

# Enabling the e-Manufacturing Vision



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Allan Chen / 陳武吉

TSMC

[allan\\_chen@tsmc.com](mailto:allan_chen@tsmc.com)

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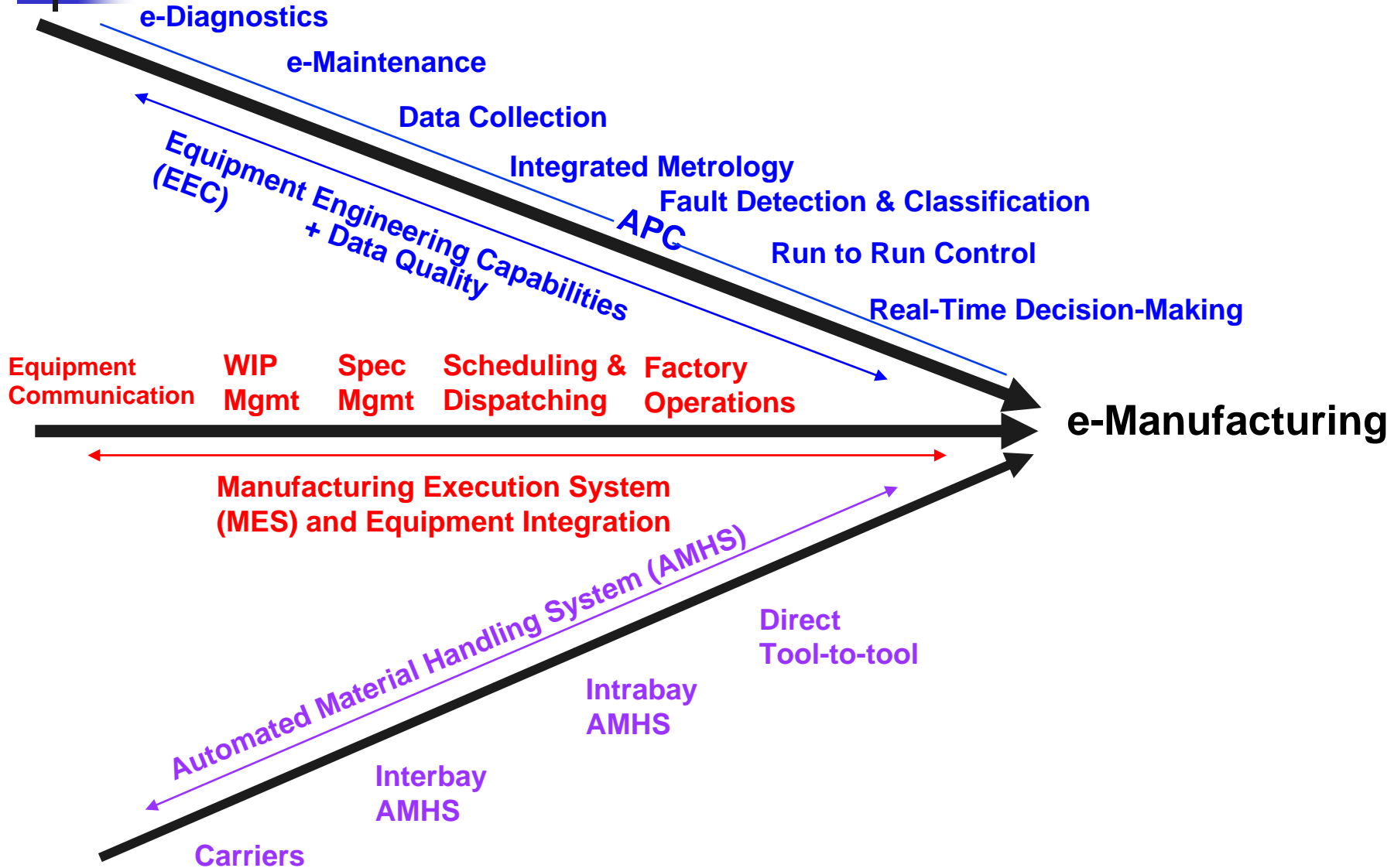


# Agenda

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- **The Vision of e-Manufacturing**
- **TSIA Member Companies' Perspectives**
- **Extending e-Manufacturing to Engineering Chain**

