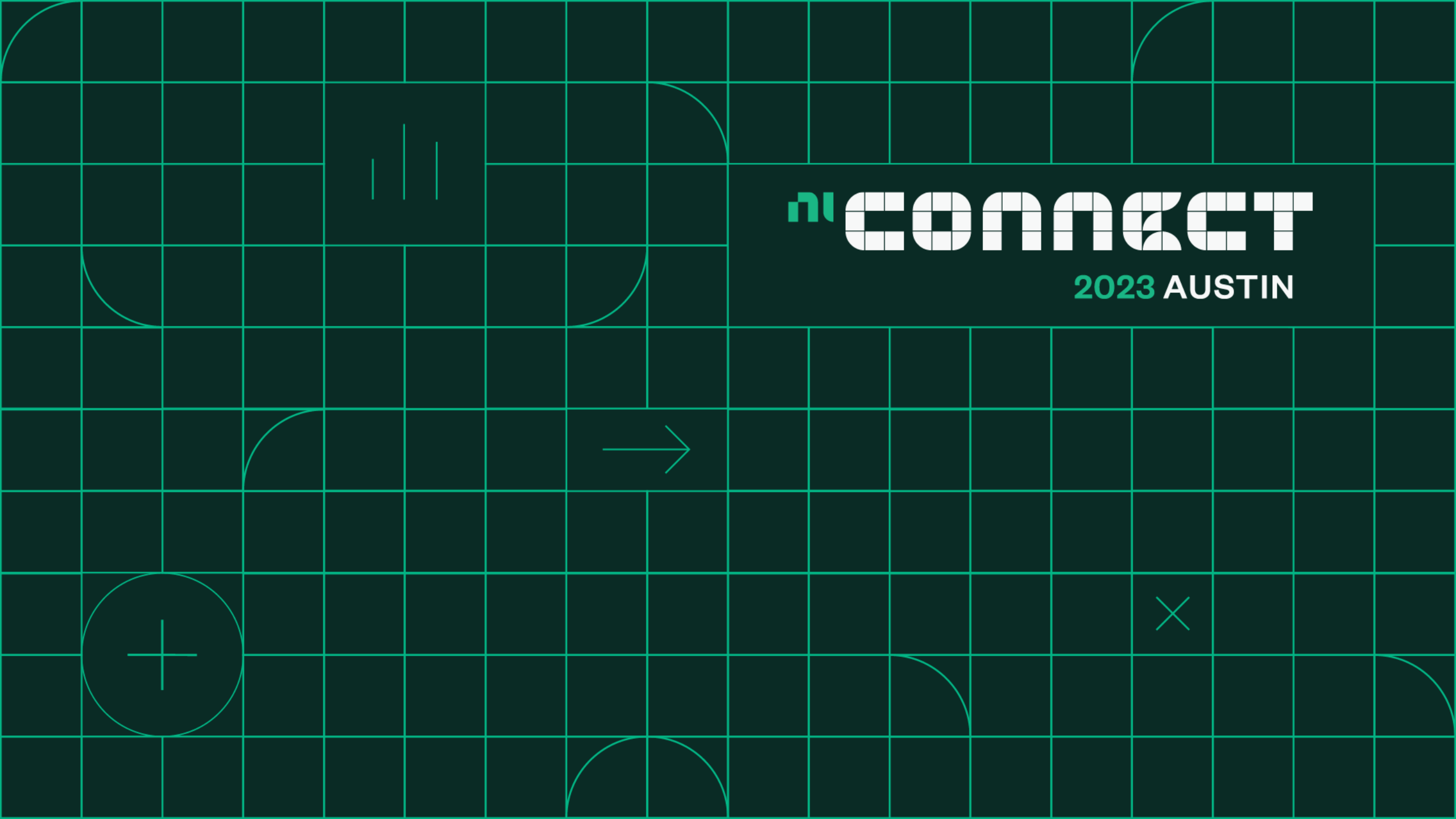

NI CONNECT
2023 AUSTIN

Hardware in the loop, is for everyone!

Anna Pedale, NI

Tanner Blair, Aliaro

Agenda

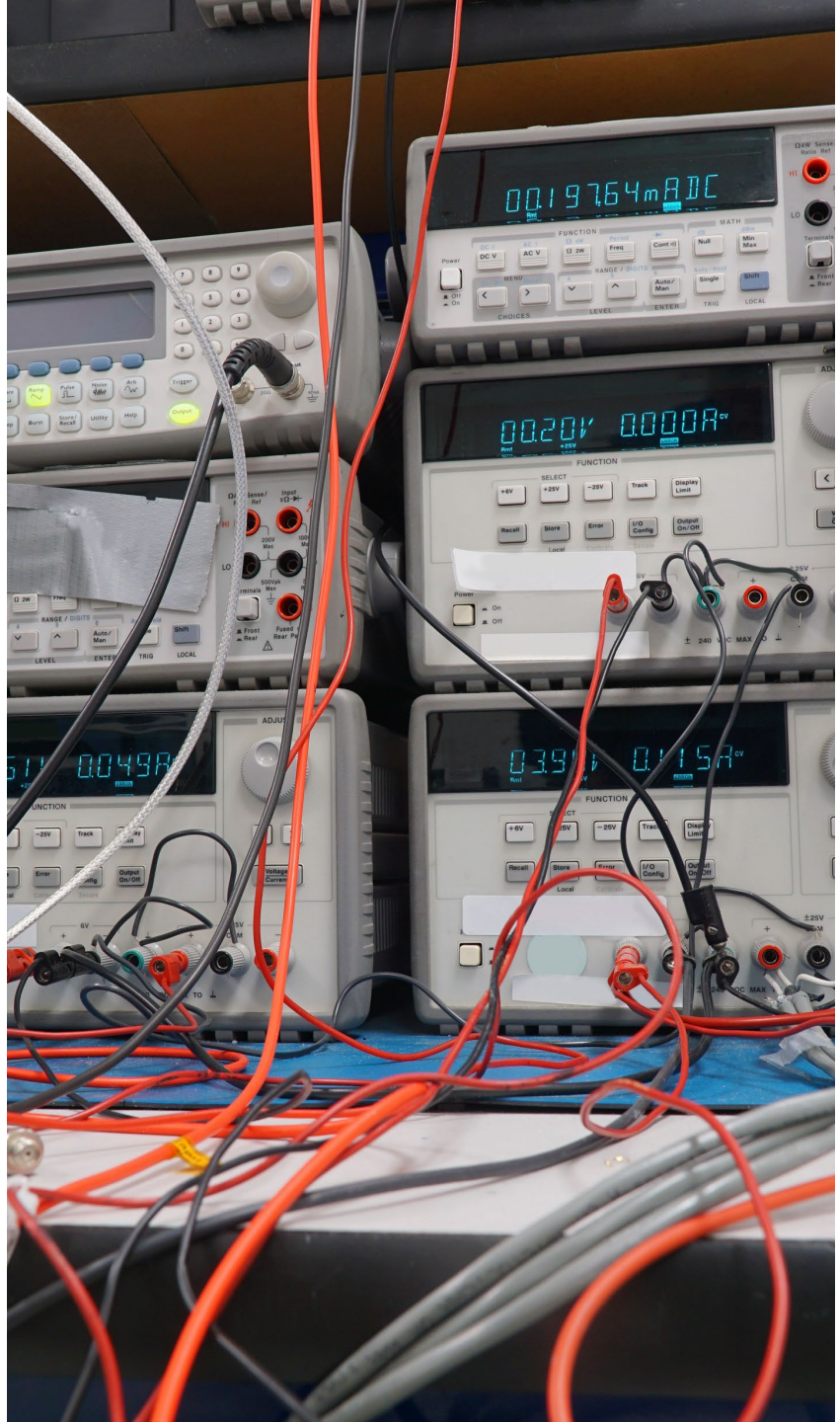
- Challenges
- Testing Early and Often
- Why HIL is for everyone
- Who is Aliaro
- What a flexible solution would look like
- xMove solution
- Next step
- Q/A

My story as Validation Engineer

Anna Pedale

Senior Product Marketing Manager - NI

Historical approaches to validation test don’t scale.



