

# **Latest report on e-Diagnostics**

## **e-Manufacturing Workshop**

### **December 3, 2002**

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**[www.sematech.org/public/resources/ediag/index.htm](http://www.sematech.org/public/resources/ediag/index.htm)**

# e-Diagnostics Vision

## Why e-Diagnostics?

- Significant reduction in Repair Time = higher Availability = Increased Output.
- Significant reduction in the time it takes to qualify a new tool.
- Anticipate problems before they occur.
- Provide data to support continuous improvement and new product development.

Internet

- Mainstream Computing Technologies
- Open Architectures



Protocol Options

- Serial line IP
- Remote Control
- Telnet
- Ethernet IP
- VPN

Firewall & Authentication


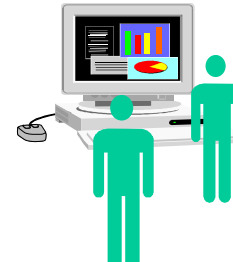
- Data Security
- Safety Infrastructure

Remote monitoring  
Remote diagnostics  
Remote de-bugging/fix  
Remote sensing  
Model tool behavior

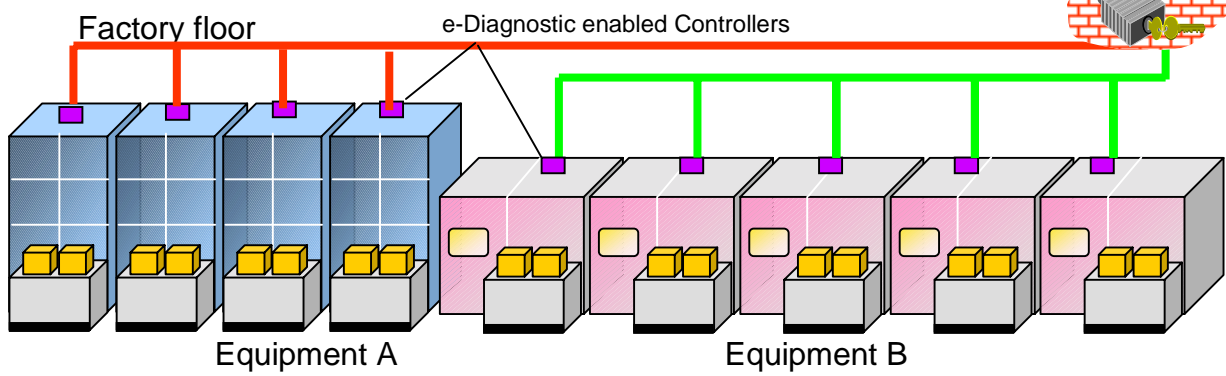



**Supplier A Main Office**

Remote monitoring  
Remote diagnostics  
Remote de-bugging/fix  
Remote sensing  
Model tool behavior

