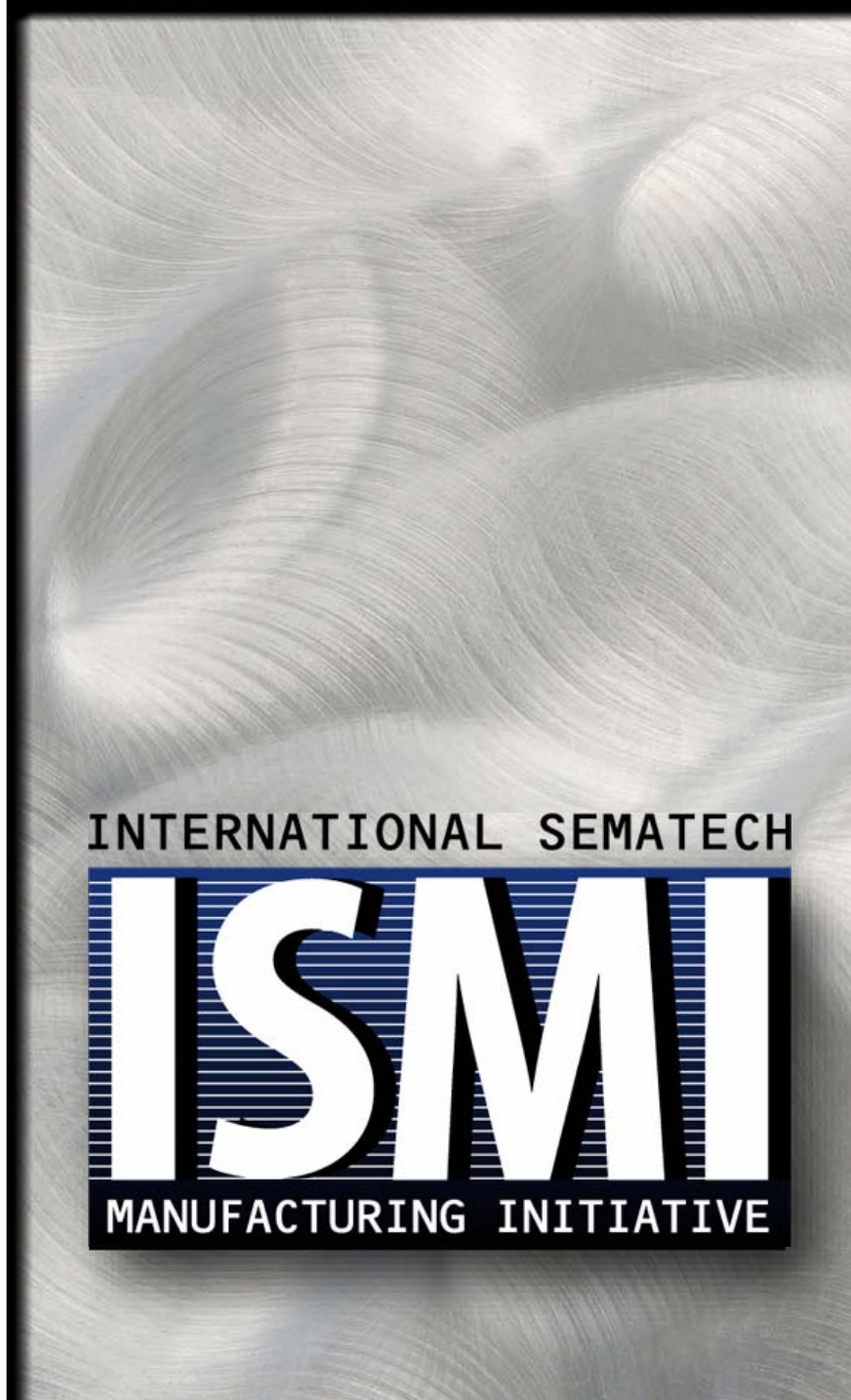
Interface A Latest News

Gino Crispieri

TEL 512-356-7547

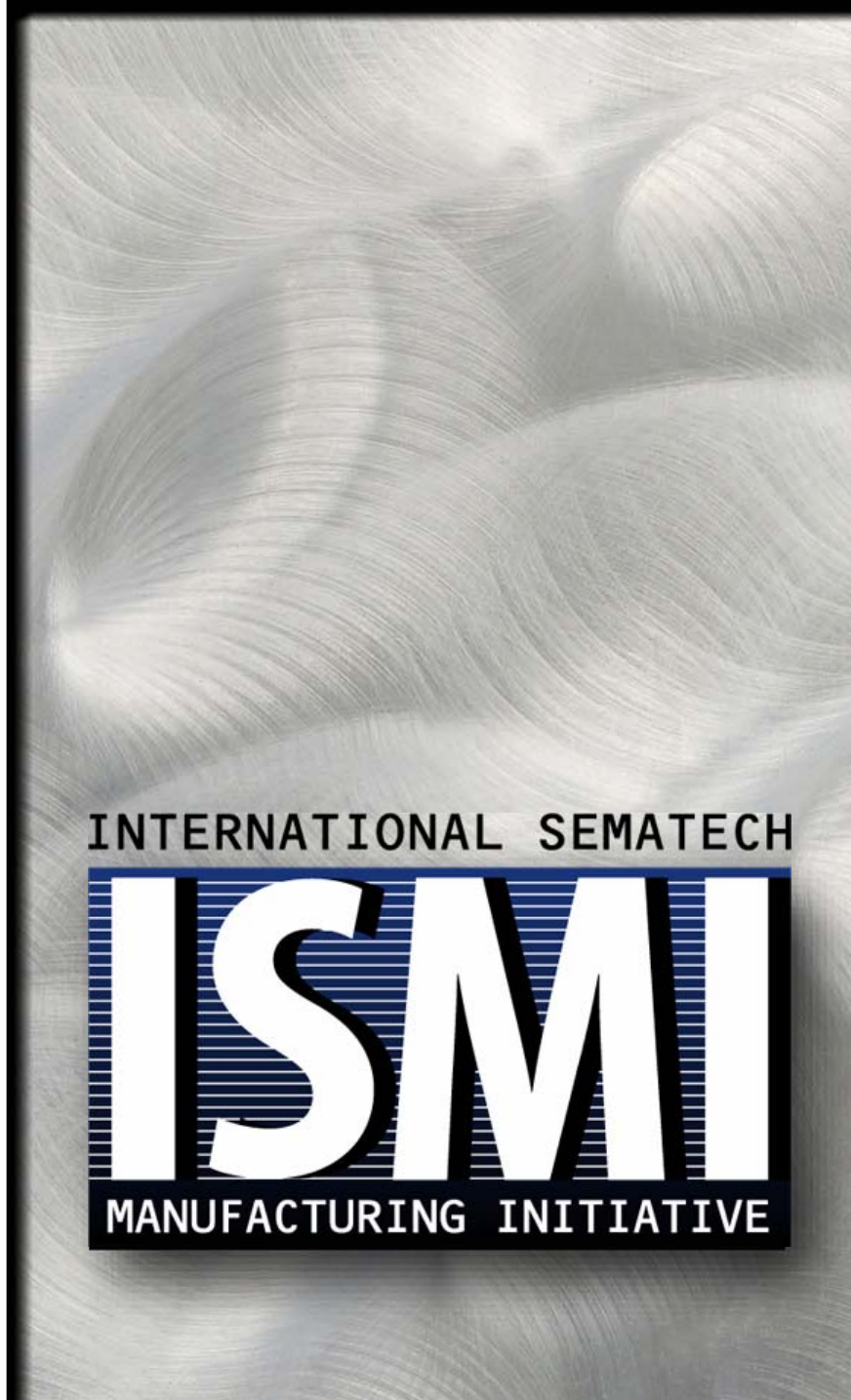
gino.crispieri@ismi.sematech.org



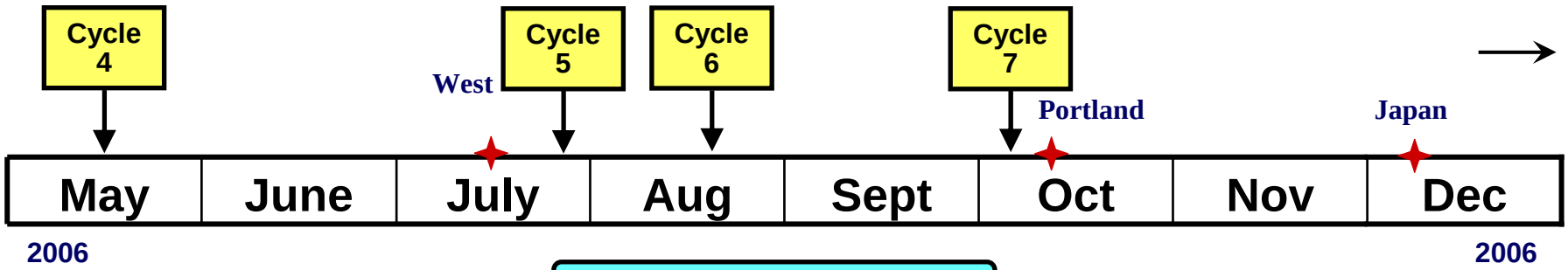
Agenda

- DDA Task Force Status
  - Ballots
  - Roadmap
- ISMI EDA Related Documents
  - EDA Usage Scenarios
  - EDA Metadata Guidance
  - EDA Evaluation Method
- EDA Evaluation Results
  - Lessons Learned
- EDA Factory Client

Task Force Status



Ballots Approved in 2006



Cycle 4 Ballot

- EDA Guide Submitted ☑

Cycle 6 Ballot Work

- EDA Guide Submitted
- E125 Revisions
  - Clarify schema/WSDL linkages
  - Events w/o state machines
  - Multiple state machines for E39 objects
  - Remove .1 Provisional
- E132 Revisions
  - Clarify schema/WSDL linkages
- E134 Revisions
  - Clarify schema/WSDL linkages
  - Remove .1 Provisional

☑

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E132 New Requirements

- **Goal**
  - E132 recognizes independent “service groups” when it connects with the equipment and allows isolation from one to another
