



EEC Update
SEMI e-Manufacturing Workshop
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Key Participants

Guidelines have been and will be ratified by International SEMATECH, JEITA, and Selete Membership

- **Selete / JEITA**
 - **Hitachi**
 - **Matsushita**
 - **NEC**
 - **Sanyo**
 - **Toshiba**
- **International SEMATECH**
 - **AMD**
 - **IBM**
 - **Intel**
 - **Texas Instruments**

Presentation Purpose

- **Introduce EEC Guideline Activity**
- **Background and fundamental expectations**
- **Describe the current EEC Guidelines**
- **Review plans for future phases**
- **Obtain feedback and suggestions**

Introduction

- **The EE Capabilities are needed to help us meet the ITRS goals for equipment productivity**
- **Selete, JEITA, and International SEMATECH are collaborating in order to send a unified message**
- **Selete, JEITA, and International SEMATECH would like the Guidelines to begin the discussion in the industry leading to rapid implementation**
- **These discussions will lead to a further understanding of the productivity improvements, the necessary standardization, and clarify the guidelines in consultation with equipment and software suppliers**

EEC Background

- **The industry must create highly efficient factories**
 - e-Manufacturing is a key concept enabling this transition
 - Factory structures and systems will change
 - Transition must also be smooth in addition to rapid
 - The entire industry must innovate, not just one company
- **International collaboration is required to control risk/cost**
 - ISMT and Selete/JEITA began collaboration in 2000
 - Use equipment data to enhance performance & availability
 - Share responsibility between device makers and suppliers

EEC Definition

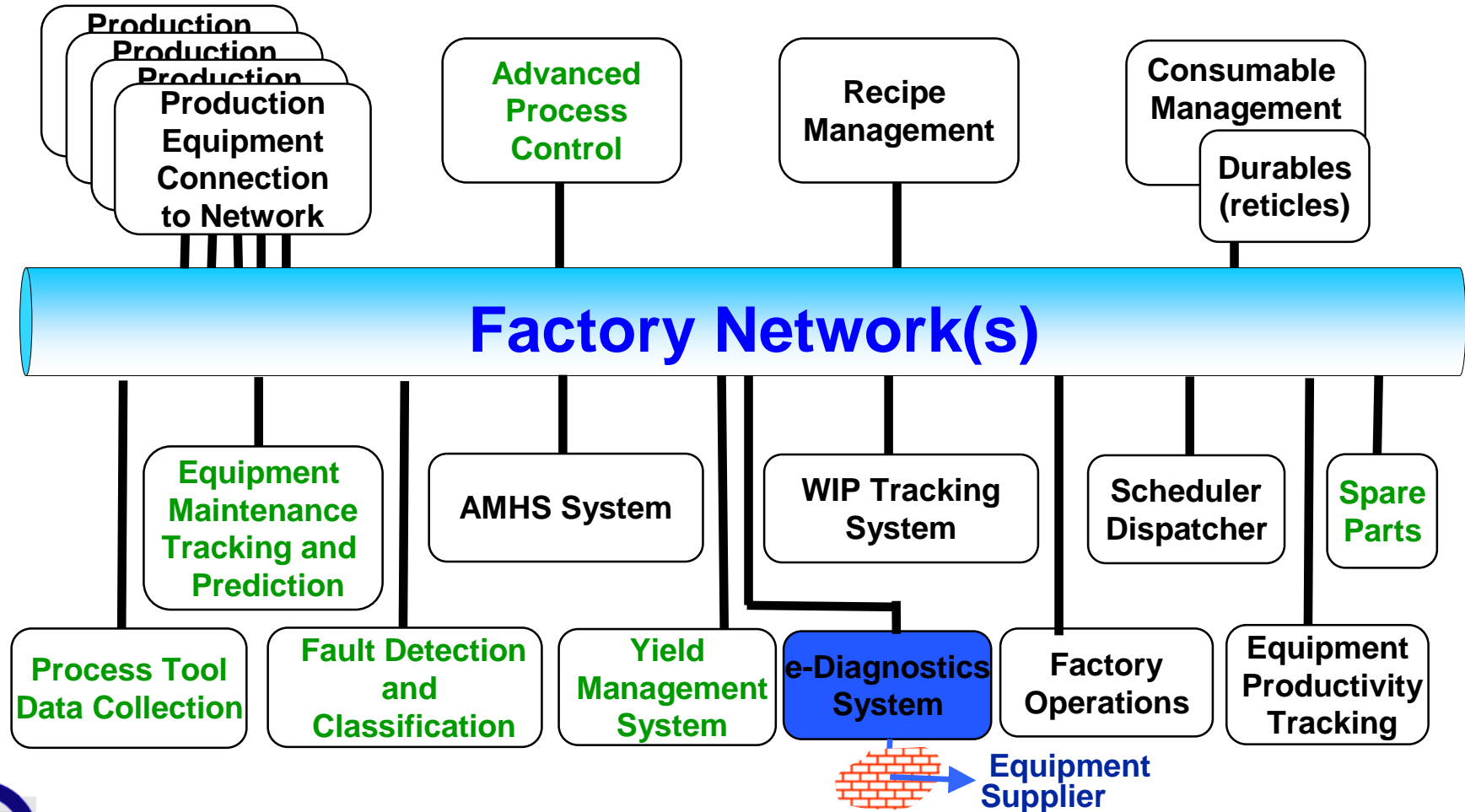
Equipment Engineering Capabilities refers to all operations for equipment availability and performance maintenance and improvement

