

e-Diagnostics Meeting

e-Diagnostics Seminar

Connectivity

Mark Pendleton, domainLogix

mark.pendleton@domainlogix.com, (858)-453-0782

INTERNATIONAL
SEMATECH

03/26/2001 3:56 PM j:\stndpres\template\IntST.ppt - 1

Agenda

- **The Connectivity Team**
 - Charter
 - Participation
 - Milestones
- **Analysis results to date**
 - Capability review
 - System overview
 - Use Cases & Analysis
- **Summary**

Connectivity Team – Charter

- **Charter**

- Develop preliminary e-diagnostics system software specifications for each identified capability, in accordance with the e-diagnostics capability and data taxonomies.

- **In Scope**

- Identification and definition of e-diagnostics system requirements
- Definition of e-diagnostics software design specifications

- **Out Of Scope**

- E-diagnostics business model definition
- E-diagnostics business value definition
- E-diagnostics security infrastructure definition

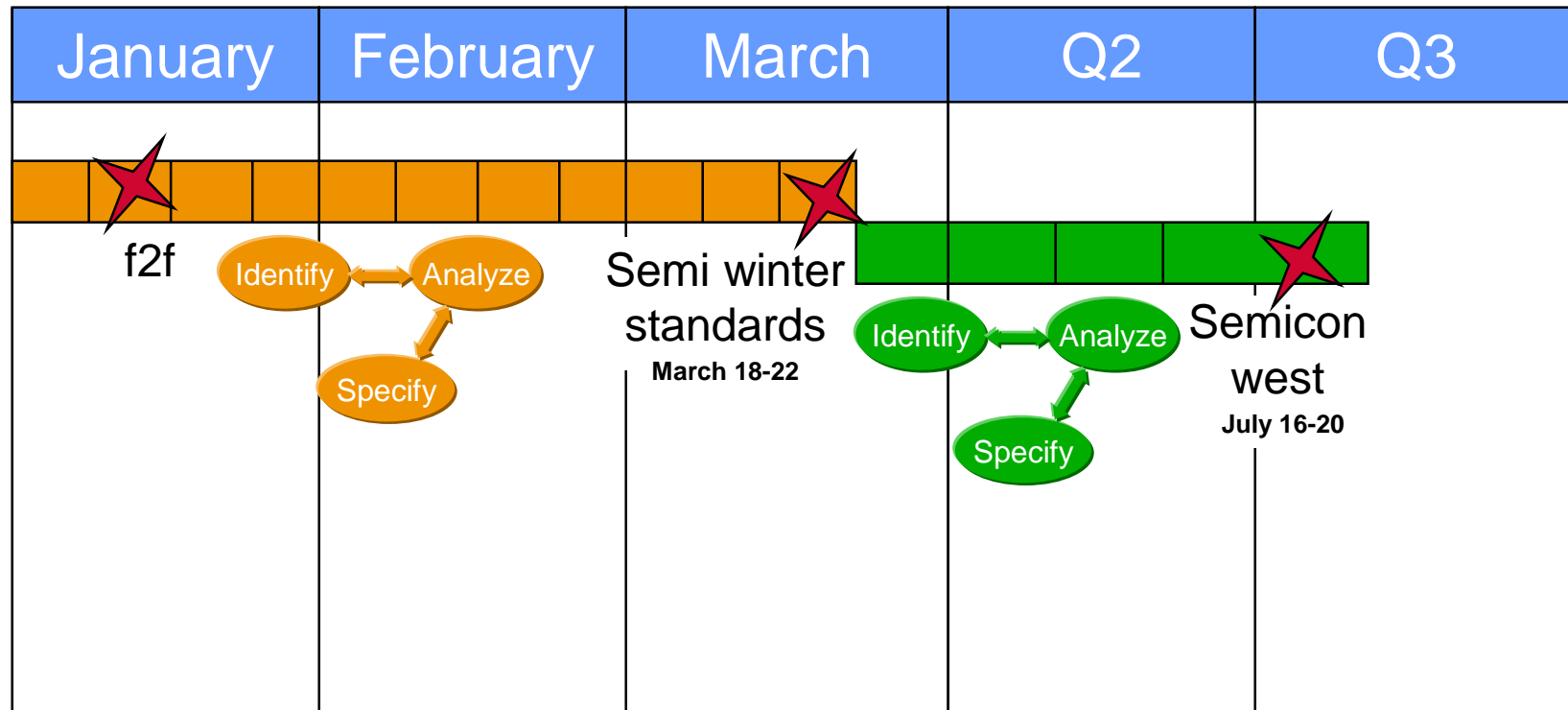
Connectivity Team – Participation

Participant	Weekly Time Commit	Duration	Team Role	Background
Equipment Supplier	10-20%	Jan – Mar	Requirements definition	Knowledge of e-diagnostics goals, information needs of support job functions at company, company security and IP issues
Equipment Subsystem Supplier (e.g., pumps, abatement systems, etc.)	10-20%	Jan – Mar	Requirements definition	“
Manufacturer	10-20%	Jan – Mar	Requirements definition	“