HISTORICAL APPROACHES

- Manual testing and data management
- Closed and inflexible test systems
- Disparate tools, processes, and software

CHALLENGES

- Limited product insight
- Reduced product quality
- Higher test and development cost
- Poor model, asset, and IP reuse
- Unable to scale with new technology

Fully Leveraging Hardware-In-The-Loop

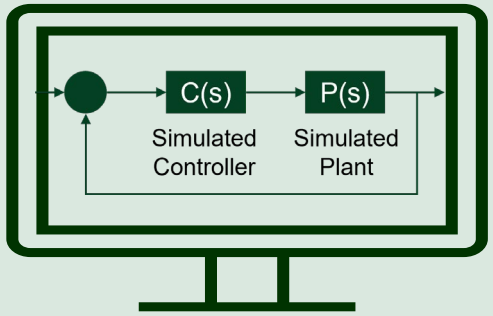
Testing

Maximize Your Investment
Across Design And Test

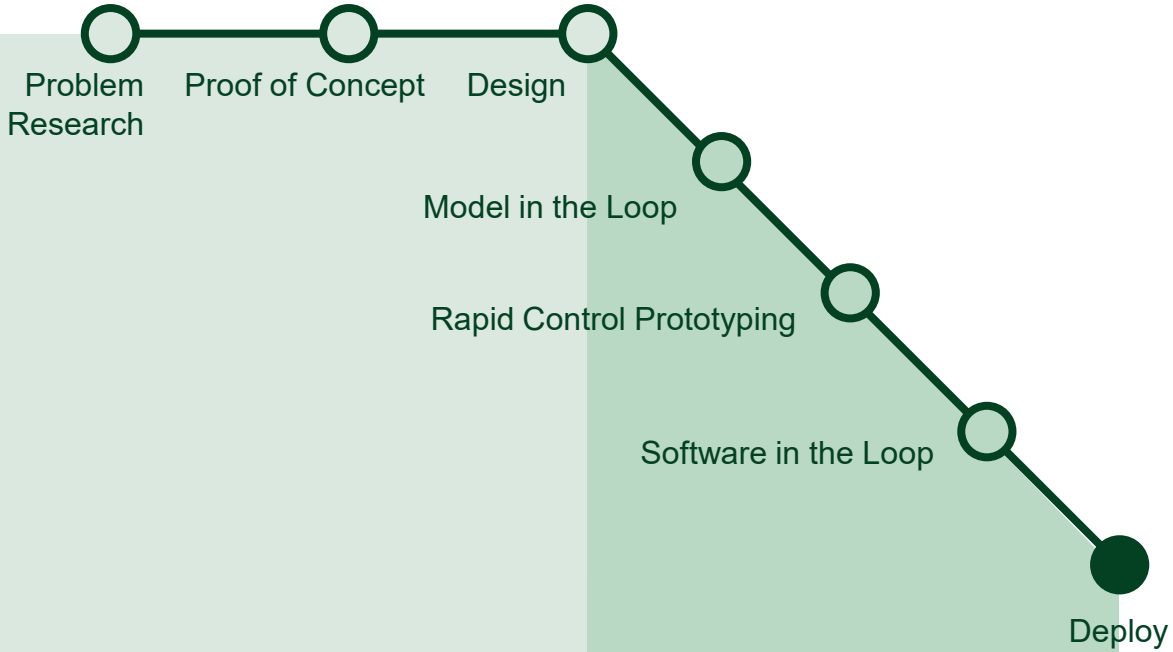
Innovation

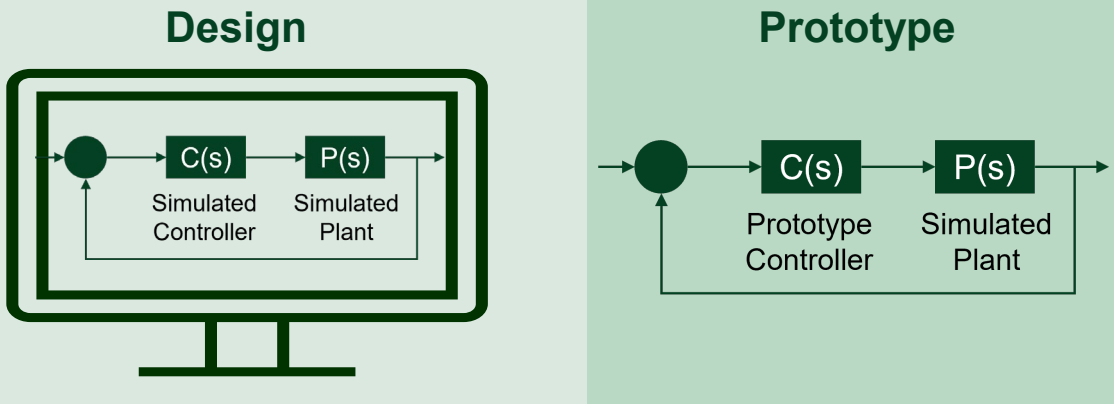
Testing Early and Often Before Production Test

