

International SEMATECH e-Diagnostics

www.sematech.org/public/resources/ediag/index.htm

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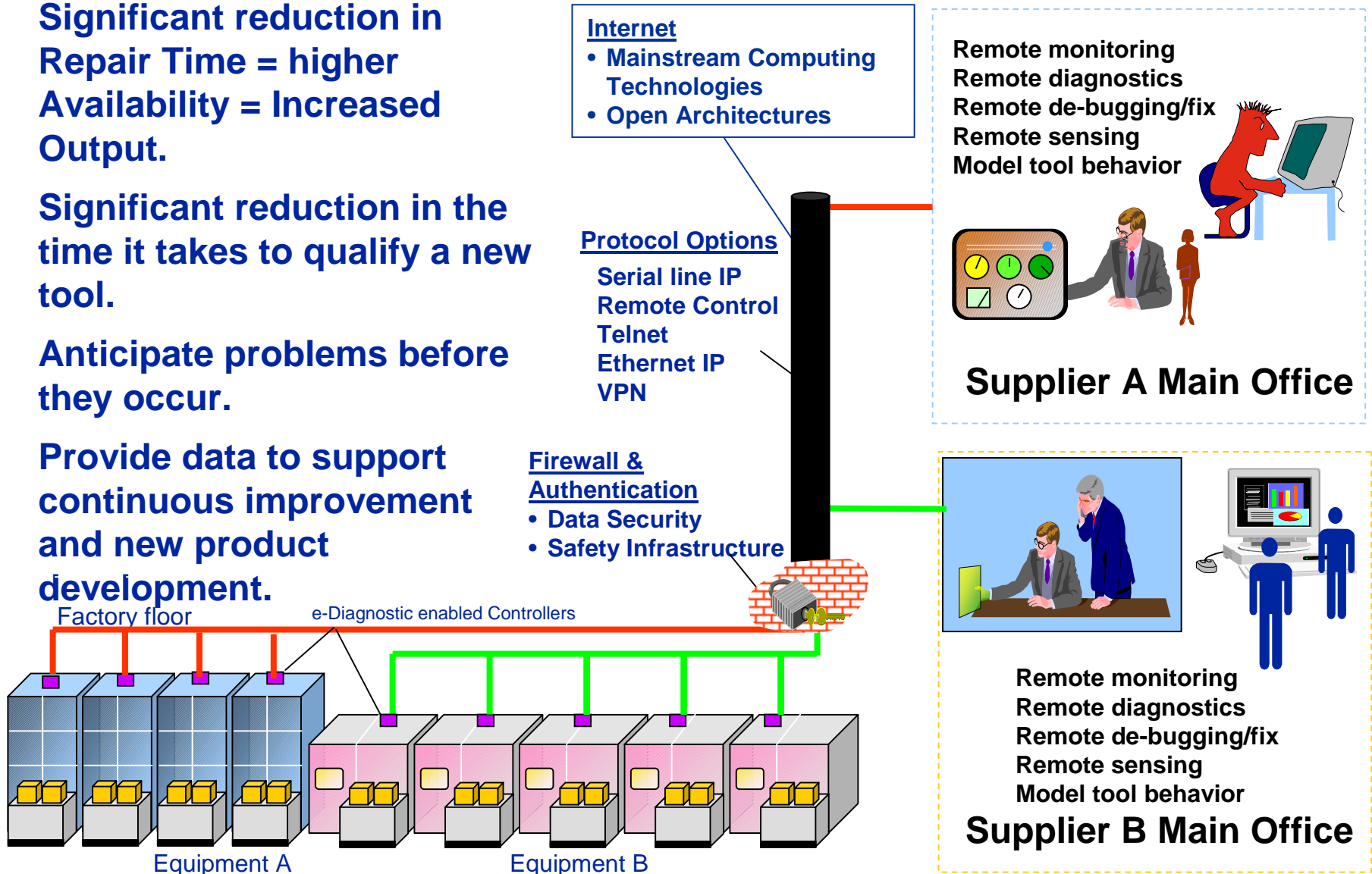
Outline

- **e-Diagnostics Overview**
- **e-Diagnostics Standards Introduction**
- **Self-Assessment Checklists**
- **Prototyping at ISMT**
- **Summary**

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.



