

The background of the image is an abstract, futuristic scene. It features a curved, tunnel-like structure with glowing lines and patterns. The colors transition from a warm orange and red on the left to a cool blue and teal on the right. The overall effect is one of depth and movement, suggesting a high-tech or digital environment.

# NIDays

WORLDWIDE GRAPHICAL SYSTEM DESIGN

## CONFERENCE



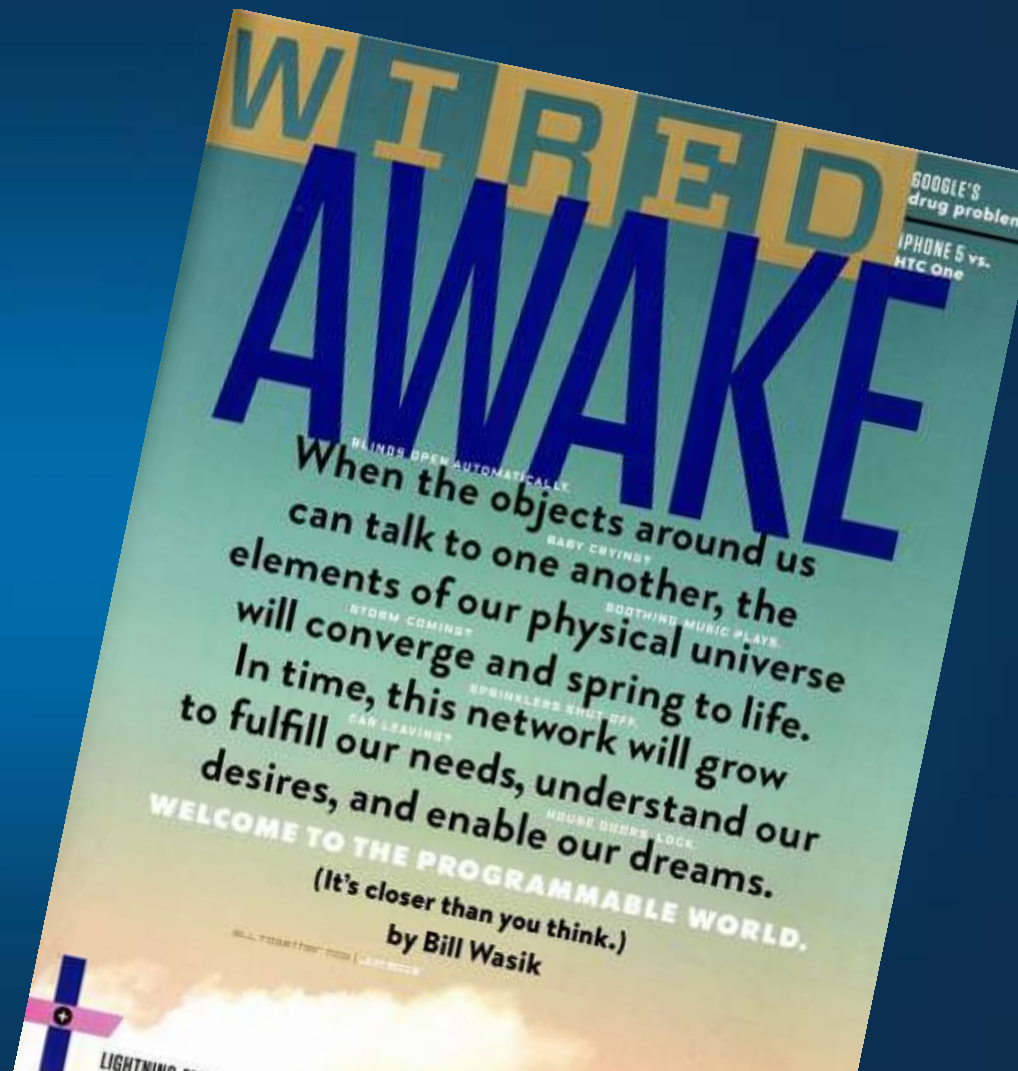
Joris Donders  
Area Sales Manager, NI



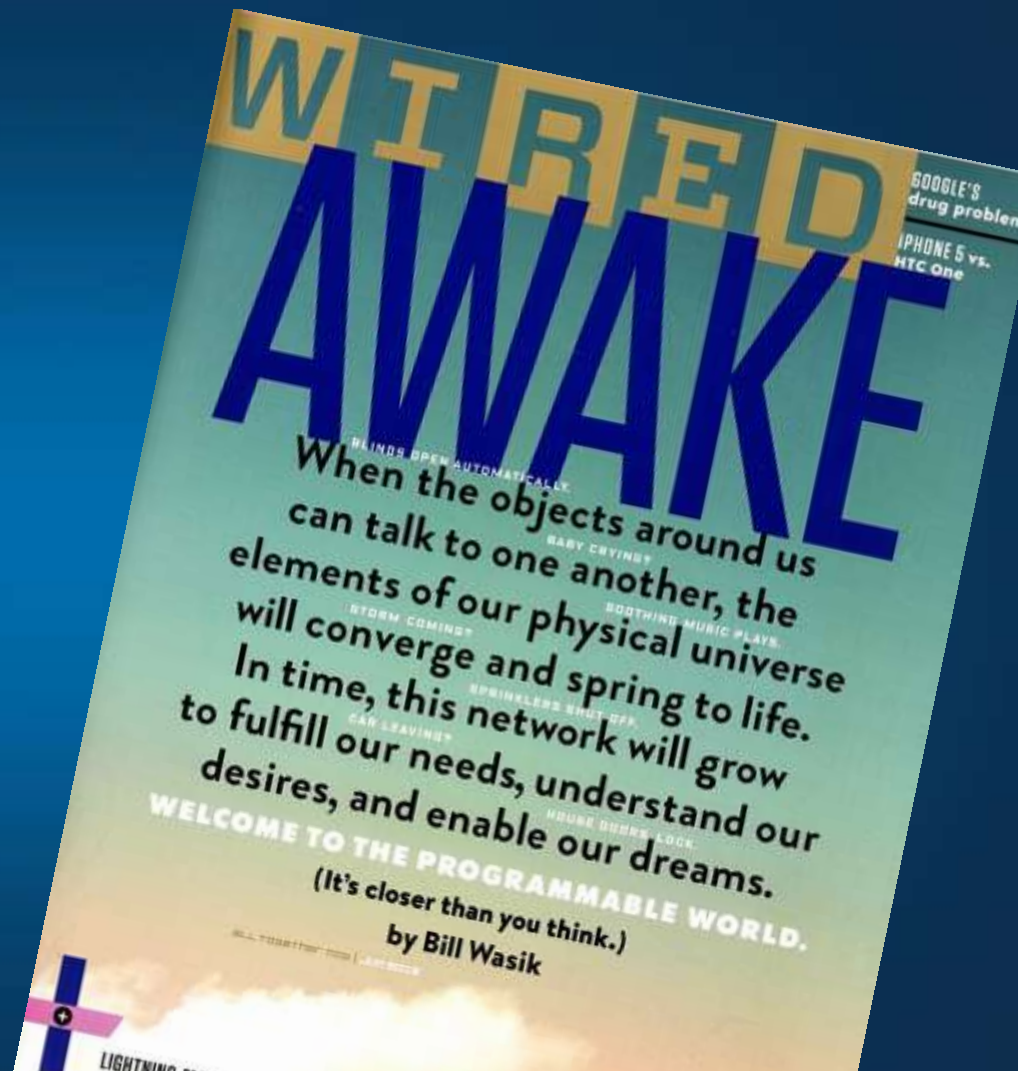
Charles Schroeder  
Director of Test Systems

