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Presentation Overview

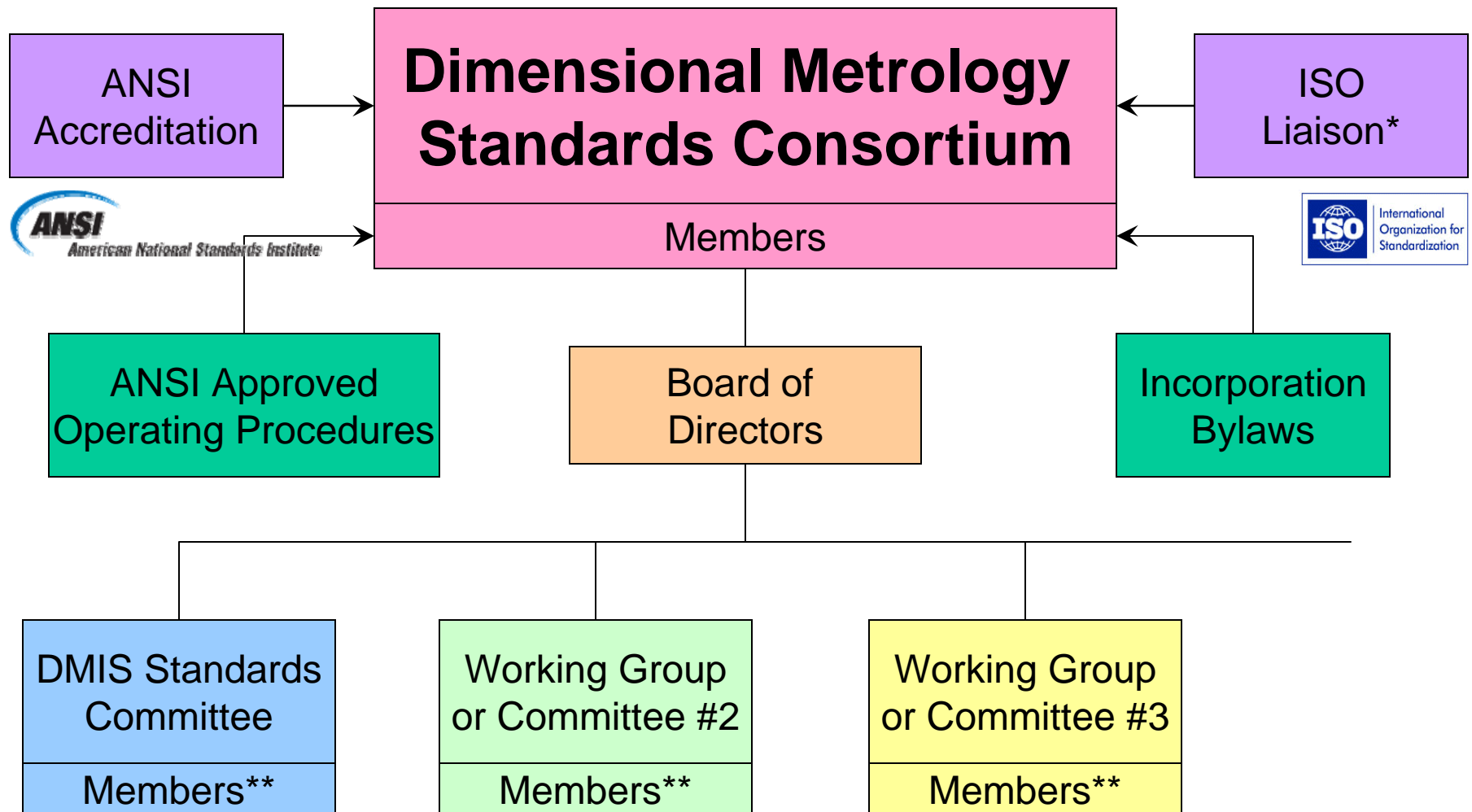
- Introduction to the Dimensional Metrology Standards Consortium (DMSC)
- IMIS (International Metrology Interoperability Summit) Summary
- DMIS past to present
- DMIS future direction
- Tie these into portable measurement systems



DMSC is . . .

