

Orchestrating Equipment™ To Increase Productivity and Value

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<http://www.symphony-systems.com>



Presentation Outline

- Company Overview & Organization
- Architecture
- Products

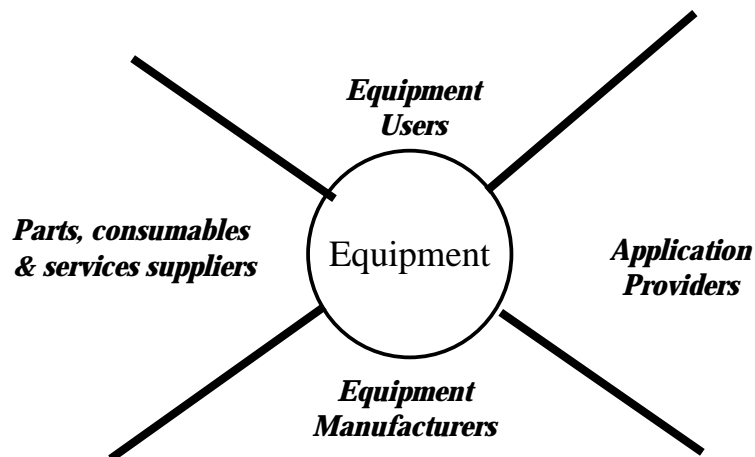


Symphony's Mission

Improve equipment productivity
and value.

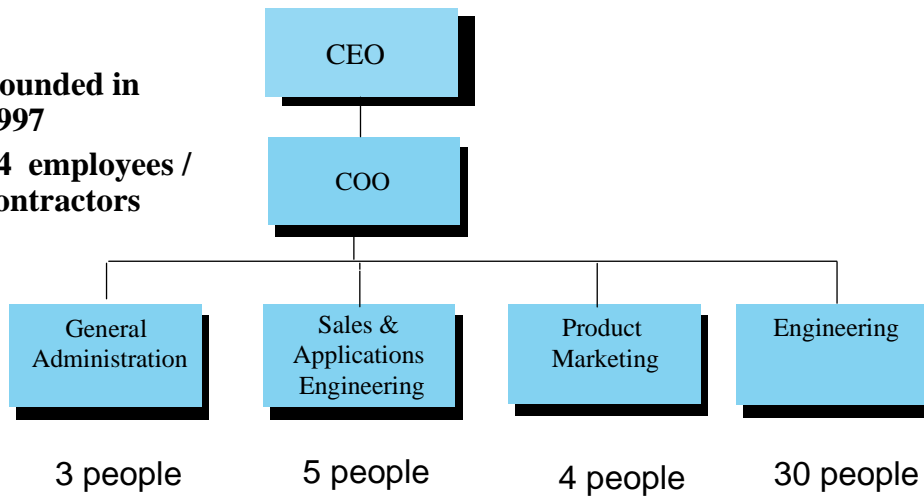


Symphony Community



Symphony Organization

- **Founded in 1997**
- **44 employees / contractors**



The Chasm

- Critical disparity between yield (90%) and equipment productivity (50%).
- Chipmakers are demanding that equipment vendors take more responsibility for increasing equipment productivity.



Reducing chip manufacturing cost

As valuable as shrinking feature size.

Annual % Reduction in Cost / Function

Factor	1980	1995	Future
Shrinking feature size	12%	12-14%	12-14%
Overall Equipment Efficiency	3%	7-10%	>9-15%
Larger wafer size	8%	4%	<2%
Yield improvements	5%	2%	<1%

and

Greater potential than yield improvement!!

Int'l Sematech, April, 2000



Semiconductor manufacturing economics

Downturn – reduce operating costs

- Reduce parts consumption
- Reduce labor costs
- Reduce warranty costs
- Reduce scrap
- Tune operation

Upturn – increase shipments

- Increase wafer output
- Improve factory throughput
- Rapid qualification of new tools / processes
- Rapid expansion because of reduced training

