



UK Atomic
Energy
Authority



Fusionics Manifesto

<http://www.fusionics-foundation.com>

The control system every fusion reactor needs.

Fusion is happening. Physics is advancing faster than ever. Billions are flowing in.

But every team, from scrappy startups to national labs, is wasting months building their own control system from scratch. Custom wiring. Custom software. Custom headaches.

We deliver a platform that lets fusion teams focus on fusion—not on reinventing plumbing.

The Problem

Every fusion startup hits the same wall. Not the physics, the engineering around the physics.

- **Running experiments from a control room:** safely, repeatably, with confidence
- **Integrating diverse hardware** as the machine design evolves week to week
- **Closing real-time control loops** with the guarantees your physics demands
- **Acquiring and storing experiment data** so it's useful to your team, your investors, and your reviewers
- **Protecting people and equipment** when you're pushing boundaries
- **Minimising commissioning time** because your runway is measured in months, not decades

These are solved problems. They've been solved in particle physics, in medical devices, and in industrial automation.

They just haven't been packaged for fusion yet.

Phase 1

Fusion Diagnostic Testbed

Months 1–6

The problem

You're building a first-of-a-kind machine. You need to prove your concept works — to your team, your board, your investors.

But your data acquisition is cobbled together from mismatched tools. Timing is inconsistent. Analysis is manual. When it's time to show results, you're stitching together spreadsheets instead of telling a coherent data story.

What you get

- **Industrial-grade timing and data acquisition** across all your diagnostics, synchronised, reliable, done right
- **Real-time visualisation and analysis suite** enables you to see what's happening in real-time
- **Works with standard experimental hardware** out of the box, requiring no custom drivers, and assuring no integration nightmares
- **Timestamped, archived, searchable experiment data assures you of tracking** every shot, every signal, every time
- **Hardware-in-the-loop testing enables you to** validate your diagnostics and analysis pipelines before you run a shot
- **Validate your fusion concept with real data right now, when it matters most**

This is the foundation on which everything else builds.

Phase 2

Control Integration

Months 6–12

The problem

You've proven your concept. Now you need to close the loop: real-time control of real hardware. But building a control system from scratch means sourcing hardware, writing middleware, integrating safety layers, and hoping it all works together. That's a year you don't have.

What you get

- **Deployable control platform** arrives with the hardware you need, ready to configure
- **Plug in your control algorithms** so that your physics models become executable control logic on industrial-grade hardware
- **Plant configuration editor** by describing your machine, wire it together, and adapt as your design evolves
- **Industrial machine protection and safety interlocks**, built in from day one, not retrofitted
- **Configure, don't build:** focus on your use cases, not on plumbing

A control system you configure, not one you construct.

Phase 3

From Lab to Pilot Plant

Years 2–3

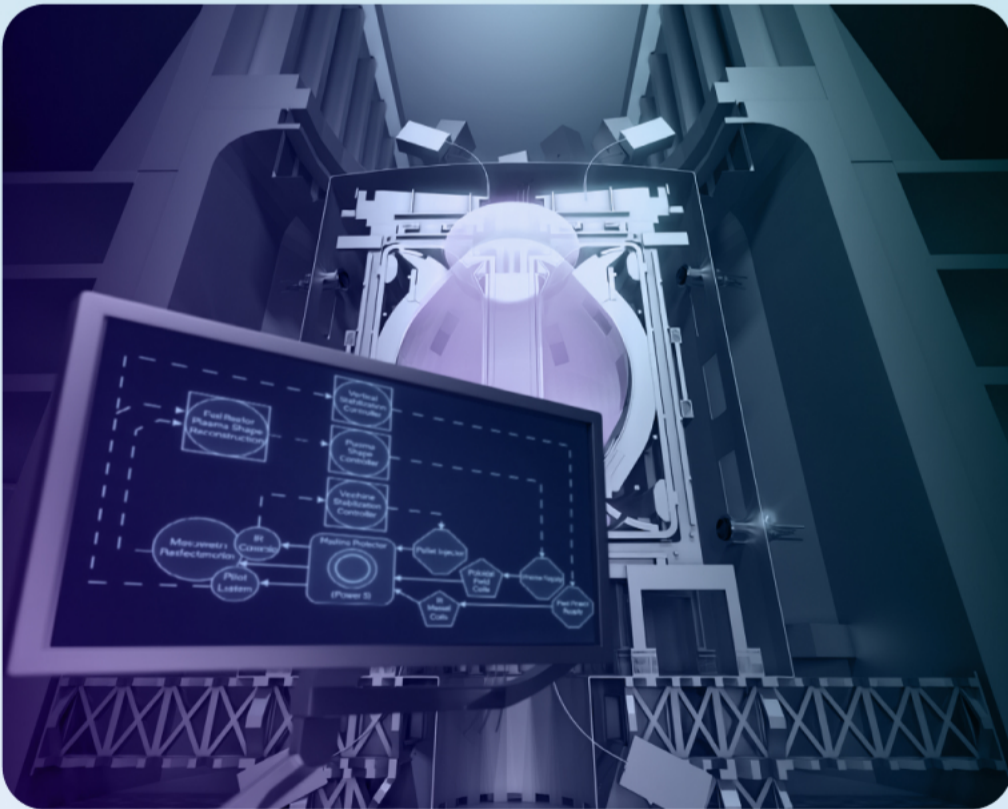
The problem

The leap from experiment to pilot plant is a chasm marked by different reliability expectations, standards, and regulatory scrutiny. Most teams hit this wall and realise they need to start over.

What you get

- **Same platform, scaling with you**, so you won't have to rip-and-replace or start from zero
- **Digital twin environment** enables you to pre-commission your upgrades virtually before you touch hardware
- **AI/ML-enhanced operations** allow predictive maintenance and anomaly detection
- **Multi-reactor concept support**: the platform adapts to your physics, regardless of your reactor type: magnetic, inertial or hybrid.
- **Cybersecurity and compliance readiness** are built in, not bolted on
- **Fusionics' standards alignment** makes it future-proof, not locked into any single vendor or framework

Your control system grows up with your machine.



Why Cosylab

Certification DNA. We've built safety-critical control systems for medical devices and particle accelerators. We know what "production-grade" means before regulators come knocking.

Vendor-agnostic. Your hardware choices are yours. Our platform works with them, and not against them, not instead of them.

Fusionics-compatible. We build to emerging fusion industry standards. You're future-proof, not locked in.

Startup-speed delivery. Enterprise-grade reliability. We move fast because you need us to. We build it right because your machine demands it.

Industry expertise that transfers. Control systems are control systems. We've done this across industries, and we bring it all to fusion.

The Ask

Whether you are an investor, a fusion prime, a startup or a supply chain partner, the question is the same:

**You're building the future of energy.
Are you going to build your own
control system, too?**

Let's talk.