Design

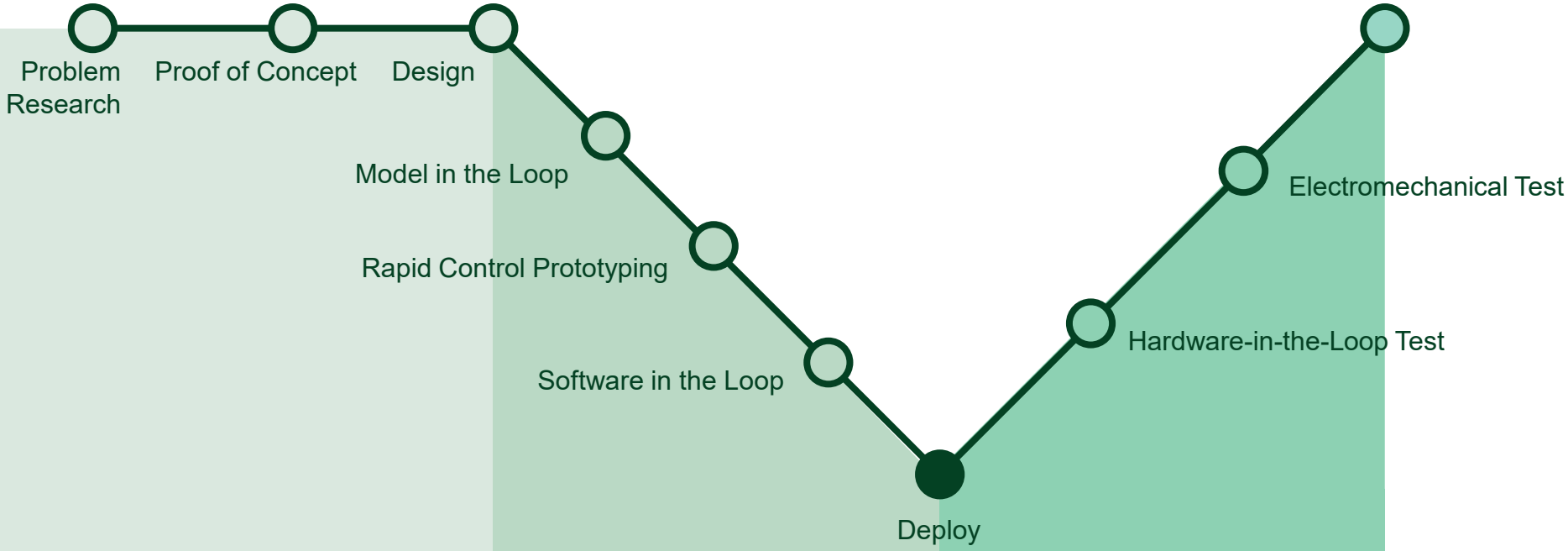


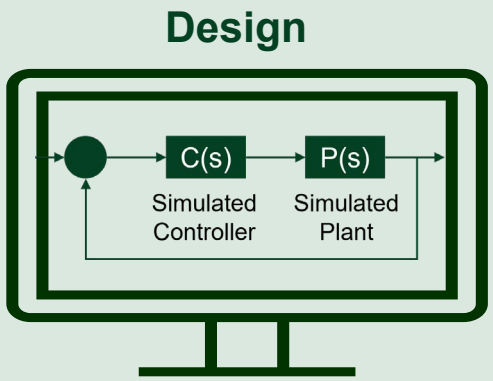
Testing Early and Often Before Production Test

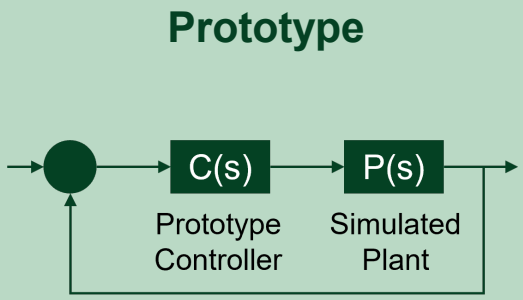


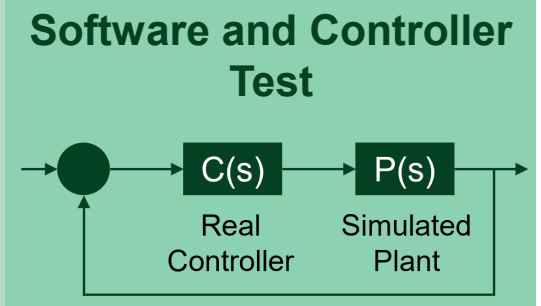


Testing Early and Often Before Production Test

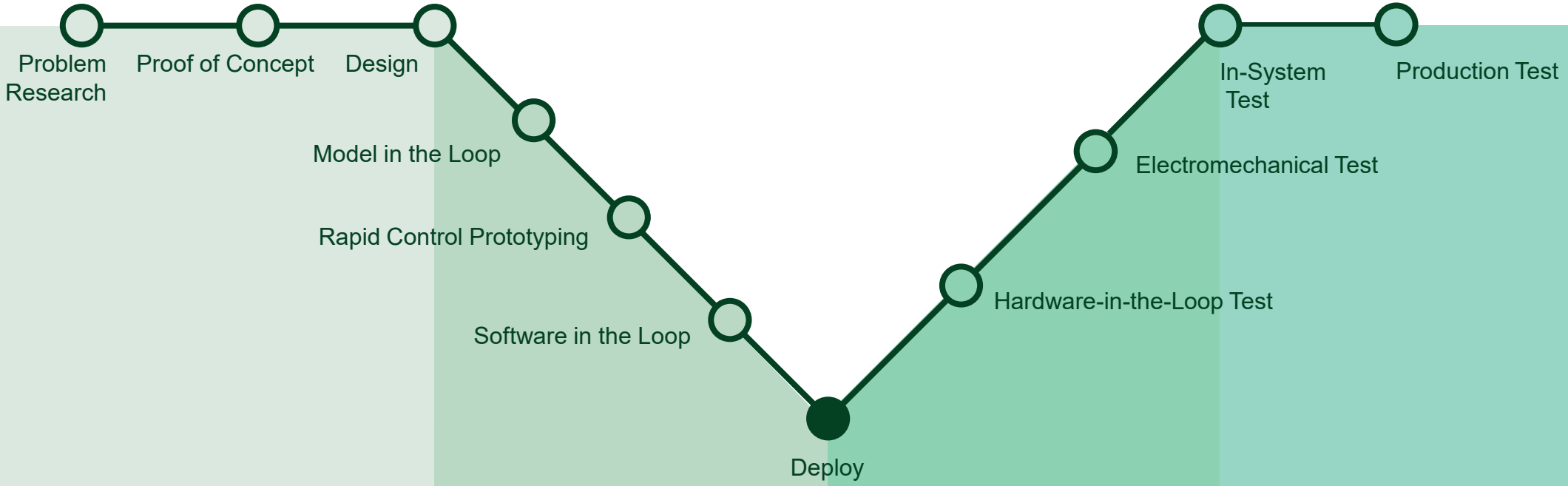




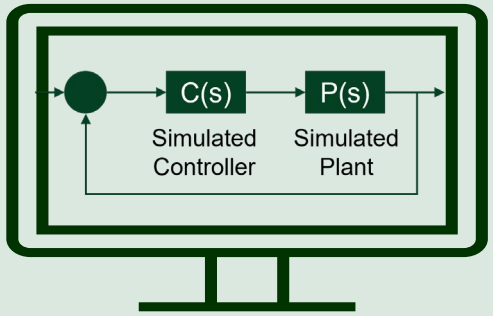




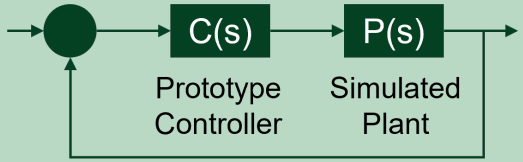
Testing Early and Often Before Production Test



