

e-Diagnostics/e-Manufacturing

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International SEMATECH



SEMI
EDUCATION

ISMT Path to e-Factory

e-Diagnostics

extract information

e-Preventative & Predictive Maintenance

prevent & solve problems

e-Fault Detection & Process Control

optimize the tool

e-Manufacturing

Real-time Mfg Control

e-Factory

**EEC
(Equipment
Engineering
Capabilities)**

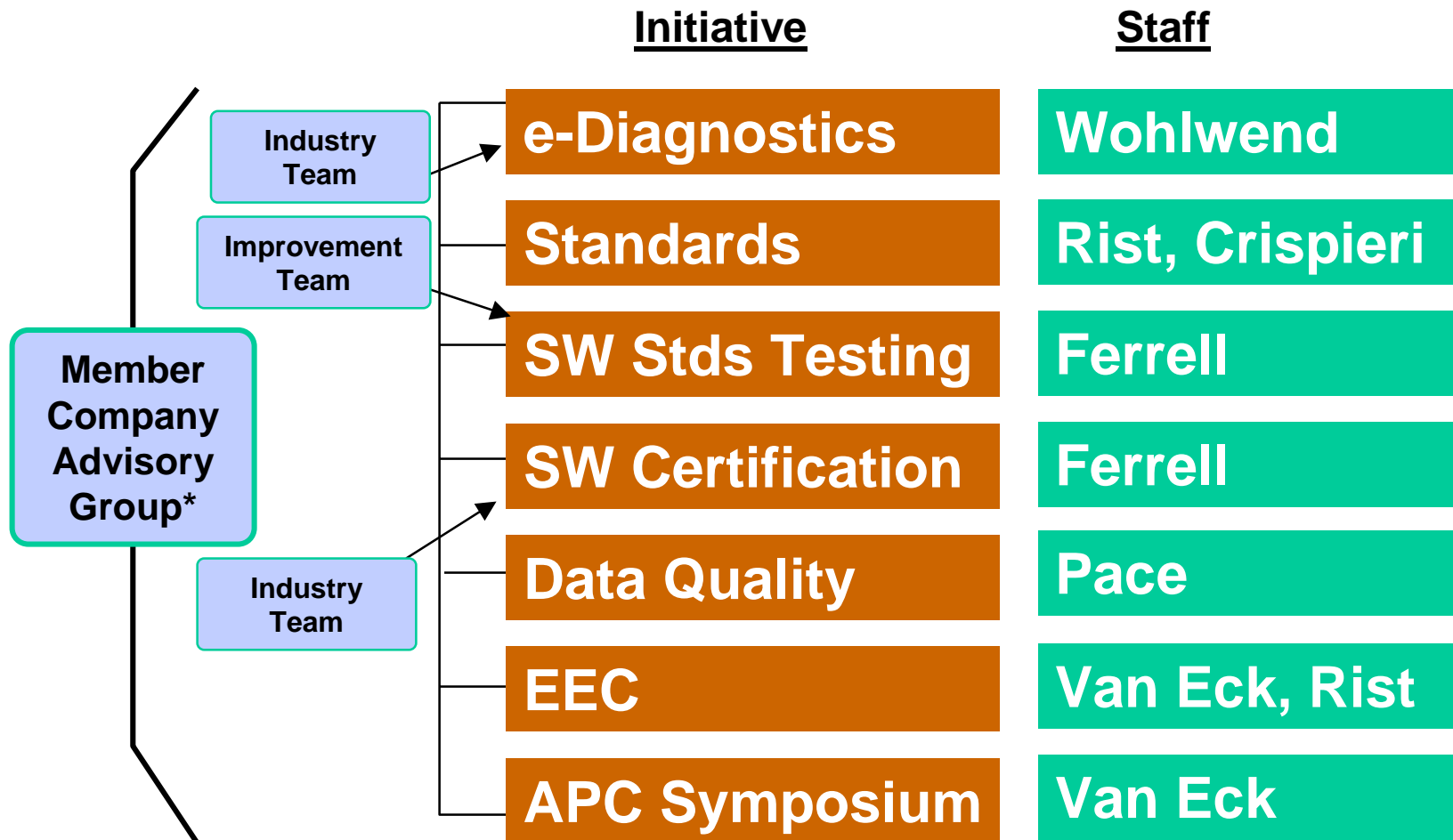
e-Business/Commerce

e-Supply Chain Management



SEMI
EDUCATION

ISMT e-Manufacturing Program

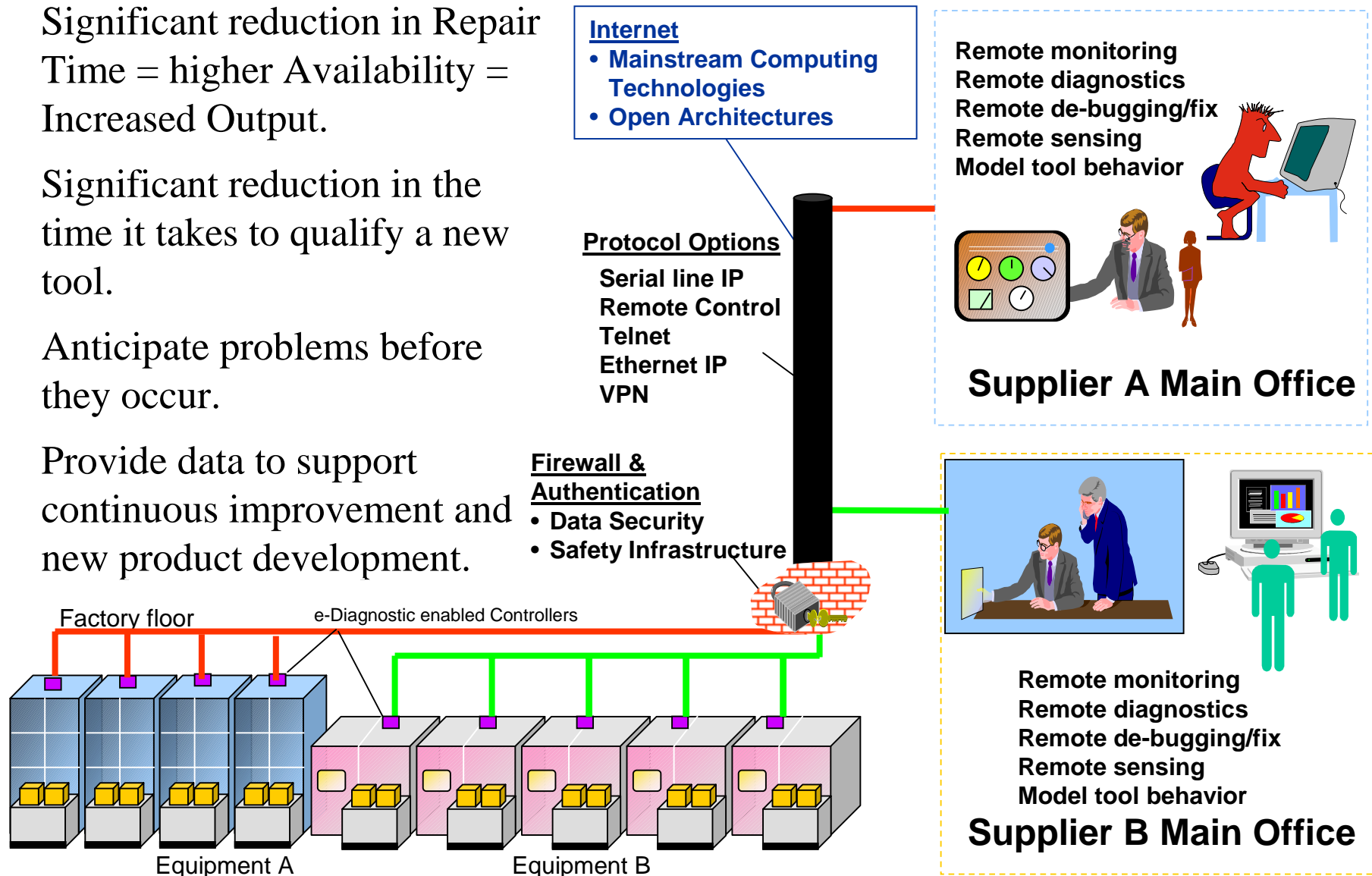


* General oversight for e-Manufacturing and provides resources to guide and drive directed teams