- a non-for-profit, cooperative sponsorship organization.
- focused on or relating to digital dimensional metrology.
- dedicated to identifying, promoting, fostering, and encouraging the development and interoperability of standards that benefit the dimensional metrology community.
- accredited national standard-making organization with international presence.
- and it is just not only about DMIS!

DMSC Organization





DMSC members are . . .

DaimlerChrysler
Hexagon Metrology
Honeywell FM&T
John Deere & Company
Lockheed Martin Corp.
Metris
Mitutoyo America Corp.
Renishaw
UGS, Tecnomatix Tech
Xspect Solutions, Inc.



JOHN DEERE



Honeywell



LOCKHEED MARTIN



Mitutoyo



DAIMLERCHRYSLER

RENISHAW



TECNOMATIX



DMSC membership is . . .

- open to any individual, company, organization, corporation or government entity
- that:
 - has a direct or material interest in the development and support of metrology-related and automation standards
 - willing to work cooperatively
 - pays the annual consortium membership dues. (currently at less than \$4k w/options)



DMSC membership . . .

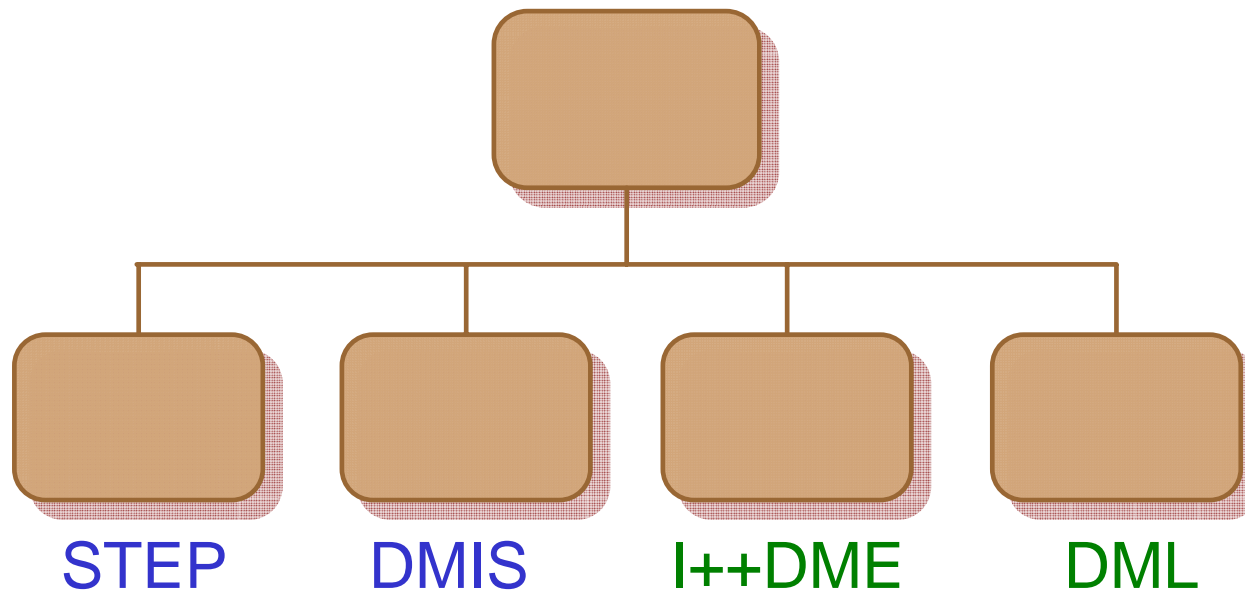
- sustains standards such as DMIS as viable
- provides an avenue for OTHER bodies of works to become accredited standards (I++, DML...)
- preserves company investments
- leverages ideas, concepts, and resources
- networks and team with peers
- gains advanced notice of emerging interoperability activity
- provides structure to champion, create, and/or extend standards
- influences standards and interoperability decisions
- enables eligibility for board of directors
- waivers for all committee participating fees



DMSC can . . .