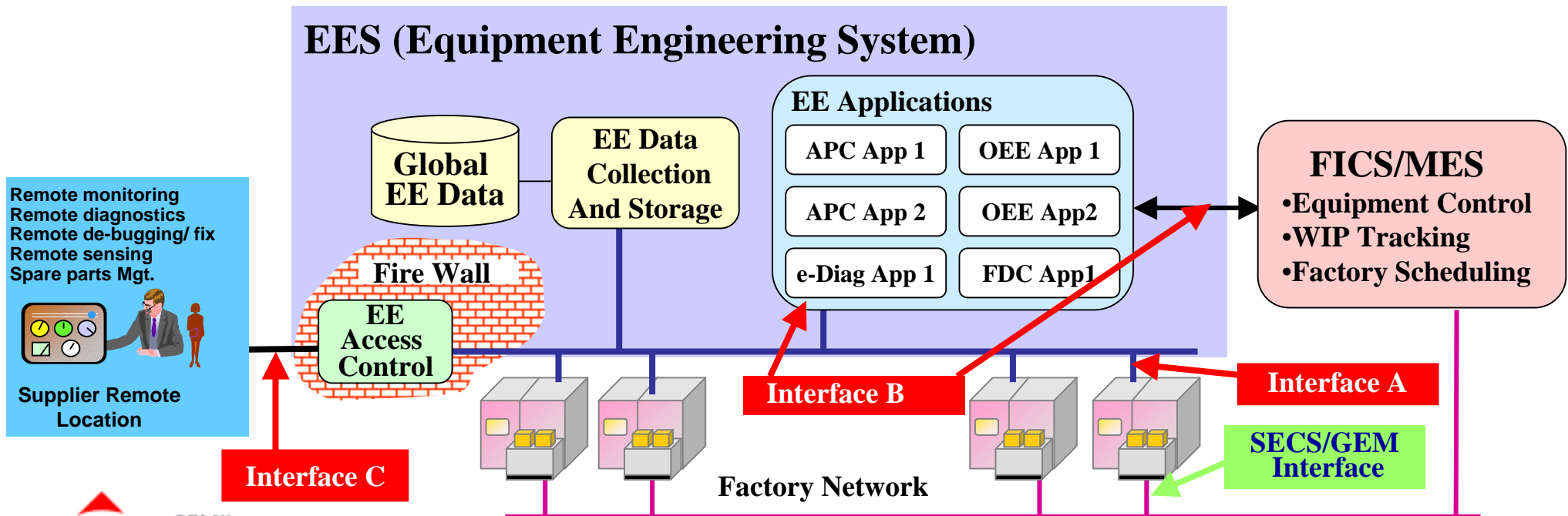



**Supplier B Main Office**



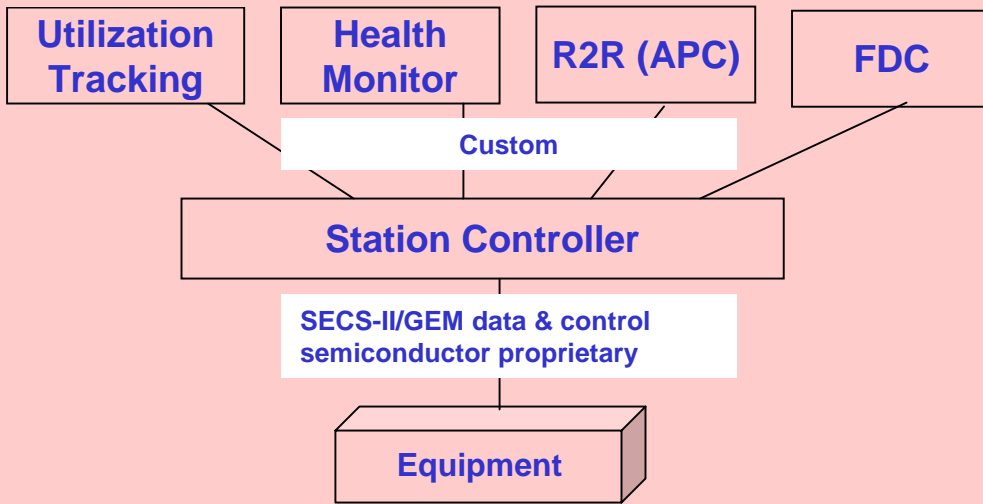
# Focus: Improved Data

- SECS/GEM – Still The Primary Equipment Control I/F
- Interface A – Equipment Data Interface
  - Getting more & better data from the equipment
- Interface C - External Access to e-Diagnostics
- Interface B – Among Applications and to FICS/MES