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:

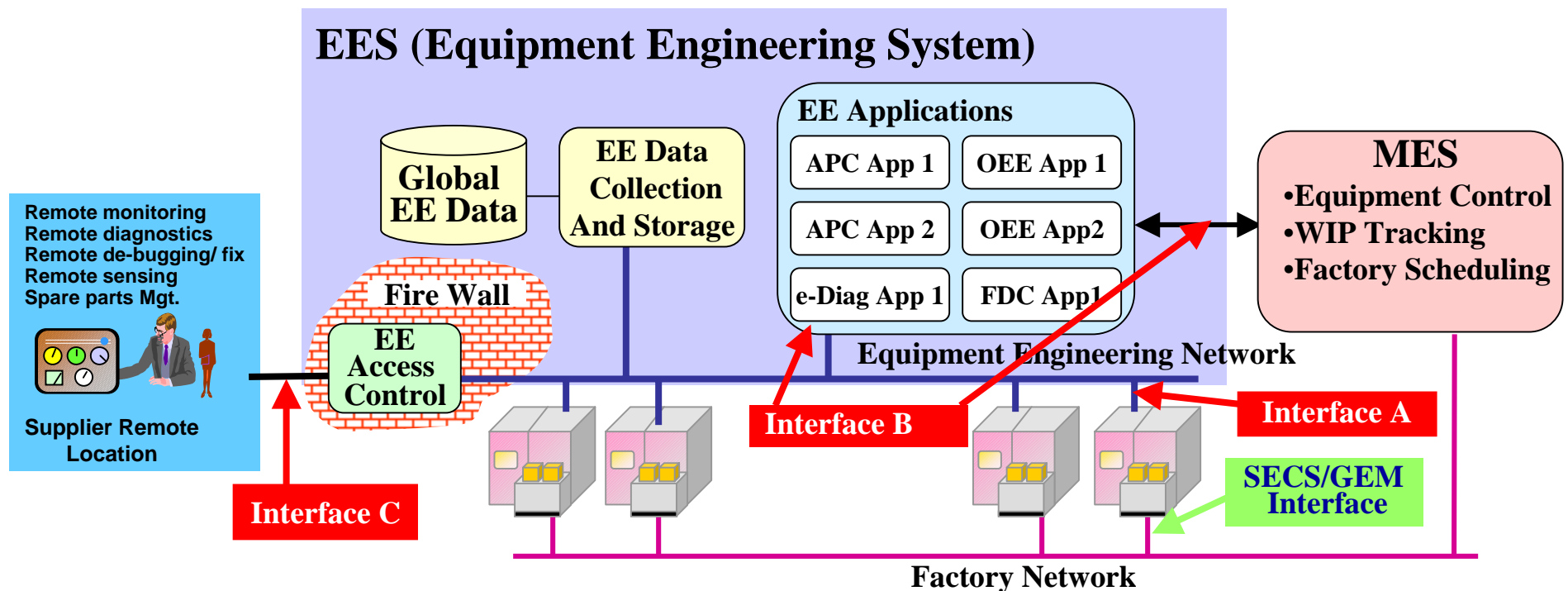
<http://www.semtech.org/public/resources/ediag/index.htm> (V1.2a)

2002 Focus Areas

- Standards activities
 - SEMI Diagnostics Data Acquisition Task Force
- Security and Safety Guideline additions
- Measurement and Assessment Methodology
- Prototyping
- Data Quality to ensure accurate information
- e-Manufacturing Roadmap

The Three Interfaces

- Analyze the data, protocol, and security requirements for support of the Equipment Interface (Interface A)
- Analyze the data, protocol, and security requirements for open EEC Application Interfaces (Interface B)
- Analyze the data and protocol requirements for external access to EEC implementations (Interface C)