# Innovating in a Platform-Based World

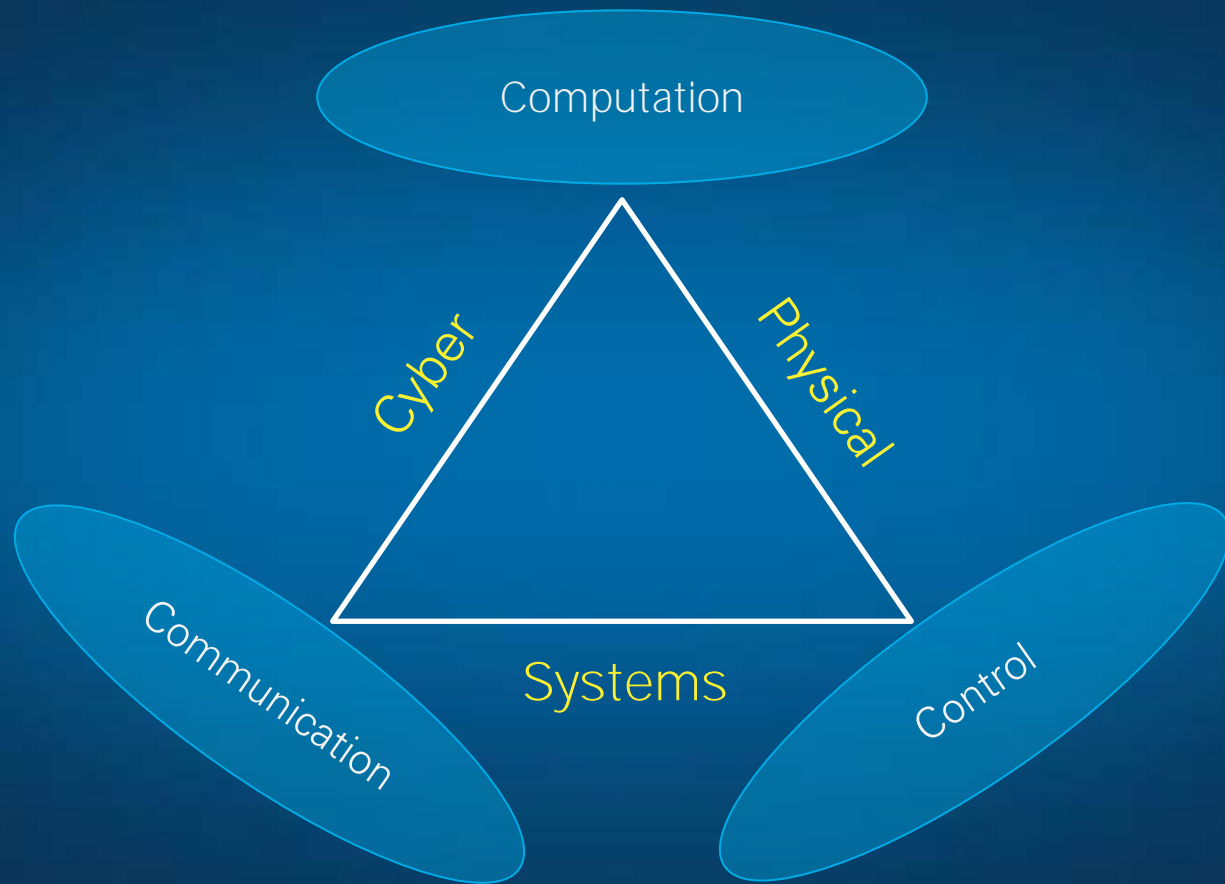
## The Programmable World



Industrie 4.0  
Internet of Things  
Big Analog Data™ Solutions  
Intelligent Systems  
Smart Factory  
M2M  
Industrial Internet









Computation

“Cyber-physical systems (CPSs) will transform entire industrial sectors, including transportation, healthcare, energy, manufacturing, and agriculture. There is an urgent need to develop design methodologies that will provide real-time, guaranteed performance.”

–Vijay Kumar, Assistant Director for Robotics and Cyber-Physical Systems,  
Office of Science and Technology Policy at the White House



Extra equipment needed.





Are You Wearing a Watch?



3G



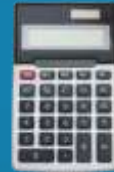
# 8:30

Tuesday, 6 August

## Instruments



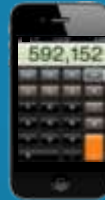
## Physical Embedded Systems



## Virtual Instruments



## Platform-Based Embedded Systems



# PC Platform





# Web Platform



# Mobile Platform



# Graphical System Design



Measurement



Test



Monitoring



Embedded



Control



Desktops and  
Laptops



NI CompactDAQ

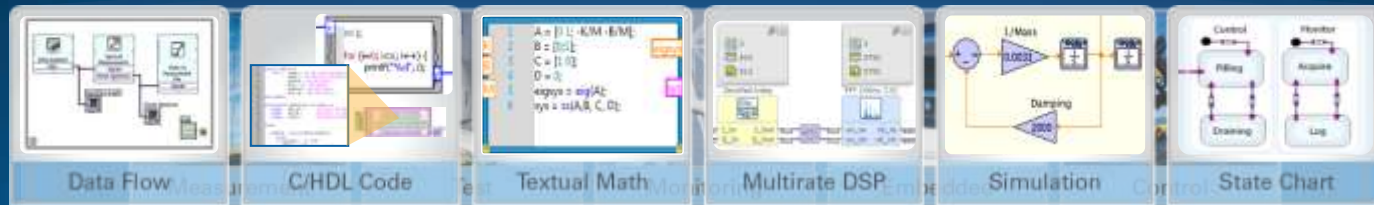


PXI and Modular  
Instruments

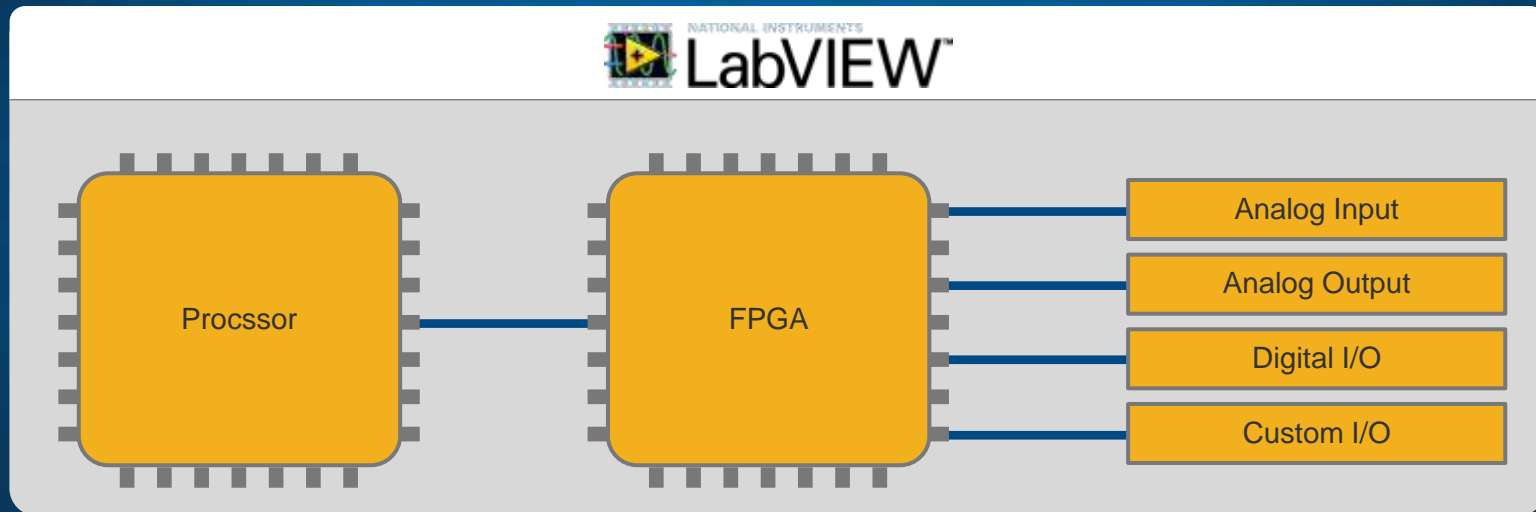


NI CompactRIO





# LabVIEW RIO Architecture





# Graphical System Design



Measurement



Test



Monitoring



Embedded



Control



Desktops and  
Laptops



NI CompactDAQ



PXI and Modular  
Instruments



NI CompactRIO





“In the past year I have been struck again and again by how important measurement is to improving the human condition.”