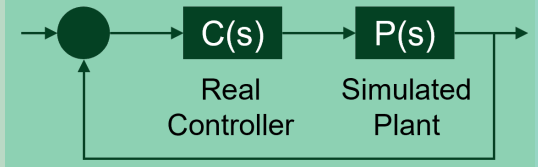
Design



Prototype

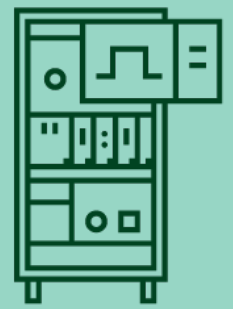


Software and Controller Test



Physical Test

Real controller
+
Real plant



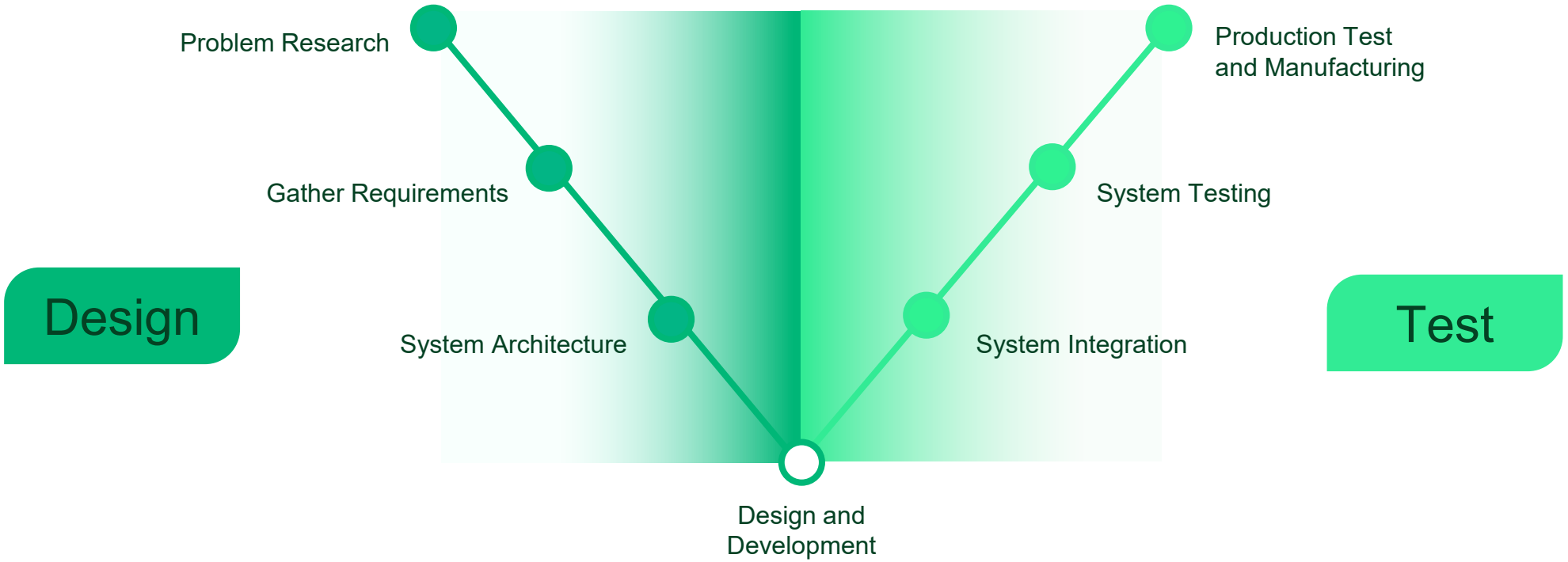
HIL as A Tool for Design Innovation

Testing

Maximize Your Investment
Across Design And Test

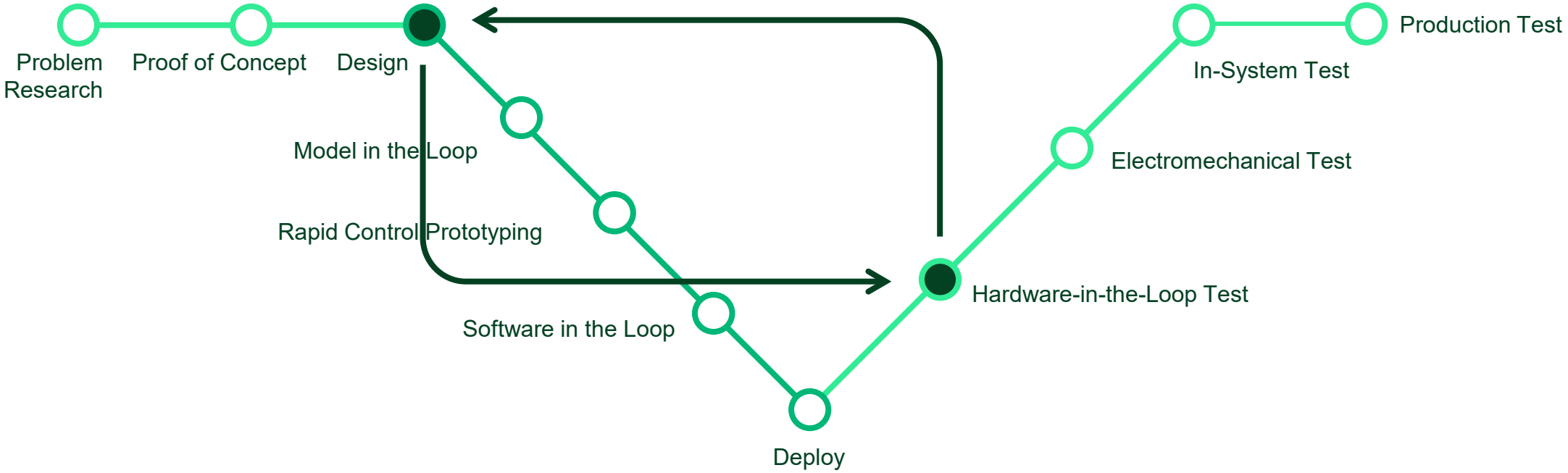
Innovation

The Traditional Design V



There Can Be a Rigged Boundary Between Design and Test

The Design V is Evolving



Software Engineers can quickly ideate, test, and iterate through **timely feedback** provided by HIL systems

If …

You are testing embedded software

Your products are getting more sophisticated

You need to leverage different tools across the organization

You think there are big entrance barrier

Hardware in the loop,

is for everyone!

ALIARO Group

Introduction

Founded in 2014 in Gothenburg, Sweden

38+ team members with a growing presence in Austin, Texas

Specialize in solutions for:

- Hardware-in-the-Loop Test
- Battery Cell Simulation/Validation

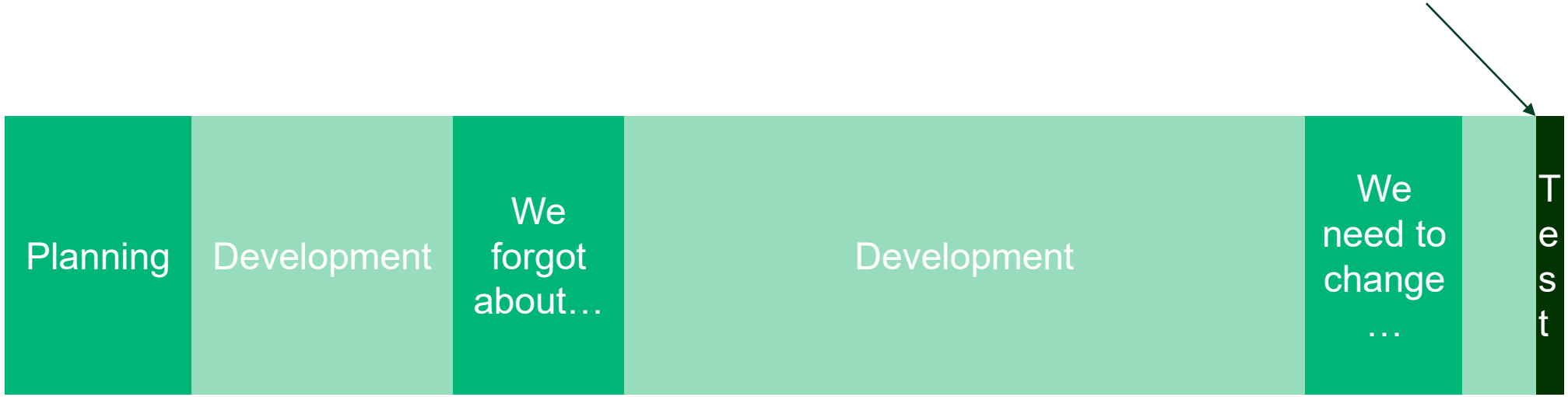
100+ customers globally, 90% within Transportation