Defining the Interfaces

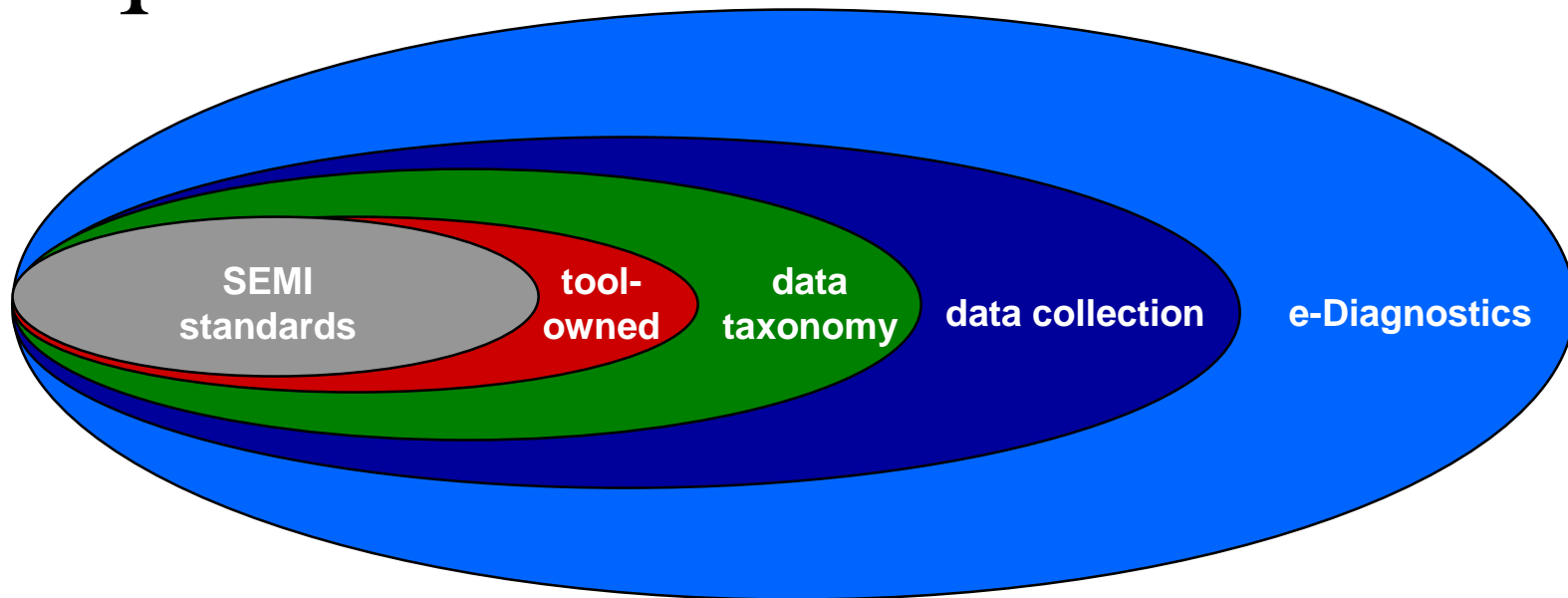
- Interface A
 - An interface to the equipment, separate from the SECS/GEM interface, designed to satisfy the data collection requirements of e-Manufacturing.
- Interface B
 - Refers to the communications among equipment engineering applications and to other factory system components, including data storage.
- Interface C
 - The communication path through the factory firewall that connects a remote supplier site (e.g., indirectly) to its equipment for the purpose of e-Diagnostics.

e-Diagnostics: from Defacto to SEMI Standards

- Charter: Provide data acquisition interface to semiconductor equipment supporting the diagnosis of equipment health issues
 - SECS gap analysis - White Paper available
 - Standards/Information Model gap analysis available
- Scope: What should be expected of the equipment interface in order to support e-Diagnostics objectives?
 - Do the current SEMI equipment software standards support these objectives?
 - If not, what is the best approach for closing?
 - Require implementation of existing standards
 - Modify existing standards
 - Create new standards