# Semiconductor Industry Path to e-Manufacturing



# The Vision of e-Manufacturing

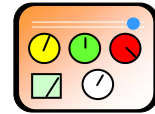
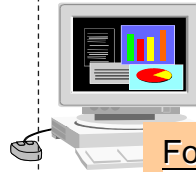
## Linkages to/from Enterprise systems & suppliers



### For Planners/Schedulers

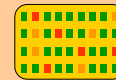
- Enterprise interfaces
- Finance interfaces
- Materials interfaces
- Warehousing Interfaces

## Summary Data & Analysis



### For Mangers

- Productivity Status
- Yield, Engineering
- Capacity planning
- Output Schedule Performance



## Drill-down data



### For Engineers/Technicians

- Equipment performance
- Inventory management
- Remote diagnostics
- Equip/Process excursion management

**Tools enabling linkages to/from enterprise systems, suppliers, and the network**

**Tools to monitor commitments of output, cost, agility, and on-time delivery of products ...**

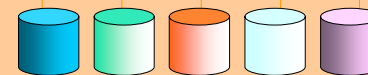
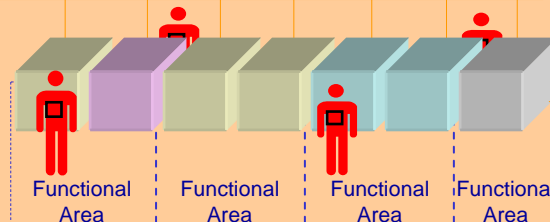
**Tools to manage factory assets effectively ...**

firewall

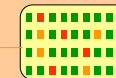
**Reliable & Consistent Information - agreed to data, any time, anywhere, ....**



- Single one-stop shop
- User interface personalized to the end-user



- Consolidated databases, datamarts
- Data mining tools, Applications



- Equipment
- Sensors
- Metrology
- WIP
- Process



- Remote diagnostics
- Remote monitoring
- Remote de-bugging/fix

**Factory**



## What is e-Manufacturing?

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- *e-Manufacturing* is the use of advanced and emerging information technologies to provide automated, data-driven, productivity optimization
- **e-Manufacturing has a wide scope**
  - Improved data availability to enable decision support and knowledge discovery
  - Enhanced tools and applications for data utilization in decision making for productivity optimization
  - Expanded equipment control to support decision implementation
  - Superior secure communication channels outside the manufacturing operation

# Environmental Pressures and Some Motivations for Change

Large Process Complexity  
+  
2-3 Year Technology Nodes

Need to Focus Few Expert  
Resources on Solving Issues  
vs. Finding Data

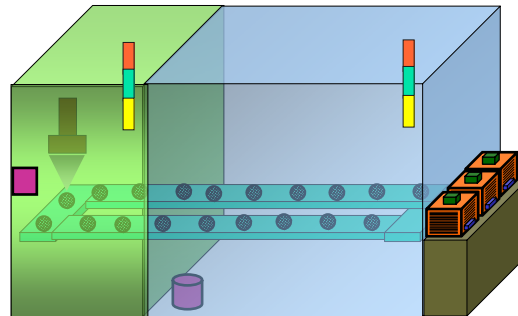
Complex Equipment  
Design  
+  
Fierce Competition for  
Next Design Win

High Cost of Mis-  
Processing (100's to  
1000's of die)