How the Plan Starts

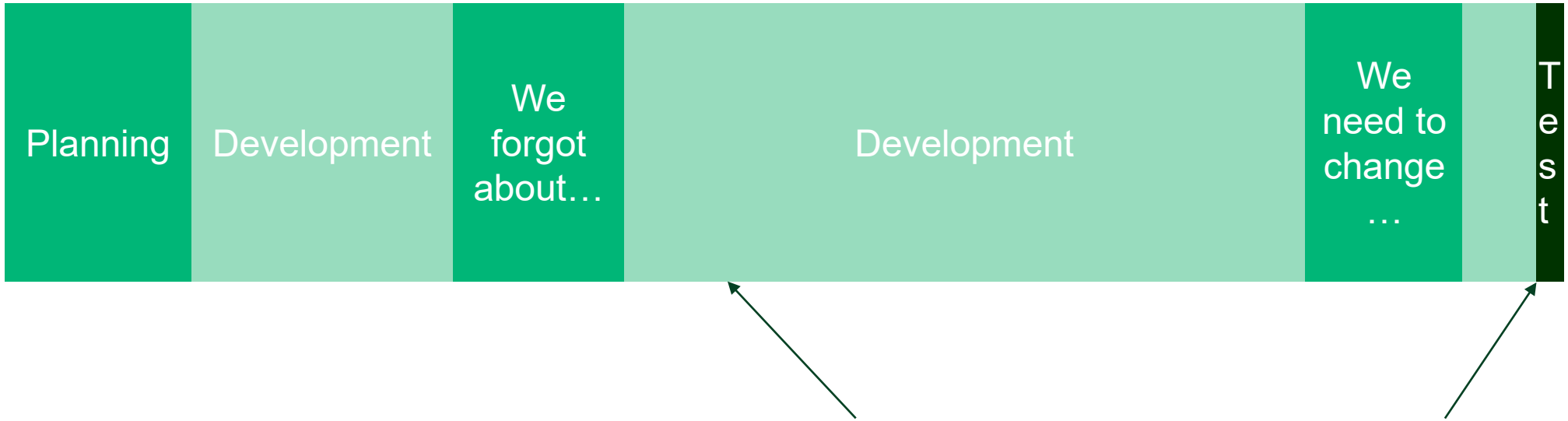
How the Plan Actually Goes

How the Plan Actually Goes

If you start designing your test solution here, it's already too late



How Can We Adapt to Reality?



The Universal Tester

What if instead of making a test system for each new product, we just made the Universal Tester!

All we need are maybe 80 digital inputs

And 80 digital outputs

And 20 or so analog inputs

And 20 or so analog outputs

And a serial bus

Also this sensor type

And Current In

And Current Out

Oops, we need 3 more DI. How do we fix the harness?

This DAQ module doesn't output fast enough. If we swap it, do we need to change the harness?

Oh, some of these are PWM signals

These too actually

These are +/-10V Except for when they are +/-60V Or +/-3.3V

That are single-ended

Or differential Or measuring current

Also, we are powering the DUT

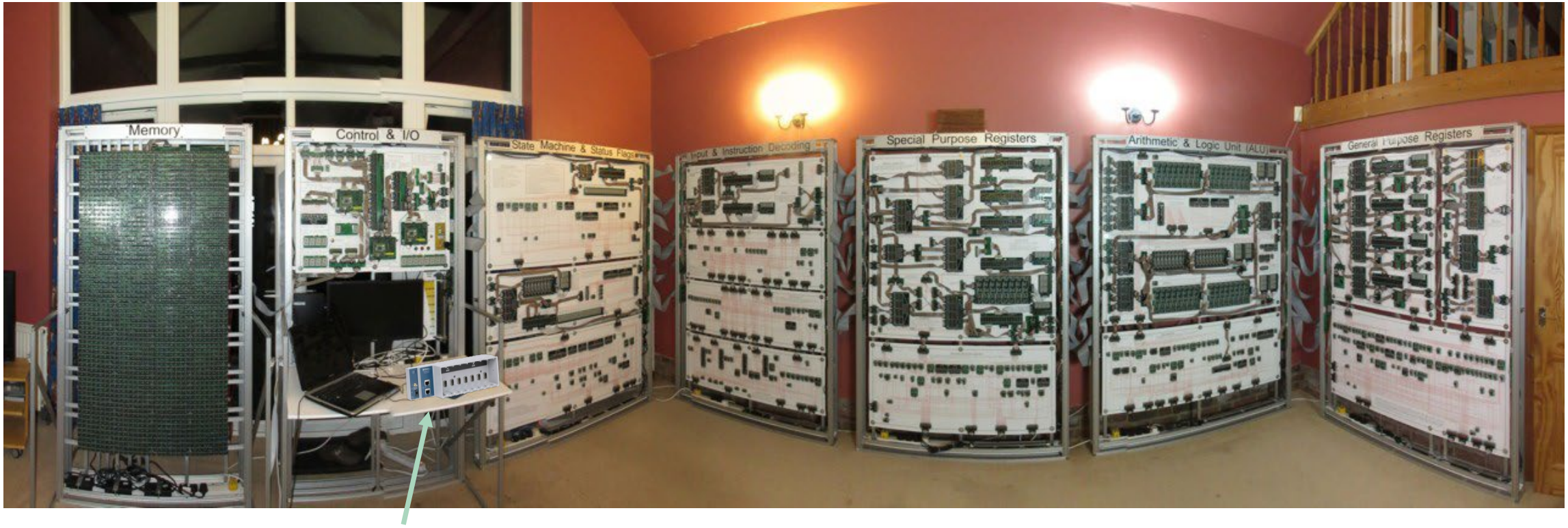
These need in-line faulting

And to connect this one to an external source

And to simulate a sensor

These require a load

What You End Up With



Actually we missed a requirement.
Gotta stick a cDAQ on there.

The ALIARO xMove Platform

ALIARO's xMove platform is a suite of hardware and software solutions that allow for dynamic definition and rapid reconfiguration of your test assets.