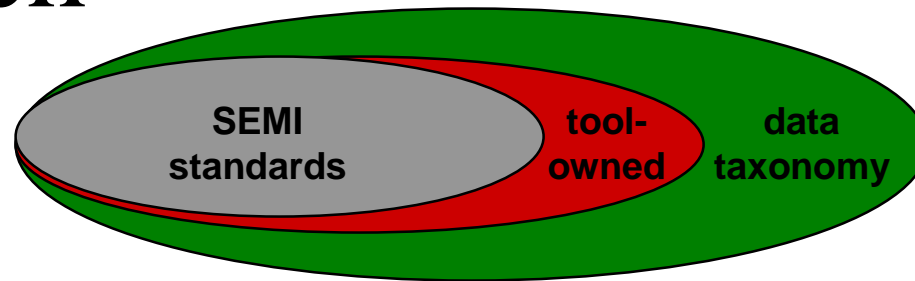
Guidelines accelerate standards creation

Requirements



- The requirements for the interface that Diagnostics Data Acquisition is developing are based on the ISMT e-Diagnostics guidebook
 - **Capability Level 1 asks for data collection (Interface A)**
 - To be able to “collect tool data in near-real time via a standard protocol using an Ethernet connection. Remote data collection must be possible while tool is under Host control or off-line”
 - **Data taxonomy describes the types of data that are desired by end users**
 - Considering only those data which should be the responsibility of the equipment
 - Existing SEMI standards cover much of the desired information
 - **Equipment Level Authentication/Authorization**

Approach



- Diagnostics Data Acquisition (DDA) Task Force Deliverables – Current Blue Ballots
 - **3508: Guide for Equipment Data Acquisition (Interim Solution)**
 - **3507: Provisional Specification for Equipment Client Authentication and Authorization**
 - **3509: Provisional Specification for Data Collection Management**
 - **3510: Provisional Specification for Equipment Services Description**

DDA Summary

- DDA Guide document provides “the big picture” and address migration, phasing, requirements, and compliance issues
- Pursuing multiple e-Diagnostics data collection paths
 - Existing standards modification
 - Require standards implementation
 - New standards being drafted
- DDA would like to produce a single interface technology to support these needs
 - Would like to take advantage of XML/SOAP-based technologies

Goal: complete standards ASAP
• Blue ballots available now
• Guide yellow ballot by SEMICON West

http://www.semi.org/web/wstandards.nsf/url/I&C_PreBallots

Blue ballots 3507, 3508, 3509, 3510

DDA Ballot Schedule

SEMI Document/Standard	2002	2002	2002	2002	2003	2003	2003	2003
	Cycle 1 Winter Mtg US/Jpn SEMICON	Cycle 2 SEMICON West Japan June	Cycle 3 SEMICON Southwest	Cycle 4 SEMICON Japan	Cycle 1 Winter Mtg US/Jpn SEMICON	Cycle 2 SEMICON West Japan June	Cycle 3 SEMICON Southwest	Cycle 4 SEMICON Japan
Diagnostics Data Acquisition (DDA)								
#3508 - e-Diagnostics Guide (Overview)	Blue Ballot	Guideline	Re-Ballot					
#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 - Technology Spec (XML/SOAP)			Blue Ballot		Yellow Ballot			
#TBD - Message/Data Dictionary			Blue Ballot		Yellow Ballot	Expansion	Expansion	