Time to Money for Install,  
Configure, & Qualification

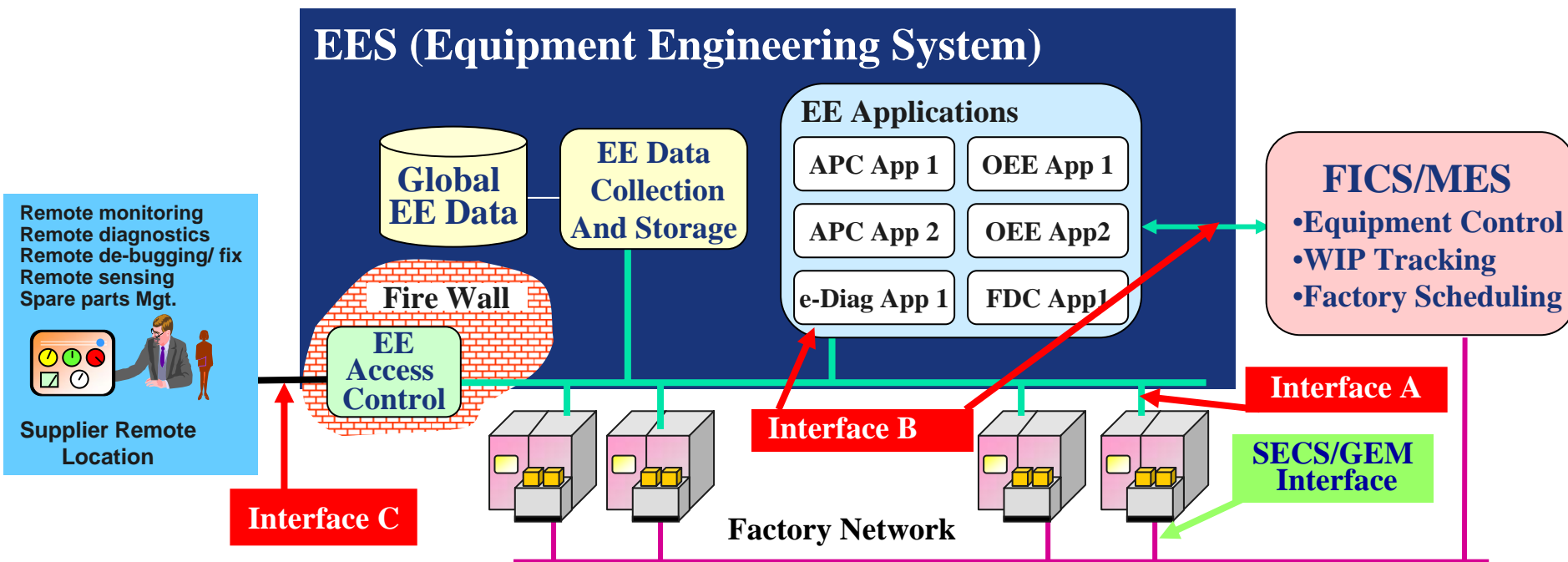
Pay for Performance – High  
Cost of Downtime

Innovation is Needed to Get the Right Data and have the Right  
Tools to Meet the Complex Needs of Future Technology



# Interface Refresher

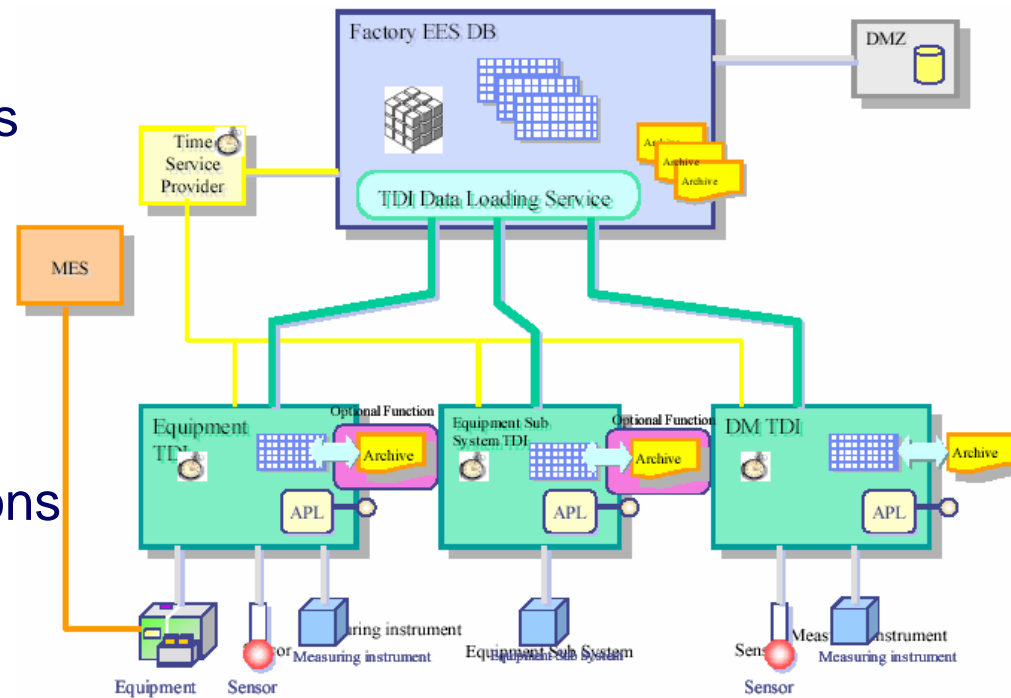
- **SECS/GEM** – Still the primary equipment control I/F
- **Interface A** – Equipment Engineering Data Interface (a.k.a. EDA)
  - First Goal: More & better data from the equipment
- **Interface C** – External access to EEC (e-Diagnostics)
- **Interface B** – Among EEC applications and to FICS/MES