–Bill Gates

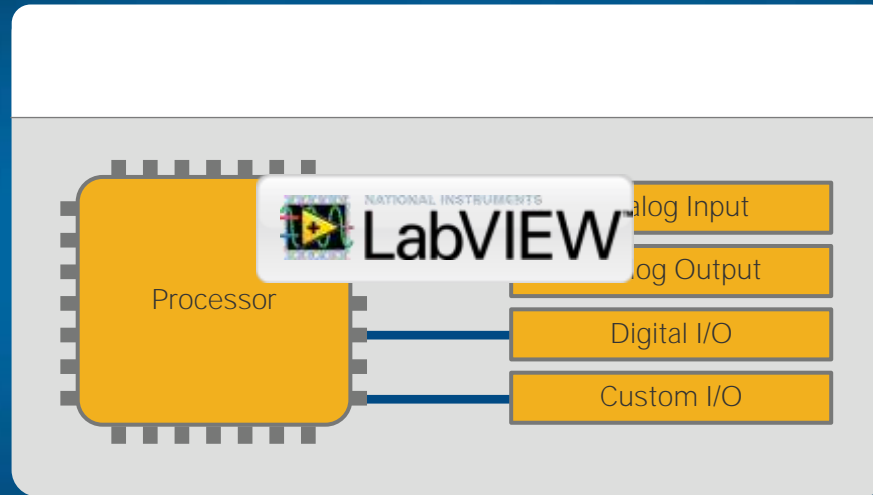
PCI Express

USB

PXI Express

Ethernet

WiFi



Voltage

Temperature

Strain

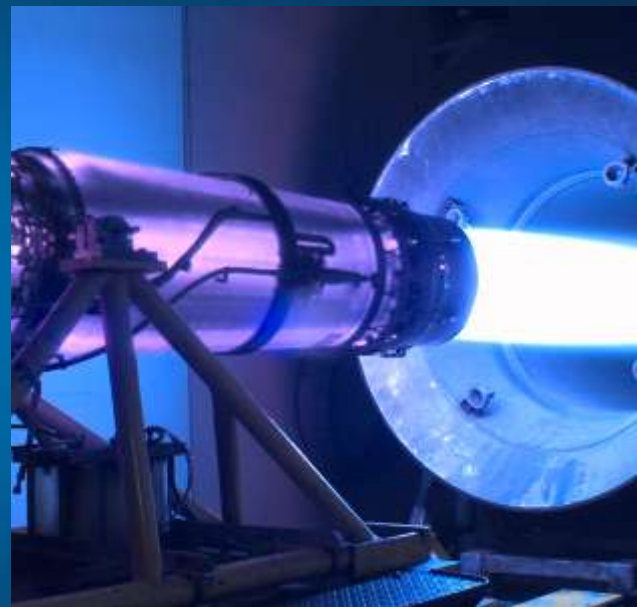
Acceleration

Motion



Rik Prins

Application Engineer Specialist, NI





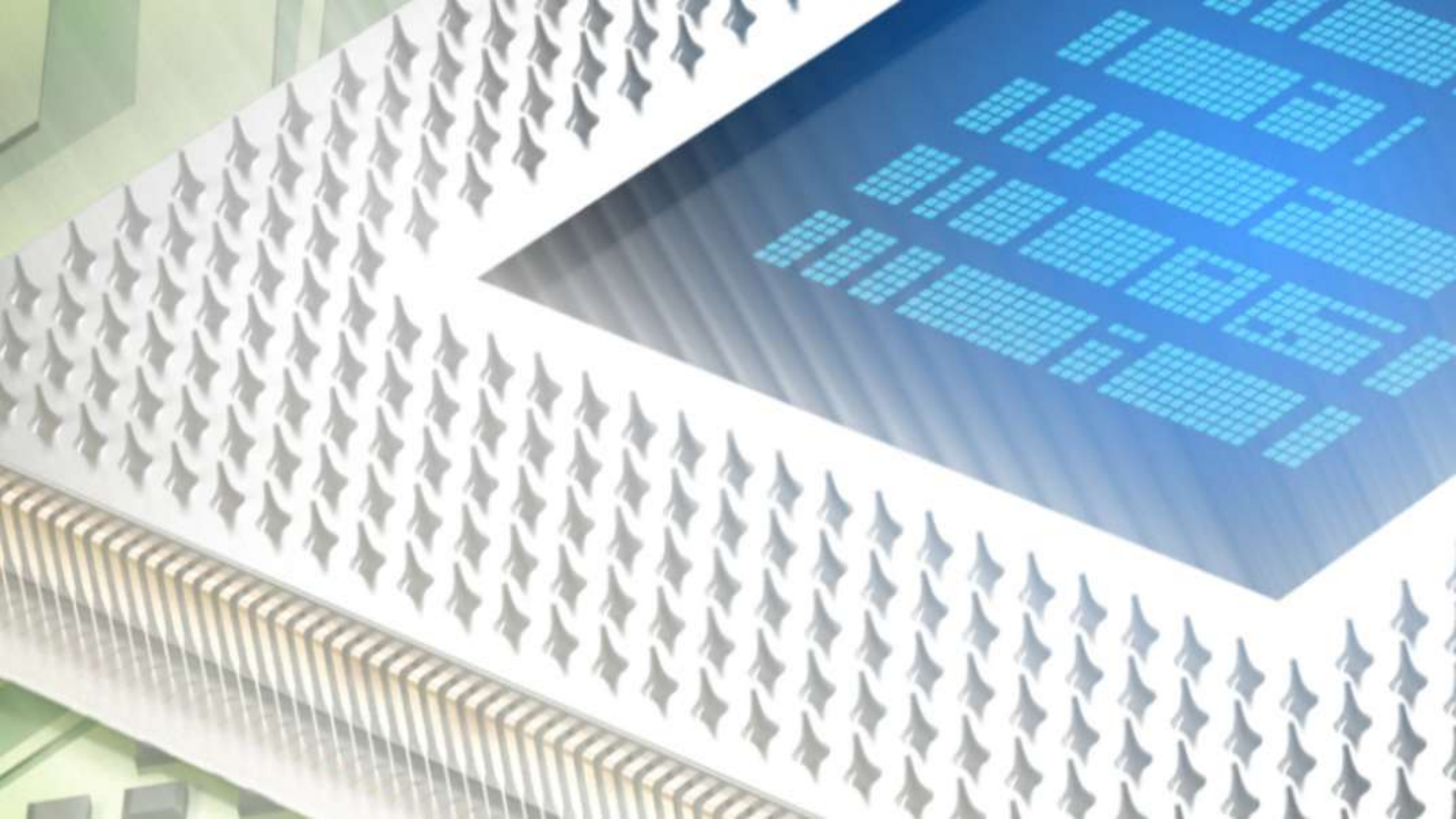
# NI CompactDAQ



# Rugged Ethernet Chassis

NI cDAQ-9188XT







***ISA  
BUS***