    - Service Groups:
      - E125/Metadata, E134/Data Collection, E139/RaP, E142/Substrate Mapping
- **Proposal**
  - New EstablishSession Command
    - Proceeding with Cycle 1 line item
    - Incorporate E128 reference

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Standards Freeze

- **Situation**
  - **There have been several key learnings regarding the EDA schema and capability**
    - **Driven by early implementations by suppliers and IC manufacturers**
    - **Mixture of maintenance, clarification, issues, and usability**
    - **As a software product, this is not unusual early in life**
  - **Initial 1105 freeze was successful**
    - **Driven by ISMI member companies**

- **Objective of Freeze**
  - **Allow standards process to drive needed capability, usability, and design improvements into EDA**
  - **Prepare EDA community for incremental changes**
  - **Maintain stability of the EDA standards suite**

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Current EDA Requirements Freeze

- **Freeze allows the community to settle on a stable standards suite**
  - **ISMI member companies agreed to freeze EDA standards purchase requirements at the 1105 cycle for at least one year**
- **EDA standard freeze consists of 9 documents plus supporting files**
  - **Five Concept Documents (current version)**
    - **E120-1104(0706) – Common Equipment Model (CEM)**
    - **E125-1105(0306, *0307*) – Equipment Self Description (EqSD)**
    - **E132-1105(0306, *0307*) – Client Authentication and Authorization**
    - **E134-1105(*0307*) – Data Collection Management (DCM)**
    - **E138-0305 – Common Components**
    - **Concept documents and Technical Specifications available at:**

      http://downloads.semi.org/PUBS/SEMIPUBS.NSF/webstandardssoftware!OpenView
  - **Four Technical Specifications**
    - **E120.1-1104, E125.1-1105, E132.1-1105, E134.1-1105**
  - **Support Files – Schema and WSDL**
    - **E120.1-1104, E125.1-0305, E132.1-0305, E134.1-1105, E138.1-0305**
    - **Available at: http://dom.semi.org/web/wstandards.nsf/supmaterials**