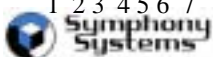
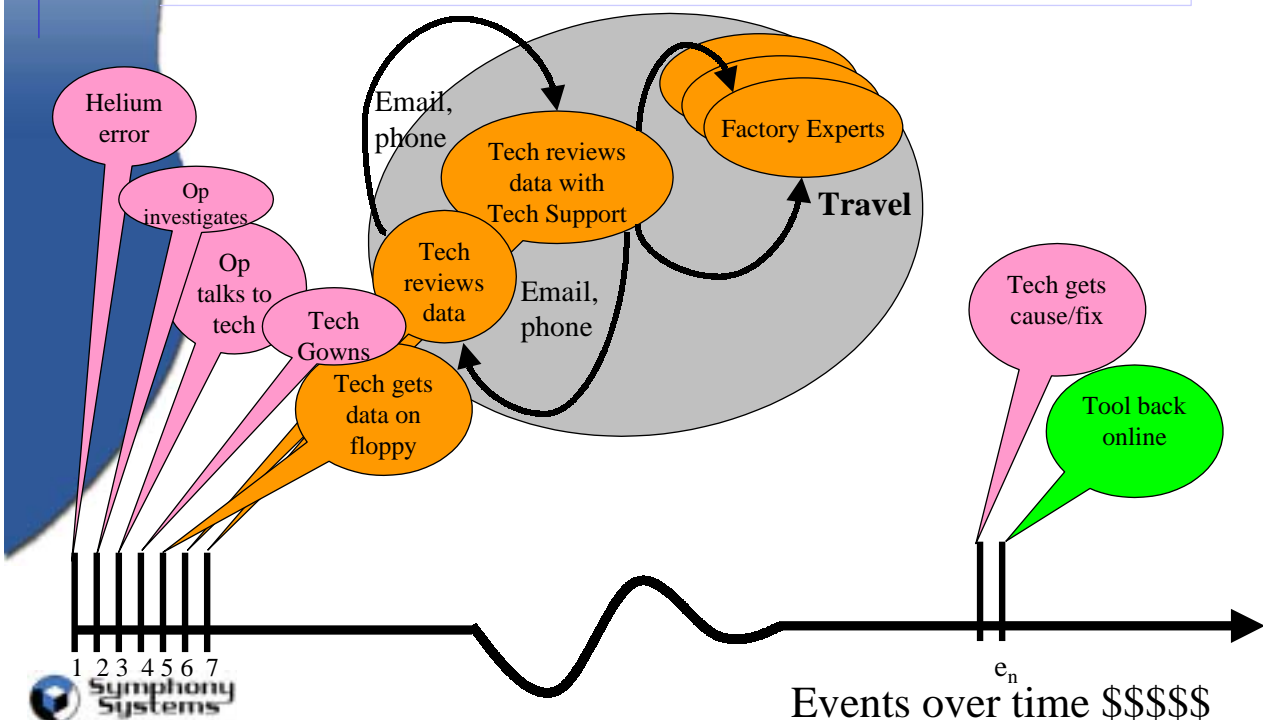


Lowering semiconductor manufacturing costs

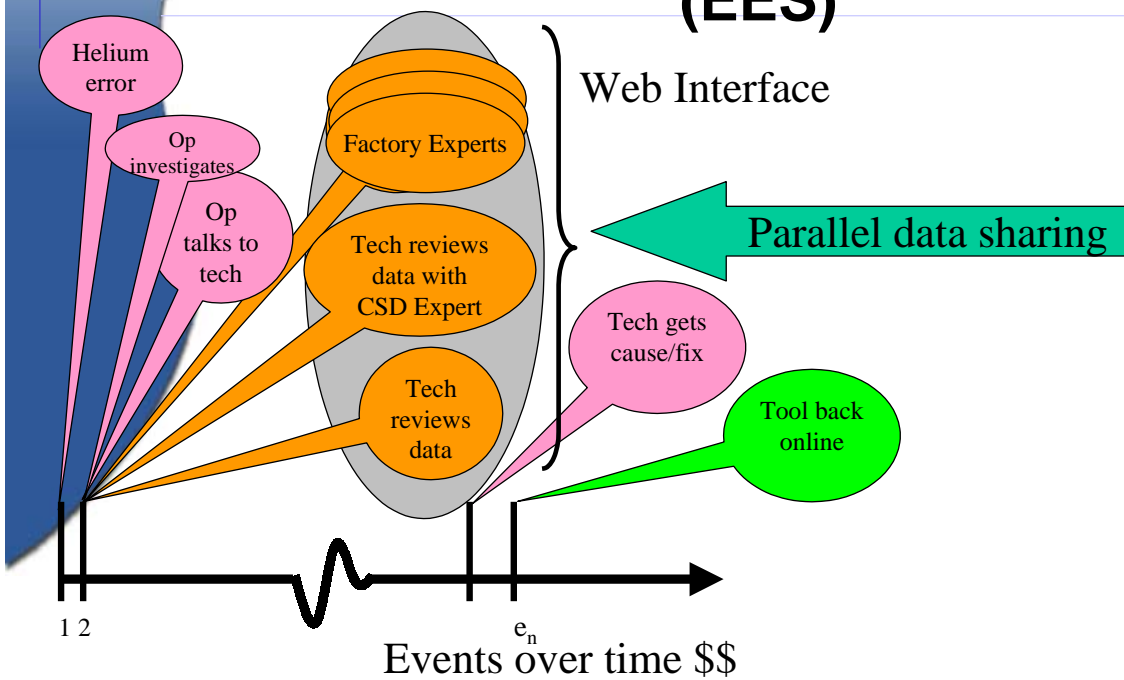
Factor	Implementation
Shrinking Line Width	Advanced Process Control Sensor Integration Multi-tool solutions
Improving Throughput	E-diagnostics Vendor / User collaboration Enhanced customer service and support