Data Bus



Processors



FPGAs

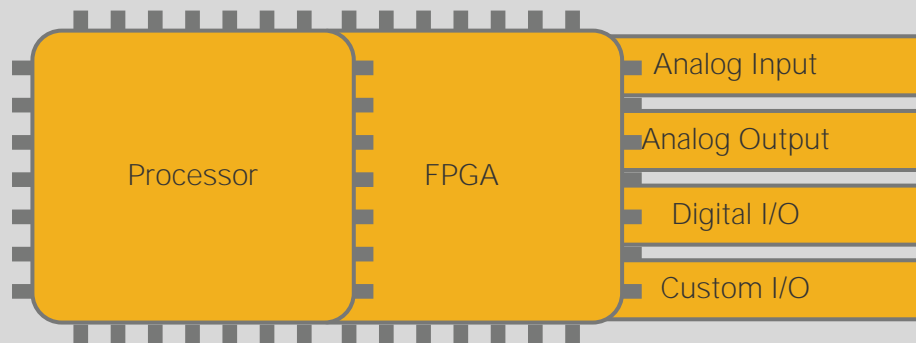


Converters

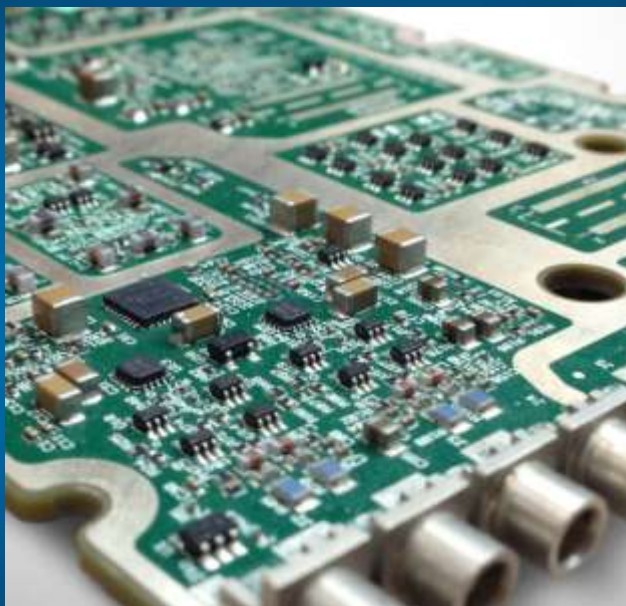


NATIONAL INSTRUMENTS

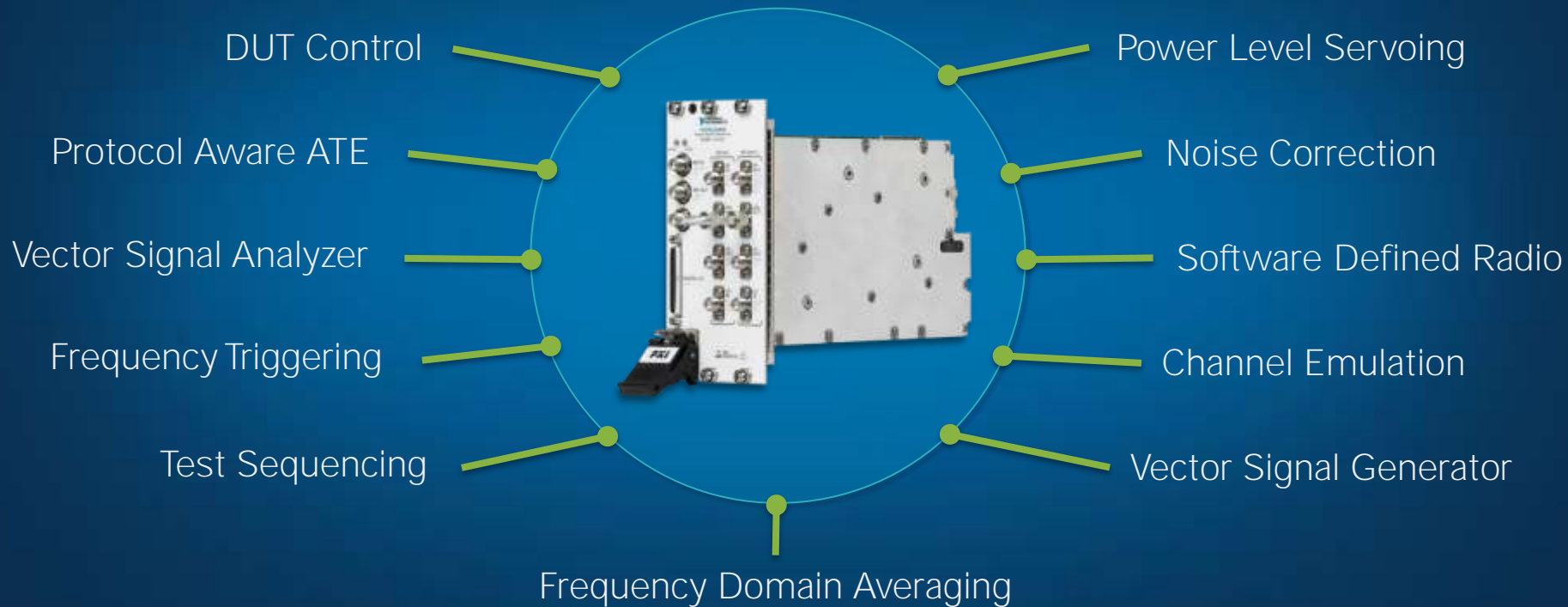
LabVIEW™







# Vector Signal Transceiver



# Two Programming Options for NI VSTs

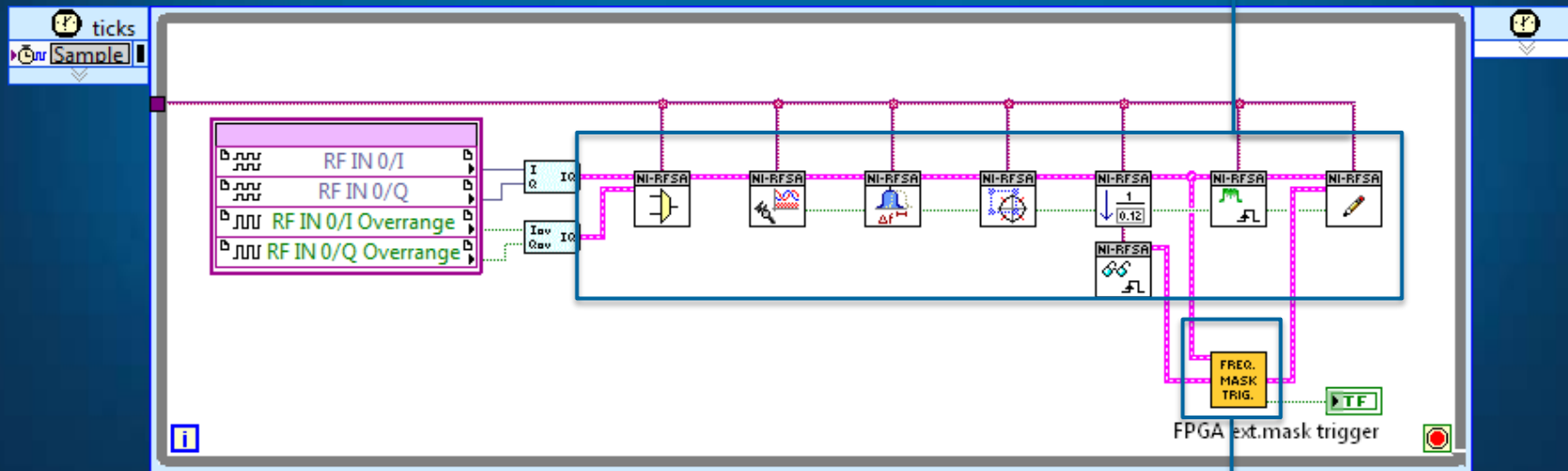
The *compatibility* of industry-standard instrument drivers



