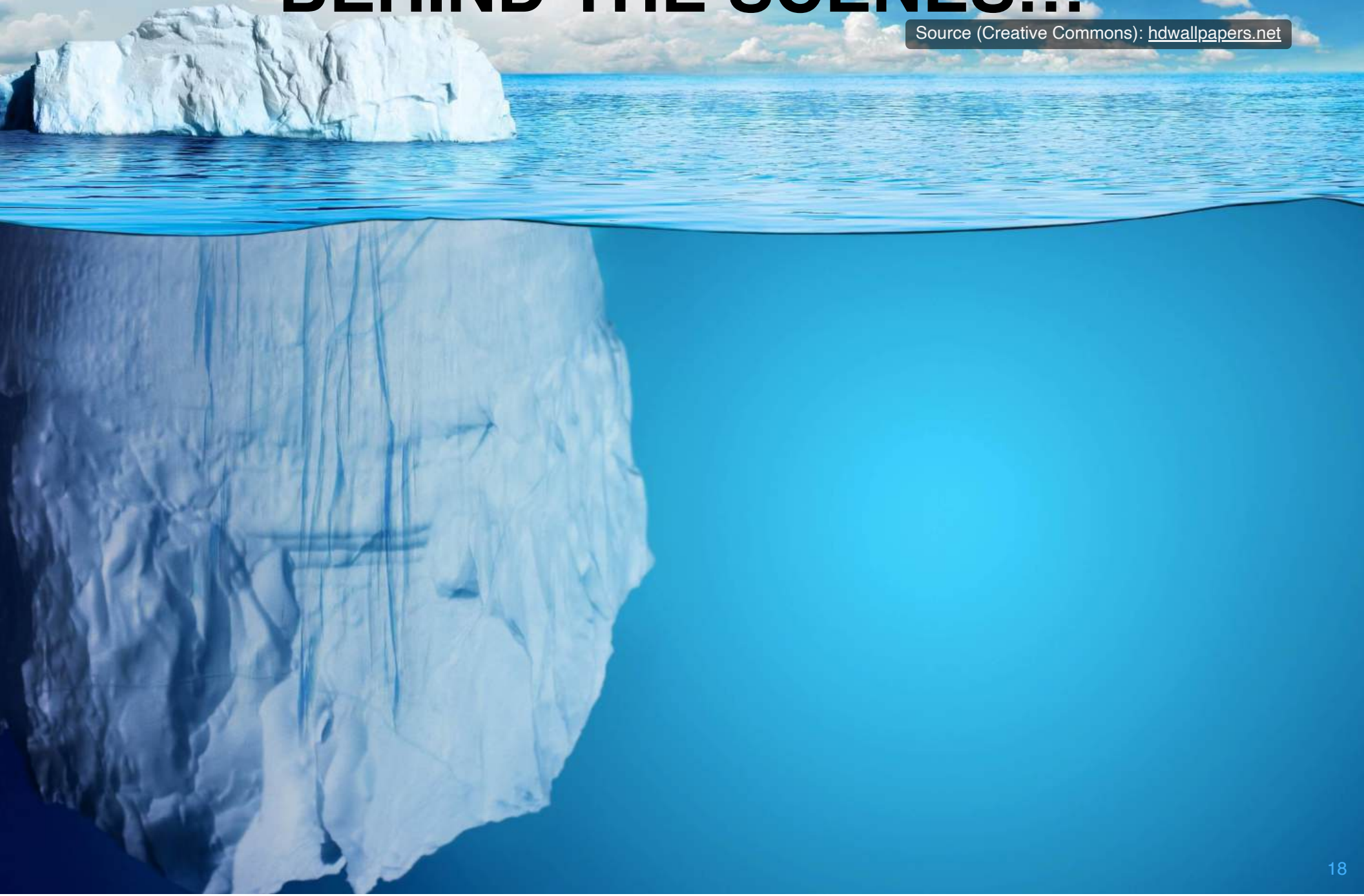
- Not every driver supports every operation
- Discovery: S7, EtherNet/IP, Profinet, BACnet
- Browse: OPC UA, ADS, S7 (limited)
- Read/Write: all drivers
- Subscribe: OPC UA, ADS, KNX, BACnet
- Documented per driver in the user guide
- The API itself reports which operations a given driver/connection supports
 - No need to hard-code capability assumptions
 - Tools and UIs can adapt automatically

A TYPICAL USE CASE



BEHIND THE SCENES...