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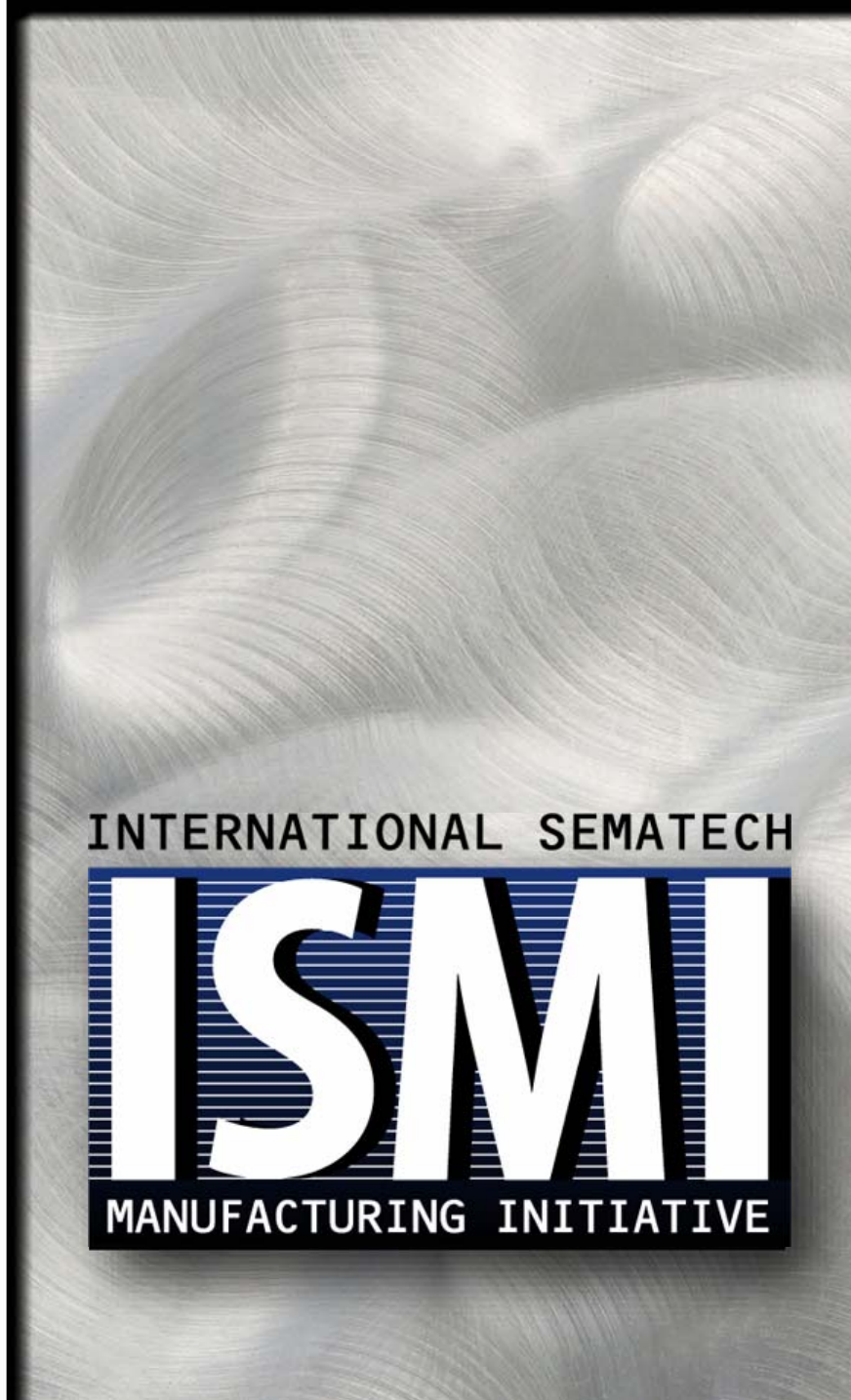
ISMI EDA Guidance



ISMI EDA Related Documents

- **EDA Usage Scenarios 2.0**
  - ismi.sematech.org/docubase/abstracts/4579btr.htm
- **EDA Evaluation Method 3.0**
  - ismi.sematech.org/docubase/abstracts/4664btr.htm
- **EDA Metadata Guidance**
  - ismi.sematech.org/docubase/abstracts/4748aeng.htm

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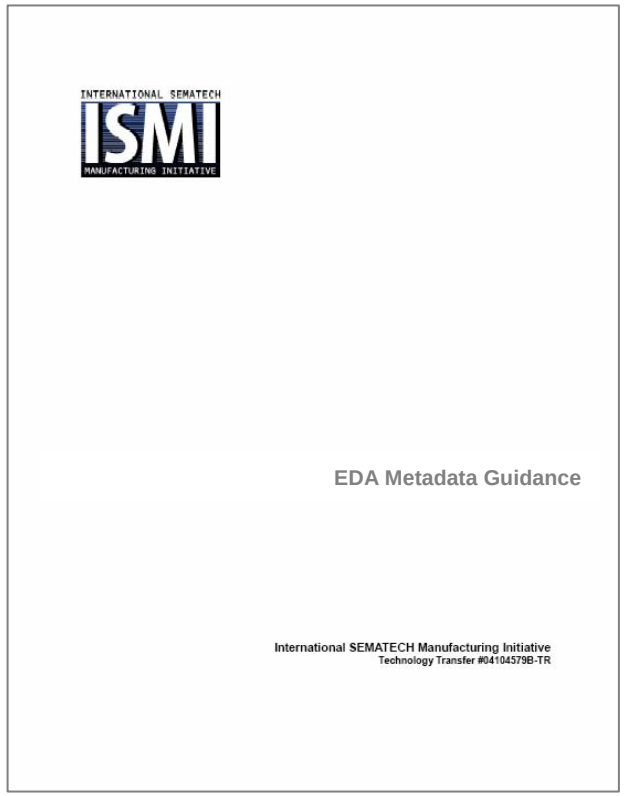
EDA Metadata Guidance