This extreme flexibility enables you to maximize the utility of your test assets and adapt to changing requirements throughout the development lifecycle.

xMove Hardware Platform

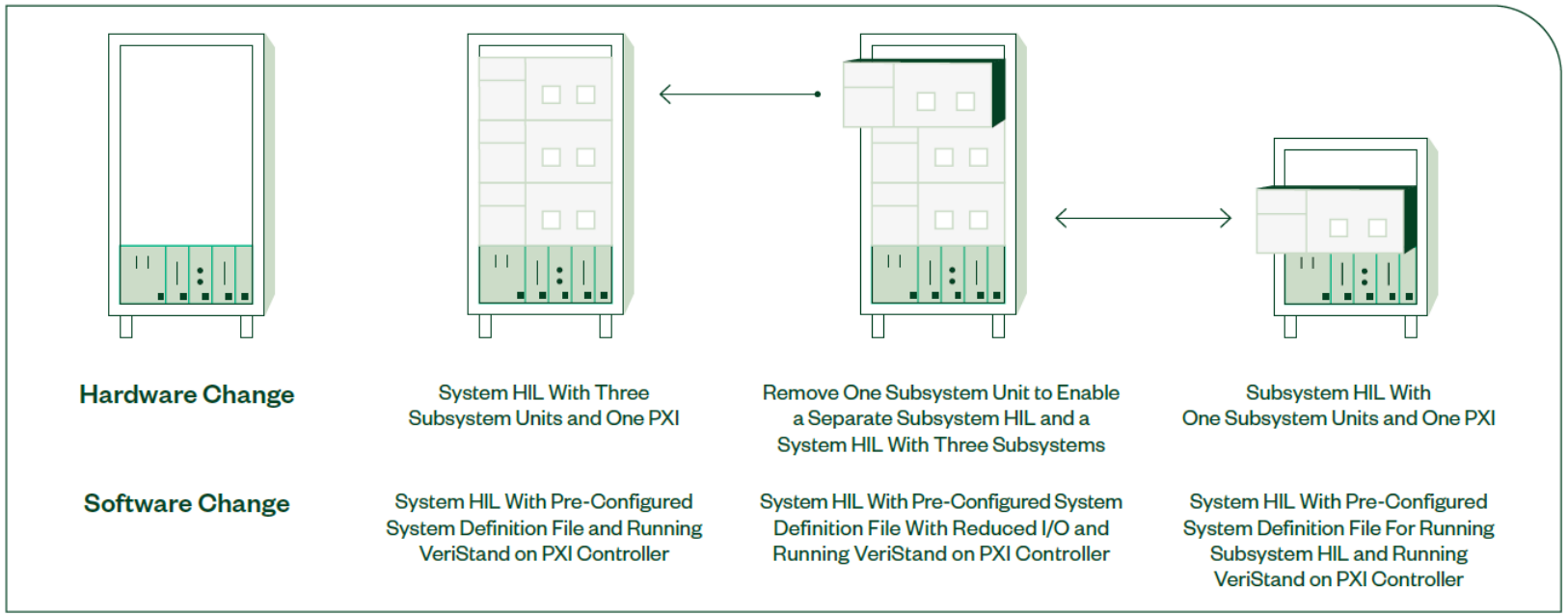
The ALIARO hardware platform provides a real-time test environment for dynamic, open/closed-loop testing of many transportation control systems.

By leveraging ALIARO's unique solution for NI's SLSC platform, an xMove-based system can provide a wide variety of functionality with unparalleled flexibility on every pin.

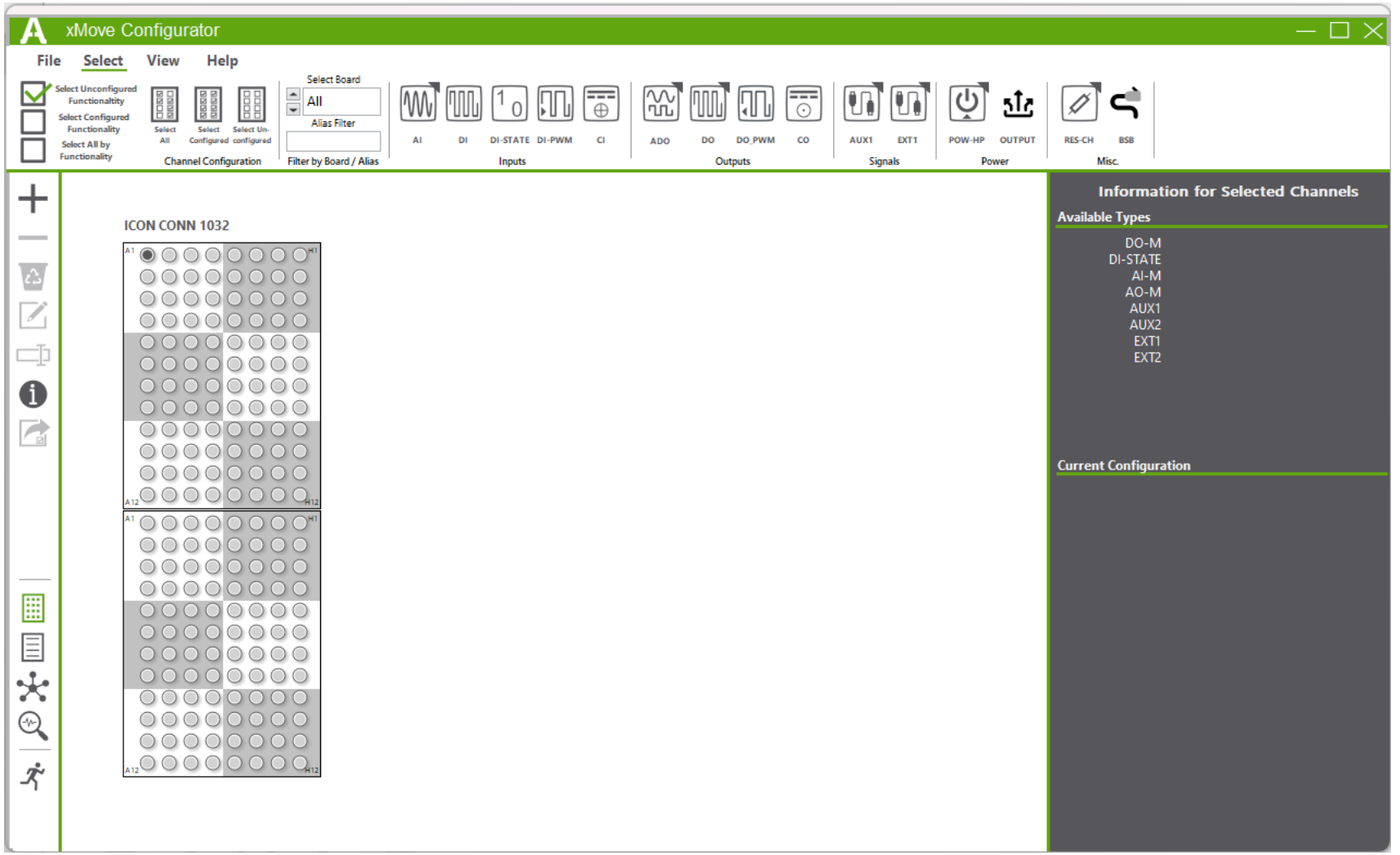
xMove Configuration Utility

xMove Configurator provides a user-friendly interface to swiftly configure test systems and HIL. It makes it simple to rapidly adjust to new requirements and add new ECUs by remapping your signals with a few clicks of a button.

