Thank you for attending NIWeek 2017.
A software-centric platform that accelerates the development and increases the productivity of test, measurement, and control systems.
Comprehensive Services to Ensure Customer Success

- Technical Support
- Customer Education
- Consulting & Integration
- Hardware Services
- Alliance Partner Network
- Community Engagement
NI Integration Engineering Services

NI-based Integrated Systems

End User and Alliance Partners

IES Services

Advance Targeted Application Area When:
- Platform is not mature;
- NI brand not strong;
- Not enough partners with the expertise.

Penetrate a Strategic Account When:
- Customer does not know/trust NI or partners;
- Competition dictates NI direct involvement;
- Large opportunity warrants our investment.
Designing Test Systems for Large Deployments in Production Environments

Description: Learn about the design considerations for large-scale deployment of test systems into production environments. Balance hardware design trade-offs for a low-cost versus the robustness necessary for up-time production. How do you develop robust software to be mass deployed, flexible enough for various configurations, and then maintainable as production needs change?
Large Scale System Design and Deployment
Large Scale Projects

- This projects are almost universally troubled
- Joint study by McKinsey and Oxford University found on average:
  - 66% of the large software projects run over budget
  - 33% over schedule
  - 17% went so badly that threaten the very existence of the company

Large-scale deployment is challenging, but at the same time, it's doable and rewarding
Considerations *(for any scale program)*

- Goal – Predictability in Quality, Schedule, Scope and Cost
- How is our planned vs actual tracking?
Designing for Characterization vs Production

Characterization
- Comprehensive Test Plan Coverage
- Flexibility to change if they need to investigate
  - Customer may want to be able to modify tests themselves
- May want to leverage for future DUTs

Production
- Needs to robust to run 24/7
- Dirty power, noise, environment
- Optimize test time and increasing throughput (e.g. multi-up)
- Handling of equipment in a factory (covering sensitive PCBs, robust cables, equipment meant for env, safety)
- Understand production floor constraints
- Failure tolerant
- Simplified usability

Characterization vs production
- Production will be a subset of characterization
- May or may not use the same code/equipment as production system
- Both cases should have intuitive error handling for the audience
System Design/Upgrade - Challenges

- Customer requirements rarely frozen
  - Poorly defined requirements?
    - Show and tell (prototyping)
  - Continuous evolving requirements?
    - Grading the requirements
  - Getting sign off on document?
    - Write document in the way customer would have written

- Keep up with the release schedule

- Team management
  - Distributed teams (regions, time zones, language, etcetera)
System Design/Upgrade - Software

- Using an architecture capable to achieve the goals
  - Don’t go automatically with the hype of new advanced architectures
  - What's the simplest way to achieve the requirements

- Software licensing
  - Development environment license versus run-time or debug

- Solid and simple software UI and UX
  - User interface localization (multi-language capability)

- Consider future owners of the software
  - End user
  - Sustaining and maintenance
Design Considerations

- Components Selection
- EOL
- Availability
- Service & Maintenance
- Foot print
- Trade Compliance
- Environmental Conditions
- Safety
- Manufacture model
- Supply Chain
- Regions deployed to and constraints
- And many more
Plan to Second Source Critical Components

- Preplanning for second source use
  - Large scale deployments can stress JIT suppliers
  - Unplanned everts

- Designing for interchangeability when second source moves to first
System Design/Upgrade - Component Selection

- Accurately provide the current status of an item, i.e., have discontinuance or last-order notices been issued?
- Identify alternative or substitute parts
- Forecast the date of obsolescence
Compliance, Certifications, Customer Specific Requirements

- Regional Certifications
  - CE, UL, DEMKO, CCC, KCC, RoHS etc.
- Power Cords
- Safety / Hazards
  - Voltage
  - Noise Levels
  - Pinch, Crush, Reach
- Wireless
- Ergonomics
  - Regional
  - Customer
System Deployment
What’s Deployment?

Transformation from a packaged form to an operational working state
  - Mechanical device
  - Electrical system
  - Software

Being able to deploy without downtime requires the entire project stakeholders cooperation.
  - Project Managers
  - Technical team leaders
  - Developers
  - Logistics
  - CM
  - Operators
Guidelines

- Use tried and proven concepts
- Keep things simple
- Keep things safe
- Second source critical items
- Consider regional partners
- Add some form of Self-Test
- Test It, Test It & Test It again.
System Shipping And Trade Compliance

- Customer approvals are obtained
  - Factory acceptance test (FAT) - Passed
  - Licensing
- Clear procedure for verification of equipment
  - Insurance
  - Damage inspection
- Customs and Trade Clearance
  - Goods enter the United States in conformance with all U.S. laws and regulations
  - Tariff
  - ITAR & EAR
  - RoHS
  - Export / Import Classification Codes
  - Shipping Materials Restrictions
Installation

- Facilities are in place and in a known condition
  - Interface control document to specify needs and critical dimension
  - Correct electrical connections
  - Air supply is clean and dry
  - Process Cooling Water is contamination free

- Electrical & mechanical installation under specifications
  - How to documentation for installation

- Bring up manual
  - What’s required step by step to get the system online
Deployment Location(s) Condition

- Native Voltage and Frequency
  - 100V, 110, 200, 220 – Volts
  - 50 vs 60 Hz

- Power Quality (Do I need a power conditioner or UPS)
  - Brown outs
  - Surges
  - Noise
  - Ground quality and bonding
Deployment Location(s) Conditions

- Controlled or Uncontrolled Environment
  - Temperature & humidity
  - Clean vs industrial
    - Debris, dirt, dust, furry animals, etcetera...
  - Damage risks

- Space Constraints
  - Minimal footprint
  - Adequate clearances
  - Airflow
  - Risk of damage

- Challenging operator interactions
Clean vs Industrial Environment
Added protection for industrial environment systems
Making Changes To Software

- Any successful software evolves in order to stay successful
  - Fitting in new features into the current software
  - Fixing undetected bugs previous to release
- Right Design
- Version control
- Software testing
- Think beyond development phase – release v1.0
- Error management
- Proven software distribution channel
Software Roll Out

- Automate everything

- Test early, test often
  - Tests must be complete
  - Tests must be automated as much as possible
  - Test the release process

- Hold developers responsible for their changes all the way out to where the changes provide value to end users

- Make sure that each release has a team engaged and available at release time
Sustaining
Previous to Software Rollout – pt. 2

- Design the release process with rollback in mind
- Design the product to allow multiple versions to be live at the same time
Software Deployment Strategies

- Ensure you are validating a only software change
- Deploy to a staging area and test the trial deployment
- Roll out code in multiple phases, so errors in the release can be rolled back before they affect many users
- Feature gating
- QA control and industry standard checks
  - Gage R&R
After Rollout

- Monitoring deployments health/performance
- Monitoring customer experience

Something as simple as log files are key to analyzing production problems, so make sure you evaluate your log data during development and ensure that it contains clear information that can be used in the event of a problem
Self Test and System Integration Test

This feature lets the system return diagnostics information to the end user.
Usually used during bring up or when there is suspicion of malfunction.

Different Audiences (FIS vs. Field Support):
- SIT verifies i.e. assembly of PXI components
- Self-Test verifies functionality of entire system
Before you go, take the survey.
Stay Connected During and After NIWeek

ni.com/niweekcommunity
facebook.com/National Instruments
twitter.com/niglobal
youtube.com/nationalinstruments

Please provide feedback on this session via the NIWeek Mobile App
Thank You