- **Line throughput maintenance and improvement**
- **Health monitoring and troubleshooting**
- **Performance improvement (critical for new equipment)**
- **OEM collaboration: improvement, diagnosis, re-design**
- **Equipment, parts, assembly versions, modification mgmt**
- **Maintenance operation management and planning**
- **Process performance adjustment, such as APC/FDC**



OEE Improvement through Global Factory Information System Guidelines

EEC components: many exist in today's factories

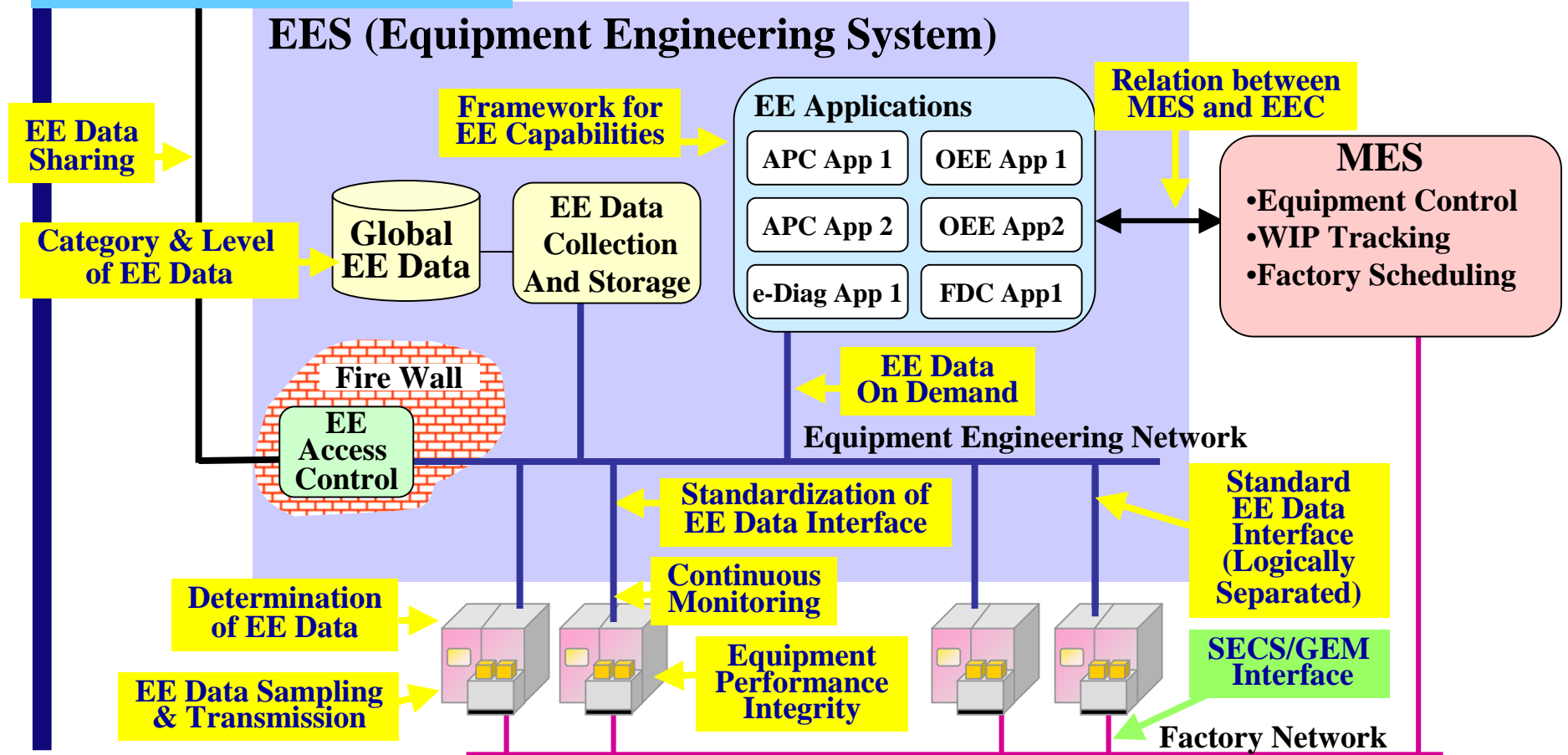




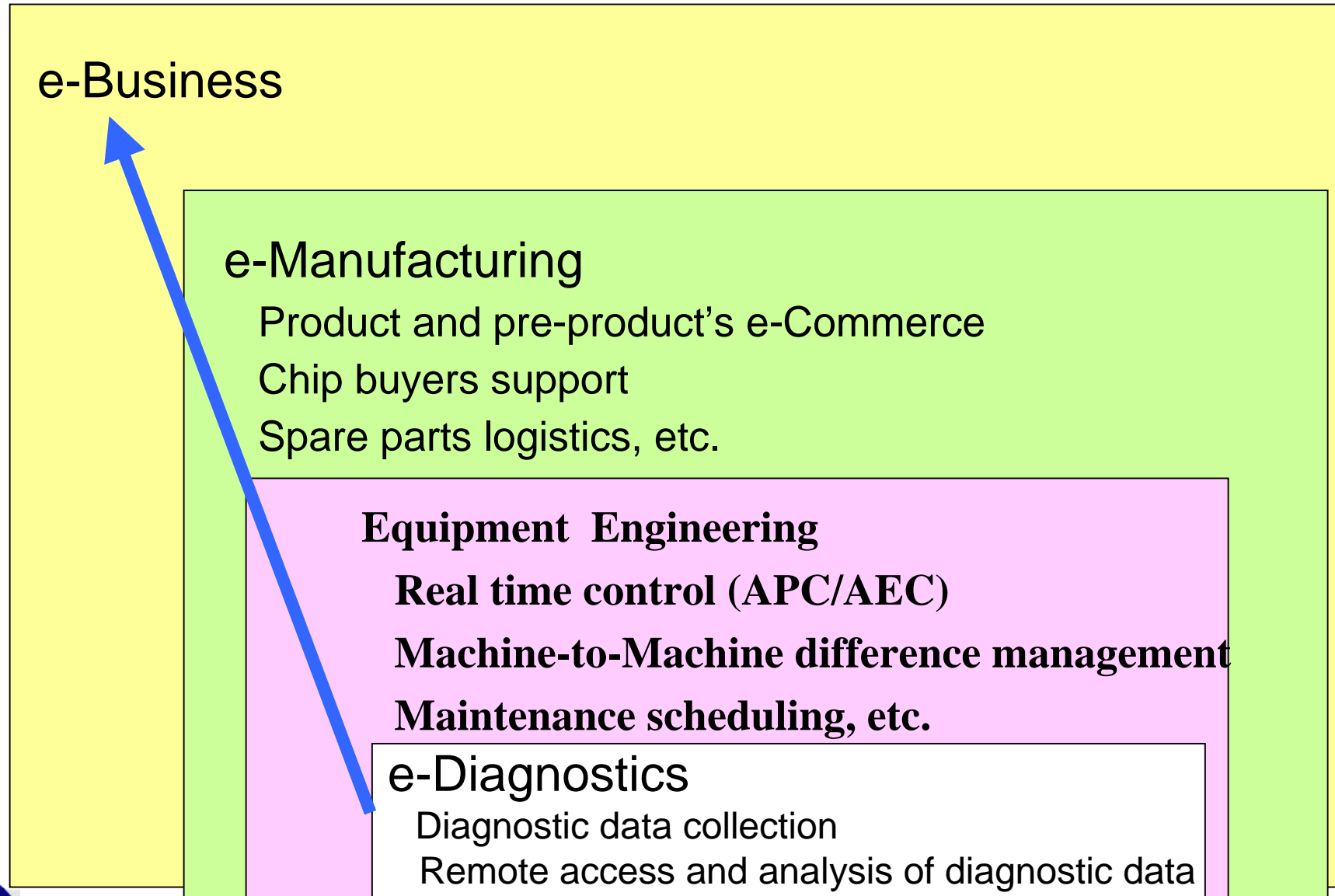
Supplier Remote Location

Equipment Engineering Capability View

We have to do this much quicker!!



EEC Collaborations



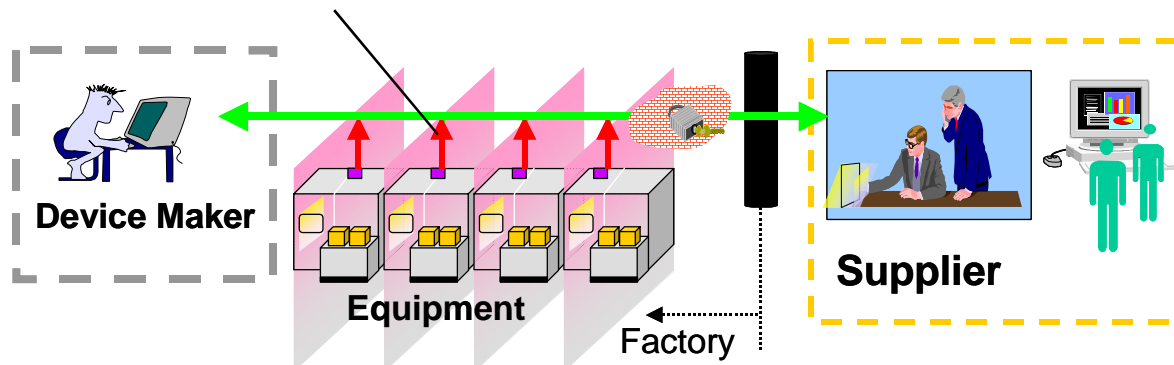
Fundamental EEC Expectations

- **Equipment allows multiple EEC applications**
 - **Multiple FDC applications on a single process equipment**
 - **Multiple run-to-run controllers applications**
- **EEC applications are modular and optional**
 - **Modular: EEC applications from a third party may be substituted for that provided by the OEM**
 - **Optional: Purchase of any EEC applications are not dependant on the purchase of other EEC applications**
 - **Users are able to independently purchase individual EEC capabilities such as e-Diagnostics, Run-to-run control, Fault Detection and Classification**

EEC Data Collection

- Data collection capability for EEC shall be supplied by the equipment suppliers.