- **Early access to supplier metadata prompted ISMI to quickly react to fill equipment modeling gaps**
  - **IC maker & supplier guidance**
- **Provides guidance on parameter, exception, state machine, and SEMIObject definition**
  - **Highlights potential areas for guidelines**



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EDA Evaluation Method

- **Objective**
  - **Establish a standard approach for evaluating basic function and "happy path" scenarios for EDA implementations**
  - **Based on the EDA usage scenarios**
- **Output**
  - **Artifact for assessing the EDA implementation**
  - **Available to the industry as a first way to check EDA functionality and performance**

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EDA Evaluation Method Overview

- **Purpose of the Method**
  - An understanding of the equipment's ability to perform basic EDA functions
    - Measurement of the performance of the equipment EDA interface under a selected set of conditions
    - Provide subjective recommendation for supplier and users to understand EDA implementation
- **Content of the Document**
  - Defines basic steps for preparing for an EDA evaluation
  - Execution
    - Establishes that basic functions have been implemented and work
    - Checks for implementation performance
  - Provides a template for reporting results

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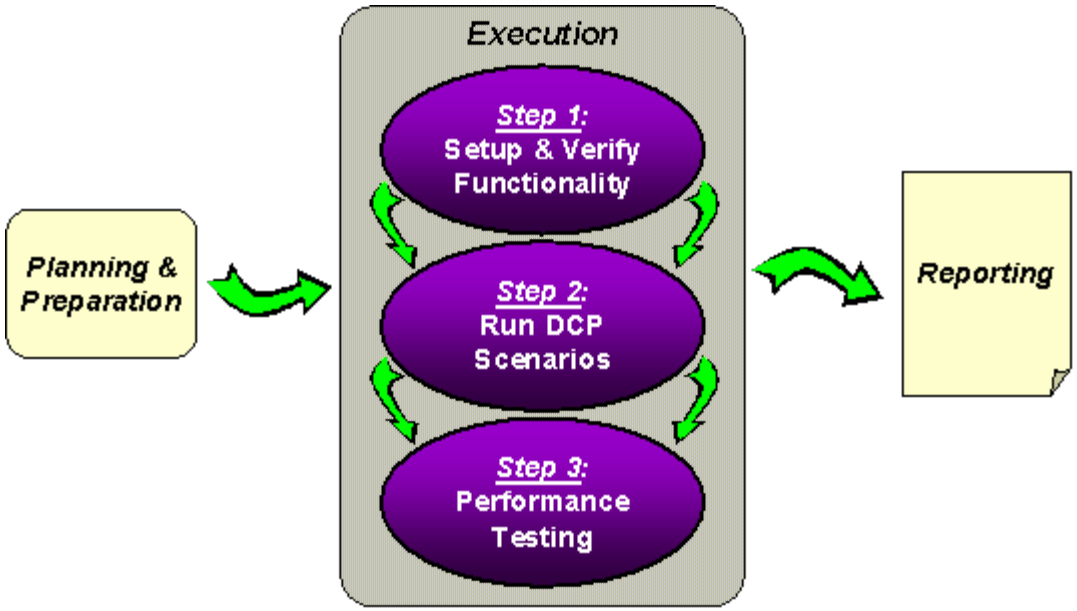
EDA Evaluation Method



- **The EDA evaluation method uses a limited set of all possible variations for each of the defined EDA functions**
  - **This set is intended to represent the "typical" use by IC makers**
  - **Does not cover all possible situations in EDA communication**
- **The EDA evaluation method does not check error handling**
  - **There is no Pass/Fail but a Does/Does Not Meet Expectations**