ISMT e-Diagnostic Capability Definitions

Level 3 - Prediction:

Predictive Maintenance, Self Diagnostics, Automated Notification

Level 2 - Analysis:

Automated Reporting and Advanced Analysis with SPC capability

Level 1 - Collection and Control:

Remote Tool Operation, Remote Performance Monitoring, Remote Equipment Configuration

Level 0 - Access and Remote Collaboration:

Remote connectivity to the tool and remote collaboration capabilities (text, audio, video), Field service access

Full capability definition document available at:

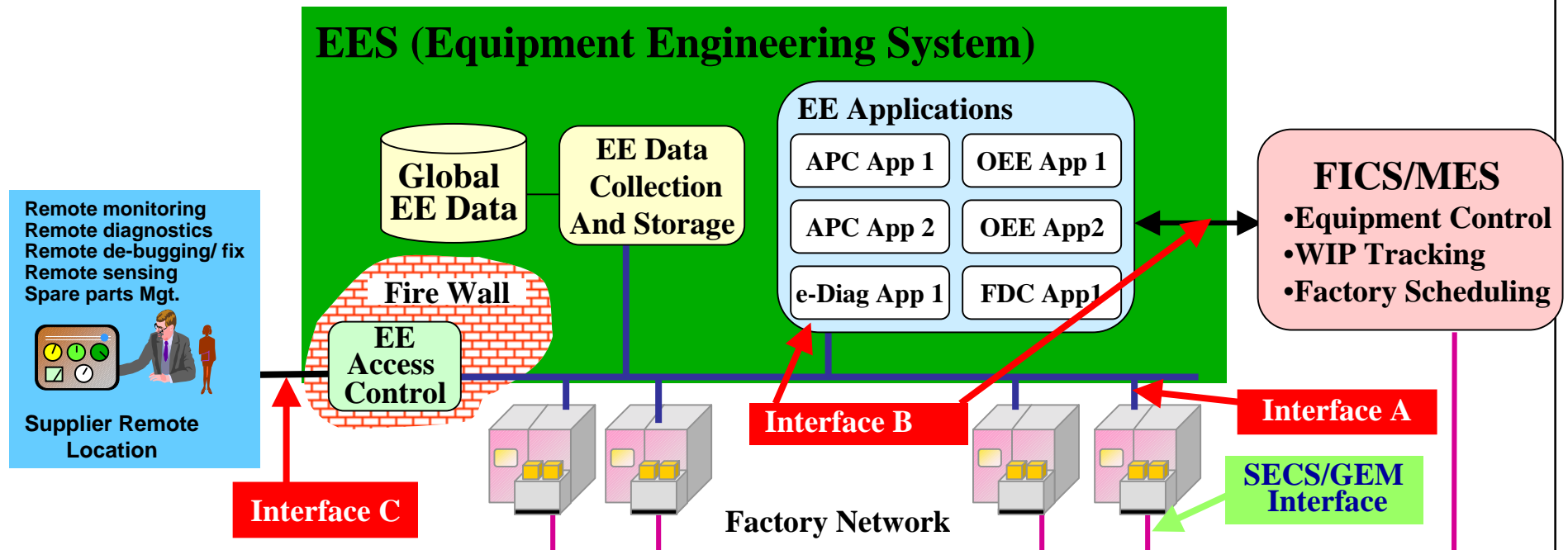
<http://www.sematech.org/public/resources/ediag/index.htm> (V1.5)

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10/29/2002 haw/e-mfg/roadshow/Europe e-diag 2002 - 4