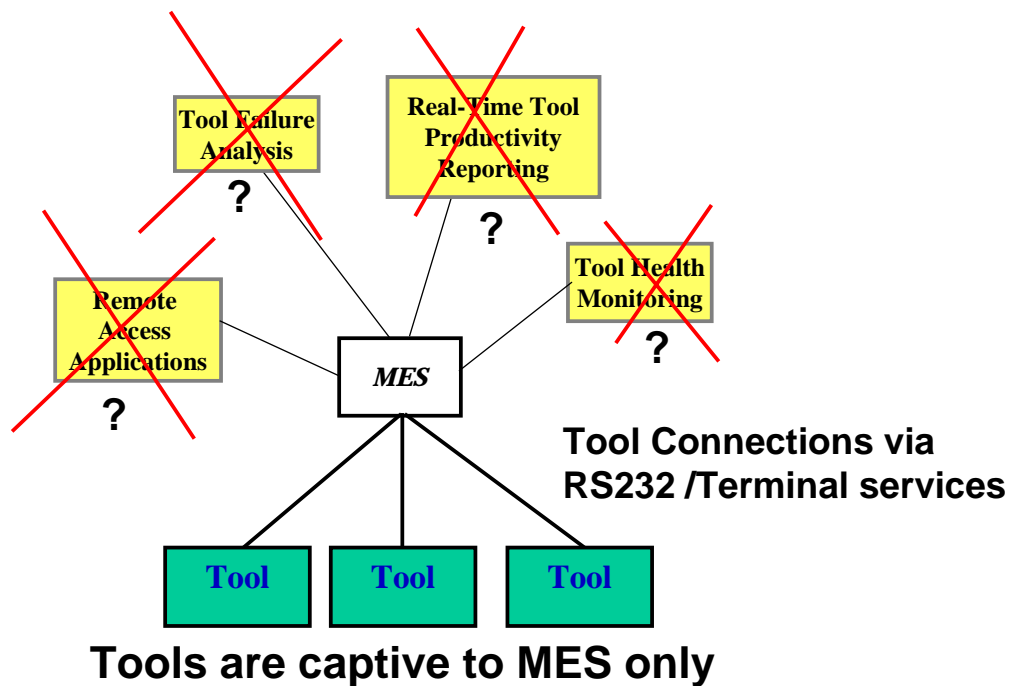
Typical equipment problem without EES



With Equipment Engineering System (EES)



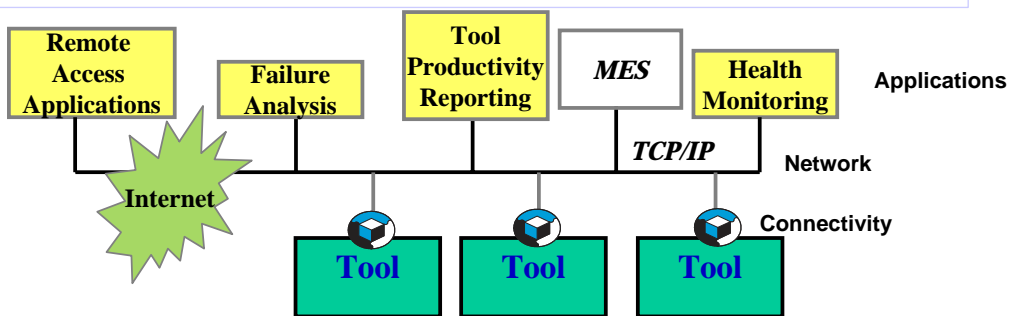
Many Fab MES setups



Equipment Productivity Management Suite (EPM)



Focus - Improving Tool Productivity



Object-Based, Open Tool Communications Architecture
Best-of-breed Flexibility
The Tool is a Shared Resource

Automated Data Collection
Keys to the Kingdom

Data Warehousing/Archival/Analysis
Turn Data into Information
"e-diagnostics" "OEE" "remote access"