- provide the mechanism to establish national and international standards.
- foster authorized groups (sub-committees).
 - to promote and/or develop specifications into standards.
 - to maintain and/or enhance existing standards
 - to coordinate and harmonize related standards.
- encourage the collaboration of efforts to achieve shared goals.

International Metrology Interoperability Summit (IMIS)



Lack of interoperability abounds between the four functional components that comprise the dimensional metrology process



Top Product Definition Issues

<p>CAD data (including GD&T) does not flow seamlessly to downstream processes when components are not from same vendor.</p>
<p>GD&T data is not associated with individual features of the part (the CAD model), which makes it impossible to automate inspection process programming. If GD&T information is expressed as annotations in CAD files or as notes on drawings, it is not available to automated computer processes that can use it.</p>
<p>It is difficult if not impossible to know if a vendor truly supports a standard as advertised. When a vendor claims that its product conforms to a standard, there is often no means of certifying that the product actually does conform to the standard as claimed.</p>
<p>There continues to be divergence in the use and interpretation of GD&T standards both within the U.S. and at the international level. Some major companies have adopted internal variations in the way that they interpret and apply the standards. It is believed that this practice will result interoperability problems in the near future. The standards effort must be international, involving multiple government standards organizations.</p>
<p>Crosscutting Issue: There are currently no “consensus” approaches to the interconnection of components/systems. The “big picture” needs to be defined before unified efforts can be developed to solve this important problem. There is no shared vision between vendors and users for interoperability</p>

Top Inspection Process Definition Issues

The lack of comprehensive non-shape information available from the product definition model – CAD Tolerance Data, material properties, optical properties, etc.
The lack of a standard mechanism to capture and exchange knowledge – including methods, practices, and rules.
The lack of resource definition from the product definition model or elsewhere – such as inspection equipment capability, capacity, available configuration, performance, measurement uncertainty, etc.
Does DMIS support all measuring devices?
The macro-to-multiple-micro planning interface is not well defined.

Top Inspection Process Execution Issues

I++ DME isn't a formal standard.
Overlap between I++ DME and DMIS Part 2 – dueling standards.
I++ DME needs to be extended to handle more equipment, sensors, environment].
A formal I++ DME framework is needed.
Implementation [b1] barriers need to be reduced.

Top Analysis and Reporting Issues and Solutions

Lack of uniform data model for the single part report (cross-cutting issue)	1. Provide unified data models for single part inspection measurement results
Lack of uniform data model for quality study summary reports with traceability (cross-cutting issue)	1. Develop unified data model
Bandwidth and storage limitations (data overload)	1. Handle large data and provide acceptable performance
Synchronization and correlation of all data for each measurand (primarily traceability) (cross-cutting issue)	1. Augment data flow models to uniformly integrate data from different sources into single part and summary report data models
Lack of feedback of study data for manufacturing	1. Augment data model for feedback to manufacturing
Lack of consistency of statistical calculation methods and definitions	1. Capture and identify best practices and unify into a single standard
Lack of feedback of study data for measurement planning	1. Develop a methodology to change the measurement and sampling plan based on measurement results
Planning for report formatting (standardization of report templates)	
Legacy systems are too dumb and costly to update (cross-cutting issue)	
Proprietary business models (cross-cutting issue)	