2002 Focus: Improved Data

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



Many e-Standards are Needed

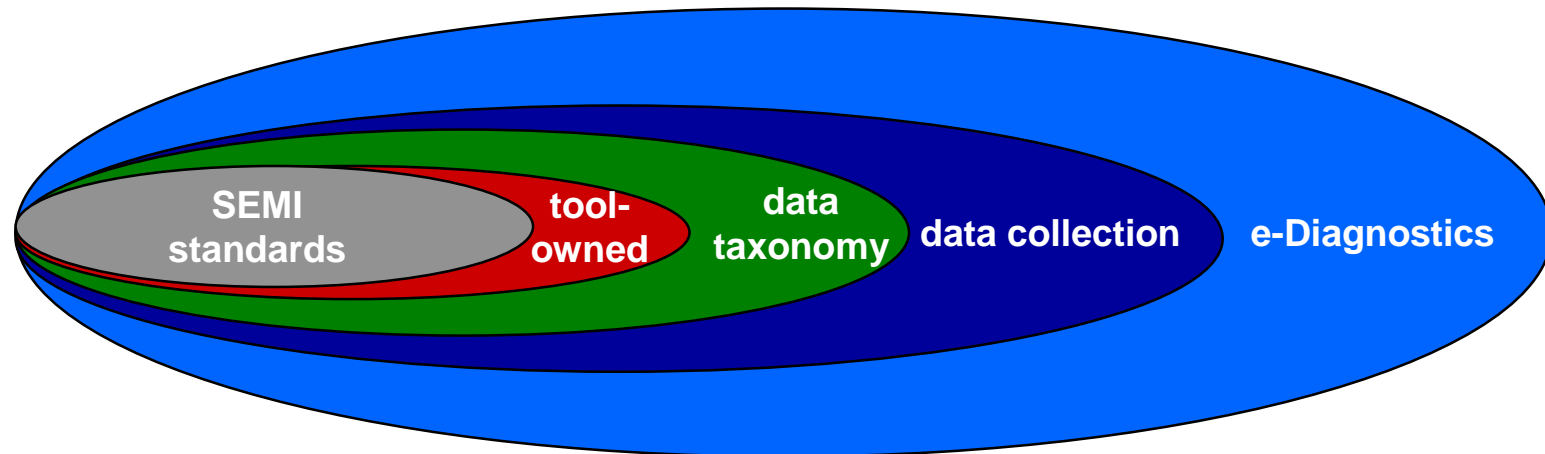


- **e-Mfg related standards activity is HOT!**
 - Several TFs meet weekly w/good attendance (~18hrs/week)
- **The e-Manufacturing related standards effort is the largest combined effort I&CC has attempted**
 - Global participation, including NA, Japan, Europe
 - Standing-Room Only meetings at recent SEMICONs
- **Much progress has been made**
 - Over 20 ballots (blue and yellow) are in the system
- **We are poised for steady, rapid progress**
 - Interim DDA solution targeted for December, 2002
 - Supporting stds (XML & CEM) approved in Oct, 2002
 - Data interface definition by Spring, 2003
 - More activity to follow

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:**
 - **Long lead time for suppliers**
 - Improvements in equipment design to support dedicated data collection system without impacting equipment performance are expected to require significant design and development time for suppliers
 - **New Technologies**
 - Adoption of new technologies in the industry will also involve significant learning and adjustment period for suppliers, ICM's, and application providers
 - **Interim solutions**
 - Simpler, single-client, minimally configurable push of equipment data. Provide access to new data on new technologies while complete specifications are being developed and designed-to
 - Not a SEMI specification (essentially a precursor to the final standards).
Targets current generation of 300mm equipment

Standardizing Interface A - Data Acquisition



SEMI Diagnostics Data Acquisition (DDA) Task Force Ballots

- **3571 - Data Acquisition Guide**
 - Overview of problem statement, relevant clients, related standards, technologies, ...
- **3507 - Equipment Client Authentication Spec**
 - Definition of authentication handshake required for subsequent communication with the equipment
- **3510 - Equipment Services Description Spec**
 - Definition of technique for modeling equipment structure, available data items, implemented state models, their associated events and reportable parameters, and exceptions/alarms. Clients will be able to discover this information at runtime.
- **3509 - Data Collection Management Spec**
 - Definition and management of data collection plans, allowing clients to specify desired trace, exception, and event data as well as triggering and buffering policies