e-diagnostics



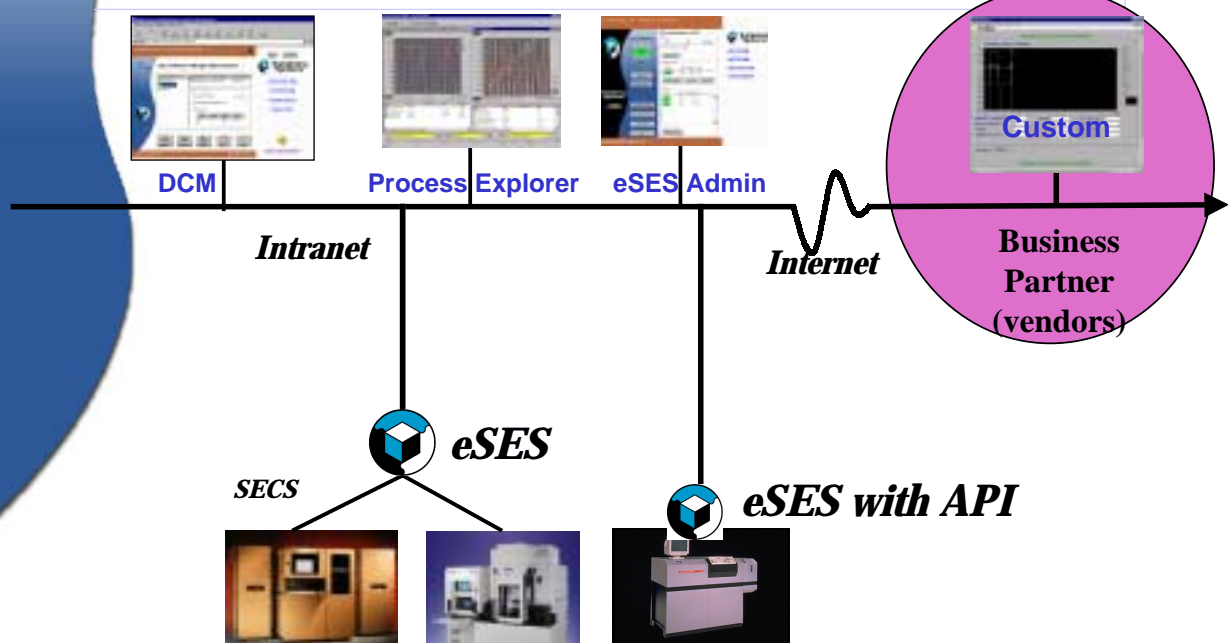
EES Platform Features

Integrating equipment into enterprise and supply chain management applications for improving equipment productivity and value

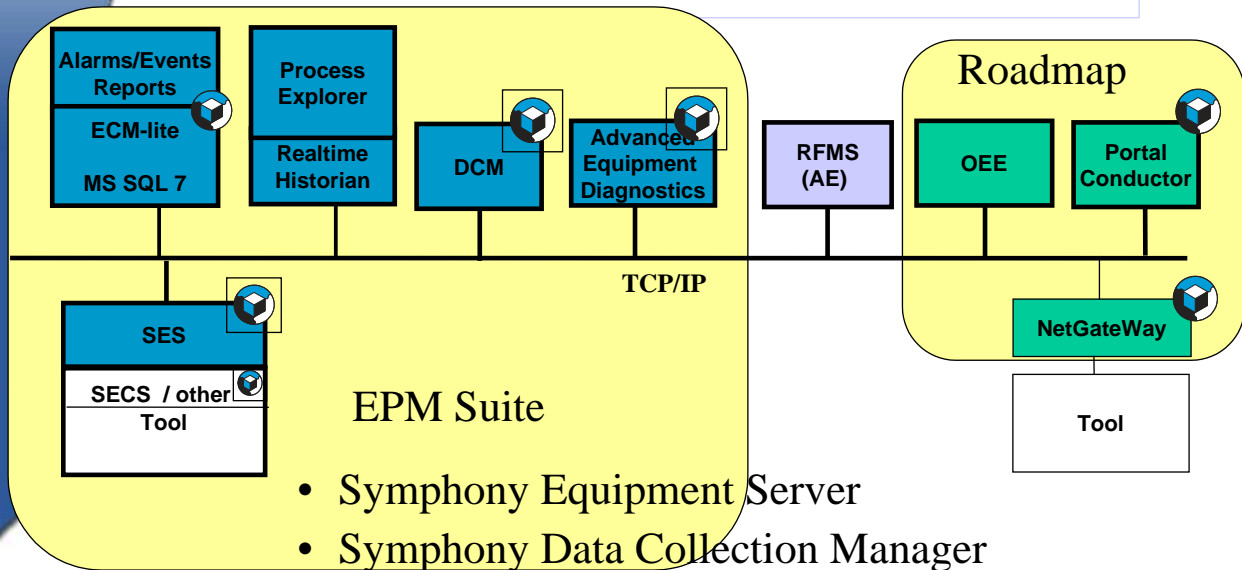
- Remote and web access (Intranet and Extranet)
- e-diagnostics (share tool data with vendors)
- Web-applications for (connectivity, Process Data Historian, Fault Detection)
- Object-Based, open tool communications architecture
- Open database connectivity



Symphony System Architecture



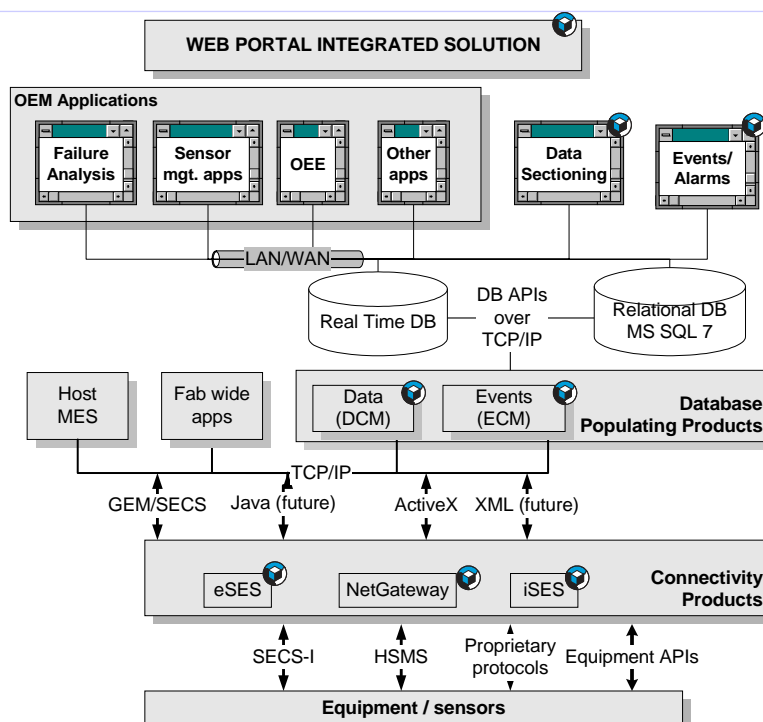
Equipment Productivity Management (EPM)