Supplier Software Engineer / Architect	30-40%	Jan – Mar	Analysis and design	Knowledge of e-diagnostics goals, familiarity with web, security, database, and application development technologies, familiarity with SEMI software standards, semiconductor equipment control and interfacing
Manufacturer Software Engineer / Architect	30-40%	Jan – Mar	Analysis and design	“
3 rd Party Software Engineer / Architect	30-40%	Jan – Mar	Analysis and design	“
International SEMATECH representative	5-10%	Jan – Mar	Guidance and steering	Involvement in e-diagnostics roadmap definition, prototyping efforts

Connectivity Team – Milestones

- **Current work scope represents a second iteration on e-diagnostics system definition**
- **First iteration (as the Protocol Definition team) identified 12 use cases**
 - Detailed 7 use cases to develop essential criteria and communication protocol recommendations
- **First iteration results completed December, 2000**
 - See the Protocol Definition section of the Guidebook

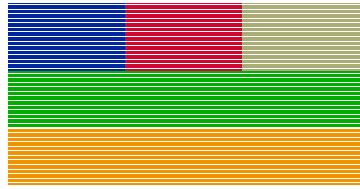
Connectivity Team – 2001 Milestones



Design
Revisions:
Rev 0
Rev 1

- System model overview
- Remote tool sessions
- Administration
- Steady state data collection
- Live equipment status viewing
- Historical reporting
- Sign-on/off
- Collaboration
- File transfer

Capability Review



~85% of essential
communication
infrastructure

Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Performance Monitoring and Remote Operation
Level 2: Analysis	Automated Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

Note:

Use Case development is ongoing – titles in flux

Current iteration focus:

Level 0

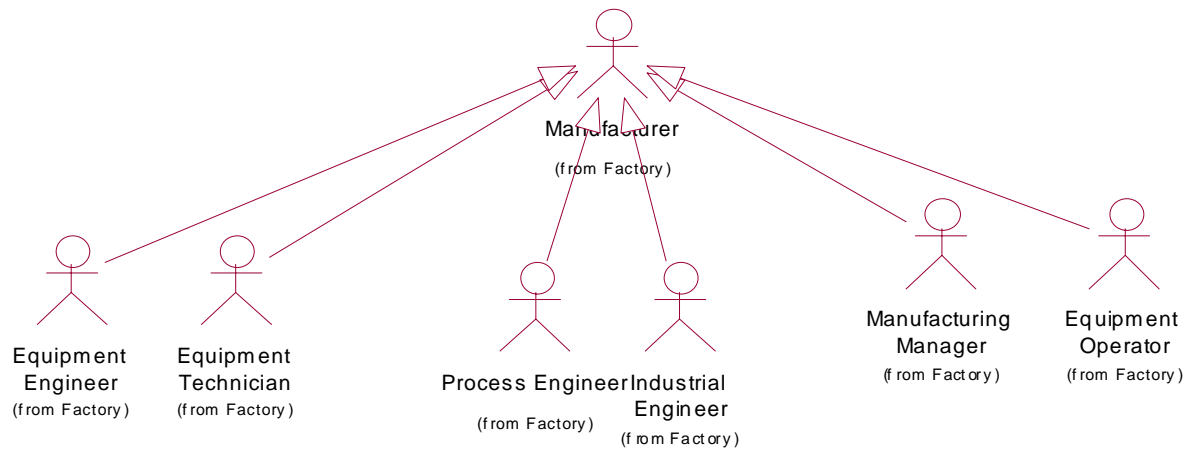
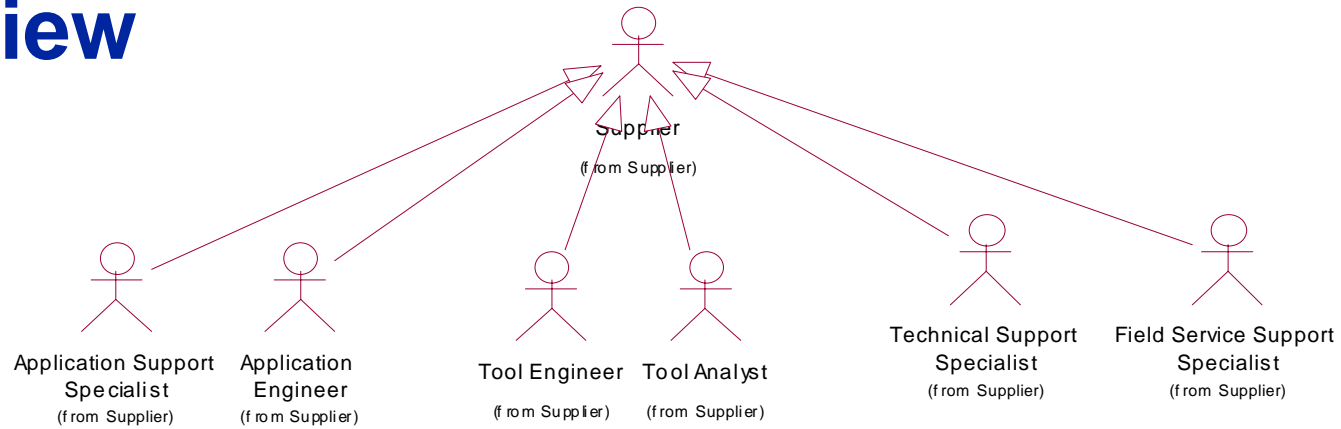
- Authorize new user
- Sign on
- Sign off
- Collaborate
- Transfer files

Level 1

- Conduct a Remote Tool Session

System Overview

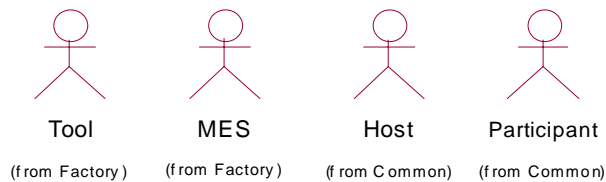
e-diagnostics Actors



Associated diagrams:

Use Case Diagram: Use Cases / Main

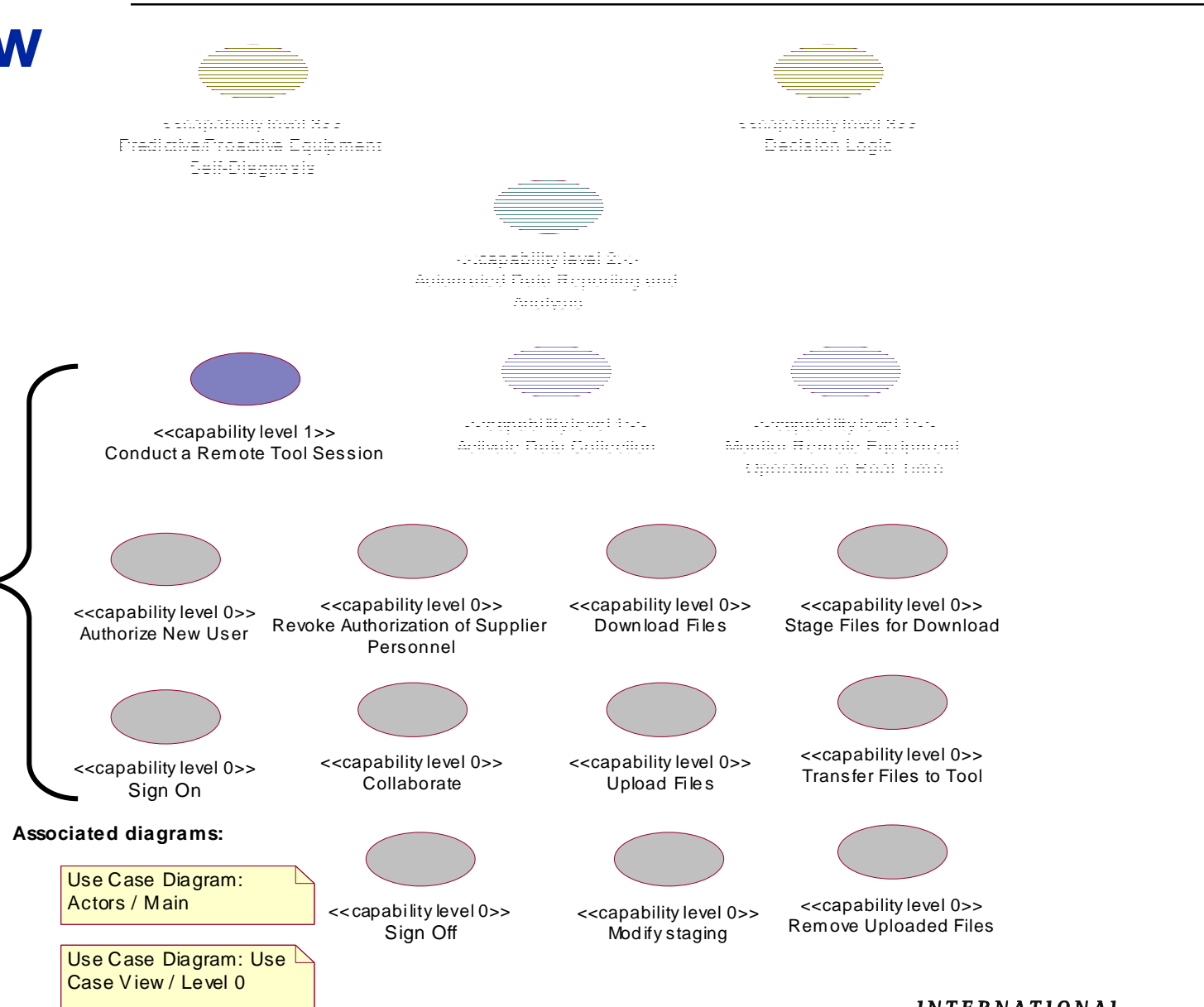
Use Case Diagram: Use Case View / Level 0