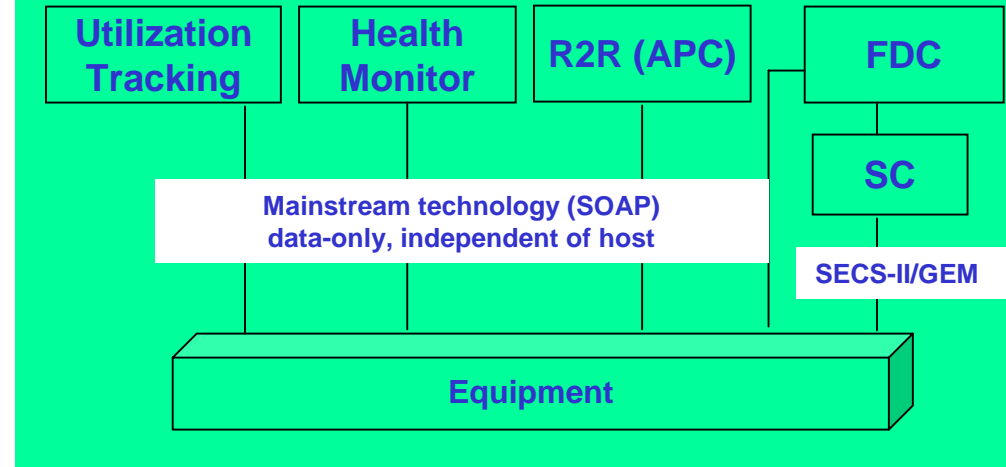


# Data Acquisition Vision

## Current State

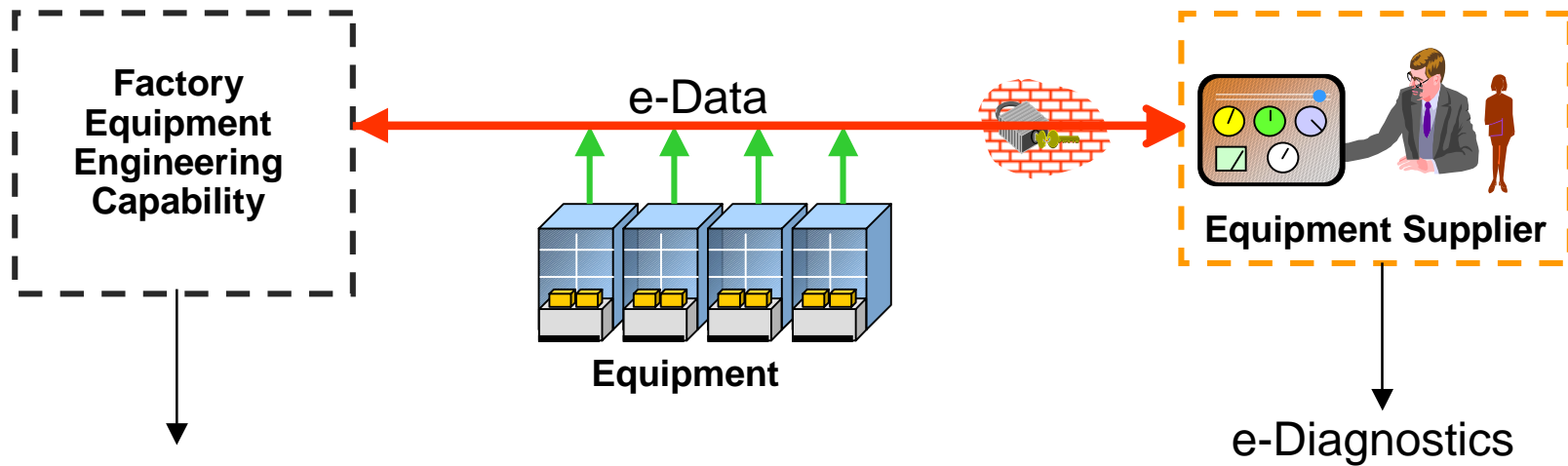


## Desired State



# e-Diagnostics Leads into e-Manufacturing

## Standardizing the Interface A Data Port



Fault Detection & Classification  
Run-to-Run Control  
Machine matching  
Spare Parts Management  
Predictive Maintenance

...