- Symphony Equipment Server
- Symphony Data Collection Manager
- High-performance process data historian
- Viewer for data presentation & analysis
- Alarms/Events collection and reporting



Symphony EPM – Architecture

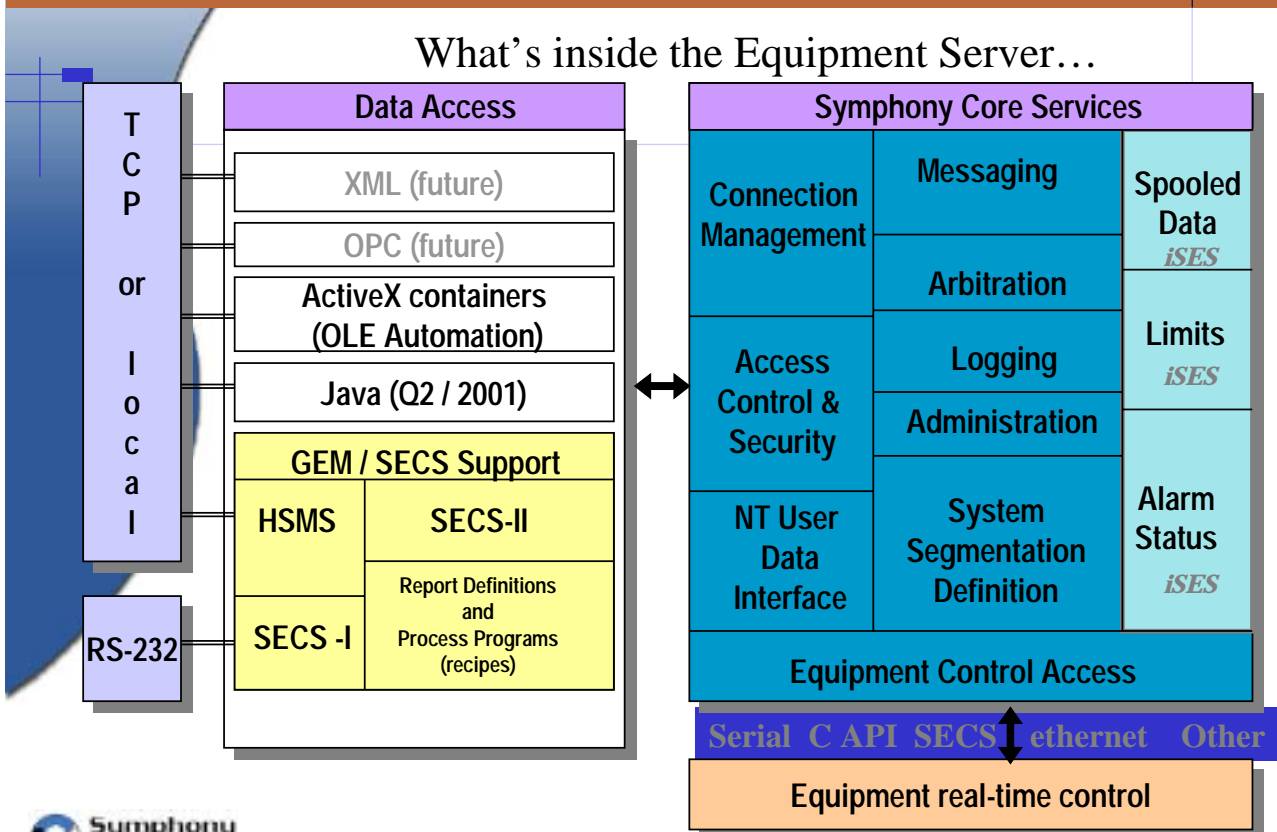


eSES Connectivity Benefits

- Makes equipment an easy-to-use, sharable resource for multiple applications and users
- Provides remote access to equipment and sensors for monitoring and control
- Greatly reduces the time to deploy application software for different types of equipment
- Rapid retrofits of existing factory automation systems
- Supports EES
- Facilitates collaboration between equipment manufacturers and fabs for more efficient maintenance and troubleshooting



What's inside the Equipment Server...



