

interoperability

Need for a Effective Standards Development Process

John Horst

Metrology Interoperability Project Leader,
The National Institute of Standards and Technology (NIST)
Gaithersburg, MD

NIST

National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

IMIS March 28, 2006

MEL
Innovation & productivity

Standards Development Process Overview:

- What is the interoperability problem?
- How are businesses addressing this problem?
- A successful standards development process

What is the interoperability problem?

- Any cost due to the **inability** of two system components to communicate correctly and completely with components from any vendor worldwide

Dimensional Metrology System:

Component diagram with candidate open & non-proprietary interface standards

Design

Planning

Execution

Analysis

CAD + GD&T

Part geometry and design tolerances

STEP AP203e2, AP219, DML

Inspection process planning

Inspection process plans
DMIS

Inspection execution

Measurement results
DML, STEP AP219

Reporting & analysis

Quality measurement information...

AIAG Quality Data

CMM control commands and responses
I++ DME

Coordinate measuring machines (CMMs)

Quality device integration

manufacturing interoperability

Innovation & productivity

How are businesses addressing the interoperability problem?

- Point-to-point
 - “Getting incompatible components to communicate together”
- Single supplier network
 - “Selecting and requiring one vendor per function throughout the corporation”
- Common language
 - “Defining open, non-proprietary interface languages for each key interface”

Point-to-point solution

- Provides partial solution
 - Can allow best-in-class solutions
 - May avoid retraining
 - Allows use of legacy systems
- A costly solution because
 - Lose quality in file translations
 - Must pay labor (in-house or vendor) to modify files/software to gain compatibility
 - Does not grow easily with technological change
 - Vendors must maintain multiple versions

How are businesses addressing the interoperability problem?

- Point-to-point
 - “Getting incompatible components to communicate together”
- Single supplier network
 - “Selecting and requiring one vendor per function throughout the corporation”
- Common language (standards approach)
 - “Defining open, non-proprietary interface languages for each key interface”

Dimensional Metrology System:

Component diagram with candidate open & non-proprietary interface standards

Design

Planning

Execution

Analysis

CAD + GD&T

Part geometry and design tolerances

STEP AP203e2, AP219, DML

Inspection process planning

Inspection process plans
DMIS

Inspection execution

Measurement results
DML, STEP AP219

Reporting & analysis

Quality measurement information...

AIAG Quality Data

CMM control commands and responses
I++ DME

Coordinate measuring machines (CMMs)

Quality device integration

manufacturing interoperability

Innovation & productivity

Single supplier network solution

- Brings relief and reduces some cost if
 - Each vendor/supplier is stable, compatible, inexpensive, and provides best-in-class
- Remains a costly solution because
 - Increases cost due to decreased competition
 - Passes on cost to tier suppliers
 - Restricts best-in-class choices due to decreased competition
 - Greater risk
 - Limits acquisitions or makes more costly
 - Harder for smaller vendors to compete

How are businesses addressing the interoperability problem?

- Point-to-point
 - “Getting incompatible components to communicate together”
- Single supplier network
 - “Selecting and requiring one vendor per function throughout the corporation”
- Common language
 - “Defining open, non-proprietary interface languages for each key interface”

Dimensional Metrology System:

Component diagram with candidate open & non-proprietary interface standards

Design

Planning

Execution

Analysis

CAD + GD&T

Part geometry and design tolerances

STEP AP203e2, AP219, DML

Inspection process planning

Inspection process plans
DMIS

Inspection execution

Measurement results
DML, STEP AP219

Reporting & analysis

Quality measurement information...

AIAG Quality Data

CMM control commands and responses
I++ DME

Coordinate measuring machines (CMMs)

Quality device integration

manufacturing interoperability

Innovation & productivity

Open, non-proprietary interface language solution

- Maximizes interoperability
- Reduces measurement errors
- Reduces overall costs (in comparison to the other solutions), since requires less time and effort for user and vendor
- Provides greater freedom for
 - successful acquisitions
 - best-in-class & individual preferences
 - broader set of tailored manufacturing solutions
 - integration and leverage with other domains: electronics (NEMI), aerospace, machine tools (OMAC)

Open, non-proprietary interface solution

- Brings relief and reduces cost if
 - A critical mass of users and permanent folk (e.g., NIST and AIAG) supply adequate sustained support for concurrent development of
 - Interface language (syntax and semantics)
 - Implementation
 - Testing (good role for NIST)
 - Purchase requirements
 - Everyone follows efficient/effective standards development process
 - Vendors with new technologies (e.g., Revo™) must be able to
 - Incorporate necessary functionality into the interface language
 - Protect any intellectual property to encourage competitive advantage
- If enough users support, vendors will join in

Standards development process

- Successful common interface solutions require concurrent development of

- Interfaces: Identify appropriate interfaces, identify existing interface standards, and identify gaps and overlaps
- Interface languages: Timely, unambiguous, sufficiently functional, and consensus-based
- Implementations: Timely, compliant, fully functional, interoperable, and performed by a critical mass of vendors worldwide
- Tests: Product must pass conformance and interoperability tests for purchase

Conclusion

- Interface standards allow OEMs and suppliers to “take back control of their business” (Glen Allan --Ford)
- Users need to have faith that open, non-proprietary standards can be accomplished and will greatly reduce interoperability costs
- Vendors will get involved if critical mass of OEMs, and suppliers participate (minimally)
- Our “imperfections” in the past have made “selling” standards approach harder
- Key question: is the cost of standards development and maintenance \ll costs due to single supplier network solution?

Metrology Interface Standards Successes

- I++ DME: with 5 years effort...
 - Functionality 95% complete
 - “Critical mass” user support worldwide
 - Concurrent application of conformance and IO tests
 - Many products now being sold
 - International cooperation
- Quality data
 - One year effort: distilled major open, proprietary quality data “standards” (Q-Das, Mitutoyo, ...)
 - Four year effort: defined DML w/conf and IO tests
 - DML-compliant products in production
- DMIS
 - Conformance class definition and conformance test definition
 - Harmonization with I++ DME defined

m a n u f a c t u r i n g i n t e r o p e r a b i l i t y