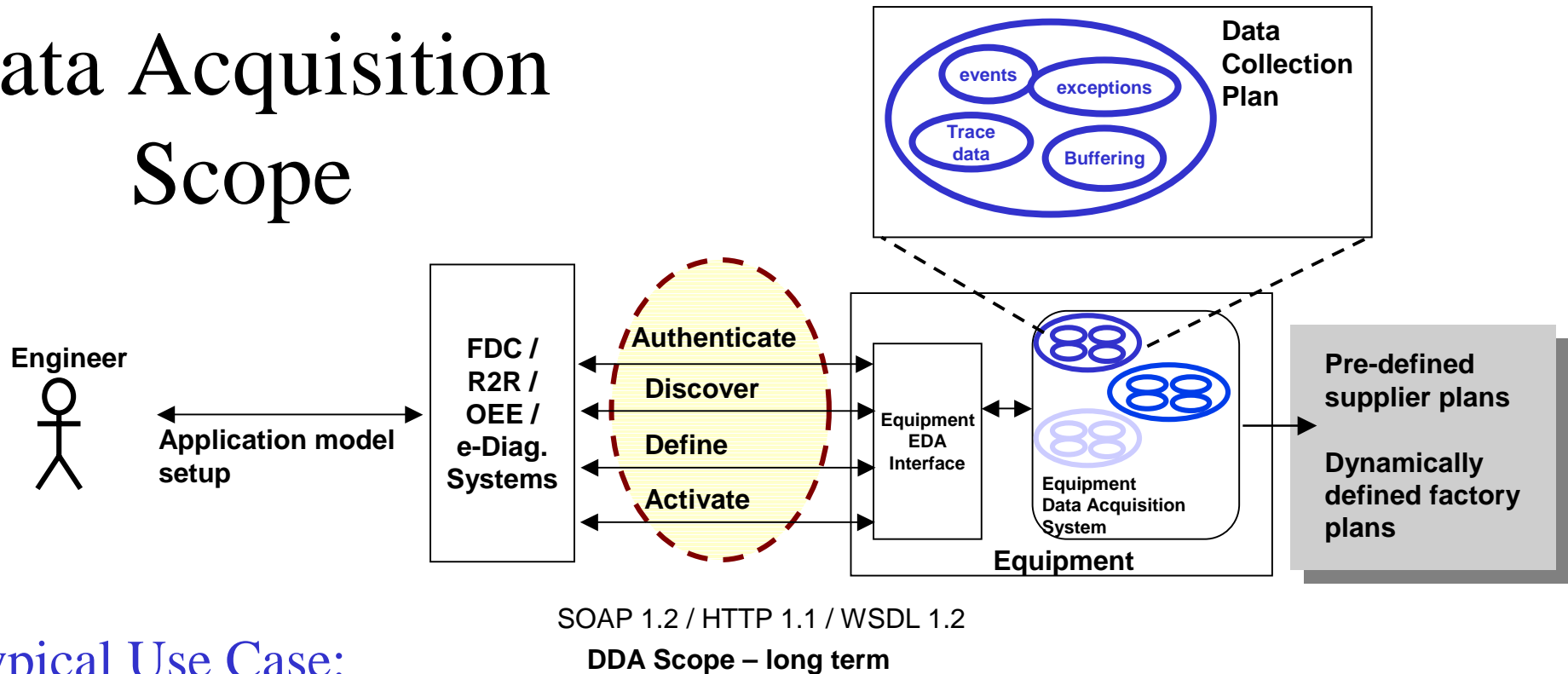
e-Manufacturing is automated,  
data-driven,  
productivity optimization

# e-Standards Summary



- e-Mfg/EEC related standards activity is **HOT!**
  - Multiple TFs meet weekly w/good attendance (~18hrs/week)
- The e-Manufacturing related standards effort is the largest combined effort I&CC has attempted
  - Global participation, including NA, Japan, Europe
  - Standing-Room Only meetings at recent SEMICONs
- Much progress has been made
  - Over 20 ballots (blue and yellow) are in the system
  - Some have passed ballot and are now SEMI standards
- The goal is steady, rapid progress
  - Interim DDA solution targeted for December, 2002
  - RaP definition as early as Spring, 2002
  - Data interface definition by Spring, 2003
  - More activity to follow

# Data Acquisition Scope



- **Typical Use Case:**

- **Authenticate (ballot 3507)**

- Application authenticates to equipment

- **Discover (ballots 3510 + 3522)**

- Application queries tool metadata, presents available data to engineer

- **Define (ballot 3509)**

- Engineer establishes data needs according to factory policies or troubleshooting scenario, builds requirements into a Data Collection Plan; application sends plan to tool.