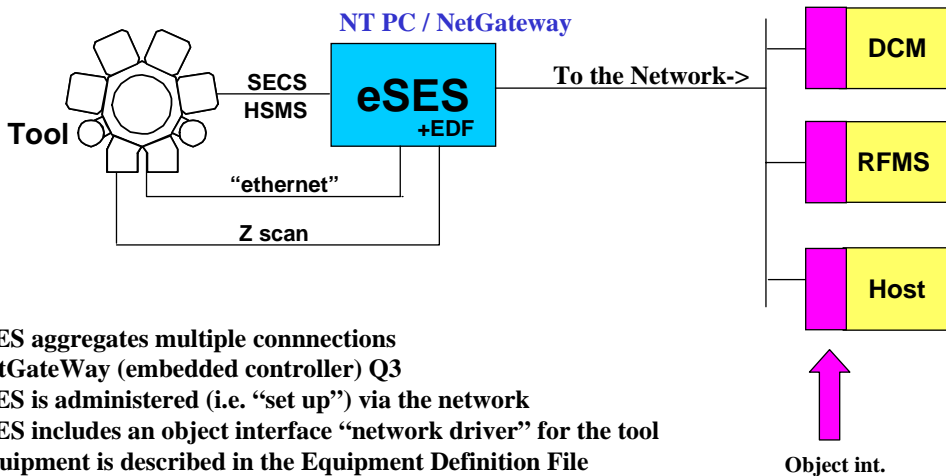
SES Features

- Advanced web-based administration services and logging
- Automated equipment / host connection management
- Pass-through SECS communication
- SECS / HSMS Conversion
- Built-in protocol decoding and interpretation
- Event and alarm support
- Multi-user management for access control and arbitration
- Connection to SECS / HSMS tools, sensors, and other equipment



Connectivity

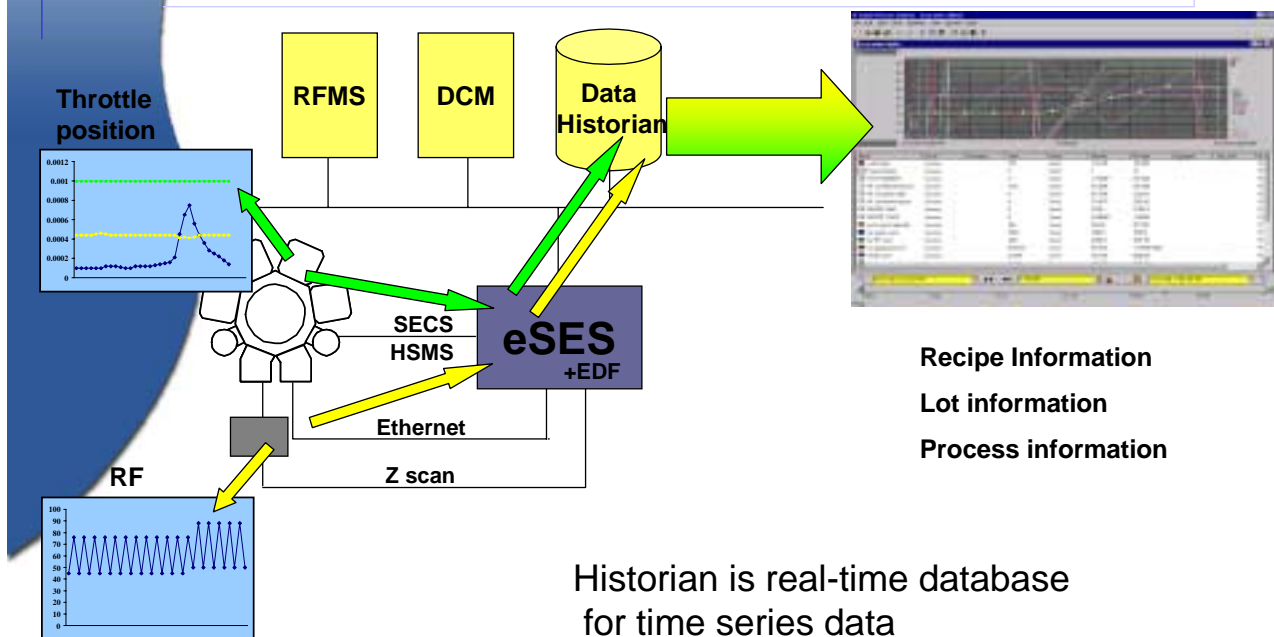
eSES: external Symphony Equipment Server



- eSES aggregates multiple connections
- NetGateWay (embedded controller) Q3
- eSES is administered (i.e. “set up”) via the network
- eSES includes an object interface “network driver” for the tool
- Equipment is described in the Equipment Definition File
- “Host” messages “pass-through” to the tool