System Overview

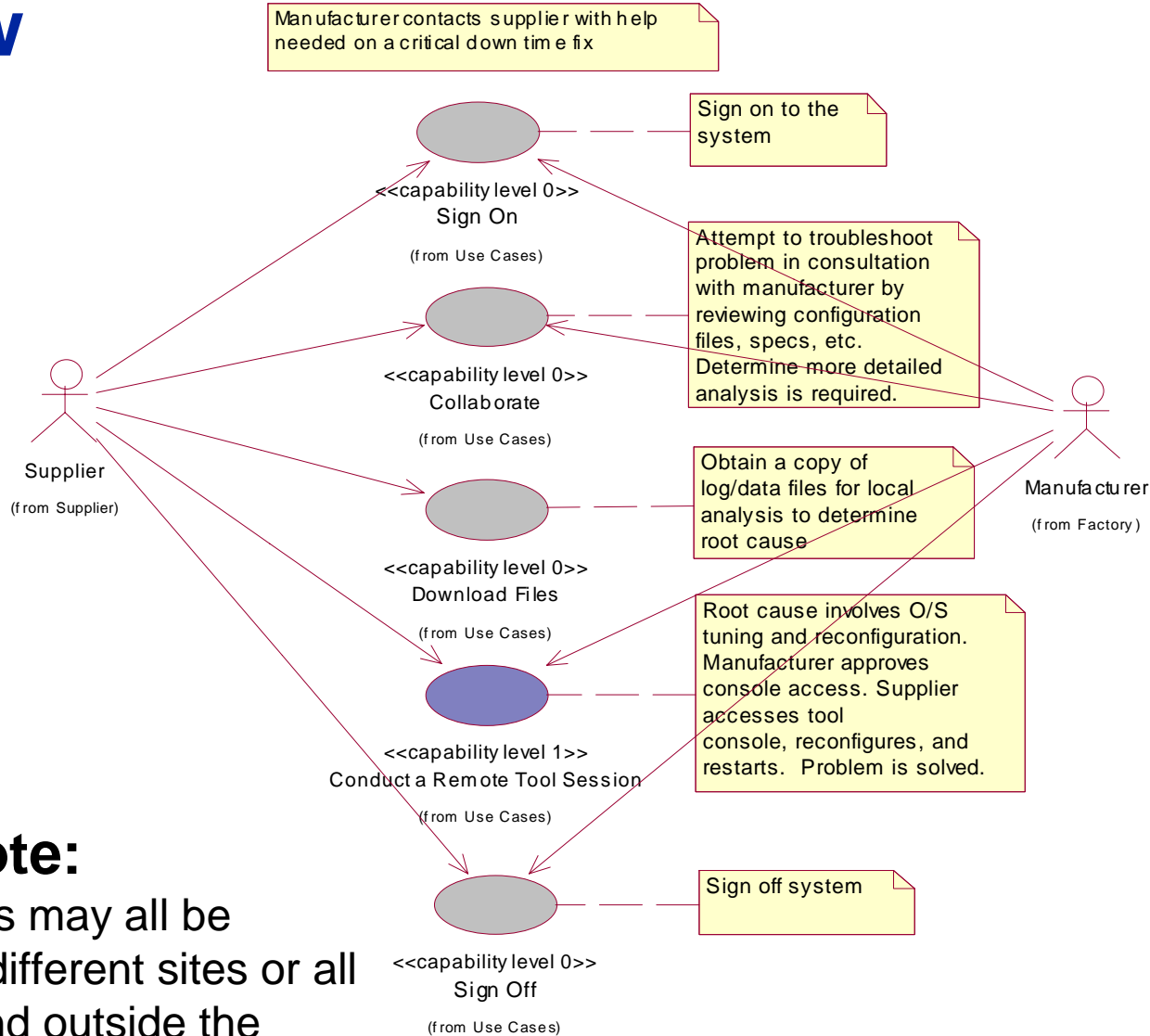
Use Cases by Capability Level

Current iteration focus:



System Overview

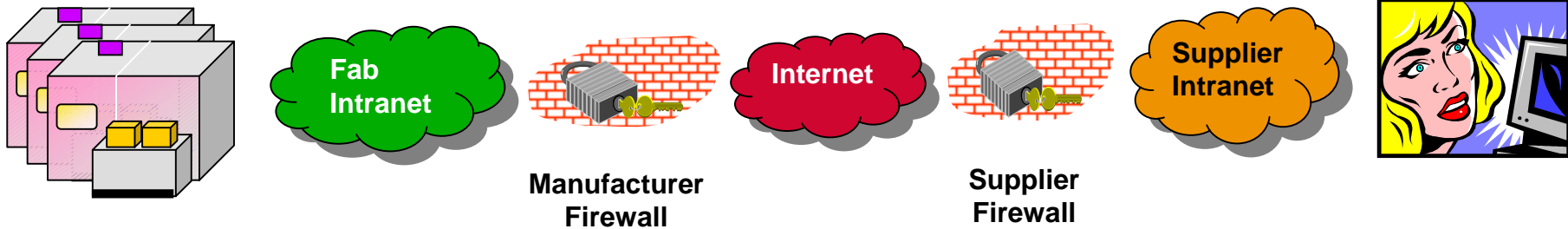
Example Troubleshooting Scenario



Note:

Participating actors may all be manufacturers at different sites or all suppliers inside and outside the factory, or any imaginable permutation

Use Case – Authorize New User



Pre-conditions: • **Authorized Administrator**

Post-conditions: • **User has unique identity known to system + privileges**

Essential Criteria

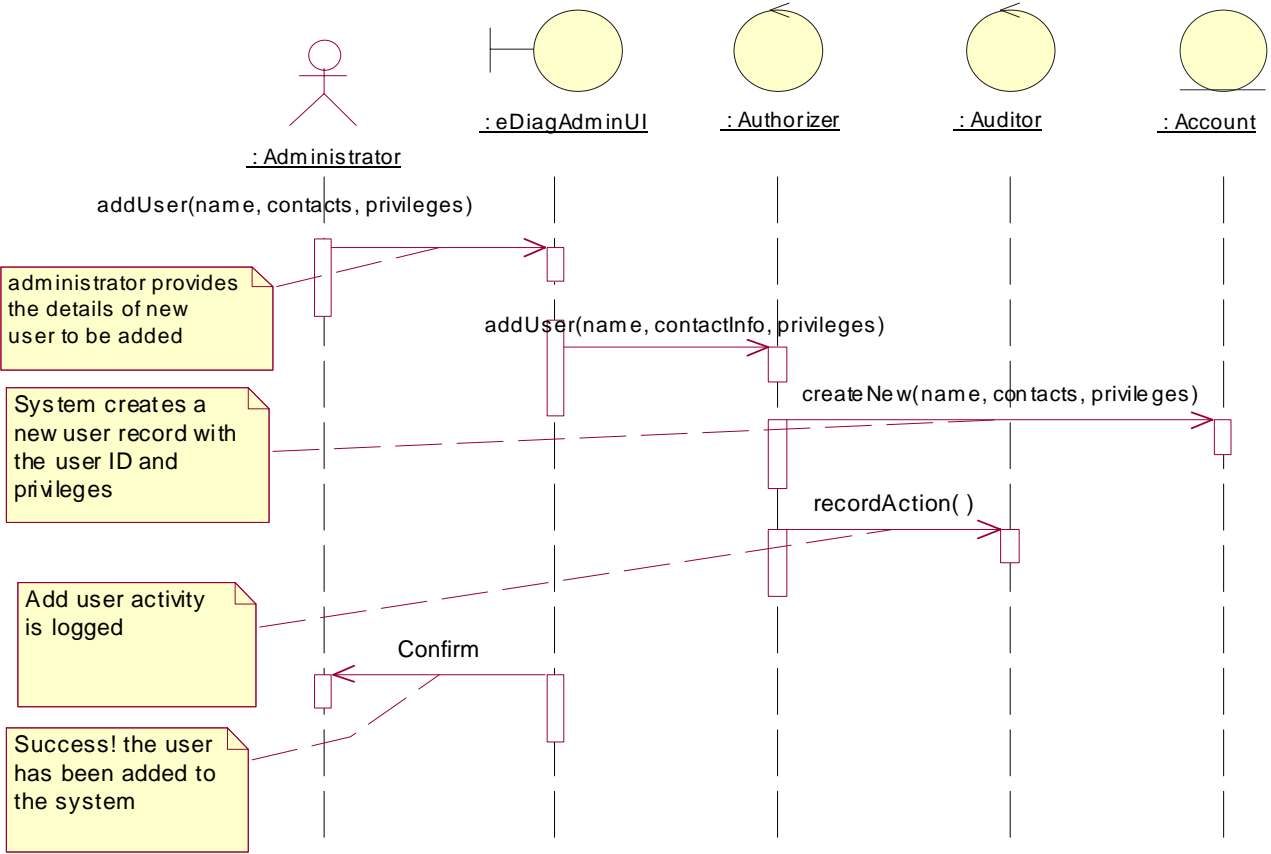
- Single point of access, authorization
- Heterogeneous h/w & s/w
- Encrypt-able
- Support group concepts
- Support designated admins