The *flexibility* of the LabVIEW RIO architecture

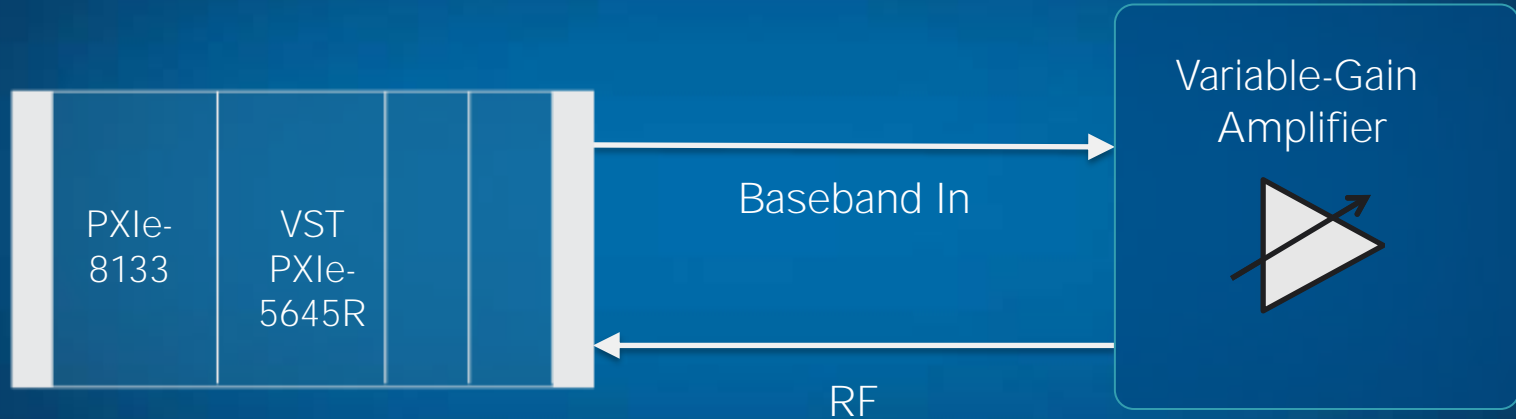
# Instrument Driver FPGA Extensions

NI Instrument Driver FPGA VIs



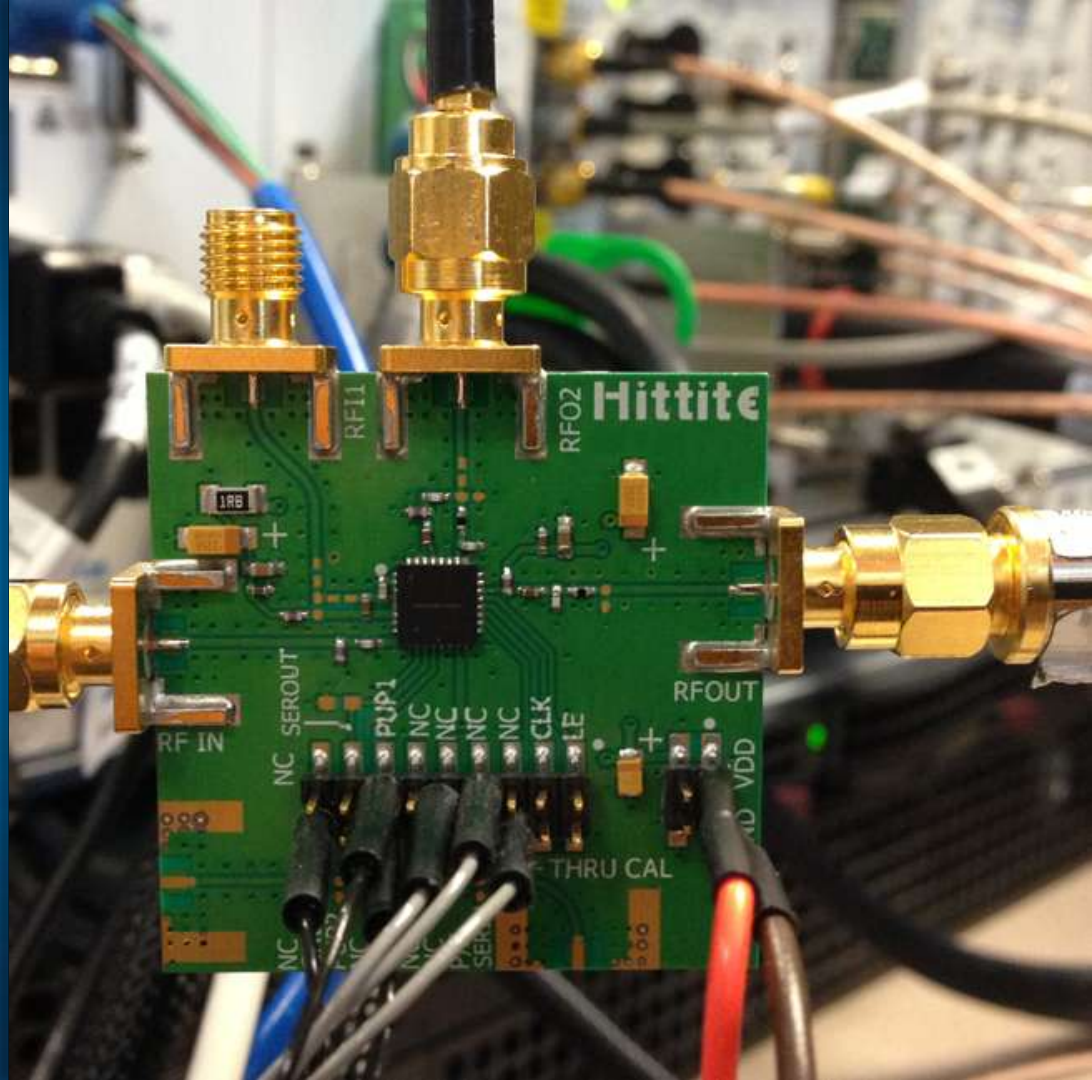
Application or User FPGA VI

# Testing Modern RF Transmitter Front Ends

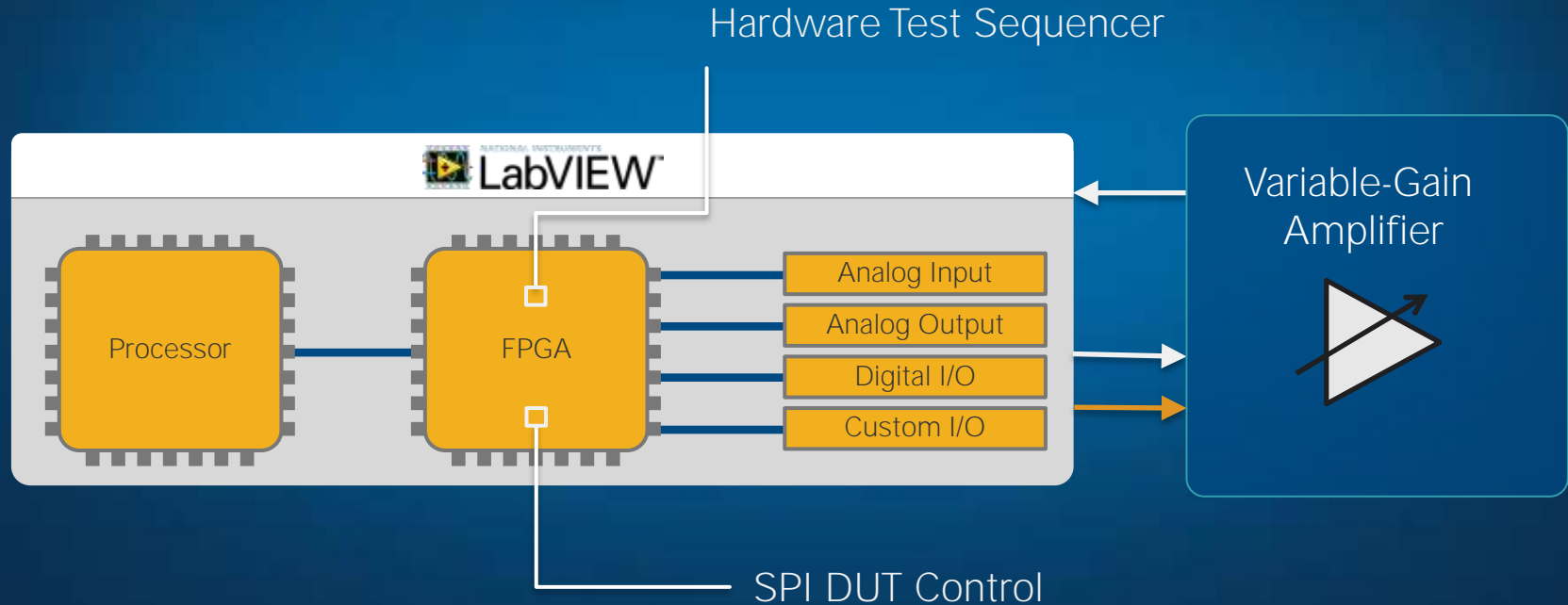


# RFIC Production Test Application

- Using instrument driver FPGA extensions
- 30X lower test times
- Increased test coverage