# Tool Data Interface (TDI) by Selete

*“TDI propose the function which collect EE data by communication to data source that output EE data, hold and management EE data during any period.”*

- Collect EE data from data sources
- Hold and manage EE data
- Propose data to Factory EES DB
- Coordinate time for time-stamp
- Interface to TDI outside applications
- Output EE data archive





## Conclusions from TSIA members (1)

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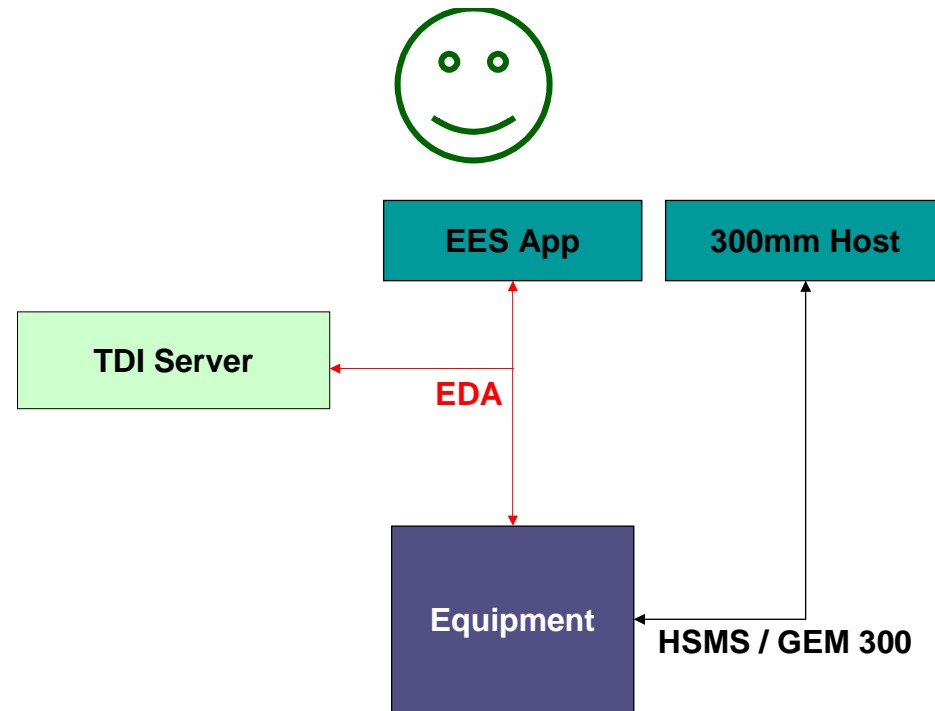
Reviewed the capabilities and differences of TDI, which driven by SELETE, and EDA (a.k.a. Interface A), the SEMI standards. Confirmed the **SEMI EDA standards are the common requirements for TSIA members.**

- SEMI EDA is the main stream for equipment data acquisition, and will adapt it to Fab operations.
- EDA will be part of equipment purchase specification.
- Requirement to EDA implementation
  - Free to chipmakers
  - Performance and reliability guarantee
  - Deliver key EDA capabilities/standards by phases. *Collecting trace data could be the first priority; management functions, such as user authentication and authorization could be in later phase.*