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EDA Evaluation Method

APPENDIX 1 – FUNCTIONAL EVALUATION PROCEDURES

Feature Description	Test Procedure	Expected Result	Metric	Comments
A. Establish Session – With SSL				
1) Establish a secure session via the following command: a) EstablishSession() 2) Get an ACL entry from the equipment with an entry equal to "AnyPrincipal" using the following command: a) GetACL(AnyPrincipal) b) If the entry is not present, build an ACL file and then, install it in the equipment		A secure session is made with the equipment and at least one ACL entry is present.	Success / Does Not Meet Expectation	
3) Get the active sessions open on the equipment by sending the following command to the equipment: a) GetActiveSessions()		A successful response	Success / Does Not Meet Expectation	
4) Using an administrative session, get the maximum sessions by sending the following command to the equipment a) GetMaxSessions() b) Determine the maximum limit of non-admin sessions that can be set on the equipment and note in the comments section at the right of this row.		A reply message with current equipment settings for maximum sessions allowed.	Success / Does Not Meet Expectation	
5) Set Maximum Sessions Setting by sending the following command to the equipment: a) SetMaxSessions() b) Set the value to 11 sessions.		A successful response	Success / Does Not Meet Expectation	
6) Verify that the maximum number of non-administrative sessions has been set correctly by sending the following command to the equipment: a) GetMaxSessions()		A reply message with current equipment settings as requested in step 3.	Success / Does Not Meet Expectation	

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1. Lessons Learned Evaluating EDA

The ECCE (EDA Client Connection Emulator – Sample Client)

- It works well and is very useful to troubleshoot the problems encountered
- There is a small learning curve to use and discover all features included with the ECCE
  - Once familiar with them, client is easy to use
- It covers all the defined EDA evaluation steps
- Additional features to analyze client performance
- Available at ismi.sematech.org/emanufacturing/ecce.htm

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2. Lessons Learned Evaluating EDA

Supplier Implementation Environment

- Most supplier implementations are Alpha or Beta versions and are not the final product yet
- Many manual steps required to set up the EDA connection
- Some suppliers had about 80% of their SECS-II variables (VIDs) and alarms entered in their metadata
- Some suppliers' metadata models incomplete and in some cases lacked structure and complete description of the parameters, alarms, and supplier-defined state models
- Some solutions integrated on separate computers not the main equipment computer
- Some equipment architecture may have to change to achieve data refresh rates