# Test System With Instrument Driver FPGA Extensions





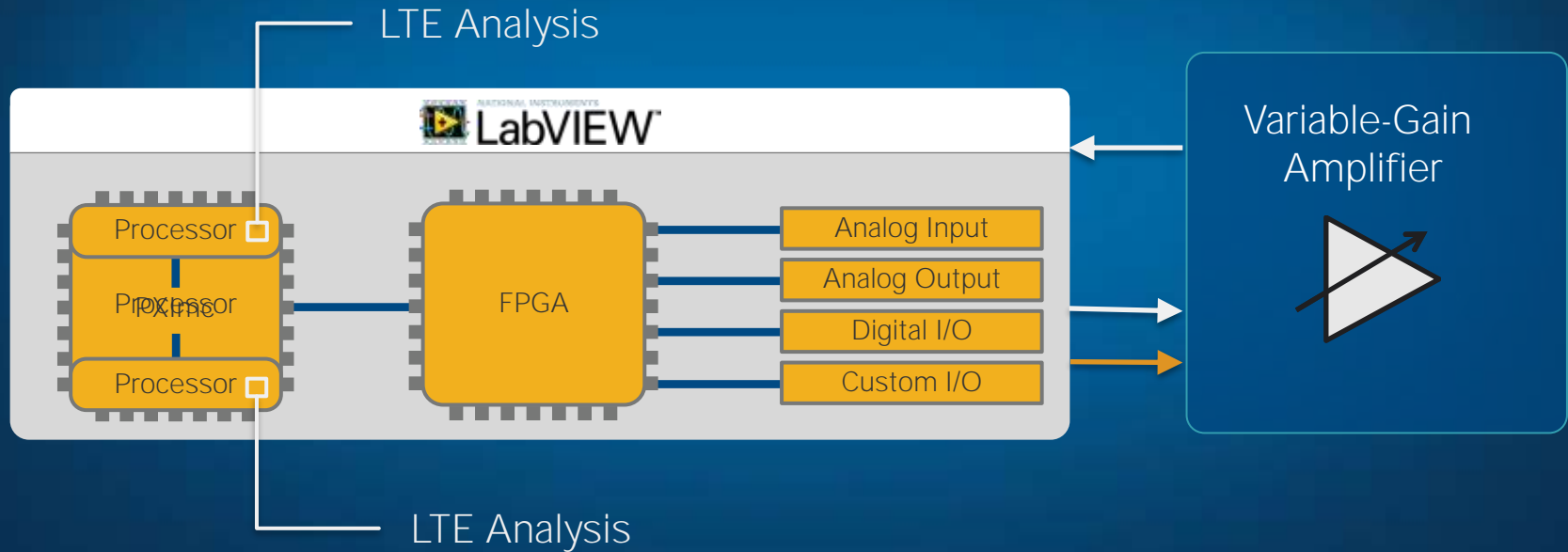
# Industry's First PXImc Adapter Module

NI PXIe-8383mc





# Test System With PXI MultiComputing



# Transmitter Control Unit for Radar Application using NI RIO and LabVIEW FPGA

**PREPARED FOR**  
NIDays 2013 Brussels  
3<sup>rd</sup> October 2013

**PRESENTED BY**  
Armando ARENAI  
AIR DEFENCE PROGRAMME  
[armando.arenai@nspace.nato.int](mailto:armando.arenai@nspace.nato.int)



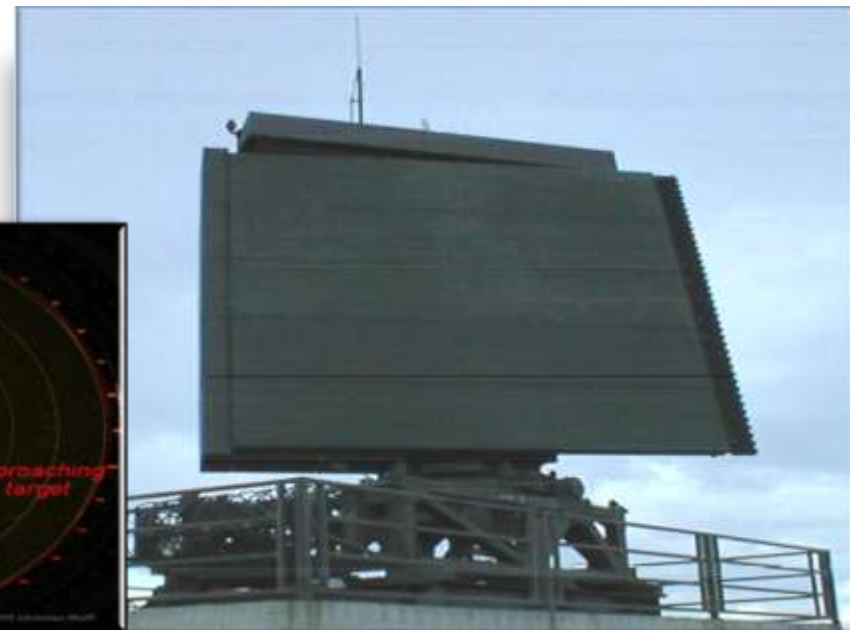
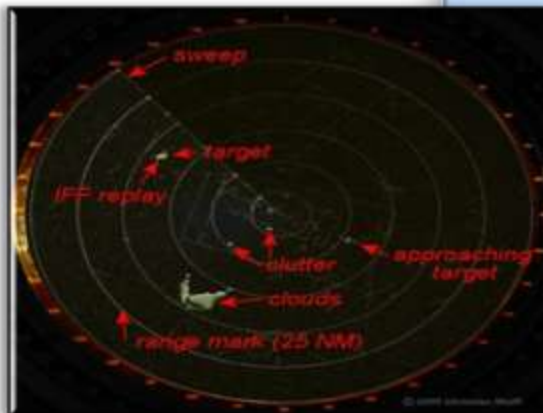
## ❑ *Project requirements and goals:*

- ❑ Development cost savings
- ❑ Future maintainability

## ❑ *Development:*

- ❑ NI PXI and RIO components
- ❑ Benefits

## ❑ *Conclusions*



## ❑ Requirements:

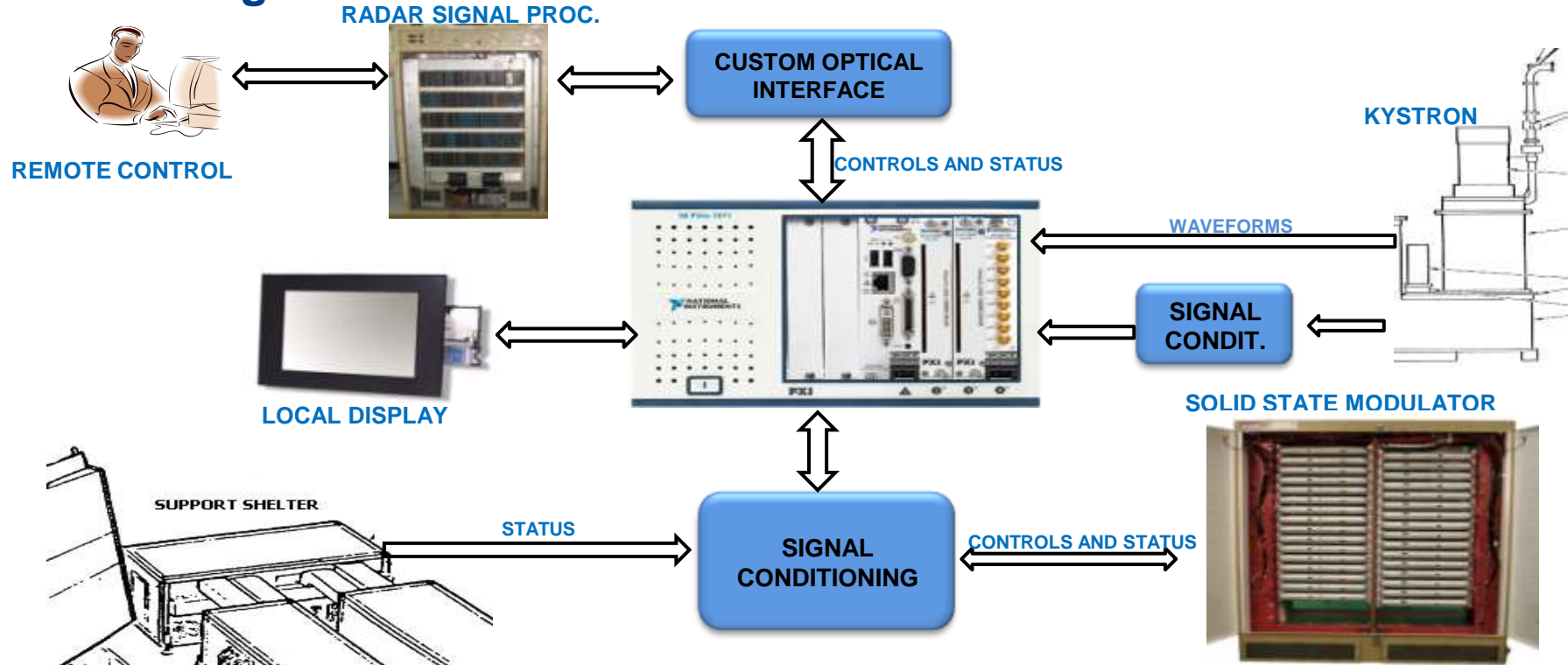
- ❑ Replace the Hard Tube Modulator of the RSRP radar using modern Solid State Technology (Marx Modulator)
- ❑ ***Design a new Transmitter Control Unit to:***
  - ❑ Control the Solid State Modulator
  - ❑ Process the analog and digital Status/Fault Signals received from various sub-assemblies to ensure safety operation of the system
  - ❑ Man-Machine Interface

