

Improve Equipment Productivity

Year Technology Node Wafer Diameter	1999 180 nm 200 mm	2002 130 nm 300 mm	2005 100 nm 300 mm	2008 70 nm 300 mm	2011 50 nm 300 mm	2014 35 nm 450 mm
Bottleneck production equipment OEE [3] (SEMI E79)	75%	87%	89%	91%	92%	92%
Average production equipment OEE [3] (SEMI E79)	55%	65%	71%	78%	80%	82%
% Capital equipment reused from one process node to next	> 70%	> 0%	> 80%	> 80%	> 80%	>20%
Production equipment lead time (months from order to full throughput capability) [5]	< 9 months	< 8 months	< 7 months	< 6 months	< 5 months	<5 months
Process equipment availability [6] (SEMI E10)	> 85%	> 90%	> 93%	> 95%	> 95%	> 95%
Metrology equipment availability [6] (SEMI E10)	> 90%	>95%	>95%	>98%	>98%	>98%
% of equipment to factory systems interface standards defined [2]	75% 300 mm	100% 300 mm	100% 300 mm	100% 300 mm	80% 450 mm	100% 450 mm
% conformance: equipment to factory systems interface standards [2]	100% 200 mm	100% 300 mm	100% 300 mm	100% 300 mm	100% 300 mm	100% 450 mm

SOURCE: 1999 ITRS

Bottom Line

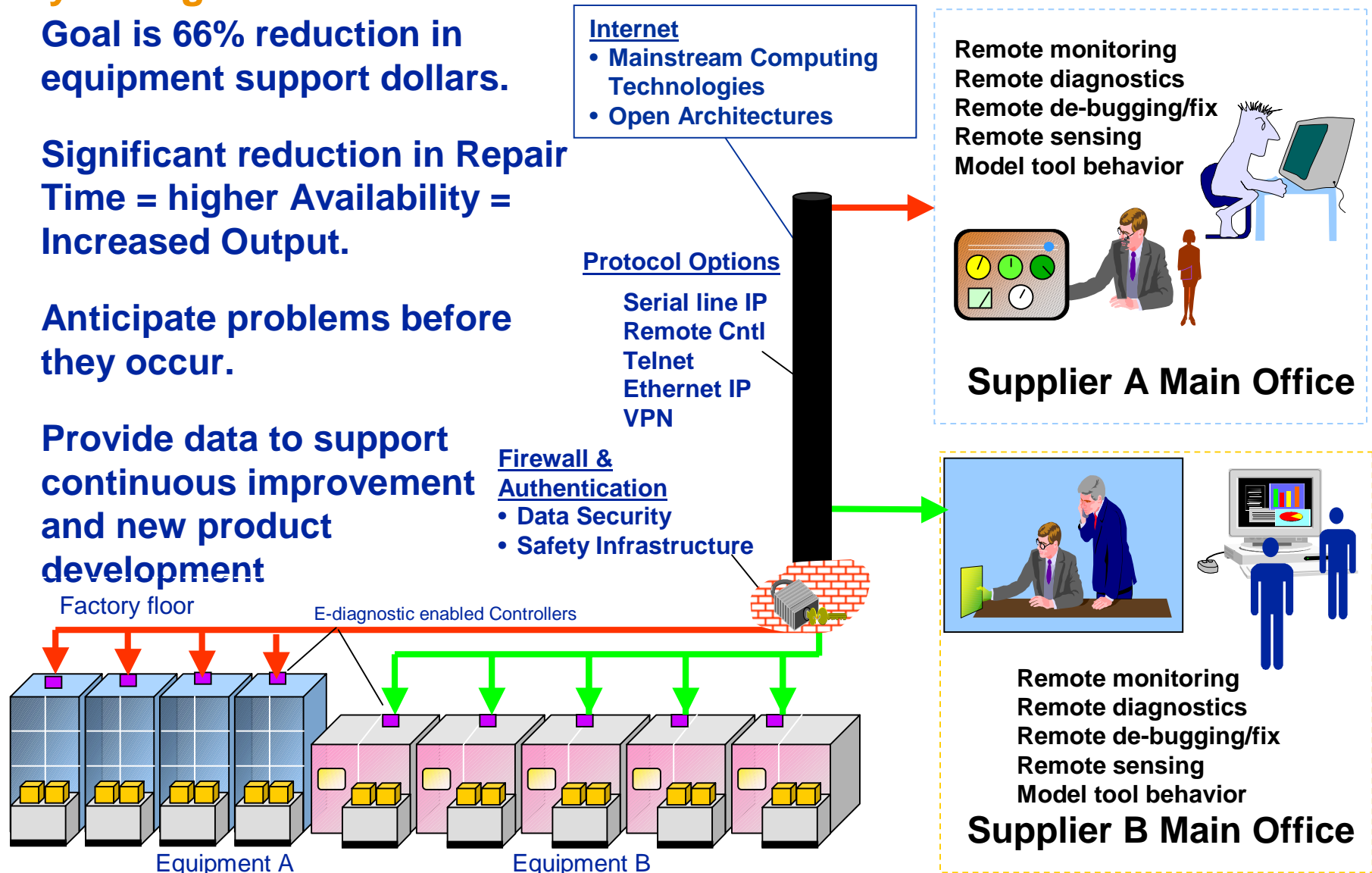
- Equipment productivity (availability and overall effectiveness) are not meeting roadmap targets. Need to update tables with actuals + gaps and drive improvements through potential solutions
- 300mm software interface standards are defined, but industry implementation is not meeting expectations



e-Diagnostics Vision

Why e-Diagnostics?

- Goal is 66% reduction in equipment support dollars.
- Significant reduction in Repair Time = higher Availability = Increased Output.
- Anticipate problems before they occur.
- Provide data to support continuous improvement and new product development



Remote Diagnostics is Essential to improve Equipment Productivity

- **Problem Statement:**
 - Mean time to repair equipment is high due to long time (80% of resolution time) to diagnose issues (high equipment complexity and low support expertise at factories)
- **Key Objectives:**
 - Reduce time to resolve equipment process or reliability issues.
 - Improve support efficiency and reduce cost by allowing supplier's to service equipment remotely from their field service centers
- **Tactics:**
 - Leverage supplier expertise to resolve factory issues from personnel at their service and design centers
 - With access to factory equipment from their service and design centers,, suppliers can more easily apply design changes based on knowledge acquired
 - Leverage mainstream computing technology to attract richer depth of technical experts
- **Barriers to Implementation:**
 - Security concerns by IC makers, Equipment Suppliers, other subcontractors
 - Lack of IC maker and supplier infrastructure to implement remote diagnostics
 - Lack of diagnostic capabilities on embedded controllers