

Kry10 Secure Platform

Delivering a modern devices platform

Boyd Multerer

Kry10 Limited

seL4 Summit 2022









IoT Momentum

- **10 billion** active IoT devices ¹
- **127** new devices connect every second ²
- **\$15 trillion** invested in IoT by 2025. ³

1. iPropertyManagement.com
2. McKinsey Digital
3. Gigabit

IoT Headwinds

Predictions were for 50B connected devices by 2025 (IDC)

Currently at only 20% of that prediction!

IoT Headwinds

- More IoT projects fail than succeed
 - 75% Projects Fail([Cisco](#))
 - 30% failing at the PoC stage (Microsoft)
- Enterprise concerns limiting growth

The market has grown considerably in the intervening years but not as fast as we expected in 2015. The IoT has faced headwinds related to change management, cost, talent, and talent, and cybersecurity, particularly in enterprises ¹

Problems → Solutions → Problems



Natural Gas Repair



A landscape photograph showing a row of seven white wind turbines on a ridge. The turbines are set against a backdrop of a dense green forest and a blue body of water under a clear sky. In the foreground, a golden-brown field contains several large hay bales. The text 'Windmill Maintenance' is overlaid in white across the center of the image.

Windmill Maintenance

NZ IoT Alliance



Device Development



TOP CTO Concerns around Mission Critical IoT

Security

- 97% concerned about security
- IoT attacked w/in 5 minutes of connecting²
- 48% admit unable to detect IoT security breaches on their network.³

Resilience & Isolation

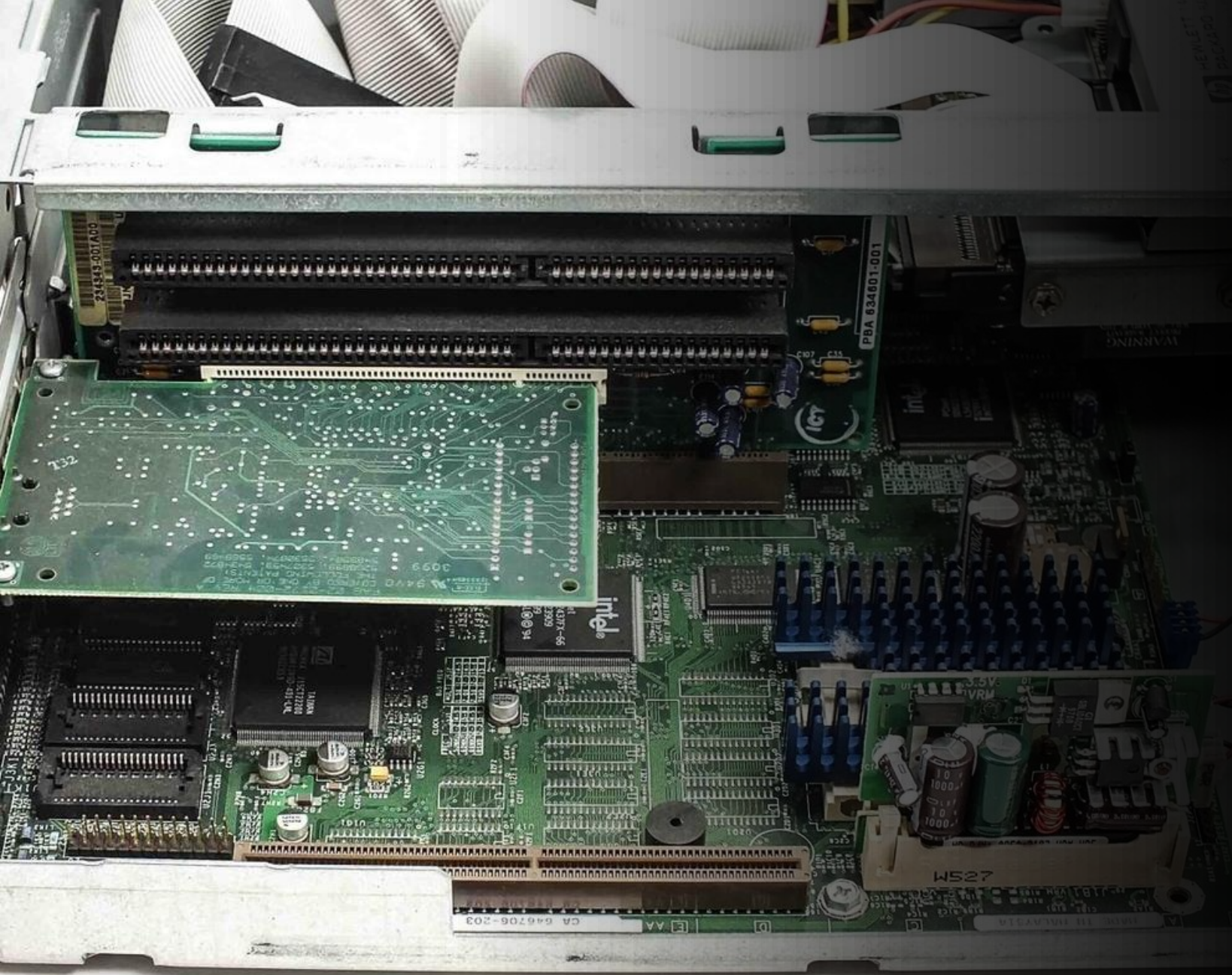
- 1 device bringing the whole system down, (hard to risk mission critical)

Resources/Skills gap

- Lack of skilled professionals (hardware/software) to build
- 80% respondents “don’t have skills to keep their IoT devices working
- Manageability of remote devices

Torvold / Tanenbaum Debate





Almost all devices
run legacy
operating systems
from the 1900s

The future has already arrived.
It's just not evenly distributed.