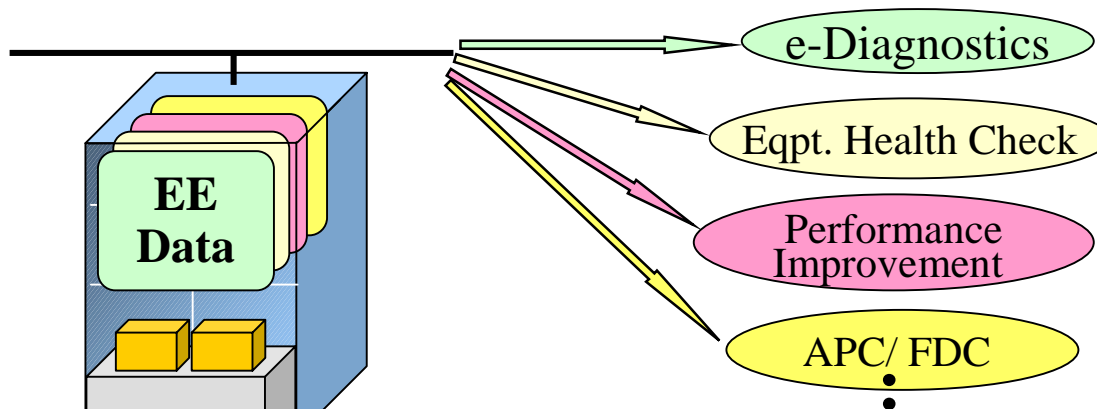
“ Who will provide EE data collection capability? ” → Supplier



'On Demand' EE Data

- Data must be selected and transmitted upon demand
- EE applications should be able to access the necessary data.

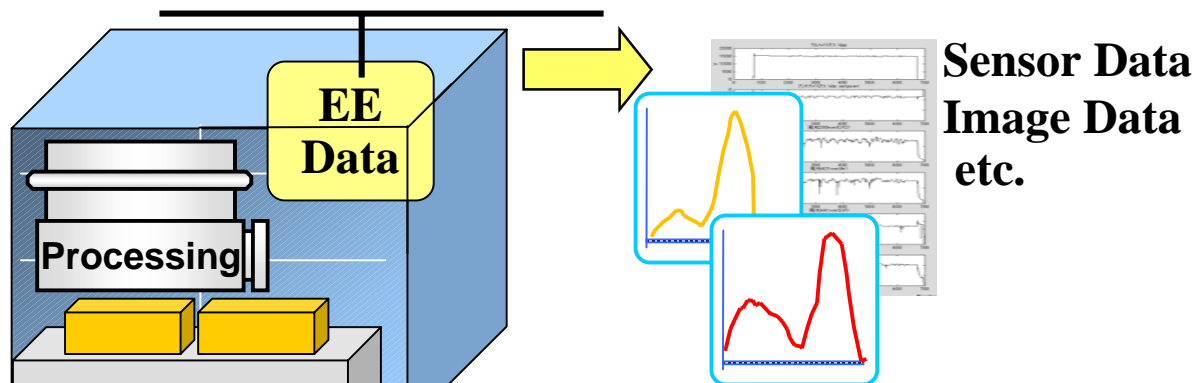
“EE data can be used for various purposes and applications.”