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THE COST OF WRITING DRIVERS

- Each driver requires:
 - Real hardware (PLC, gateway, field device)
 - A licensed engineering tool (TIA, TwinCAT, RSLogix, ...)
 - Protocol specs - if they exist - at significant cost
 - A test bench that does not break the hardware
- Mid-range PLC + license: 2.000 - 8.000 EUR
- Test lab for **one** vendor: easily 20.000 EUR+

10 YEARS OF "FREE"

- Almost a decade of full-time hours + nights + weekends
- Could not buy even half of the equipment needed
- Most hardware vendors do not donate
 - Notable exceptions: **Beckhoff, Wago, Phoenix Contact**
 - And recently: an older **S7-1500** from **Siemens** (too old for S7+)
- The economics simply do not work on enthusiasm alone

MY LAB



MY LAB



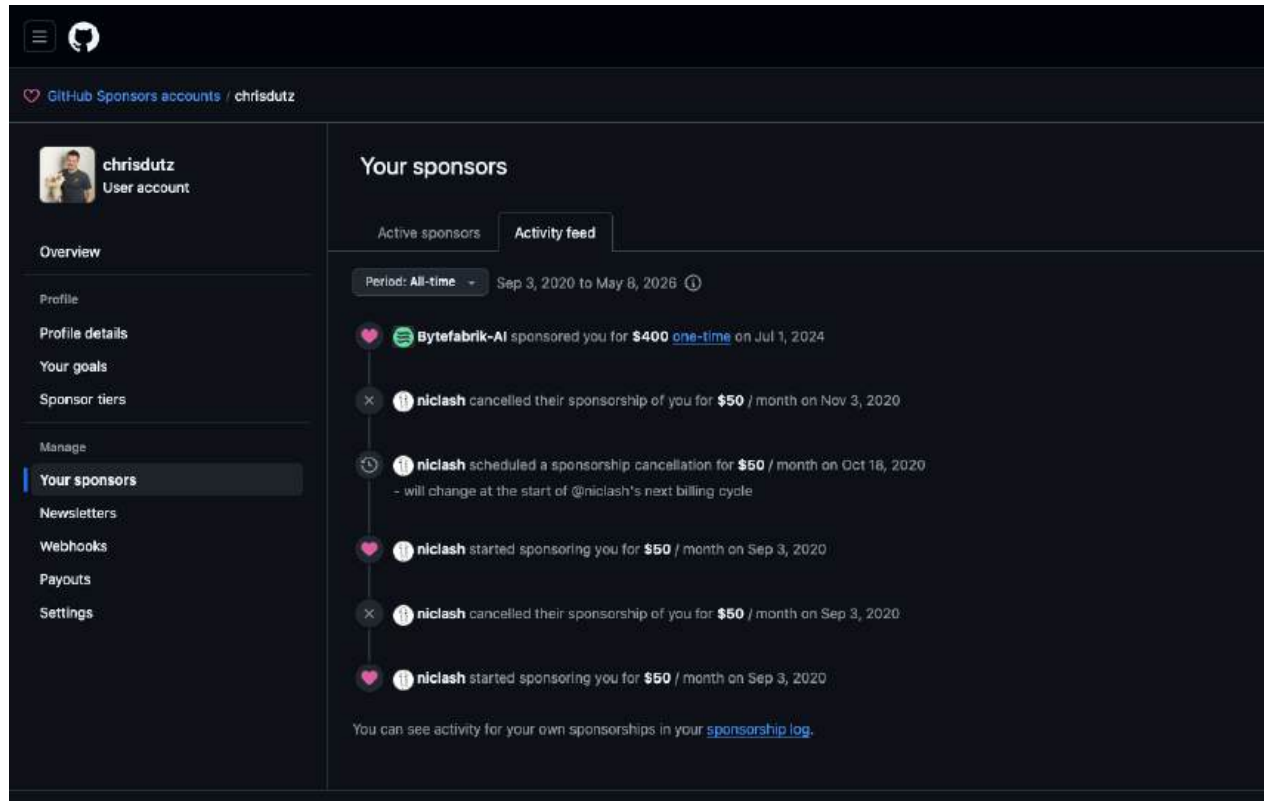
THINGS I TRIED: CONSULTING

- In 9 years: exactly **one** serious consulting engagement
- 2-3 extremely successful proofs of concept
- Every time the customer wanted to scale the PoC into production...
 - ...the contract went to one of the big players
 - "We need a vendor with a logo our board recognizes"
- Lots of free pre-sales work, very little revenue

THINGS I TRIED: COMMERCIAL SUPPORT

- "Pay us, get SLAs and bug fixes."
- Customers loved the **idea**
- Signed contracts in 9 years: **zero**
- "Why pay? Apache is free."

THINGS I TRIED: GITHUB SPONSORS



The screenshot shows the GitHub Sponsors interface for user **chrisdutz**. The page is divided into a left sidebar and a main content area. The sidebar contains navigation links: Overview, Profile, Profile details, Your goals, Sponsor tiers, Manage (with sub-links for Your sponsors, Newsletters, Webhooks, Payouts, and Settings), and Your sponsors (which is currently selected). The main content area is titled "Your sponsors" and has two tabs: "Active sponsors" and "Activity feed" (which is selected). Below the tabs, there is a "Period" filter set to "All-time" and a date range of "Sep 3, 2020 to May 8, 2026". The activity feed lists several events:

- Bytefabrik-AI sponsored you for **\$400 one-time** on Jul 1, 2024
- niclash cancelled their sponsorship of you for **\$50 / month** on Nov 3, 2020
- niclash scheduled a sponsorship cancellation for **\$50 / month** on Oct 18, 2020 - will change at the start of @niclash's next billing cycle
- niclash started sponsoring you for **\$50 / month** on Sep 3, 2020
- niclash cancelled their sponsorship of you for **\$50 / month** on Sep 3, 2020
- niclash started sponsoring you for **\$50 / month** on Sep 3, 2020

At the bottom of the activity feed, there is a note: "You can see activity for your own sponsorships in your [sponsorship log](#)."

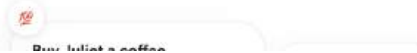
THINGS I TRIED: BUY ME A COFFEE

The screenshot shows the homepage of Buy Me a Coffee. At the top, there are navigation links for 'FAQ', 'Wall of ❤️', and 'Resources'. The main header features the 'Buy me a coffee' logo, a search bar for creators, and 'Log in' and 'Sign up' buttons. The central message reads 'Fund your creative work' with a 5-star rating and 'Loved by 2,000,000+ creators'. Below this, it says 'Accept support. Start a membership. Setup a shop. It's easier than you think.' and a prominent yellow 'Start my page' button. A note at the bottom of this section states 'It's free and takes less than a minute!'. On the left and right sides, there are several creator cards, each with a profile picture, a short bio, and a support count. For example, 'Cera' has 6,780 supporters, 'Kaleigh Cohen' has 4,488, and 'Teacher Stefano' has 641. Other cards include 'The Thrill Of The Thrift' (10 supporters), 'Reach Talk Radio' (1605 supporters), and 'Simple Politics'.

SUPPORT

Give your audience an easy way to say thanks.

Buy Me a Coffee makes supporting fun and easy. In just a couple of taps, your fans can make the payment (buy you a coffee) and leave a message.