- **Activate (ballot 3509)**

- Application activates plan, collects data, performs intended function

# Current DDA-Related Specifications

- ✓ 3523 – Guide for Style & Usage of XML for Semiconductor Manufacturing Applications (XML TF)
  - **Foundational guidelines for XML usage within SEMI**
- ✓ 3522A – Common Equipment Model (OBEM TF)
  - **Abstract model of equipment physical equipment structure**
- 3507 – Equipment Client Authentication and Authorization (DDA TF)
  - **Abstract model of authenticated communication and Access Control List management**
- 3510 – Equipment Self Description (DDA TF)
  - **Abstract model of equipment metadata describing units, types, equipment structure, state models and events, alarms/exceptions, etc.**
- 3509 – Data Collection Management (DDA TF)
  - **Abstract model of Data Collection Plans, DCP management interface and state models, and DCP reporting formats**
- 3563 – Proposed Standard for Equipment Data Acquisition (DDA TF)
  - **Concrete specification of SOAP 1.1 reduced-scope interface for data collection**

# Data Acquisition Interim Solution

- **Ballot**

- 3563 – Interim EDA Guide

- Definition of an ‘interim’ interface to sync industry on concepts and technology
- Facilitate near-term e-Diagnostic systems while specs are developed

- **Phased approach:**

- New Technologies

- Adoption of new technologies in the industry will also involve significant learning and adjustment period for suppliers, ICM’s, and application providers

- Lead time for suppliers

- Equipment supporting data collection without impacting equipment performance is expected to require design and development time

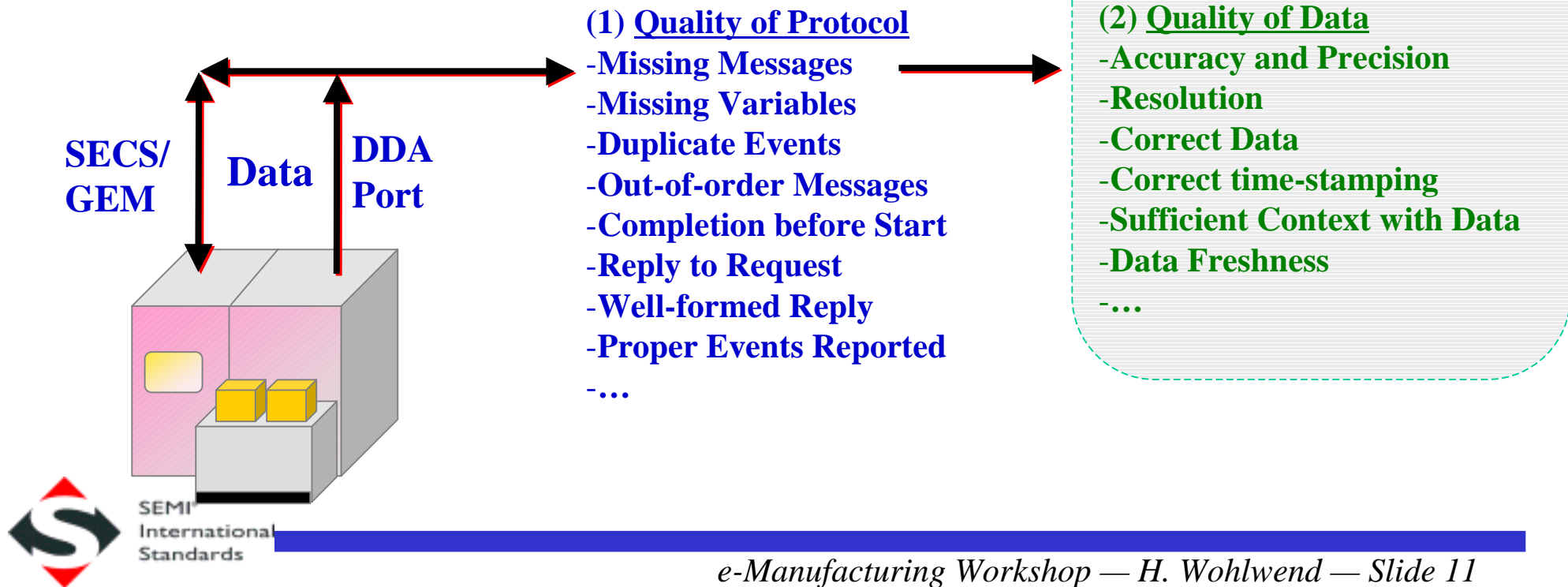
- Interim solutions

- Simpler, single-client, minimally configurable push of equipment data. Provide access to data on new technologies while complete specifications are being designed and developed
- Not a SEMI specification (essentially a precursor to the final standards). Targets current generation of 300mm equipment