Principal Stakeholders

- **National Institute of Standards and Technology (NIST)**, providing advice, support, and active participation at the task level for many years.
- **Metrology Interoperability Project Team (MIPT)** of the **Automotive Industry Action Group (AIAG)** – Consisting of users and vendors working together to achieve interoperability of software and hardware in automated metrology
- **Dimensional Metrology Standards Consortium (DMSC)** – The DMSC grew out of the DMIS National Standards Committee (DNSC) and has assumed responsibility for the maintenance and support of the DMIS Standard. However, the new mission of this group has expanded to address the development of other dimensional metrology standards.
- **European DMIS Users Group - (EDUG)** Chairman: Lutz Karras (Carl Zeiss), Vice Chair: Marcel Lenher (Metromec), Secretary: Gerd Becker (DaimlerChrysler).
- **International Association of CMM Manufacturers (IA.CMM)** – The purpose of the Association is to support and to promote the interests of the worldwide industry of coordinate measuring machines technologies. It provides support for the I++ group, which develops and maintains the I++DME Specification. [1]
- **I++ group** – which has been developing the I++ DME (Dimensional Metrology Equipment) specification and which has plans for other dimensional metrology system interface specifications

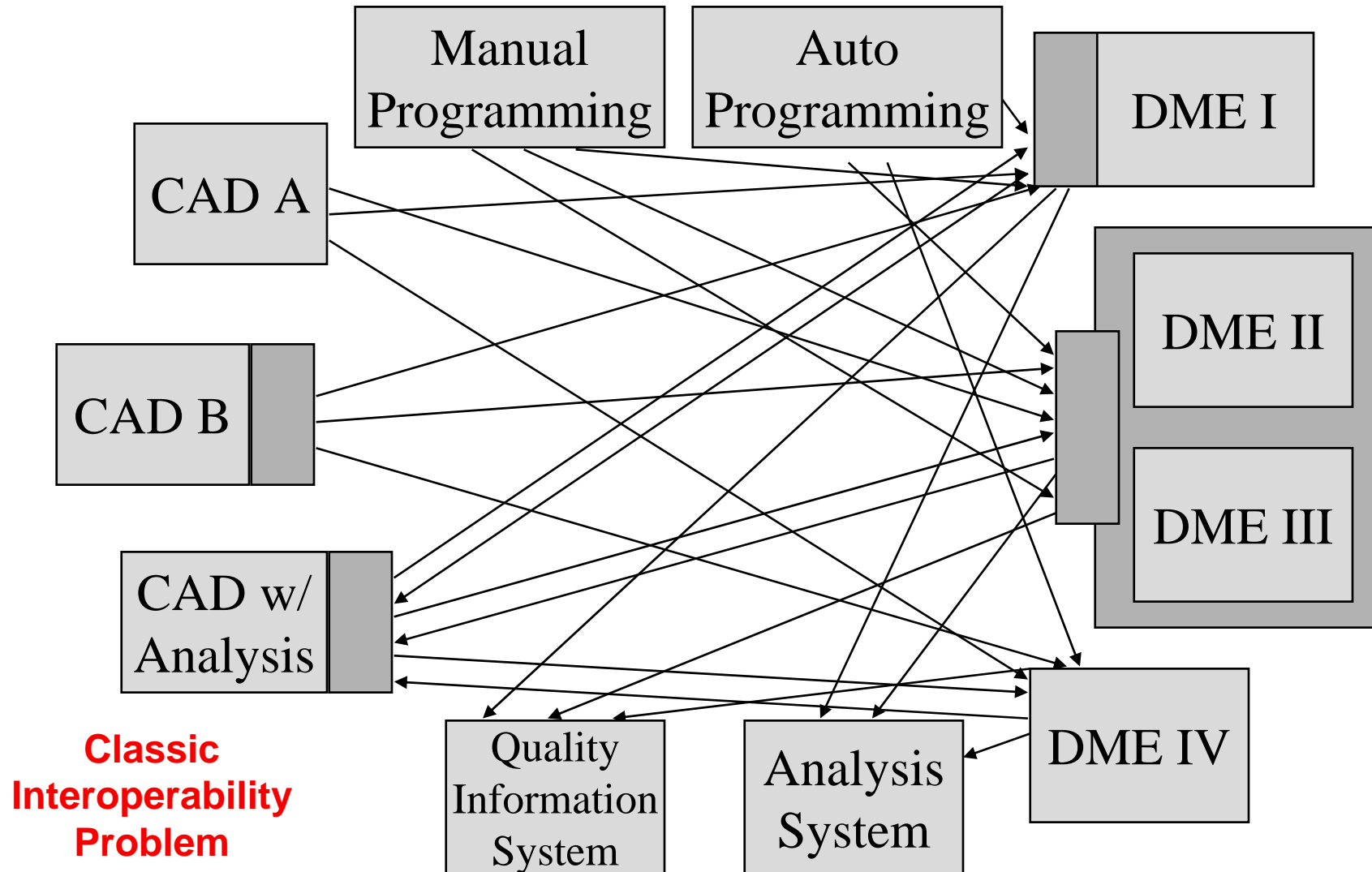


Dimensional Measuring Interface Standard

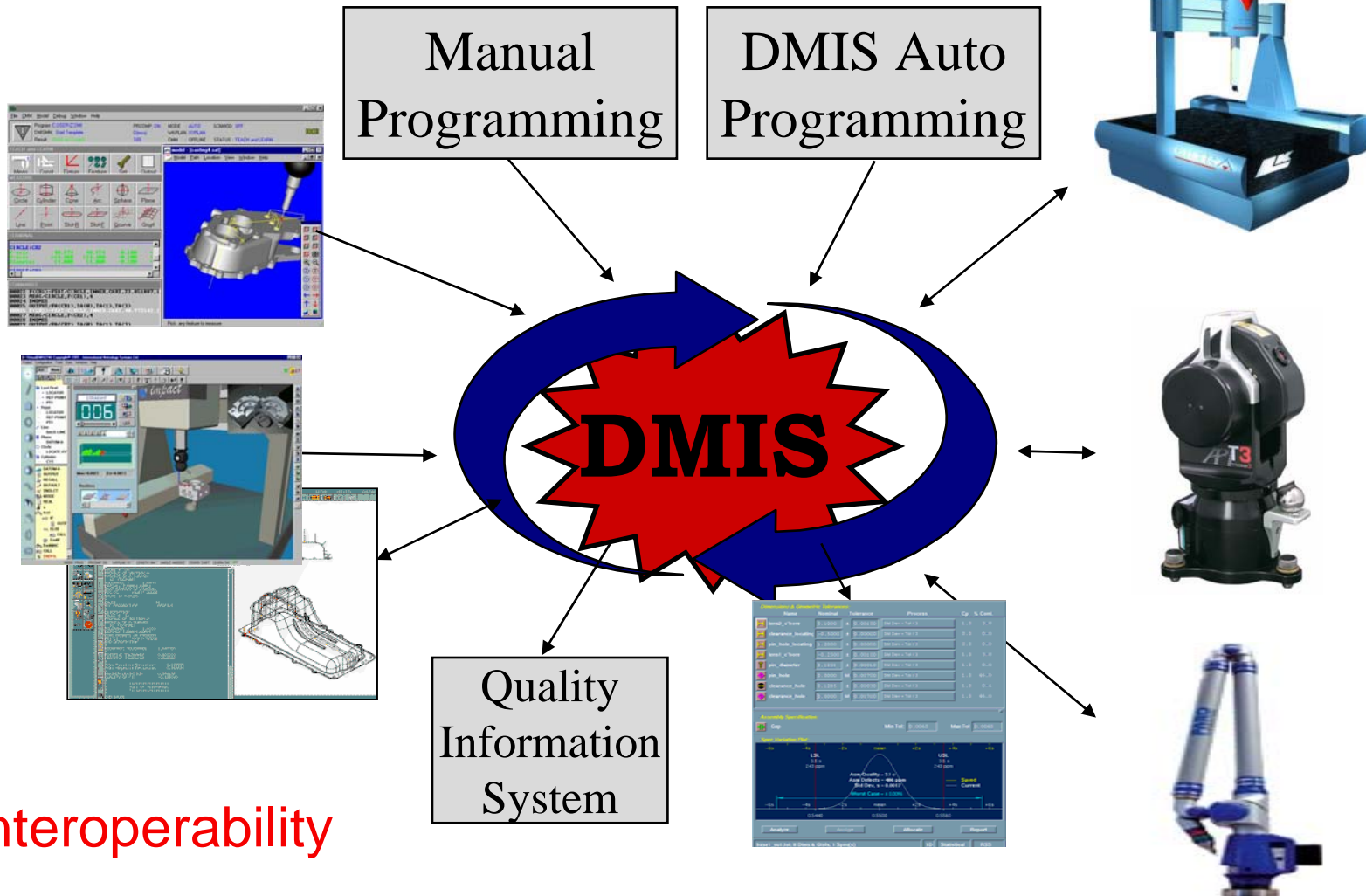


Past to Present

Pre-DMIS Environment



DMIS Environment



What is DMIS?

- Fulfillment of a Technology Void
- Standard of Bi-directional Communication for Dimensional Measurement Data
- Specifies a Vocabulary of Terms
 - Metrology Measurement Programs
 - Measurement Results Data
- Neutral Exchange Format
- Human Readable and Writeable
- Function as DME Language
- American & ISO Standard

DMIS 4.0 to DMIS 5.0

- Over 140 improvements (Interpretations, Errors, Enhancements)
- Harmonization with STEP and DML specifications
- Replaced Contact and Non-Contact Scanning (EDUG)
- Complete Suite of Measurement Features
- Continued Alignment with GD&T Standards
- Introduction of Measurement Uncertainty
- Removed Ambiguities:
 - Major and Minor Words,
 - Example Code,
 - Macros,
 - Diagrams
- DMIS Application Profiles and Conformance Levels
- Approved as ANSI Standard
- Submitting as International Standard



DMIS Conformance

- **DNMC Recognized:**
 - **The Difficulty of Using Past DMIS CHFiles for Evaluating Conformity.**
 - **The Necessity of Guaranteed Interoperability between DMIS Systems.**
 - **That Most DMIS Applications do not Need to Implement the Entire Standard.**