EE Data Collection and Transmission

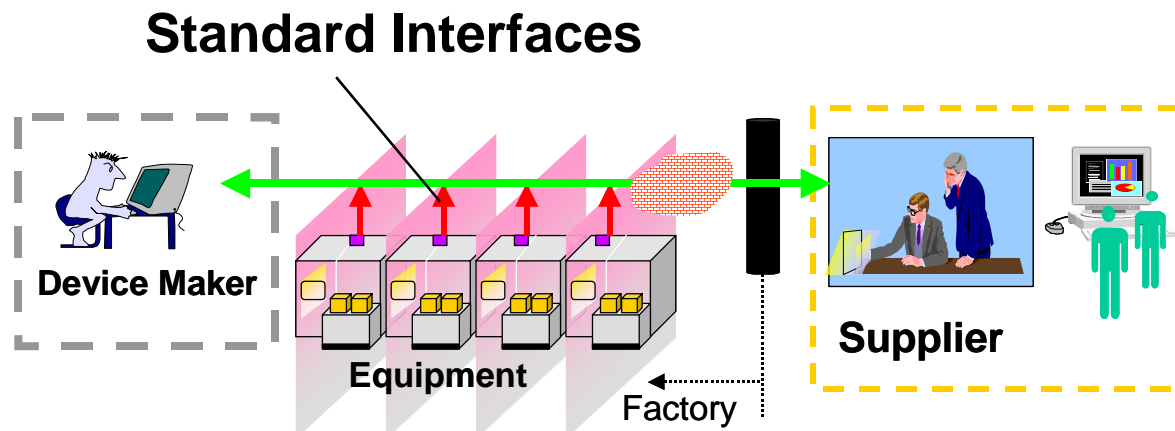
- **EE data collection and transmission must NOT affect the equipment's performance.**

“ Volume of EE data can be very large and may take CPU power to handle these data. ”



Standardization of EE Data

- **Interface for EE data must be standardized.**
 - **SEMI DDA (Diagnostics Data Acquisition) Task Force is currently addressing this.**



Data Quality

Project Description

- **The quality of data is poor and it must be dramatically improved for applications to effectively improve tool productivity. Message integrity, data accuracy, data resolution, data transmission rates, triggering, and filtering must be accurate, reliable, timely, and complete if fabs are to use the data for productivity improvements and automated decision making. Project will:**
 - **Assess and specify e-Manufacturing data quality needs**
 - **Assess the current state of data quality for selected tools**
 - **Drive improvement in data quality of selected OEM tools**
 - **Develop Data Quality Guidelines and Test Methods**

Approach

- **Gather MCs data quality issues/requirements**
- **Interact with other ISMT working groups and SEMI Task Forces working on e-Manufacturing**
- **Develop an industry-wide strategy to characterize and solve the message quality problem**
- **Develop data quality specification, methodology, and test plans**
- **Assess process tools for data quality vs. needs identified**
- **Partner with suppliers on selected tools to meet the needs identified**



Data Quality Strategy

Scope

Specify and develop test methods associated with all data used for purposes of control and diagnostics, e.g., control variables/signals sensor values, control variables/signals, events and tool health monitoring coming out of tool through SECS/GEM, e-Diagnostics data port, and other defined interfaces (standardized method) for e-Manufacturing.

The data forms include, but not limited to:

- 1) measured or content data where issues of quality include: accuracy, resolution, triggering, delivery, date, time stamp and time synchronization
- 2) symbolic data, e.g., commands, responses, event, and alarm data

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

EEC High Level Requirements for APC

e-Manufacturing Data Capability Requirements

Application Layering

Documentation

Triggering

Delivery

Availability

Compliance to SEMI Stds

Sensor Self Checking

Absolute Accuracy

Date and Time Stamp

Resolution

Field Lengths

Sensor Tracking

Sampling Rate

Compression

Reliability

Format of Data



Interfaces are Key

The prime need is for standard interfaces

- **Equipment data interface is number one**
 - **IEE/DDA/EECDTT task forces will define the interface from/to equipment to factory network**
 - **Simpler interfaces are easiest, DATA from the equipment**
- **Interfaces to Off tool EEC applications**
 - **Use of 3rd party supplier applications is strongly encouraged by IC makers**
 - **Build off existing standards where possible**
 - **If new standards required, align with existing standards**
 - **Interfaces CANNOT be based on proprietary systems**
- **Interfaces Outside of the factory**
 - **Use of standard IT technology is required**