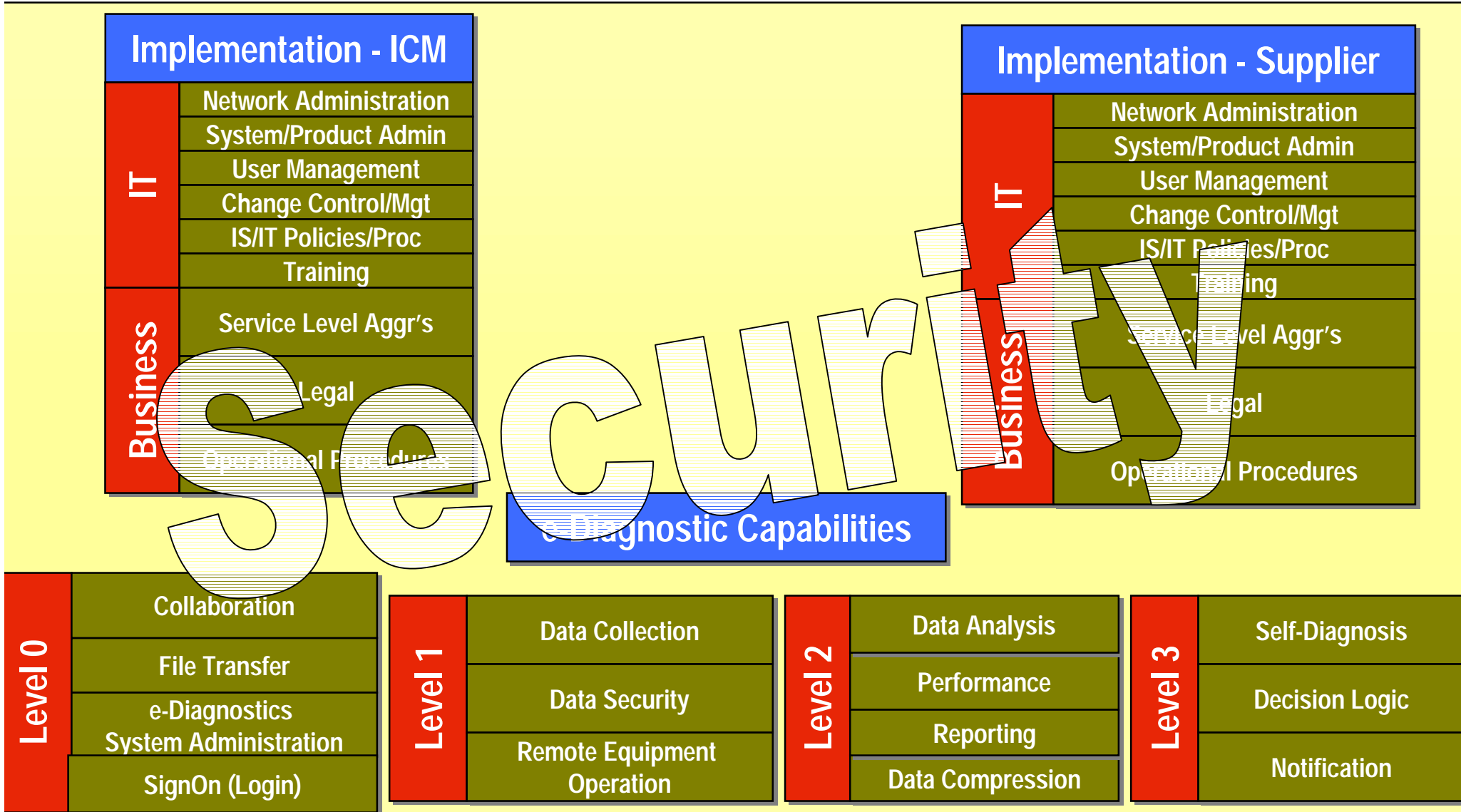


# Data Quality Needed

- Quality of Reporting of Data - The Protocol
- Quality of the Data Itself



# Measurement & Assessment Checklist



# e-Diagnostics Checklist Example

Focus Area	Compliance Element Code	Required	Optional	Shared	Feature	Feature Description	Capability Description
						Feature Description	Capability Description
Collaboration	TS-CL0.11		●		Voice transmission	Ability to provide Voice over IP between the ICM and Supplier during a collaboration session.	
	TS-CL0.10		●		Video transmission	Ability to provide streaming video between the ICM and Supplier during a collaboration session.	
	TS-CL0.9		●		Still image capture	Ability to exchange still images between ICM and Supplier during a collaboration session.	
	TS-CL0.8		●		Real-time white board drawing	Ability to provide basic "white board" capability between ICM and Supplier during a collaboration session.	
	TS-CL0.7		●		Real-time application sharing	Ability to share applications necessary for collaboration. Does not include remote administration or remote tool control applications covered in Capability Level 1.	
	TS-CL0.6		●		Customer Service Network Access	FSE has access to supplier resources from factory floor.	