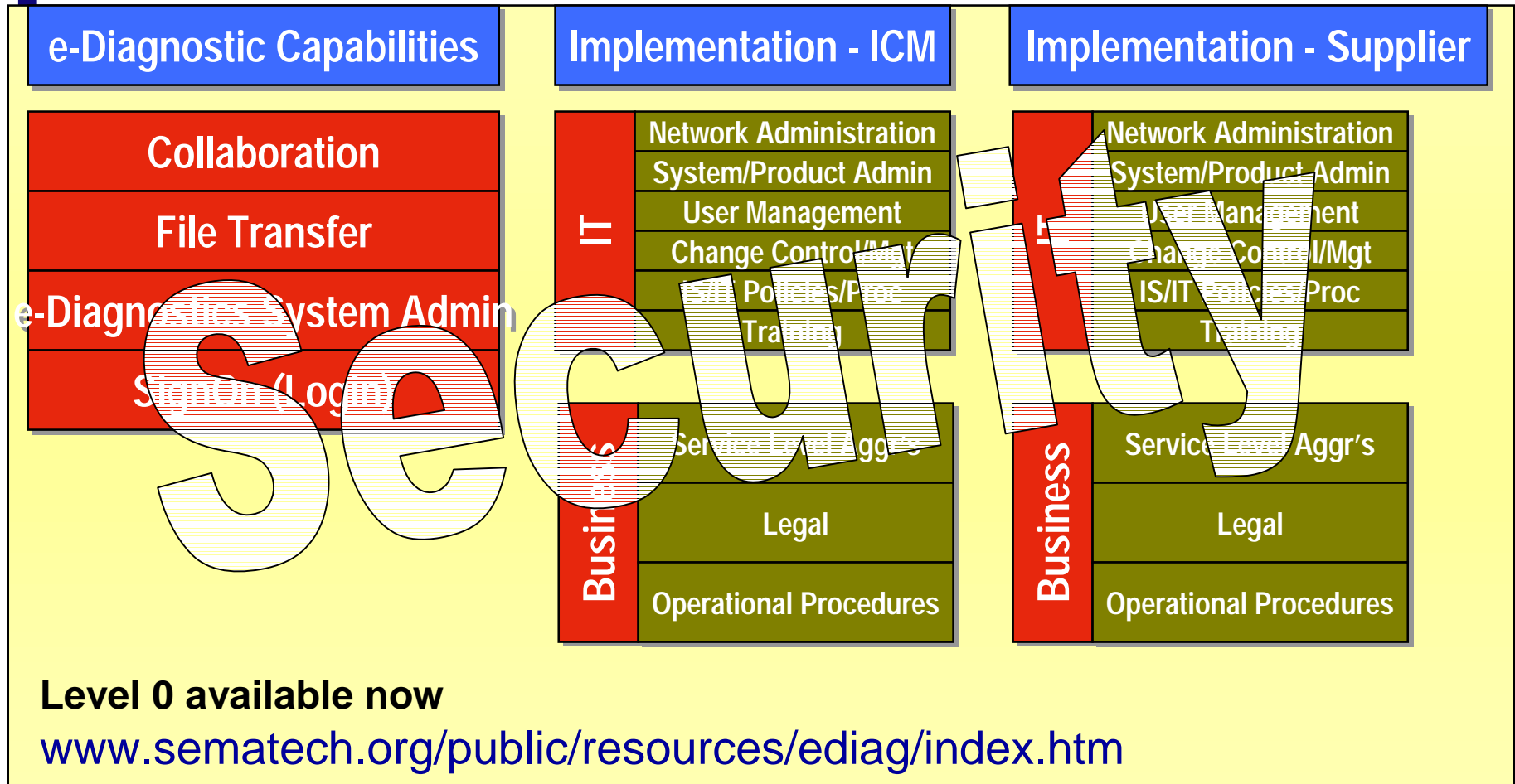
Interface A
Standardized

Interface C
to be
Addressed
in 2003

Security Capability Status

e-Diagnostics Layer	Supplier	IC Maker	Supplier & IC Maker
Hardware-Connectivity	e-Diagnostics Firewall	e-Diagnostics Firewall	Inter Company Network
	Customer Service Network	e-Diagnostics DMZ	Network Security
	Service Computers	e-Diagnostics Servers	
	Data Repository	e-Diagnostics Factory Network	
	Firewall Access	Equipment computers	
Software-Logical	Web Browser	Authentication	Network Security
	Application Client (UI)	Authorization	Collaboration
	Local User Login	Application Access	PKI
	FSE Application	Equipment Data Access	
		Application Usage	
		Application Protocols	
		Data Classification	
		Data Confidentiality & Integrity	
		System Management & Infrastructure Services	