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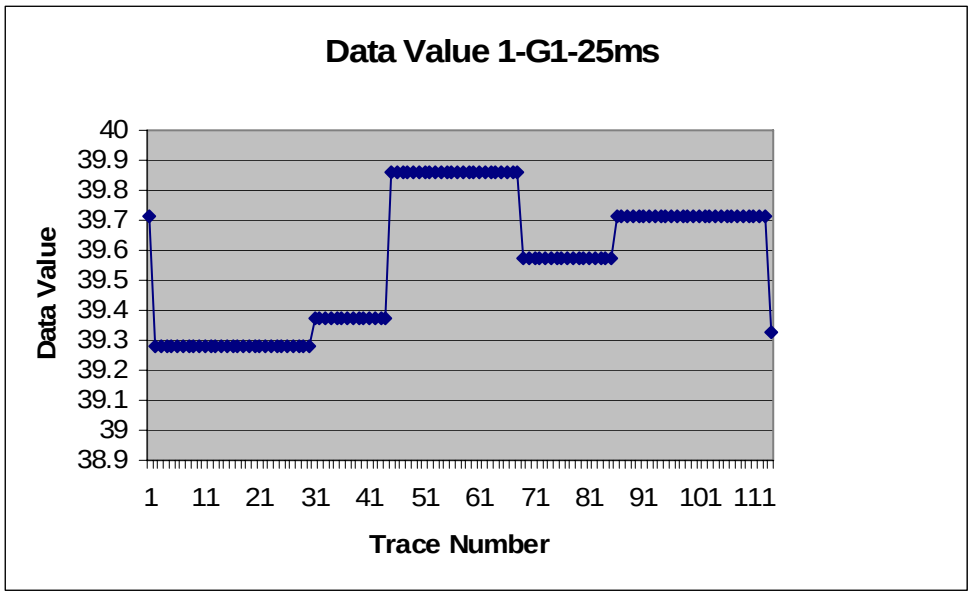
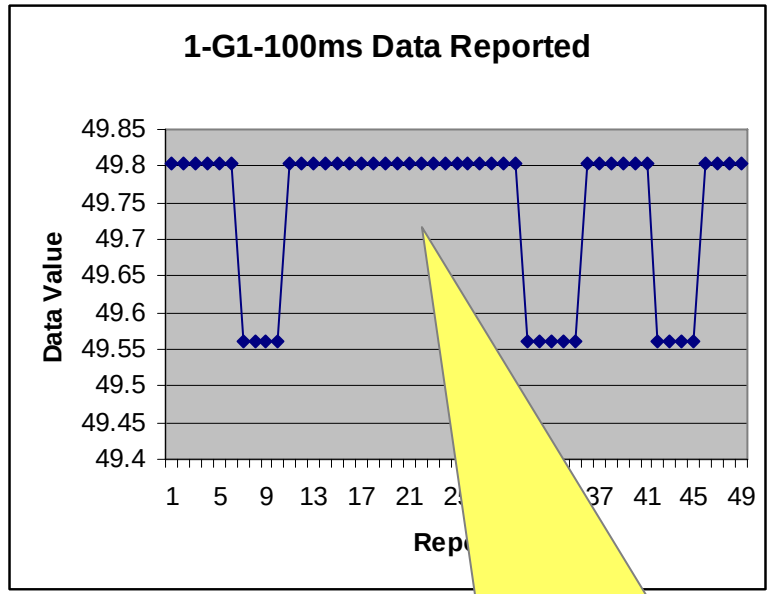
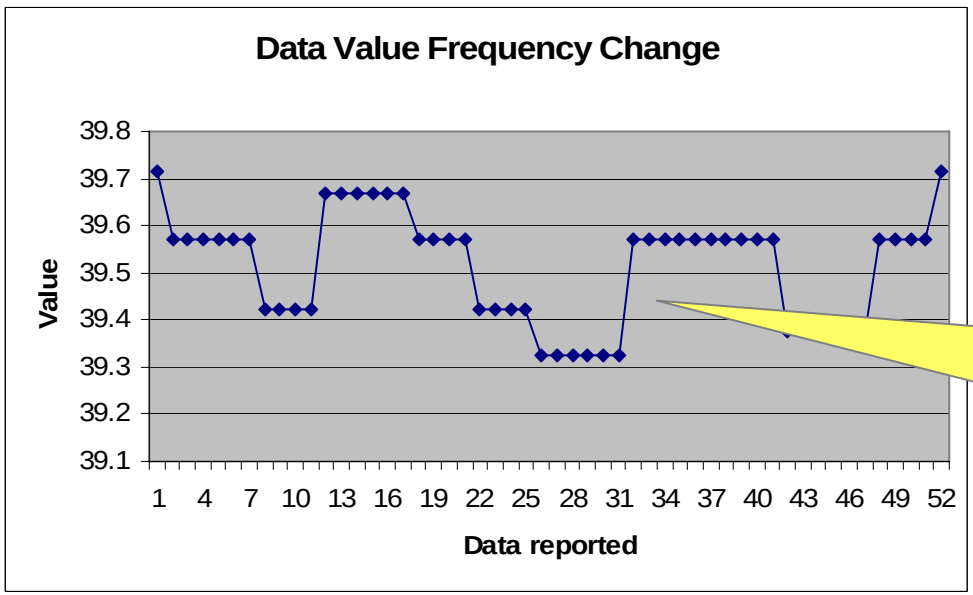
Data Value Freshness







Another problem encountered with a parameter was its resolution.
Is a change of .2% of full scale acceptable when you may need .01% resolution?

Changes in data values when running at 100 ms show that the values are changing every 0.4 seconds up to 0.75 seconds

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Message Delivery Jitter

- **Message jitter or delay is caused by the tool's inability of get data at the rates it was asked by the DCP request**
  - **Test shows that on one occasion when the equipment was asked for 1 data parameter at rates below 100 ms, the equipment could not keep up with the request rate**
- **Another tool put time-stamps on data faster than the rate asked for, eventually tool delayed the time-stamp to catch up**
- **Other tools did not have this problem**