DDA Ballot Schedule

SEMI Document/Standard	2002 Cycle 1	2002 Cycle 2	2002 Cycle 3	2002 Cycle 4	2003 Cycle 1	2003 Cycle 2	2003 Cycle 3	2003 Cycle 4
	Winter Mtg US/Jpn SEMICON Europa	SEMICON West Japan June Mtgs	SEMICON Southwest	SEMICON Japan	Winter Mtg US/Jpn SEMICON Europa	SEMICON West Japan June Mtgs	SEMICON Southwest	SEMICON Japan
Diagnostics Data Acquisition (DDA)								
#3571 - e-Diagnostics Guide (Overview)		SNARF		Blue Ballot	2nd Blue	Yellow Ballot	2nd Yellow	
#3563 - EDA Interim Interface	Blue Ballot	Yellow Ballot		Proposed				
#3509 - Data Collection Std.	Blue Ballot			Yellow Ballot		2nd Yellow		
#3510 - Meta Data/Equipment Descr.	Blue Ballot	Interim Itf Complete		Yellow Ballot		2nd Yellow		
#3507 - Authentication/Security	Blue Ballot			Yellow Ballot		2nd Yellow		
#TBD - 3510.1 Tech. Spec (XML/SOAP)					SNARF	Blue Ballot	Yellow Ballot	
#TBD - 3507.1 Tech. Spec (XML/SOAP)					SNARF	Blue Ballot	Yellow Ballot	
#TBD - 3509.1 Tech. Spec (XML/SOAP)					SNARF	Blue Ballot	Yellow Ballot	
	2004 Cycle 1	2004 Cycle 2	2004 Cycle 3	2004 Cycle 4				
	Winter Mtg US/Jpn SEMICON Europa	SEMICON West Japan June Mtgs	SEMICON Southwest	SEMICON Japan				
#3571 - e-Diagnostics Guide (Overview)								
#3563 - EDA Interim Interface								
#3509 - Data Collection Std.								
#3510 - Meta Data/Equipment Descr.		Interface A Standardized						
#3507 - Authentication/Security								
#TBD - 3510.1 Tech. Spec (XML/SOAP)	2nd Yellow							
#TBD - 3507.1 Tech. Spec (XML/SOAP)	2nd Yellow							
#TBD - 3509.1 Tech. Spec (XML/SOAP)	2nd Yellow							

**e-Standards activity
is HOT!**

–Several TFs meet weekly
w/good attendance
(~18hrs/week)

–SEMI Meetings have
50+ attendees in I&CC TFs

Voting (Yellow) ballots at:

http://www.semi.org/web/wcontent.nsf/url/stds_ybic

Informational (Blue) ballots at:

http://www.semi.org/web/wcontent.nsf/url/stds_bbic

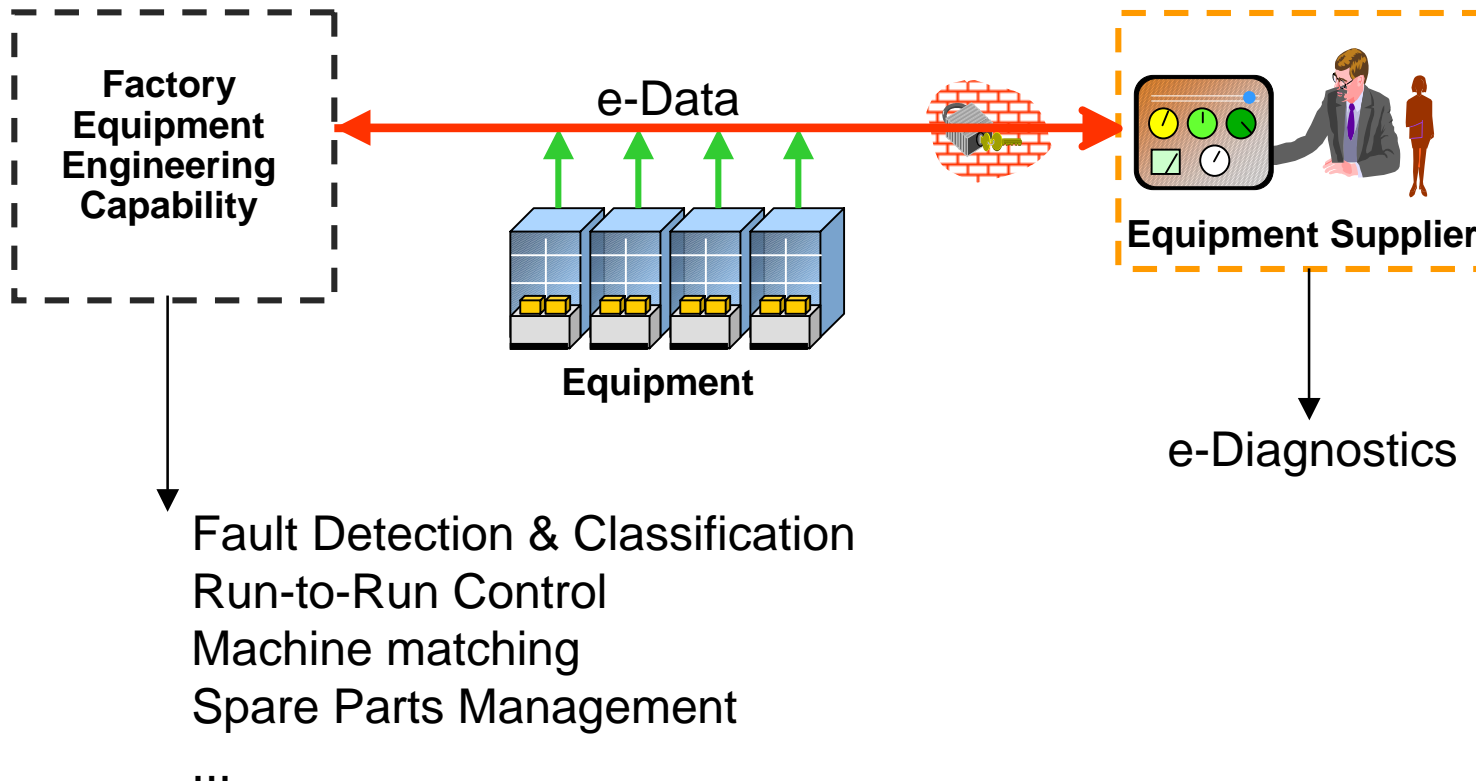
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e-Manufacturing Standards Roadmap