Protocol Recommendation

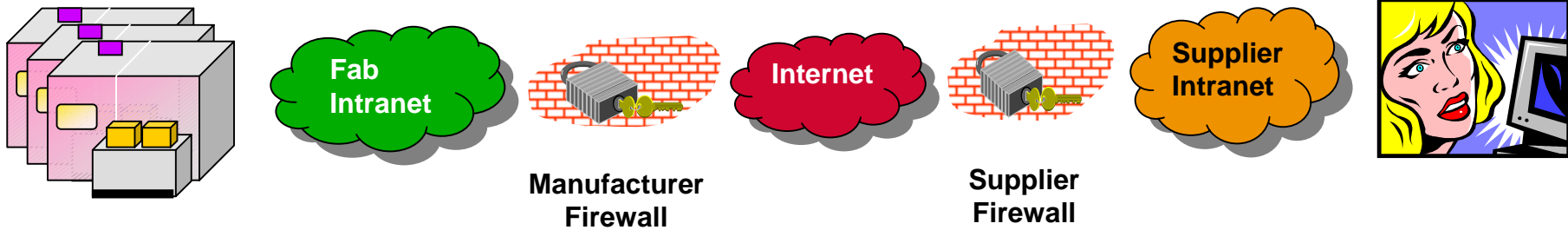
- HTTP on SSL
- Working with security team (looking at PKI + LDAP)

Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Performance Monitoring and Remote Operation
Level 2: Analysis	Automated Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

