Kabul Maharjan
Principal Process Development Engineer
Software Standardization in Large Teams
A Case Study
Agenda

Renishaw Toolchain

Standardization
What, Why, Who, How?

Ways to Succeed
Or Fail!

National Instruments
Relationship

Renishaw
Company Introduction
Renishaw
Renishaw Global

Renishaw PLC
Gloucestershire, UK

Miskin
South Wales

Illinois
USA

80+ offices in 36 countries
Simplified Company Structure
New Product Development Cycle

- Concept
- Design
- Develop
- Commercialize
- Produce

Product
Product Manufacturing Process

- Cable
- PCB
- Body
- Cover

1. Assemble Core
2. Assemble Product
3. Functional Test Product
4. Product
Product Manufacturing Process

- Cable
- PCB
- Body
- Cover

Test

Assemble Core

Assemble Product

Functional Test Product

Product
National Instruments
Renishaw Enterprise Agreement

- Unlimited Software*
- Technical Support
- Training Access
- Success Plan

*N: Indicates a special condition or note.
Investment Profile of Software

Initial Investment Into Training, Tools and Design

Just-In-Time Development

New Test Requirements

Time

Investment
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Standardization
Product Manufacturing Process

Cable → Test → Assemble Core → Test → Assemble Product → Test → Functional Test Product → Test → Product

PCB → Test → Assemble Core → Test → Assemble Product → Test → Functional Test Product → Test → Product

Body → Test → Assemble Core → Test → Assemble Product → Test → Functional Test Product → Test → Product

Cover → Test → Assemble Core → Test → Assemble Product → Test → Functional Test Product → Test → Product
Single Test System

- Specify
- Design
- Develop
- V&V

- Validation & Verification
- Documentation
- Duplication
Single Test System - Team

Electronics

Mechanical

Software

System

TEST

[Diagram showing the integration of mechanical, electronics, and software teams in a single test system]
Product Manufacturing Process

1. Cable
2. PCB
3. Body
4. Cover

- Assemble Core
- Assemble Product
- Functional Test Product
- Product
Product Manufacturing Process
Product Manufacturing Process
Is Software Standardization more difficult than other engineering disciplines?
Contents

1. Introduction ..........................................................
2. Software Maintainability ...........................................
3. Software Configuration Management (SCM) ...........
4. Folder/Project Structure ...........................................
5. Resource Files ....................................................
6. User Interface Design ............................................
7. Code Modules ....................................................... 
8. Comment Conventions ...........................................
9. Error Handling .....................................................
10. Access Control ....................................................
11. Safety ..............................................................
12. Optimisation Memory Usage .................................
13. The Build Process ............................................... 
14. Compiling RT FPGA ............................................
15. Verification and Validation (V&V) .........................
Software Configuration Management (SCM)

- Microsoft’s Team Foundation Server with SharePoint
  - Git Repositories
- Confluence with Jira
  - Git Repositories
What about VI Package Manager?
What about VI Package Manager?

- VIPM Packages
- LabVIEW Folders
- OS Folders
- Project Folder
- Library Manager
- Import
- Commit
- Repository of Libraries
- Library 1
- Library 2
- Library 3
Library – Types

Utilities
  - Standalone

Synchronous
  - Singleton
  - Cloneable

Asynchronous
  - DQMH Singleton
  - QMH
  - Actor
Data Storage Strategy

TDMS + Database + Other Files = Results for Product
Database Tool
Database Tool

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Database Tool
Database Tool

- Test System
  - Product Results
    - Edit enum
  - Configuration
    - Edit limits
    - Edit cluster
    - Edit values
Build Tool
Video Tutorials
Renishaw Toolchain Summary

- Standard
- SCM
- Templates
- Libraries
- Data Storage
- Tools
- Training
Ways to Succeed or Fail
Ways to Succeed

- Onboarding & training
- Standardization has a life cycle, keep it refreshed!
- Coding style best practices
- Treat Standard like a Product
- Software Configuration Management & Continuous Integration
- Reusable libraries strategy
- Not all engineers wear capes!
Ways to Fail

“This is over-engineered!”
- Bruce Banner

“I came up with this, all singing all dancing architecture and everyone should use it 😊”
- Tony Stark

“When I look at a code, it should look and feel the same, regardless of who wrote it”
- Loki

“True standardisation means innovation dies!”
- Bane

“I am Groot”
- Groot
Questions?
Before you go, take the survey.
Safe Journey!
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