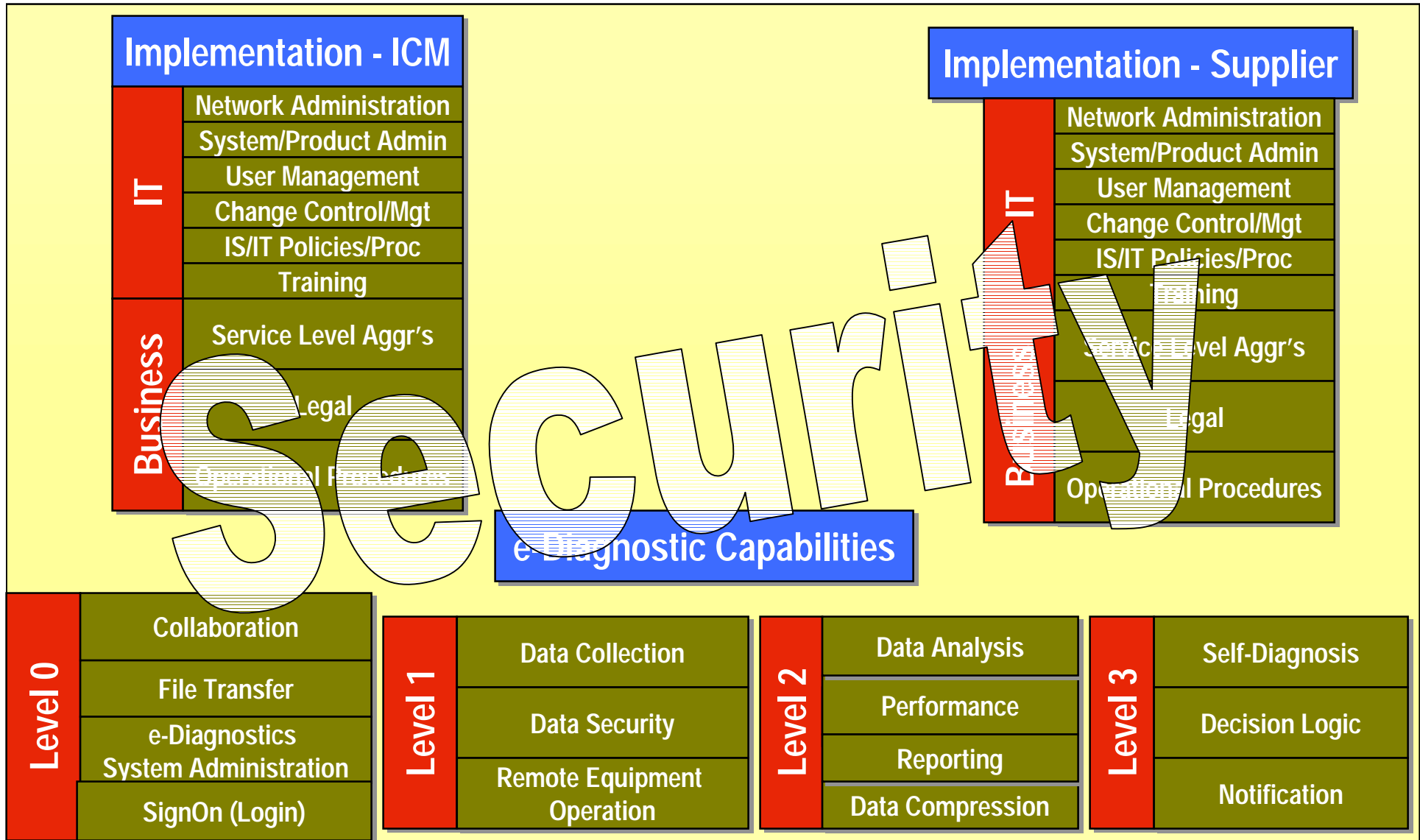
SEMI Document/Standard	2002	2002	2002	2002	2003	2003	2003	2003
	Cycle 1 Winter Mtg US/Jpn SEMICON Europa	Cycle 2 SEMICON West Japan June Mtgs	Cycle 3 SEMICON Southwest	Cycle 4 SEMICON Japan	Cycle 1 Winter Mtg US/Jpn SEMICON Europa	Cycle 2 SEMICON West Japan June Mtgs	Cycle 3 SEMICON Southwest	Cycle 4 SEMICON Japan
EEC Related Standards Activities								
International Equipment Engineering (IEE)								
#TBD - Time Synchronization					Blue Ballot	Yellow Ballot	Interface C to be Addressed in 2003	
Diagnostics Data Acquisition (DDA)								
#3571 - e-Diagnostics Guide (Overview)		SNARF		Blue Ballot	2nd Blue	Yellow Ballot	2nd Yellow	
#3563 - EDA Interim Interface (was 3508)	Blue Ballot	Guideline		Prop Std				
#3509 - Data Collection Std.	Blue Ballot			Yellow Ballot		Re-Ballot		
#3510 - Meta Data/Equipment Descr.	Blue Ballot			Yellow Ballot		Re-Ballot		
#3507 - Authentication/Security	Blue Ballot			Yellow Ballot		Re-Ballot		
#TBD - 3510.1 Tech. Spec (XML/SOAP)					SNARF	Blue Ballot	Yellow Ballot	
#TBD - 3507.1 Tech. Spec (XML/SOAP)					SNARF	Blue Ballot	Yellow Ballot	
#TBD - 3509.1 Tech. Spec (XML/SOAP)					SNARF	Blue Ballot	Yellow Ballot	
Interface A Validation (above stds)				Validation				Validation
XML								
#3523 - XML Style & Usage Guidelines	SNARF	Yellow Ballot	Re-Ballot		Expansion			
#3569 - XML Messaging Protocols		SNARF	Blue Ballot		Yellow Ballot			
#3570 - XML Common Components (Data)		SNARF	Blue Ballot		Yellow Ballot	Expansion	Expansion	
Recipe and Adjustable Parameters (RaP)								
#3442 - RaP Standard		Blue Ballot	2nd Blue		Yellow Ballot	Re-Ballot		RaP Standard
#TBD - RaP Mapping to XML							Yellow Ballot	
#3528 - X-Stream XML via SECS/HSMS			No Ballot					
Data Quality (DQ)								
#TBD - Data Quality Test Methods		TFOF			Blue Ballot	Yellow Ballot		1st Interface B Standard
Process Control System (PCS)								
#3527 - Process Control System Std.	SNARF		Blue Ballot		Yellow Ballot	Re-Ballot	Validation	
Integrated Measurement (IM)								
#3529 - IM Object-Based IM Modules	Preview Doc	Blue Ballot	No Ballot		Re-Ballot			Integr. Metrology Standardized
Object-Based Equipment Model (OBEM)								
#3479 - Removal of E98 Provisional Status	Modification				Modification			
#3493 - OBEM-XML Mapping (Japan)	Yellow Ballot			Re-Ballot	Common Equipment Model Standardized			
#3522 - Common Equipment Model		Yellow Ballot	Re-Ballot					
#3568 - XML Schema for CEM			Blue Ballot		Yellow Ballot			
Equipment Control Systems (ECS)								
#3511 Key Quality (Control) Parameters	Preview Doc	Yellow Ballot	Re-Ballot		Expansion	Expansion		