## ❑ Goals:

- ❑ Minimize immediate development costs
- ❑ Reduce maintainability and support costs

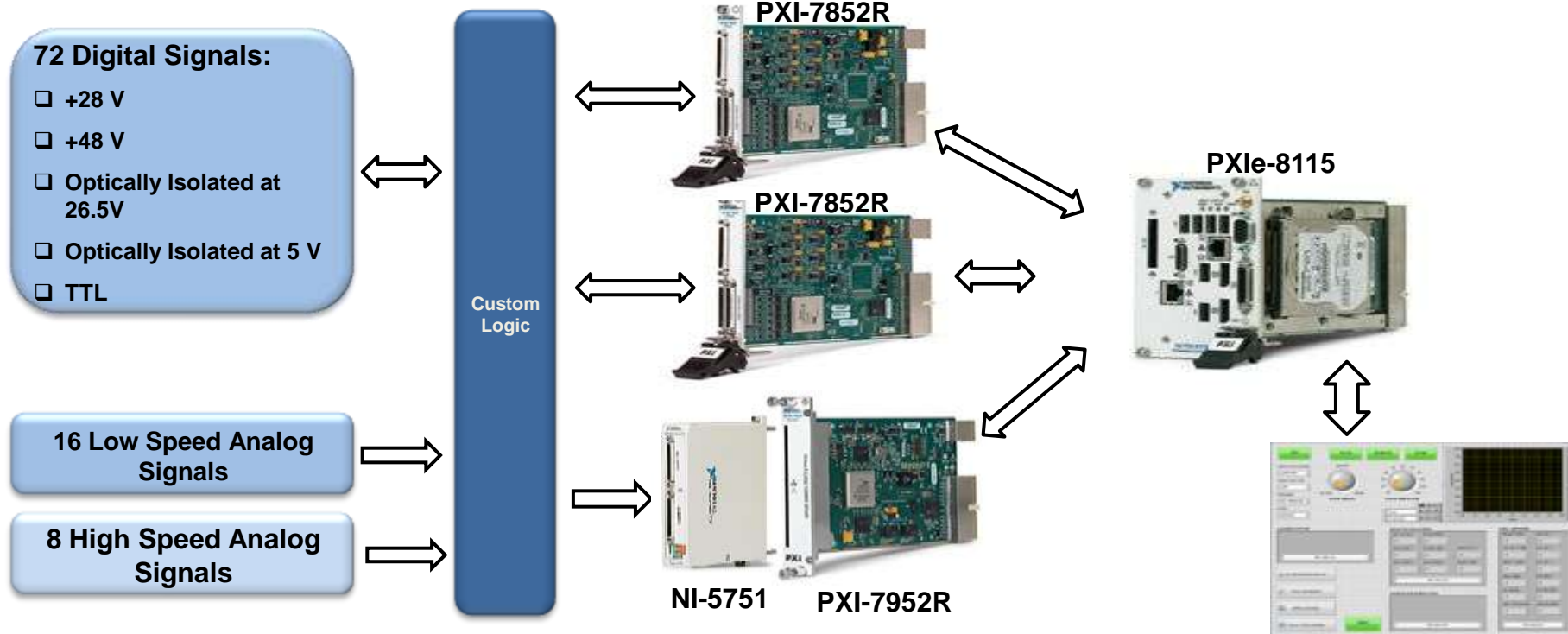


## □ Block Diagram





## Implementation using FlexRIO and PXI Controller:



## ❑ Benefits - Cost Savings

- ❑ Compared to a commissioned custom development using COTS products/assemblies (non-MIL standard):
- ❑ Development costs:

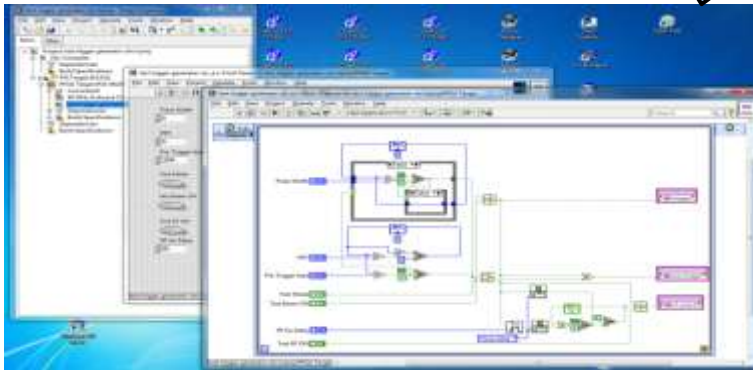


## ❑ Production costs:



## ❑ Benefits – Obsolescence/Maintainability:

- ❑ LabVIEW FPGA development environment hides the “*behind-the-scene*” of the hardware layer(s) offering a stable and robust platform which ease the future supportability and maintainability of the whole system





- ❑ NSPA has selected the FlexRIO and LabVIEW FPGA as the core elements to overcome the challenges of redesigning a Transmitter Control Unit
- ❑ Key Benefits:
  - ❑ *Shorten* the development cycle
  - ❑ *Reduce* the development and production costs
  - ❑ *Mitigate* the risks for future obsolescence
  - ❑ *Ease* the supportability and maintainability





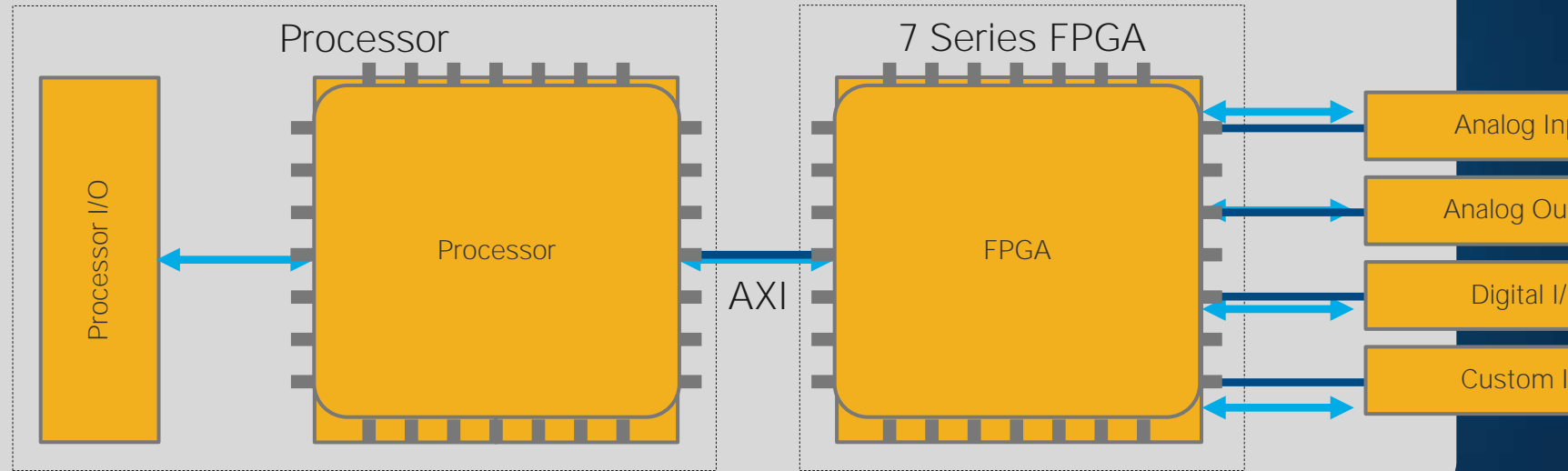


“Abbott buys laser cataract specialist OptiMedica for \$400M.”