Connectivity with real-time historian



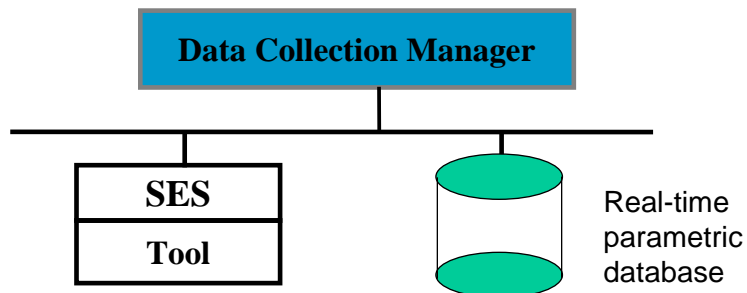
External Symphony Equipment Server

- eSES 2.0 (NT) Available Now
 - SECS / HSMS
- eSES with EqAPI (NT) Available Now
 - Sensor integration
- Pass-through Available Now
 - Tested in fabs
- Throughput - over 1,000 data points per second (pps)



Initiate Data Collection

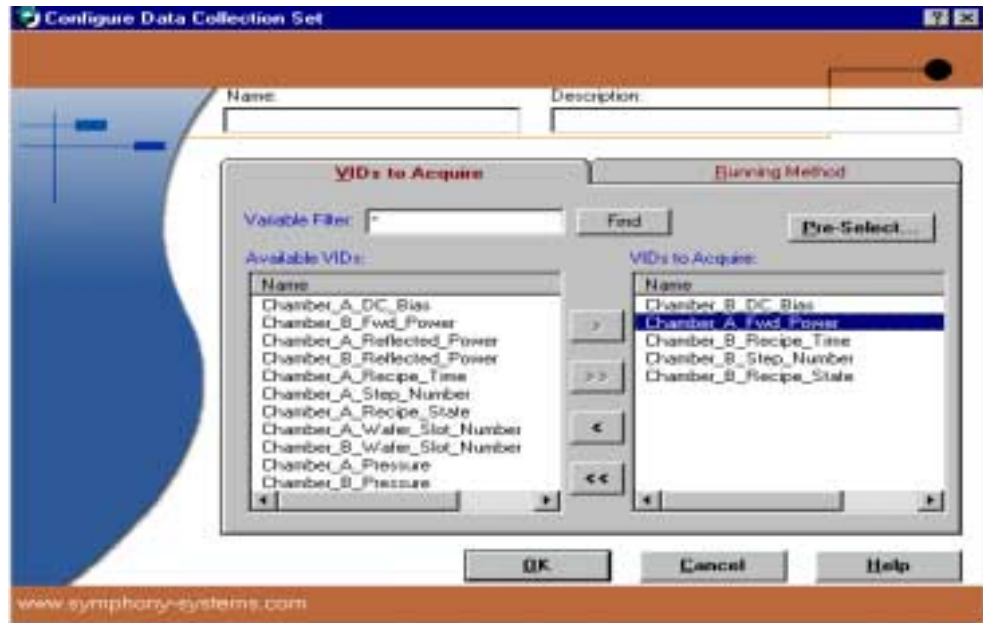
- Data Collection Manager (DCM) Application
 - Specify “Data Collection Recipes” (SVID’s lists)
 - Multiple parties can have separate DCM’s running
 - Automatically configures real-time database and stores data
 - Runs on the network
- Performance – over 1,000 data points per sec



DCM (Data Collection Manager)