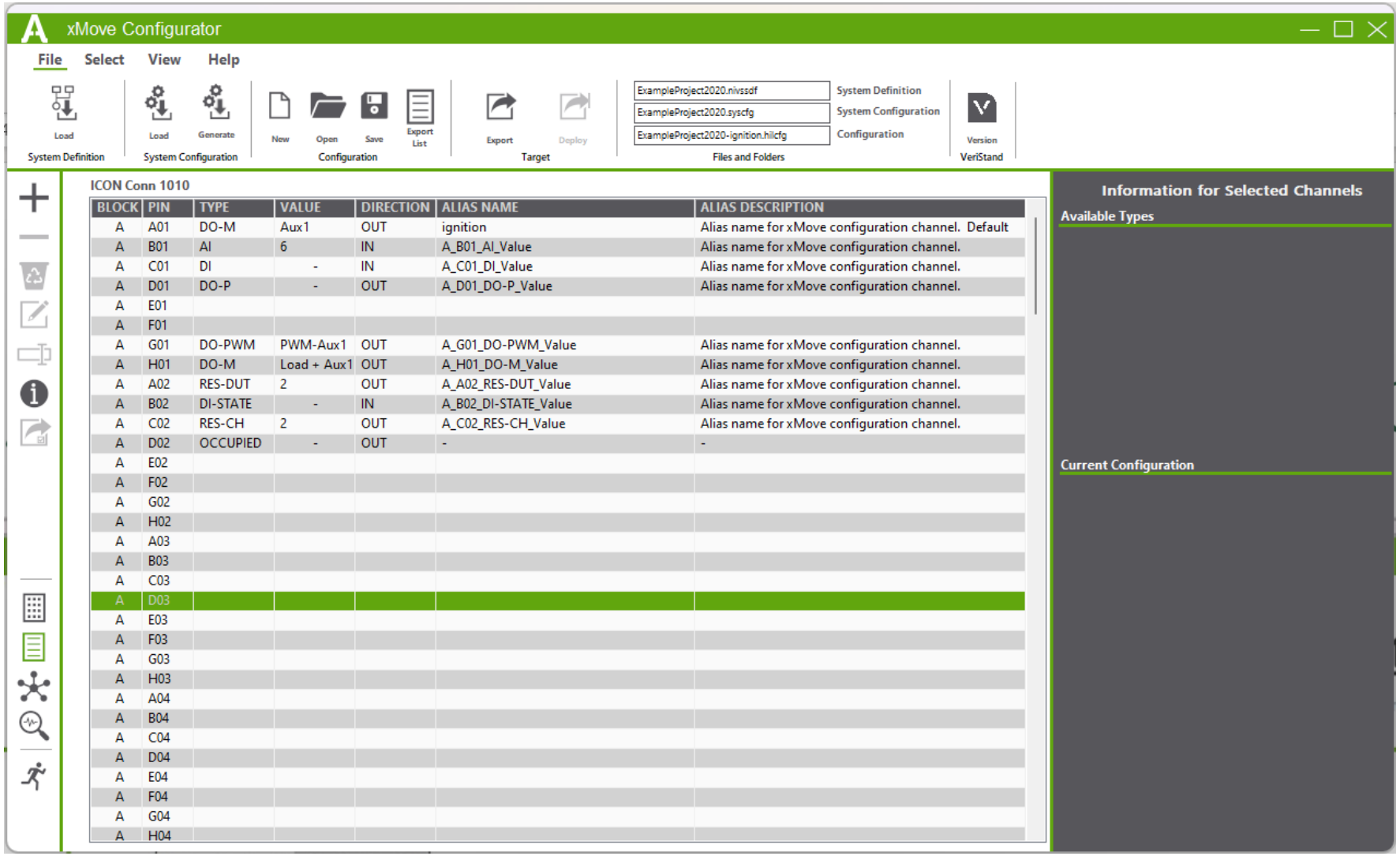
The xMove Configurator is a configuration tool for define and edit VeriStand System definition files for HIL (Hardware-in-the-loop) system with NI hardware module such as SLSC modules and Compact RIO modules.



Reconfiguring an xMove System



Reconfiguring an xMove System



Integration Testing of Commercial Electric Airplane

“We needed a partner which wanted to push the boundaries of how test systems can be built to enable us to grow faster and also allowing us to be more flexible with the floating requirements..”

HEAD OF INTEGRATION TEST

HEART AEROSPACE

Design System

5months

Ahead of test

100%

Requirements coverage

>5

Requirements changes

Integration Testing of Commercial Electric Airplane

Challenge: A high-performance application where requirements are constantly changing and they need to integrate Avionics, Flight Control, Propulsion, etc. in a simulated flight environment.

Solution: An xMove HIL system based on hardware from NI and ALIARO provides the flexibility to integrate with existing systems and to add new systems later.

Value: The power and flexibility of the xMove platform ensures that the system can evolve with their design, and new requirements have a minimal impact on cost and schedule.