	TS-CL0.5	●			Chat Capability	Ability to support multi user Text Chat sessions among all ICMaker and Supplier participants during a collaboration session.	
	TS-CL0.4	●			Secure Conferencing	If conferencing is available, the eDiagnostic system must provide the mechanisms to ensure that only authorized personnel have access into the secure conference.	
	TS-CL0.3	●			Technologies	The Collaboration technologies used must be agreed upon between IC Maker and supplier. This includes Data, Voice, and Video.	
	TS-CL0.2				Open Architecture	e-Diagnostics solutions must be implemented using an open architecture, based on mainstream computer technologies, non-proprietary standards, and data models.	
				Use of TCP/IP	Communication must take place over standard communication connections using TCP/IP protocols.		

Compliance Element Code

Capability Description

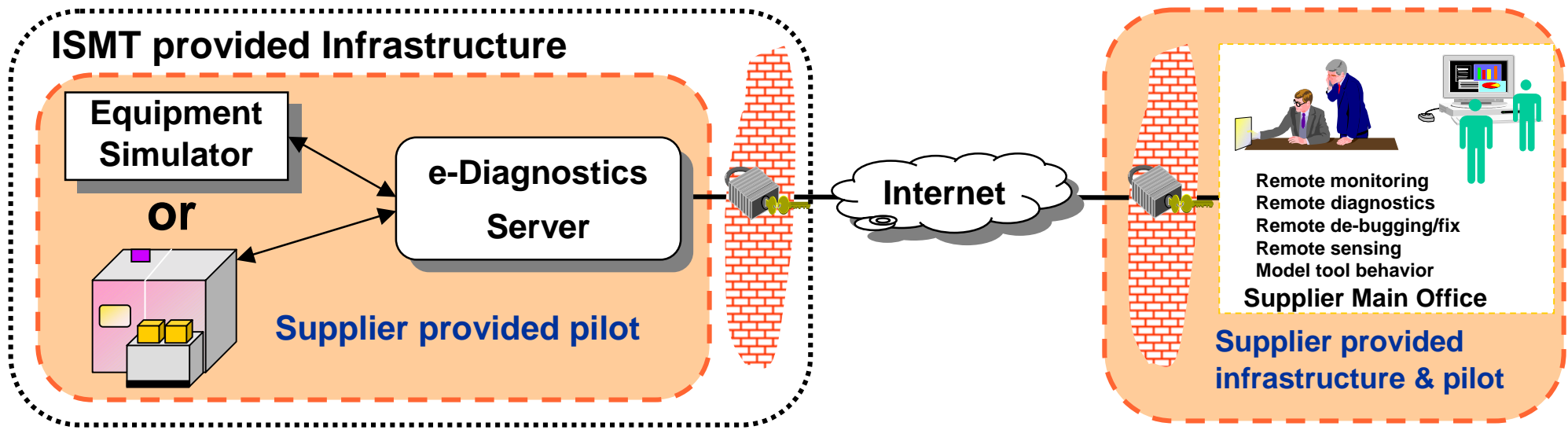
Capability

Feature Requirement

Focus Area

Collaboration

# e-Diagnostics & Interface A Prototyping



## ★ ISMT Provides

- 👉 Network infrastructure, internal firewall, hosts pilot activities, \$\$

## ★ Supplier Provides

- 👉 Equipment simulator or tool, e-Diagnostics pilot, remote pilot
- 👉 Must include OEM, but may also include 3rd party