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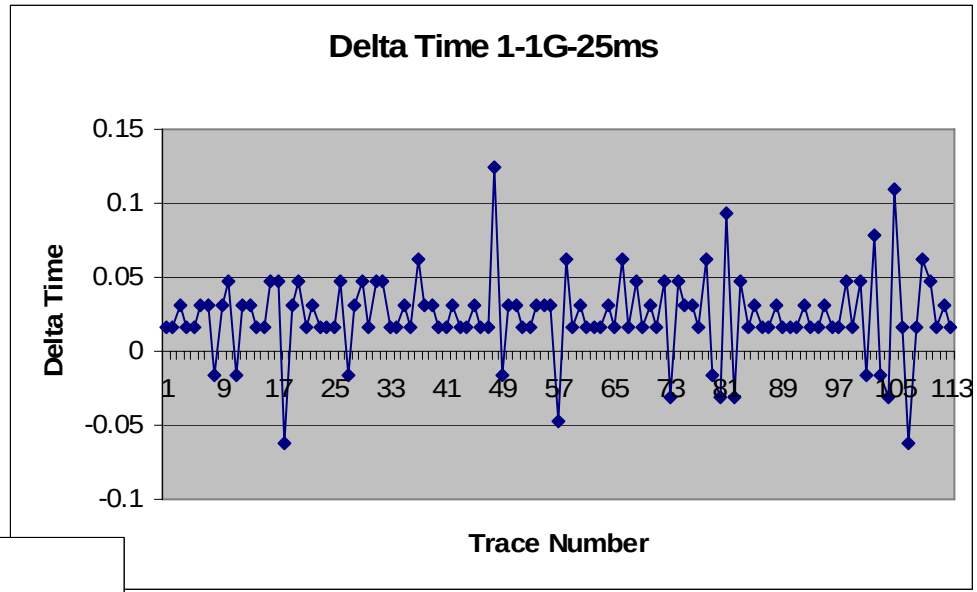
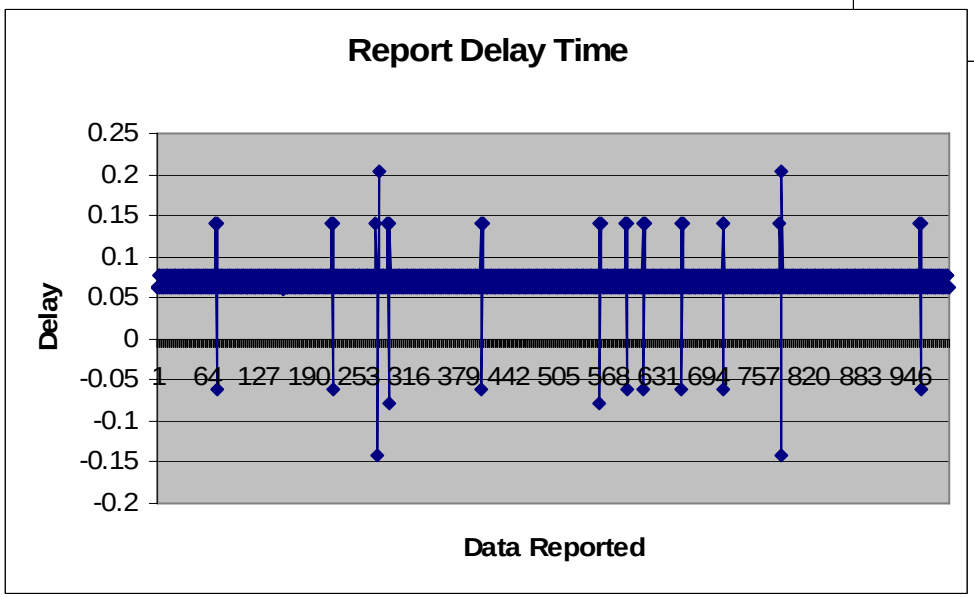
Data Message Jitter





Summary

- A number of low level issues were identified
  - Several issues were forwarded to the DDA TF
  - Most can be avoided with guidance
  - Equipment modeling is the major problem (E120)
- Parameter types and naming conventions need to be addressed
  - Too much variability in the way suppliers define similar parameters
- Repeatability, jitter, timeliness needs to be tested for those parameters that require accuracy and precision
- The biggest challenge is getting SSL to work
  - When two different operating systems are used
  - Partially due to the difficulty factor because it is a multi-step procedure
- Some suppliers better prepared than others
  - IC makers need to negotiate the data and what the metadata should support
- Evaluations
  - Evaluations have been very helpful to suppliers and ISMI to assess readiness and address issues

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