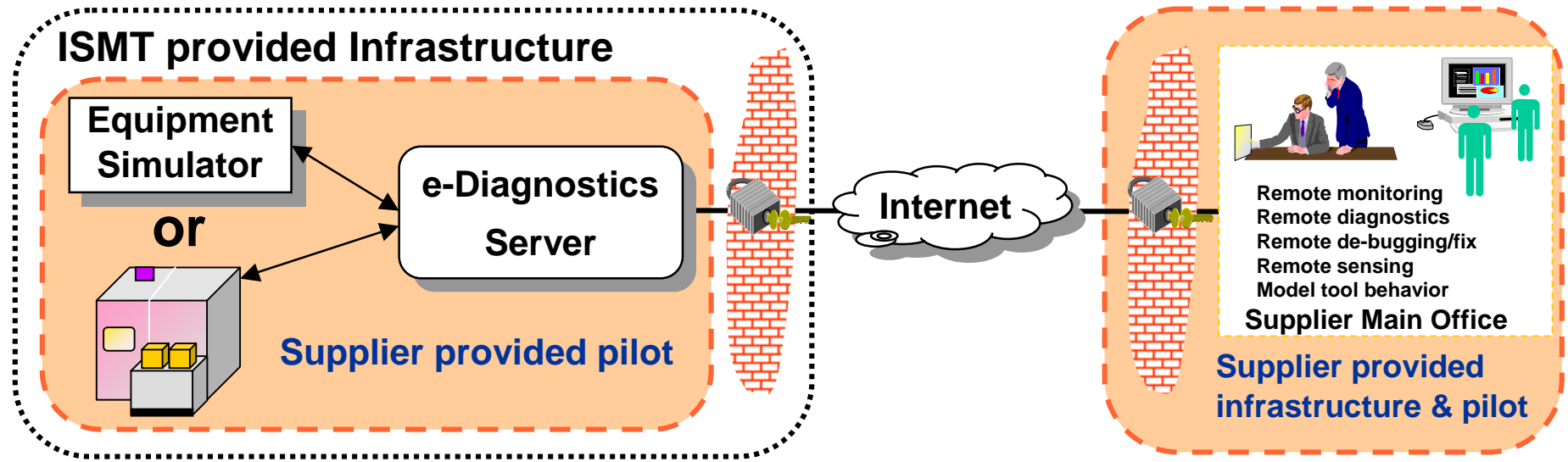
Measurement & Assessment Checklist Structure



e-Diagnostics Checklist Details

Compliance Element Code	Compliance Element Code	Required	Optional	Feature	Capability Description
Collaboration	TS-CL0.8		●	Voice transmission	Ability to provide Voice over IP between the ICM and Supplier during a collaboration session.
	TS-CL0.7		●	Video transmission	Ability to provide streaming video between the ICM and Supplier during a collaboration session.
	TS-CL0.6		●	Still image capture	Ability to exchange still images between ICM and Supplier during a collaboration session.
	TS-CL0.5		●	Real-time white board drawing	Ability to provide basic "white board" capability between ICM and Supplier during a collaboration session.
	TS-CL0.4		●	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-CL03.5		●	Customer Service Network Access	FSE has access to supplier resources from factory floor. (refer to Supplier FSE section of guidebook)
	TS-CL0.3	●		Chat Capability	Ability to support multi user Text Chat sessions among all ICM and Supplier participants during a collaboration session.
	TS-CL0.2	●		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-CL0.1	●		Technologies	The Collaboration technologies used must be agreed upon between IC Maker and supplier. This includes Data, Voice, and Video.

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

Standards Certification Guidelines Development

Objective: Establish the requirements and criteria for the accreditation and management of 3rd party resources for certification of compliance to SEMI standards requirements.