## ★ e-Diagnostics Working Group provides

- 👉 Prototype (Guidebook) evaluation criteria, evaluation results

<http://www.semtech.org/public/resources/e-manuf/rfp/index.htm>

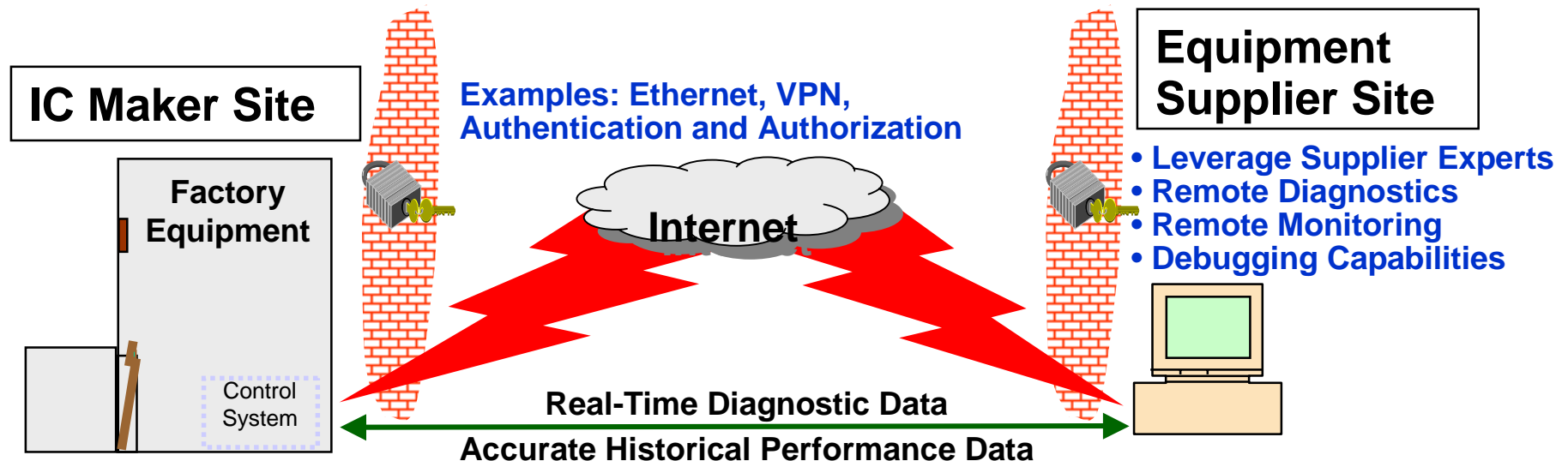
# Prototyping Proposal Status

1. e-Diagnostics prototyping opportunity available
  - Complete solutions not expected – must address a barrier to success
  - Infrastructure available
  - Confirm Guidebook integrity
  - Accelerate industry learning
  - Leveraging Assessment Checklist during prototypes
2. EDA Port prototyping opportunity available at ISMT
  - Confirm integrity and completeness of SEMI document 3563 (Interface A) definition
  - Understand implications of separating control and data
  - Understand performance: XML/SOAP/HTTP, data collection plans, trace data collection, bottlenecks, etc.

***Come one - Come all***

# e-Diagnostics Plans for 2003

- e-Diagnostics Guidebook updated and communicated
  - Compliance assessments, safety, security, data interface, tool interface
- Completion of Interface A Standards
- Definition of Interface C
  - Link through factory firewall to enable supplier access to equipment data
- Further Prototyping/Commercialization Efforts
  - Tied to actual standards as they are completed
- Education – Workshops, SEMI STEP programs, etc.



# Key ISMT Member Company Messages

1. 300mm standards implementations remains the highest priority
2. Leading OEMs are deploying e-Diagnostics solutions (100s of tools) and reporting significant benefit
3. Interface A (data off the equipment) is the ISMT MC focus - standardized, open, & with accurate data
4. Prototype solutions at ISMT, including Interface A and/or e-Diagnostics
5. ISMT MCs are cooperating with suppliers early to assure mutual success