e-Diagnostics Leads into EEC and e-Manufacturing

Opening up the Interface A Data Port



Measurement & Assessment Checklist Structure



e-Diagnostics Checklist Example

Focus Area	Compliance Element Code	Required	Optional	Shared	Feature	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			●		Realtime 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

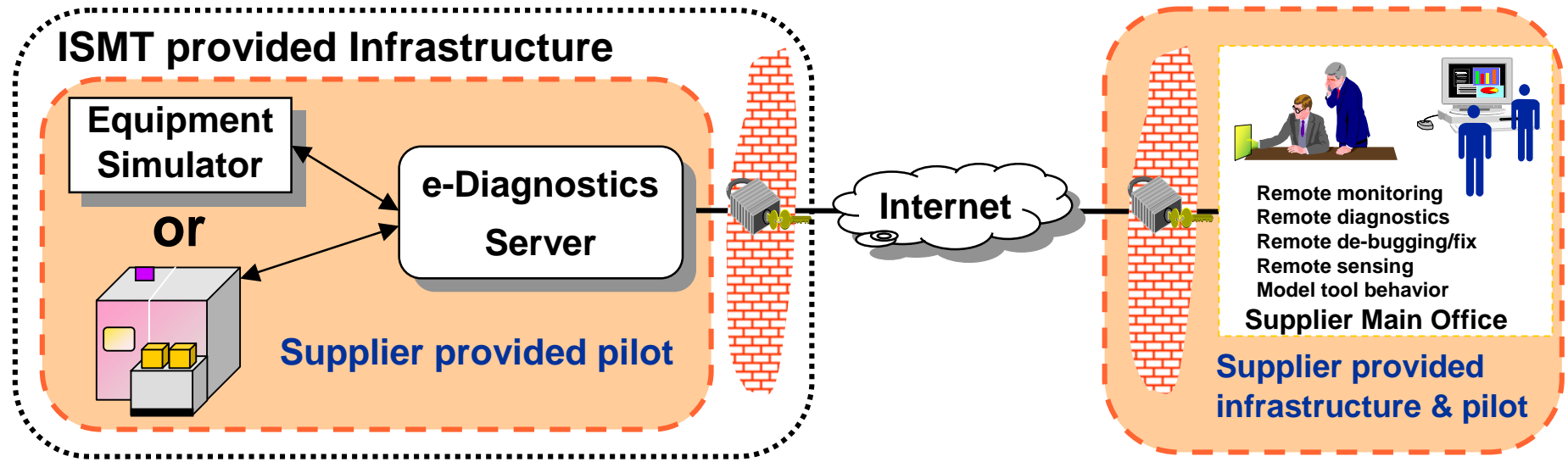
Collaboration

Assessment Checklist Lessons Learned

- **Usage experiences suggested**
 - Increasing granularity
 - More specifics
 - More comprehensive