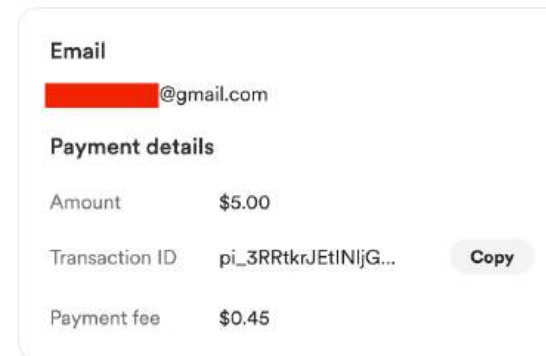
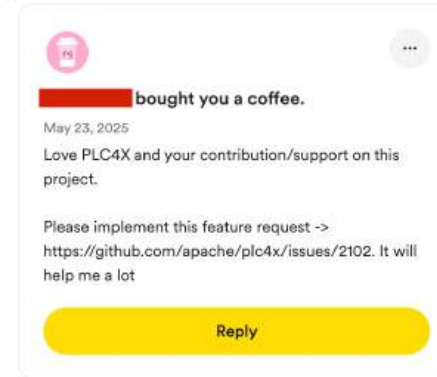


THINGS I TRIED: OPEN COLLECTIVE

- "Friends of Toddy" collective
- Per-feature fundraising goals
- The 0.13.0 release campaign actually worked
 - ...but it took almost half a year to collect ~300 EUR
- Partial funding for an s7-comm-plus driver
- But: still well below sustainable

THE 5-DOLLAR STORY

- Someone donates **\$5** on Buy Me A Coffee
- Then opens a ticket
- Then expects:
 - Multi-day support
 - A custom driver tweak
 - Same-day responses
 - "Because I sponsored you"



DRAWING THE LINE

- I love Apache PLC4X. I am not leaving PLC4X.
- But I cannot keep funding it from my own pocket.
- Something has to change in **how** the work gets paid for.

TODDYSOFT GMBH



- Founded 2025
- Sellable, ready-to-use products built on top of the open-source software I help build
- SDKs with commercial support in various programming languages
- Communication drivers are just step one

THE NEW MODEL

Apache PLC4X

- Stays Apache 2.0
- Stays at the ASF
- I keep maintaining it
- Keeps the broad driver set
- Community contributions welcome

ToddySoft GmbH

- Enterprise-ready drivers land here **first**
- Commercial license
- Support, SLAs, on-site
- Funds the lab and the hours
- Reduced-functionality versions flow back to PLC4X

WHAT TODDYSOFT ADDS ON TOP

- Significantly broader driver portfolio:
 - Profinet (full, not just DCP)
 - EtherCAT
 - Open Protocol (Atlas Copco, tightening tools)
 - S7+ / S7-comm-plus (S7-1200/1500 native)
 - ...and more in the pipeline
- Many drivers emulate operations the underlying protocol does not natively support
- Production-grade testing on real hardware in our lab

WHAT THIS MEANS FOR PLC4X USERS

- PLC4X is not going away.
- PLC4X is not changing its license.
- You can keep using PLC4X exactly as before.
- New high-end driver features implemented by me will arrive in two waves:
 - First in ToddySoft drivers (paid)
 - Later, reduced, in Apache PLC4X (free)
- Bug fixes for existing PLC4X drivers continue.

WHAT THIS MEANS FOR ME

- I can finally afford the hardware
- I can pay for the test lab
- My day job now **is** solving these problems
- I can keep contributing to PLC4X **because** of ToddySoft, not despite it
- Less burnout. More driver work. Better quality.

A SMALL ASK

- If your company **uses** PLC4X in production:
 - **Best:** contribute back - code, reviews, bug reports, test results, information
 - This is what open source is actually about
 - It also reduces the bus factor of the project
 - Contribute hardware / test access
 - Sponsor a specific feature via Open Collective
 - Allocate budget for the open-source you depend on
 - Or: a ToddySoft contract

OUTLOOK APACHE PLC4X

- New SPI rewrite (Netty-free)
 - Funded by an EU-backed NLnet research grant
 - Removing Netty also helps prepare PLC4X for CRA-era requirements
- Shared / multi-transport connections
- s7-comm-plus (S7-1200/1500 native)
 - Lands as soon as the Open Collective funding goal is reached
- And: making sure all of this is **sustainable**

THANK YOU

- PLC4X:
<https://plc4x.apache.org>
- ToddySoft:
<https://toddysoft.com>
- Open Collective: "Friends of Toddy"
- Mail:
christofer.dutz@toddysoft.com
- LinkedIn:
<https://www.linkedin.com/in/christoferdutz/>



QUESTIONS?

Source (Stock Image)