## Conclusions from TSIA members (2)

### Chipmakers' position on TDI

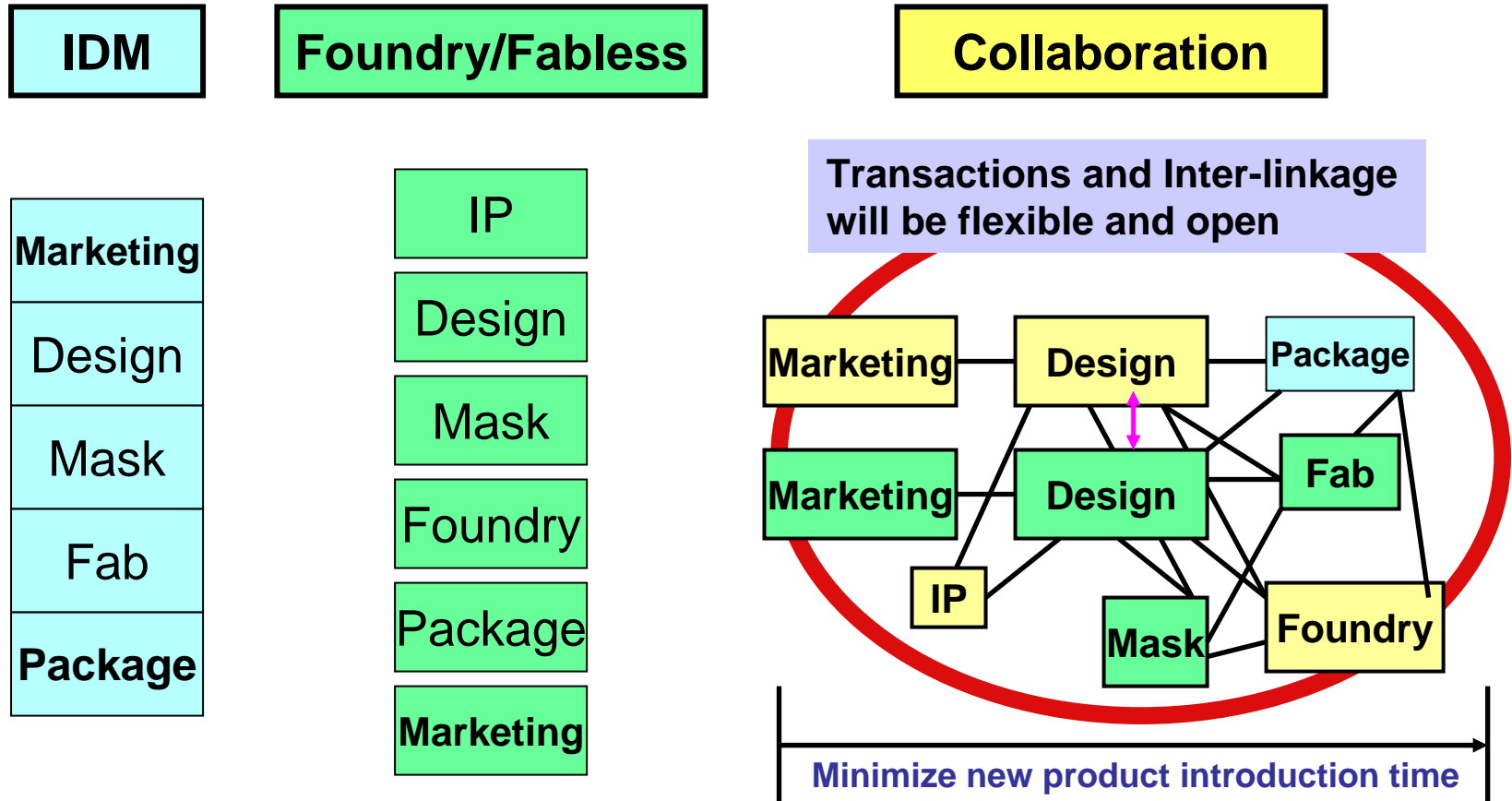
- TDI is valuable for tracing equipment performance, and it is no conflict with EDA.
- (Recommendation) EES applications and TDI could be the clients of EDA\*. Thus, we propose a usage of TDI and EDA in following picture.



\* Note: This is just a recommendation to equipment vendors. The purpose is to pull the EDA readiness schedule and reduce the complexity of the equipment interface.