- **Six checklists – 135 key e-Diagnostics features**
 - Level 0 – 25 entries
 - Level 1 – 27 entries
 - Level 2 – 11 entries
 - Level 3 – 8 entries
 - ICM – 30 entries
 - OEM – 34 entries

e-Diagnostics 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

Prototyping Invitation to Demonstrate

1. e-Diagnostics prototyping opportunity available at ISMT

- Complete solutions not expected
- Infrastructure available
- Confirm Guidebook integrity
- Accelerate industry learning
- Leveraging Assessment Checklist during prototypes

2. EDA Port prototyping opportunity available at ISMT

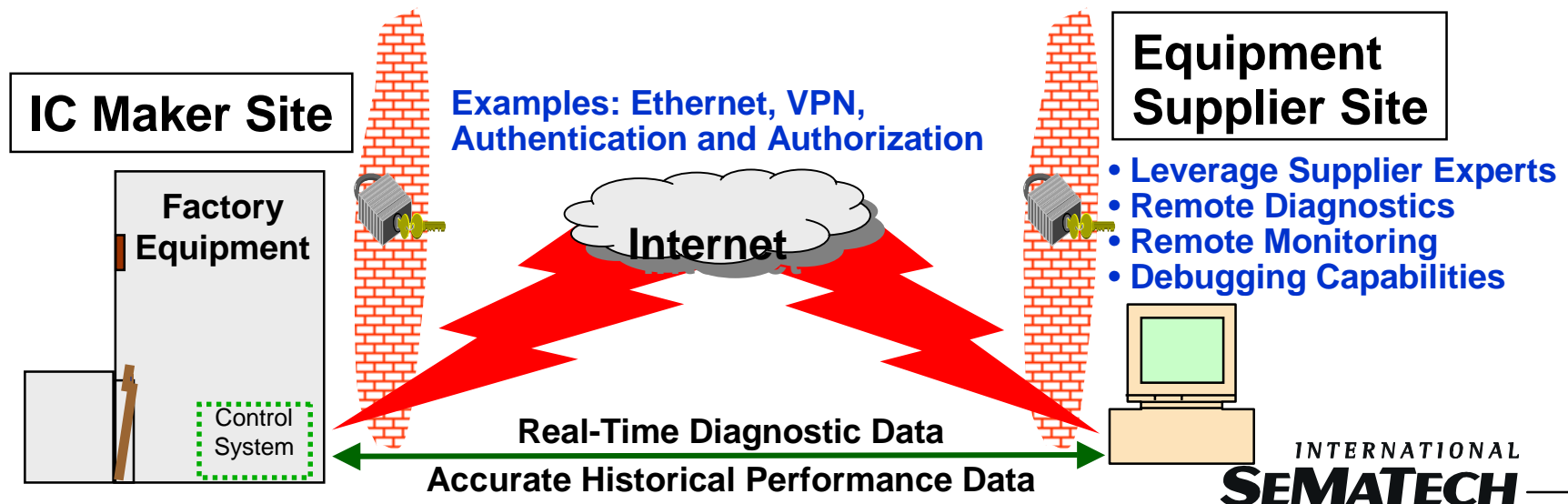
- Confirm integrity and completeness of SEMI document 3563 (Interface A) definition
- Understand implications of separating control and data
- Understand performance: XML/SOAP/HTTP, data collection plans, trace data collection, bottlenecks, etc.

Come one - Come all

e-Diagnostics Status

ISMT e-Diagnostic Very Active Working Group

- Weekly active working groups: Diagnostics Data Acquisition (DDA) Task Force, Security, Safety, Measurement & Assessment
- Weekly operations review teleconferences ongoing
- Includes MCs and ~80 suppliers (equipment + software)
- Prototyping at ISMT
- Building industry consensus: workshops, publications, teleconferences
- Deliverables: Guidebook, SEMI standards, Security & Safety learnings, Assessment checklists (6), New technology evaluations, ...



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**