Design System

5months

Ahead of test

100%

Requirements coverage

>5

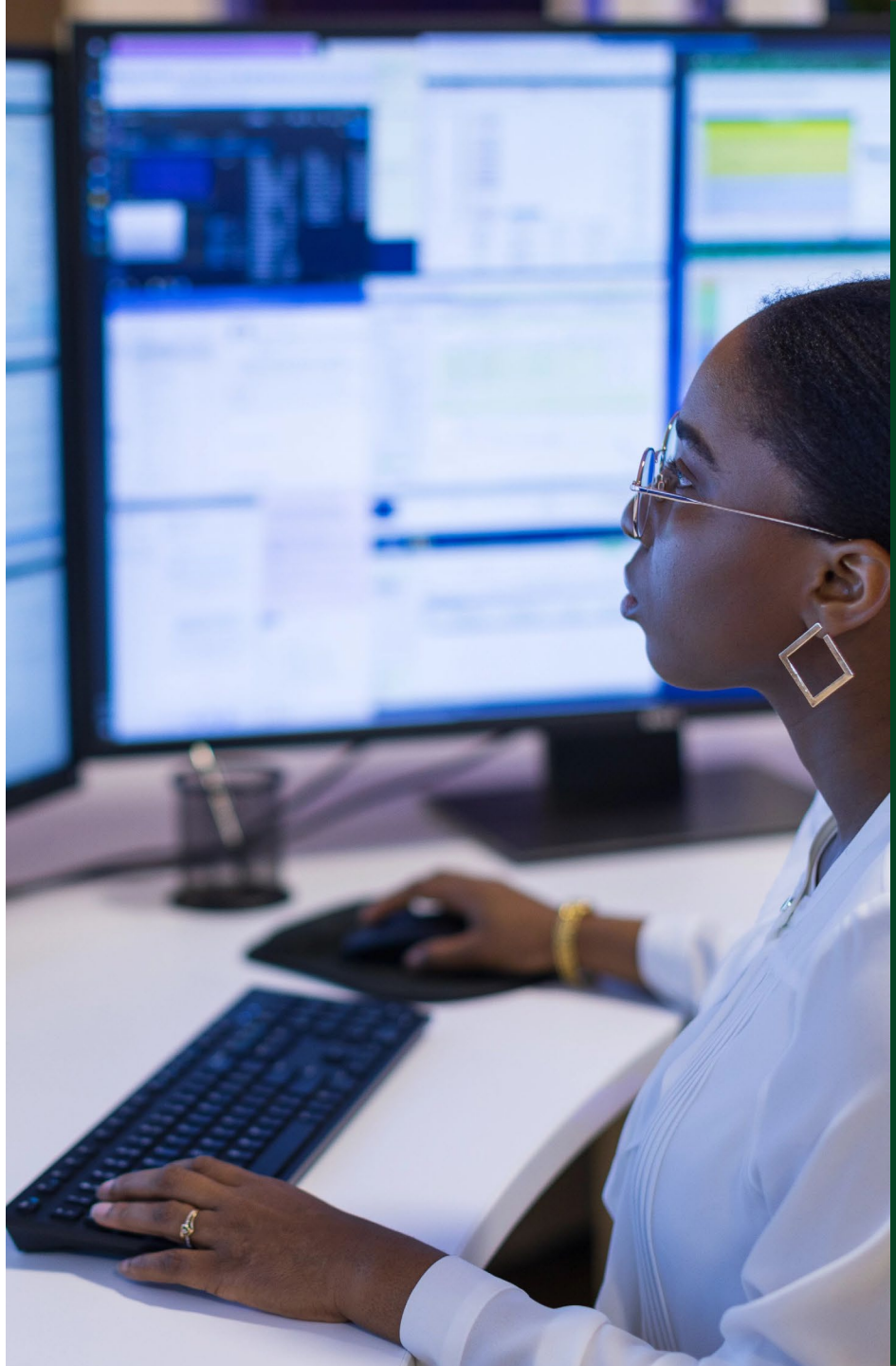
Requirements changes

SLB Accelerates Drill Performance with HIL Approach

"If you want to use physical test, it is very costly, and you cannot do this all the time. Using NI systems, we have the ability to be flexible to write our test and we see the value over the long run."

Solomon Idinyang

SOFTWARE QA TEAM LEAD
SCHLUMBERGER



33%
Embedded Test Reduction

71
Technology Centers

>20y
Technology lifetime

SLB Accelerates Drill Performance with HIL Approach

Challenge: Increased Oil Extraction complexity and drive to a balanced planet require high performance in the drilling operation which in turn commands high quality of the equipment and services. With market volatility there is less time for test and decision-making process.

Solution: SLB saves time by implementing a validation solution that simulates behavior of embedded software while also providing flexibility for use across product lines and analytics for product development

Value: NI products offer the flexibility and power to deploy embedded software test quickly and reduce costs compared to physical test repeated over the lifetime of a technology.

33%

Embedded Test Reduction

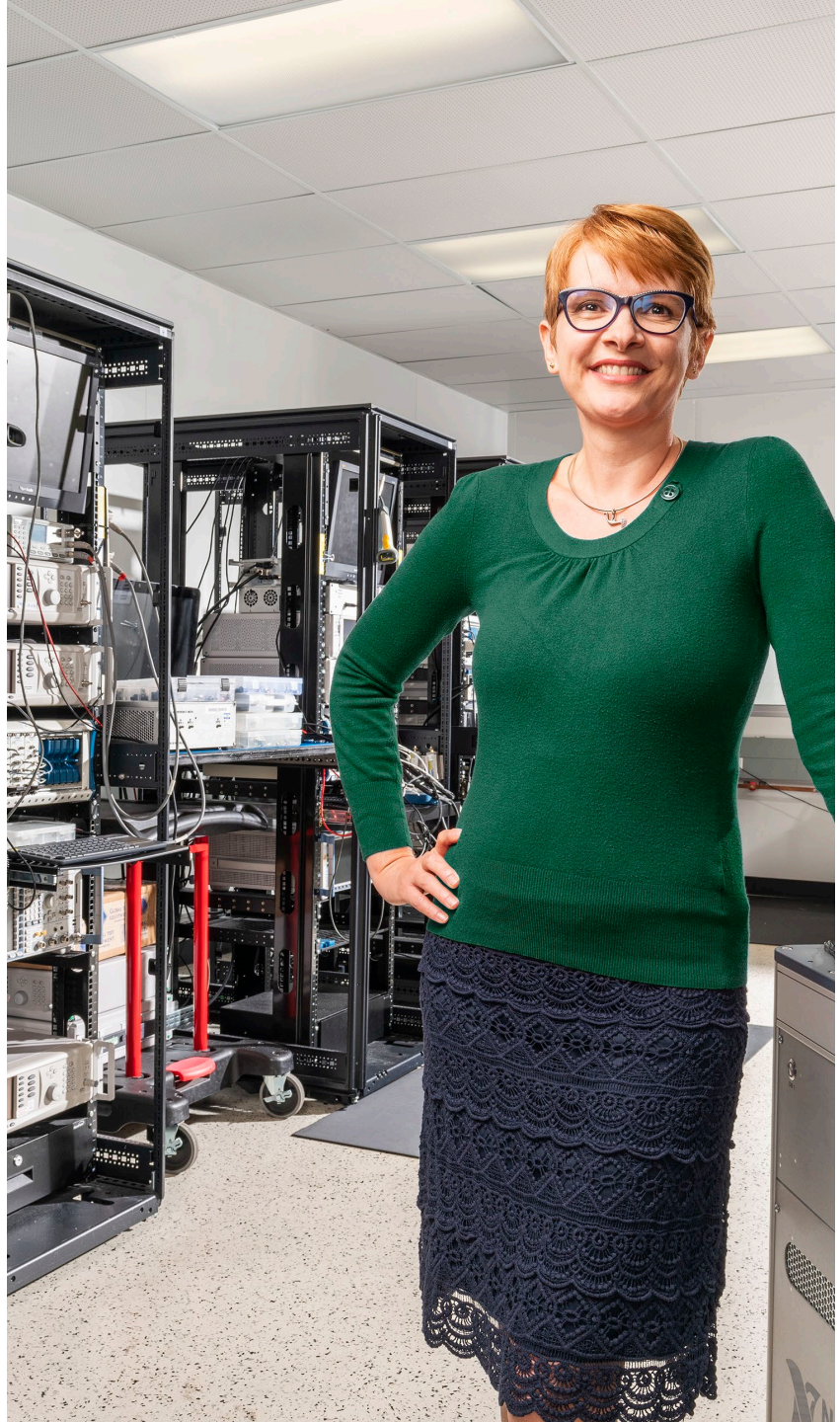
71

Technology Centers

>20y

Technology lifetime

NI’s software-connected approach to validation test drives product and business performance.



NI APPROACH

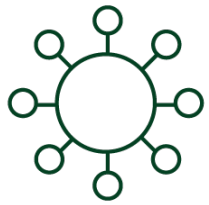
- Open and flexible test systems
- Automated testing and data management
- Scalable and integrated test software

IMPACT TO TEST ORGANIZATIONS

- Improved product insight
- Higher product quality
- Lower test development cost
- Adaptable to future requirements

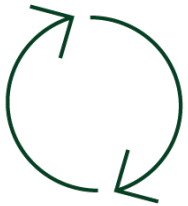
Test Early and Test Often

Doing More With Less



Increasing Complexity

More Tests

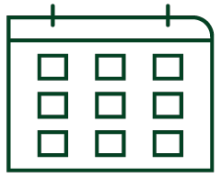


Evolving Requirements

More Uncertainty

Tight Budgets

Less Money



Aggressive Schedules

Less Time

Next steps

- Contact your NI Sales Representative or us
- Meet Tanner at Experience Lounge and watch the HIL demo

We welcome any questions!

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