 - **A Need to Define a DMIS Validation Mechanism.**
- **MIPT Initiated**
 - **Efforts to define DMIS Application Profiles**
 - **Solicitation of DNMC Participation**
- **NIST Participating**
 - **Define Conformance Testing Algorithms & Processes**
 - **Conduct Testing Pilot**



DMIS Conformance Process

- Define Application Profiles (AP)
- Approve and Publish APs
- Develop AP Conformance Testing Suite
- Recognize DMIS Conformance Testing Service
- Submit DMIS Application for Adherence
- Make Application's DMIS Conformance Claim

DMIS 5.0 Application Profile

- **DMIS Applications Profiles (AP)**
- **Application Profile Addendums (APA)**
- **APA appends to an AP**
- **With DMIS 5.0 Conformance Levels**
 - Level 1: Essential
 - Level 2: Important
 - Level 3: Beneficial
- **DMIS 5.0 Reference Section 2.1**

DMIS 5.0 Application Profiles Defined

- **Application Profiles**
 - **Prismatic**
 - **Thin Walled**

- **Application Profile Addendums**
 - **Rotary Table**
 - **Contact Scanning**
 - **Multi-Carriage**
 - **In-Process Verification (IPV)**
 - **Quality Information System (QIS)**
 - **Soft Gauging**
 - **Measurement Uncertainty**



DMIS Future Direction



DMIS Possible Changes

- Continued efforts at harmonization
 - STEP AP's
 - I++ DME
 - DML
- Modernization of high level language support (HLL)?
- Shrinkage?