*—optics.org*



# Zynq All Programmable SoC





# Software-Designed Controller

## NI cRIO-9068



# Software-Designed Controller

## NI cRIO-9068



# NI Real-Time OS History



1999

Phar Lap  
ETS



2004

RTX



2006

VxWorks



2007

NI ETS on  
Multicore



2009

NI Hypervisor



2013

NI Linux  
Real-Time



# Linux Community



Database

Raima  
MySQL  
SQLite  
MongoDB  
CouchDB



Security

OpenVPN  
IPTables  
System Logging  
fail2ban  
denyhost



Code Reuse

C/C++  
Shell Scripting  
Python  
Ruby  
Perl



Connectivity

Isshd  
IPv6  
SNMP  
NTP  
netstat



eclipse



C/C++

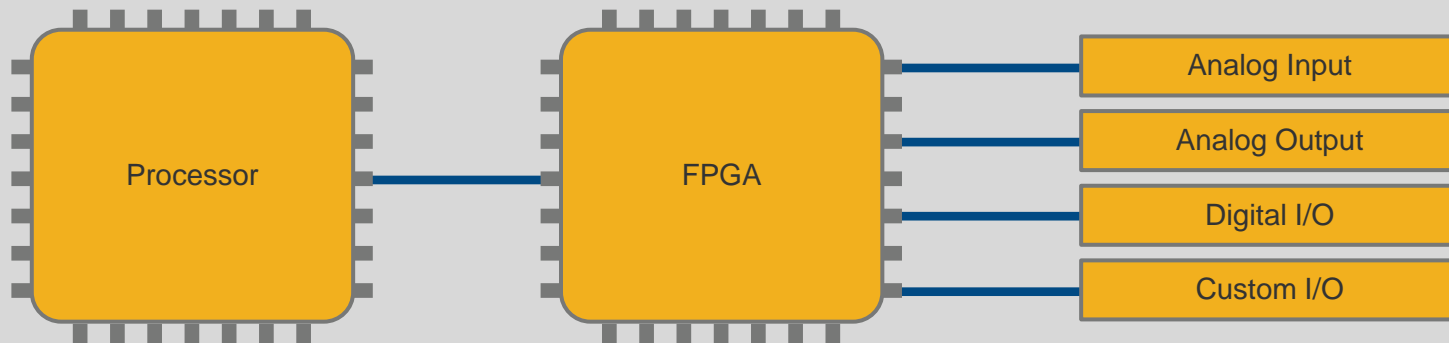


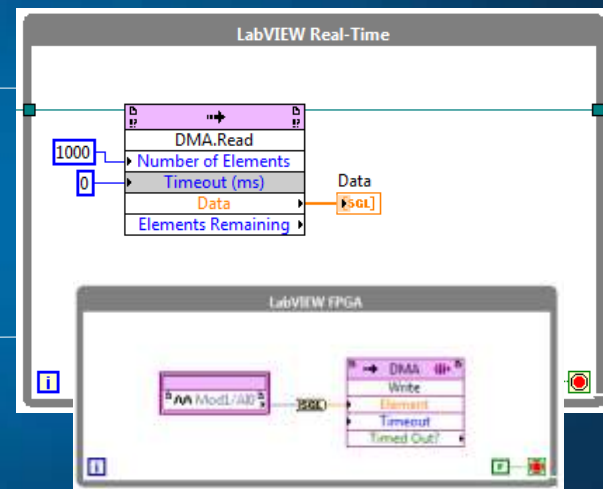
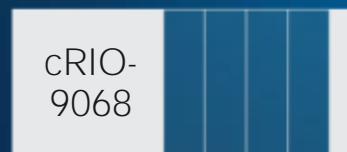
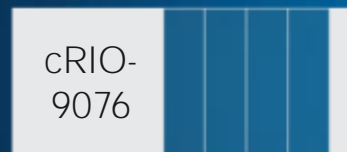
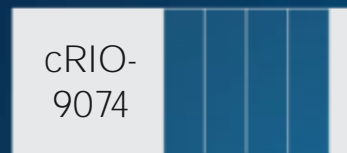
NI cRIO-9068



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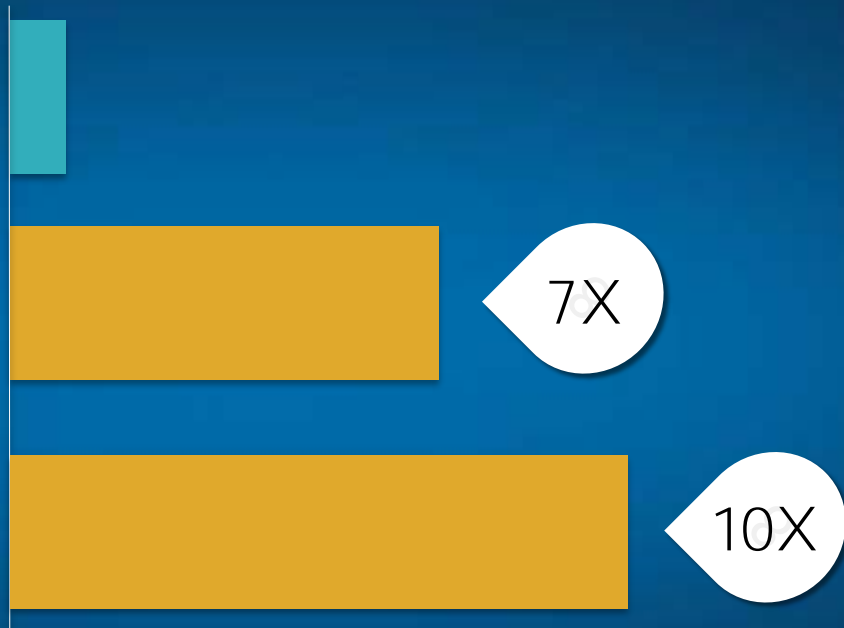
Competitor

cRIO-9074

cRIO-9068

7X

10X



# Graphical System Design



Measurement



Test



Monitoring



Embedded



Control



Desktops and  
Laptops



NI CompactDAQ



PXI and Modular  
Instruments



NI CompactRIO





# NI Supports Your Success

Through extensive services and Alliance Partner networks

Your Solution

Your Team

Engineering, Services, and More

Alliance Partners

Integration and Consulting

NI Services

Training, Calibration, Maintenance, and More

NI Products

Ecosystem and Community

Users, IP, Add-Ons, and More

A world map with a dark blue background and light blue landmasses. Numerous red circular pins are scattered across the map, indicating locations. There is a high concentration of pins in North America, particularly in the United States and Canada. Another significant cluster is in Europe, with many pins across Western and Central Europe. Smaller, more sparse groups of pins are visible in South America, Africa, Asia, and Australia. A semi-transparent dark blue horizontal band runs across the middle of the map, serving as a background for the text.

700+ Alliance Partners  
1,000+ Locations, 60+ Countries

# NI Alliance Partners



Consulting



Integration



Product Ecosystem

## Test & Measurement

Process Control  
Automated Test Cells  
Realtime Deterministic Execution  
High Speed Measurement & Control

## Visual Inspection Systems

Product Localisation and Identification  
Quality Control  
Combination with Motion (robots)  
Smart Camera



The LabVIEW software development environment lets us integrate measurement and control functionality with important aspects such as user-friendly visualisation, datalogging, database communication and report generation.

**NiniX**  
Technologies

**NATIONAL INSTRUMENTS™**  
**Alliance**  
M E M B E R



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- ✓ Training in LabVIEW (object oriented) software architecture
- ✓ LabVIEW Realtime, FPGA



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THE 10 MOST FREQUENTLY MADE MISTAKES,  
WHEN DESIGNING AND BUILDING A TURN-KEY  
PRODUCTION TEST PLATFORM FOR PCB'S



## ROMEX

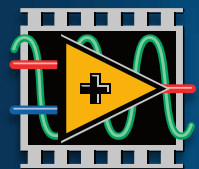


## NI – PARTNER PRESENTATION 15H35-16H20 – TRACK C



# Thank you!





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# LabVIEW™ 2013



The background features a perspective view of a tunnel-like structure with curved walls and ceiling. The left side is illuminated with a warm, orange-red glow, while the right side transitions into a deep blue gradient. The overall effect is a sense of depth and modernity.

# NIDays

WORLDWIDE GRAPHICAL SYSTEM DESIGN  
**CONFERENCE**