# Extending e-Manufacturing to Engineering Chain

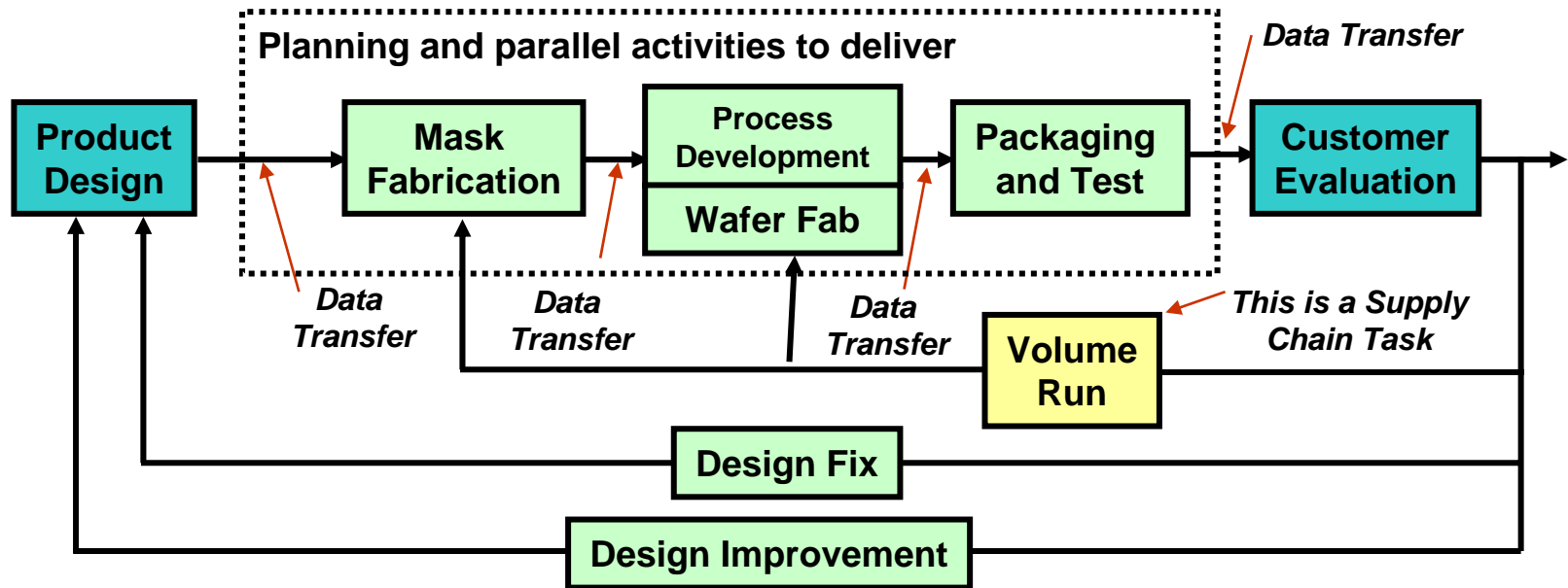
Efficient Collaboration is Required for Minimizing New Product Introduction Time



Reducing New Product Introduction Time is becoming a Competitive Requirement

# What is the Engineering Chain?

- Engineering chain management objective is to leverage capabilities and business process to meet customer delivery times, integrate new products to process technology faster, and reduce sources of error
  - Scheduling and planning systems for overall product line and Mask fabrication
  - Data transfer standards
  - Business Processes



## Legend

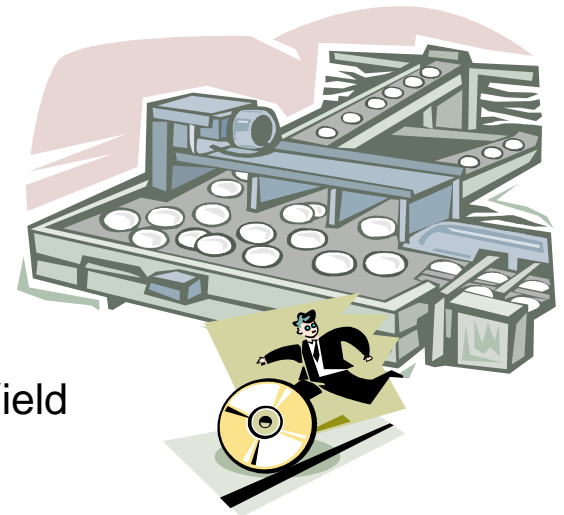


# The Objectives of the Semiconductor Engineering Chain

To ensure that factories are designed and integrated to **enable process development** and **high-volume manufacturing** so that the **right products** are made in the **right volumes on schedule**, while **meeting cost targets**.