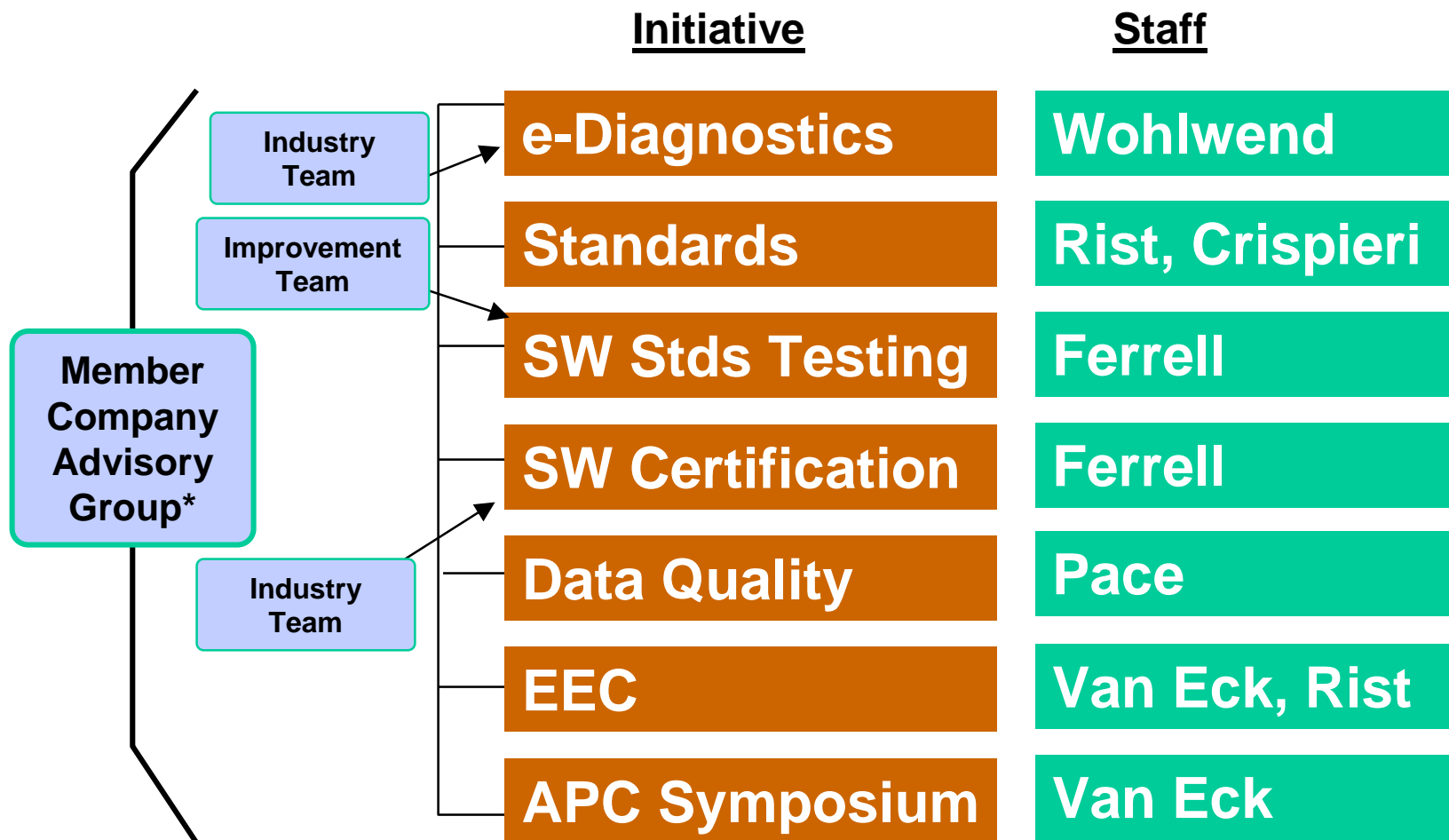
- **General processes and criteria that should apply to any service provider for any subject matter.**
- **Application-specific processes and criteria (e.g., 300 mm equipment software standards, safety guidelines)**
- **Participation is open to industry**

- We need to comprehend a model that provides **value to all stakeholders**
 - One set of known criteria
 - Objective testing
 - Eliminate redundant tests
 - Industry recognized certification
- **Status:**
 - Objective and approach defined, beginning content
 - Draft proposal by SEMICON West
 - Plan to publish ISMT Rev 1.0 Guidelines December 2002

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ISMT e-Manufacturing Program



* General e-Manufacturing oversight providing resources to guide and direct teams

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