- William Gibson

Platform Requirements

Security



Verified Isolation
Keyed Updates, VPNs
Strong System Definition

Resiliency



Fast Fault Recovery
Multi-level Supervision
Automatic Healing

Managability



Easy to Build
Easy to Maintain
Evolves after Deployment

Security

- Verified Isolation
 - seL4 Microkernel
- Well maintained keys
 - Multiple key pairs
- Strong system definition
 - Deterministic boot
 - Positive system design
 - Able to reason about the system



Resiliency

- Error isolation by default
 - Supervision trees in the BEAM
 - Processes that can naturally restart
 - Sub 100ms restarts common
- Bring Supervision into the OS
 - Mirror supervision patterns in the OS
 - The BEAM as 1st class app environment
 - Automated failure recovery



Manageability

- **Easy to Build**
 - Great tooling, documentation, tracing, APIs, and more
 - Many developers who already know languages
- **Easy to Maintain**
 - Remote, keyed updates
 - Fleet management, update groups
- **Evolves with your needs**
 - Integrate OT environments by adding software
 - Devices become a software problem.



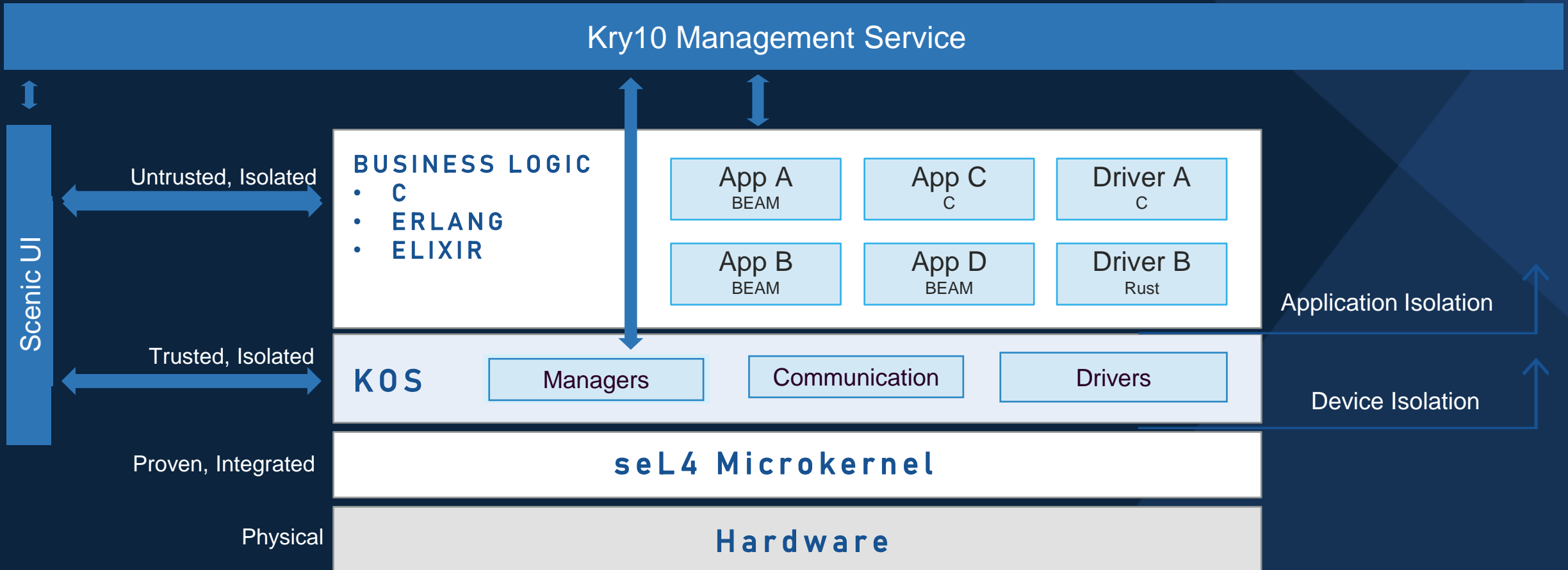


KRYTO

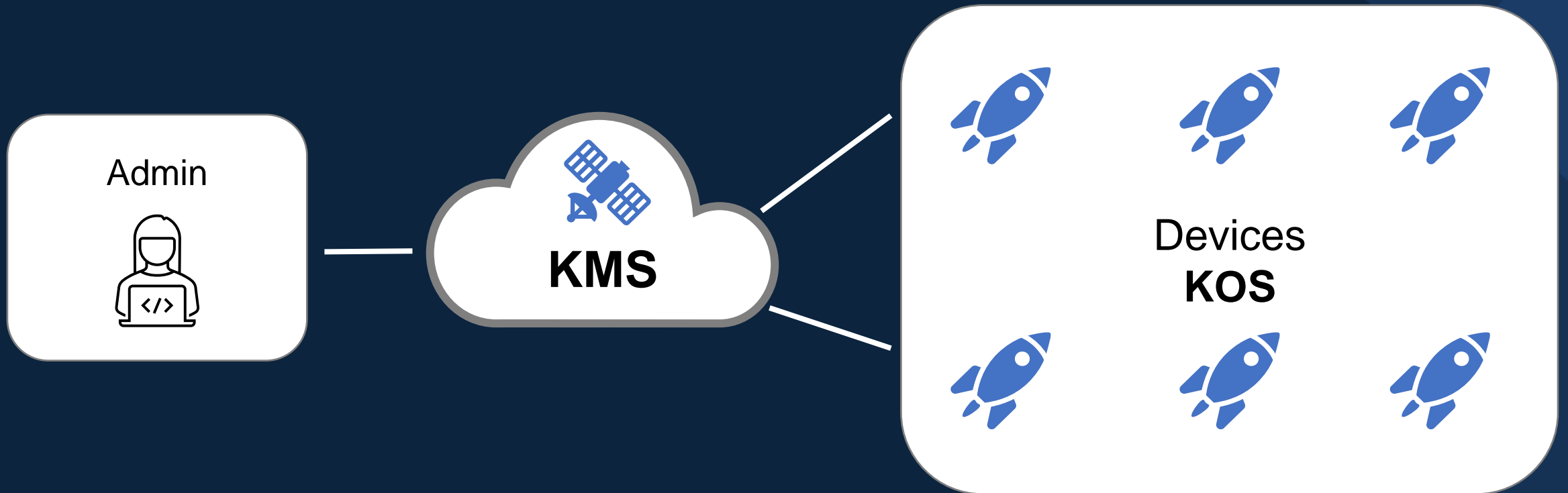
the modern platform for mission critical connected devices



The Kry10 Platform



Kry10 Platform



Management

The screenshot displays the KRYTO Operations management interface. The browser address bar shows the URL `localhost:4000/devices/6dfeb6fb-f07f-4fa7-8e3f-9dc10107164f/operations`. The interface includes a sidebar with navigation options: Dashboard, Operations (selected), Scenic, Deployment, and Settings. The main content area shows the device status as **Online** and provides control buttons for **Ping**, **System Restart**, and **Show Manifest**. A network diagram illustrates the system architecture with components like `ethernet`, `tunnel`, `admin`, `key_store`, `logging`, `self_test`, `mq_server`, `weather_station`, and `weather_sensor`. A legend on the right maps colors to