- Fast Time to Market
- Fast Ramp Up
- Low design/mfg cost
- High Productivity
- High Performance
- High Device Qualification Yield
- Strategy Alignment

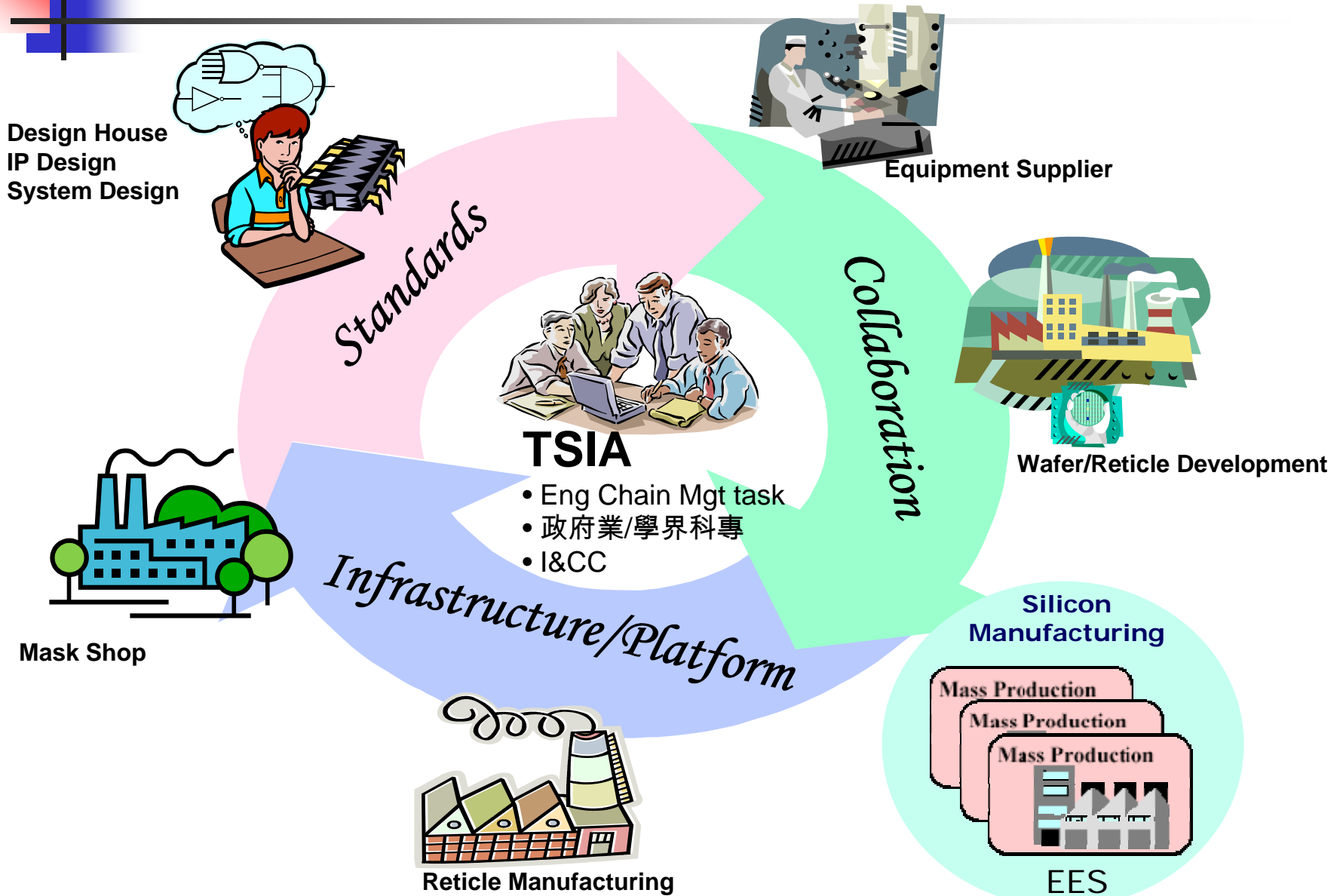


- Design House
- IP
- IDM

**Design Collaboration  
Engineering Knowledge Exchange**

- IP
- Mask Tooling
- Wafer Manufacturing
- Packaging/Testing

# TSIA Position on Engineering Chain Development





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**Have a nice workshop !!**

**Thanks**