Mechanisms for Change . . .

- Active participation in the DMSC
 - supporting consortium member
- Participating as a sub-committee member
 - DMIS Standards Committee
- Submitting a Standard Improvement Request
- For more information
 - visit the website
 - www.dmsc-inc.org

A screenshot of the DMSC website homepage. The header features the DMSC logo and a navigation bar with links for HOME, NEWS, SEARCH, LINKS, and CONTACT US. The main content area includes a welcome message, a mission statement, and a newsflash section. The newsflash mentions the availability of the new DMIS 5.0, Part 1 Standard in bookstores. A sidebar on the right contains a main menu with links to Home, DMSC Meetings and Events, DMSC Private File Area, DMIS Standards Committee, Standard Improvement Requests, Online Store, Contact Us, Search, Files/Documents to Download, and How to Join.

Dimensional Metrology Standards Consortium **DMSC**

Home

HOME NEWS SEARCH LINKS CONTACT US

Welcome to the Website of the Dimensional Metrology Standards Consortium

The mission of Dimensional Metrology Standards Consortium (DMSC, Inc.) is to identify urgently needed standards in the field of dimensional metrology, and to promote, foster, and encourage the development and **interoperability** of these standards, along with related and supporting standards that will benefit the industry as a whole. The Dimensional Measuring Interface Standard (DMIS) is one such standard that the consortium has the responsibility to develop, maintain and support as well as to coordinate and harmonize with other related standards efforts. The DMSC invites participation within the consortium of other standards groups and activities that seek to resolve the technology and other issues of automated dimensional metrology. ([Read more](#))

Dimensional Metrology Standards Consortium
Monday, 27 June 2005
Introduction and [How to Participate](#)
In today's environment, standards are essential to national and international economies, to world

Dimensional Metrology Standards Consortium

Main Menu

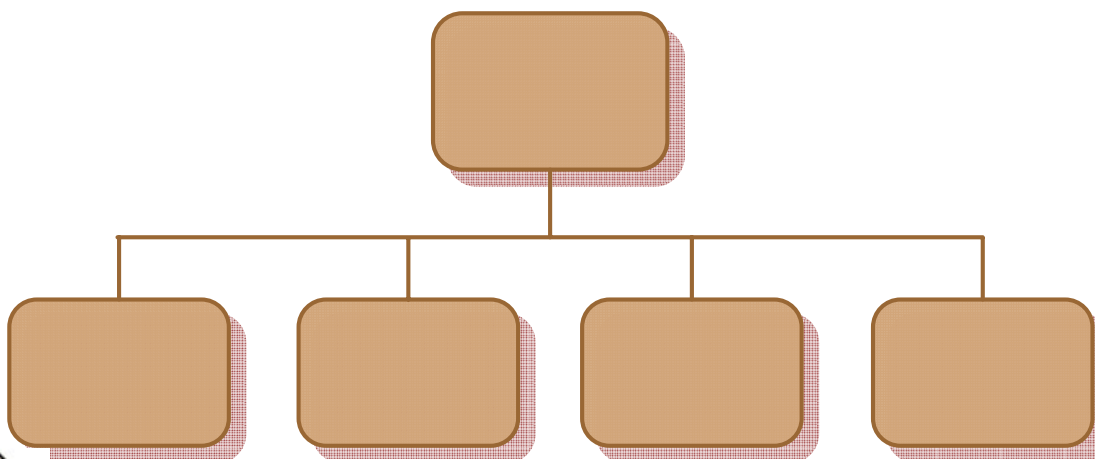
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- Online Store
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- Files/Documents to Download
- How to Join

Newsflash

New DMIS 5.0, Part 1 Standard available in bookstore!

The new and improved version of the Dimensional Measuring Interface Standard (DMIS), revision 5.0, has more than 140 enhancements over DMIS version 4.0 (approved 2001)

Portable Systems



Where are you?