specific protocols: `kos_log_protocol` (blue), `kos_internet_protocol` (purple), `kos_rng_protocol` (pink), `kos_key_store_protocol` (red), `test_protocol_denied` (orange), `kos_ethernet_protocol` (yellow), and `kos_temp_protocol` (dark orange). At the bottom, a table header is visible with columns for **ID**, **MESSAGE**, and **TIMESTAMP**.

Scenic

seL4 UI and
more...

The screenshot shows a web browser window with the URL `localhost:4000/devices/6df6b6fb-f07f-4fa7-8e3f-9dc10107164f/scenic`. The page features a dark theme and a sidebar with the KRY10 logo and navigation options: Device: Test device, Dashboard, Operations, Scenic (highlighted), Deployment, and Settings. The main content area displays the Scenic interface for a 'Sensor' scene. At the top, it shows 'Device Status: Online' and 'Service Status: Connected'. Below this, a dropdown menu is set to 'Sensor' and a toggle switch is turned on. The central display shows a large '16°' temperature reading. At the bottom of the main area, there are three buttons: 'Calibrate' (highlighted in blue), 'Maintenance', and 'Settings'. A text box at the very bottom explains: '"Sensor" is a simple scene that displays data from a simulated sensor. The sensor is in /lib/sensors/temperature and uses Scenic.Sensor. The buttons are placeholders showing custom alignment.'

Practices and Rituals

- Stable Base versions
 - Predictable releases
 - Breaking changes isolated into major releases
 - Multiple major releases supported
- Open vs Available source
 - Not everyone needs, or even wants, full open source
 - Code base must be inspectable
 - Emphasis is to not breaking existing code.

Status

- 1.0-beta to close partners in December 2022
- 1.0 Coming first half of 2023

- Beta is focused on key ISVs
- Working on key projects now

Find us at the seL4 Summit



Boyd Multerer
CEO/CTO kry10



Jason Fox
VP Ops Kry10



Neil Charney
CMO kry10



Kent McLeod
KOS Lead



Ihor Kuz
KOS Architect



Matt Brecknell
Verification Lead

fin