Selecting the Data

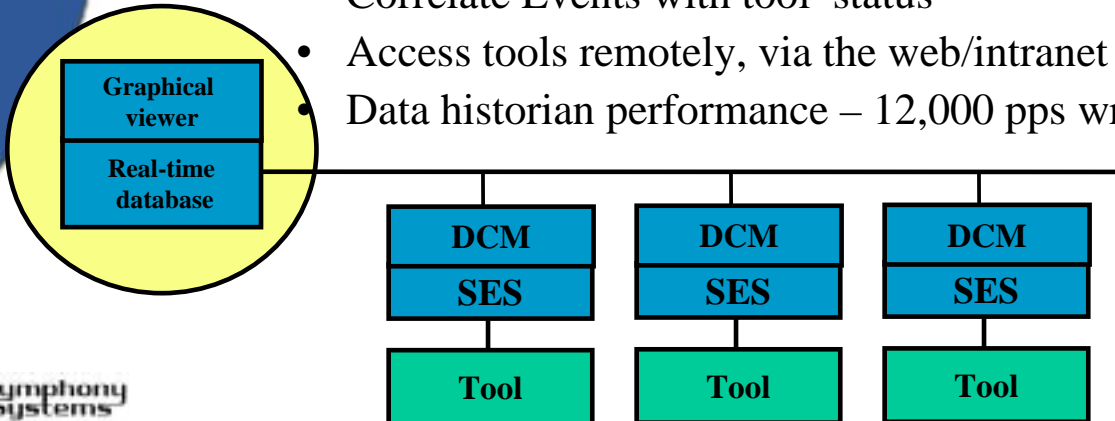


Data Acquisition Logic

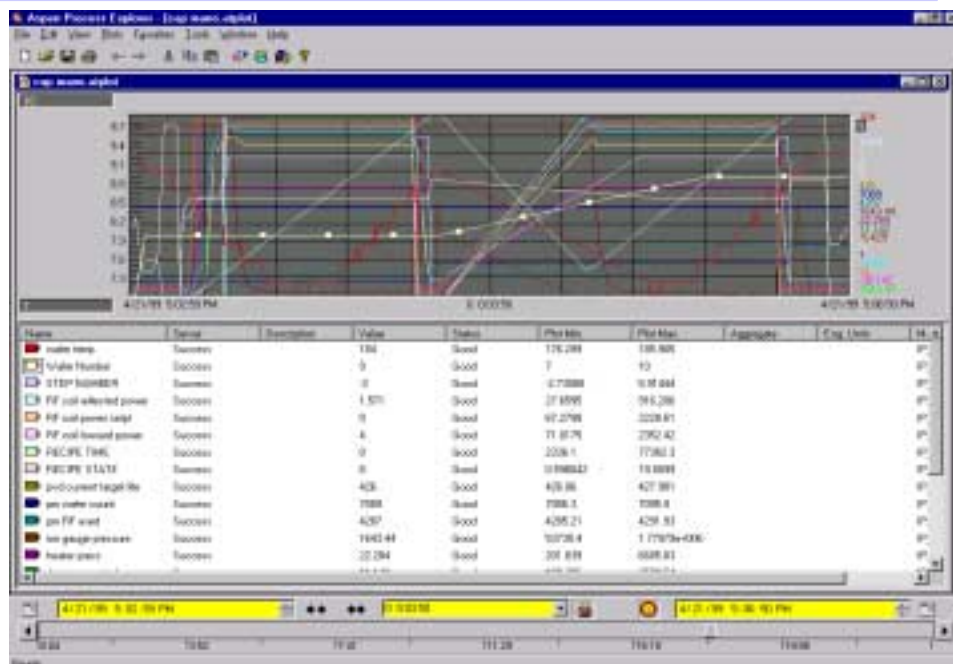


Analyze the data with graphical viewing tools

- Collect the data from different tools (SES's) into one database
- Analyze trends, real time or historic
- Track true states of the equipment
- Correlate Events with tool status
- Access tools remotely, via the web/intranet
- Data historian performance – 12,000 pps write



Parametric Data Viewing



Advanced Equipment Diagnostics Overlays and Golden Runs

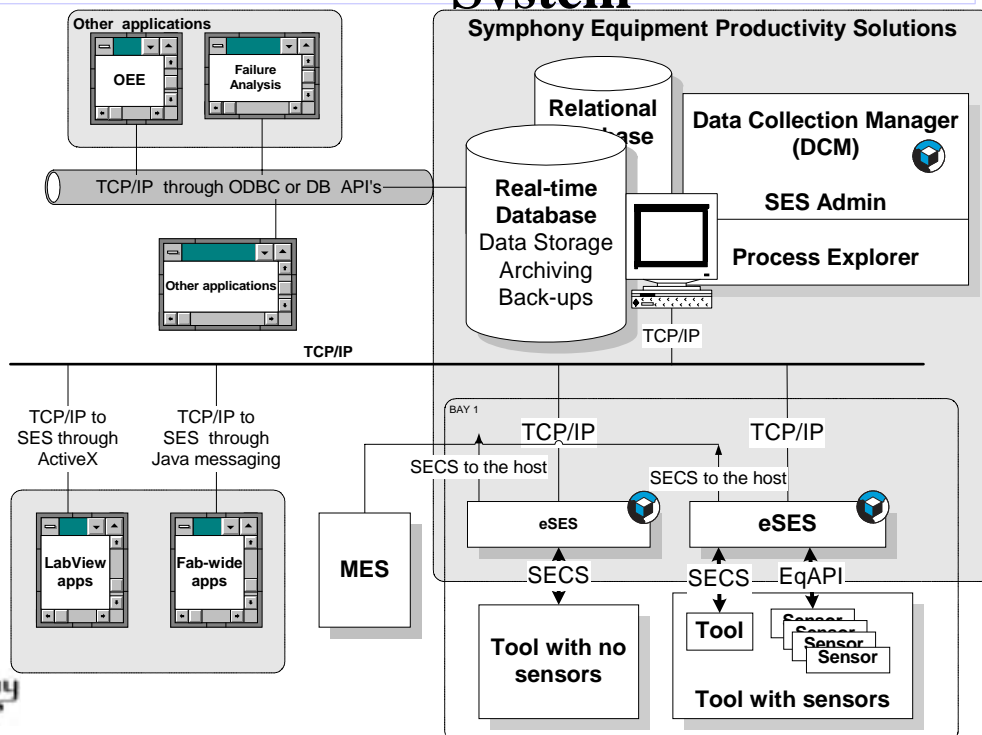


Software Demo

See a demonstration in the poster
session



Equipment Productivity Management System



Symphony Solution Summary

- Suitable for EES
- Open and extendable
 - Sensor and subsystem data
 - Original applications
- SES
 - external for existing tools
 - integrated for new tool designs
- Rapid installation in existing automated fabs
 - 3 tool types in one day at a fully automated fab
- Reliable and robust



Discussion

Thank you !

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