New User



Use Case – Sign On



Pre-conditions: **• Authorized**

Post-conditions: **• User has access to system, according to authorization**

Essential Criteria

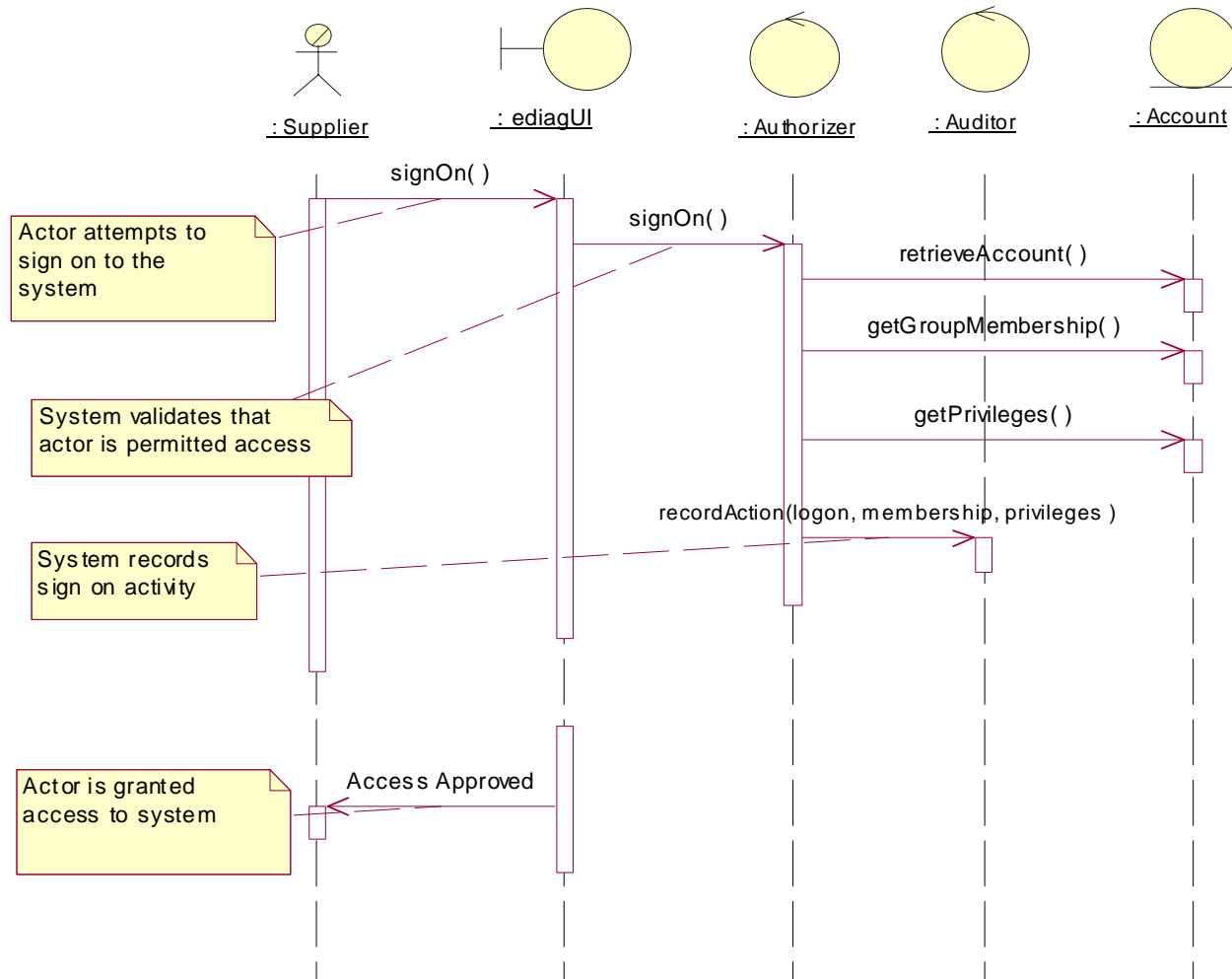
- Single point of access, authorization
- Heterogeneous h/w & s/w
- Encrypt-able

Protocol Recommendation

- HTTP on SSL
- Working with security team (looking at PKI + LDAP)

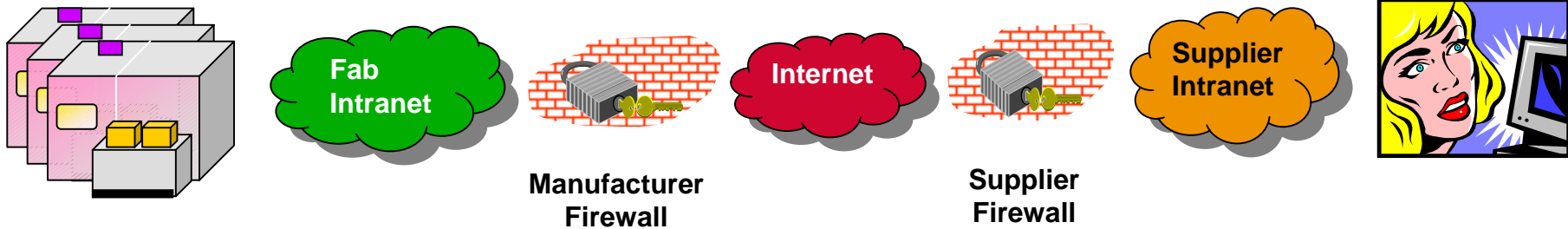
Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Performance Monitoring and Remote Operation
Level 2: Analysis	Automated Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

Sign On



Sequence Diagram: Sign On / Sign On Failure

Use Case – Sign Off



Pre-conditions: **• Signed on**

Post-conditions: **• User has no further access to system**

Essential Criteria

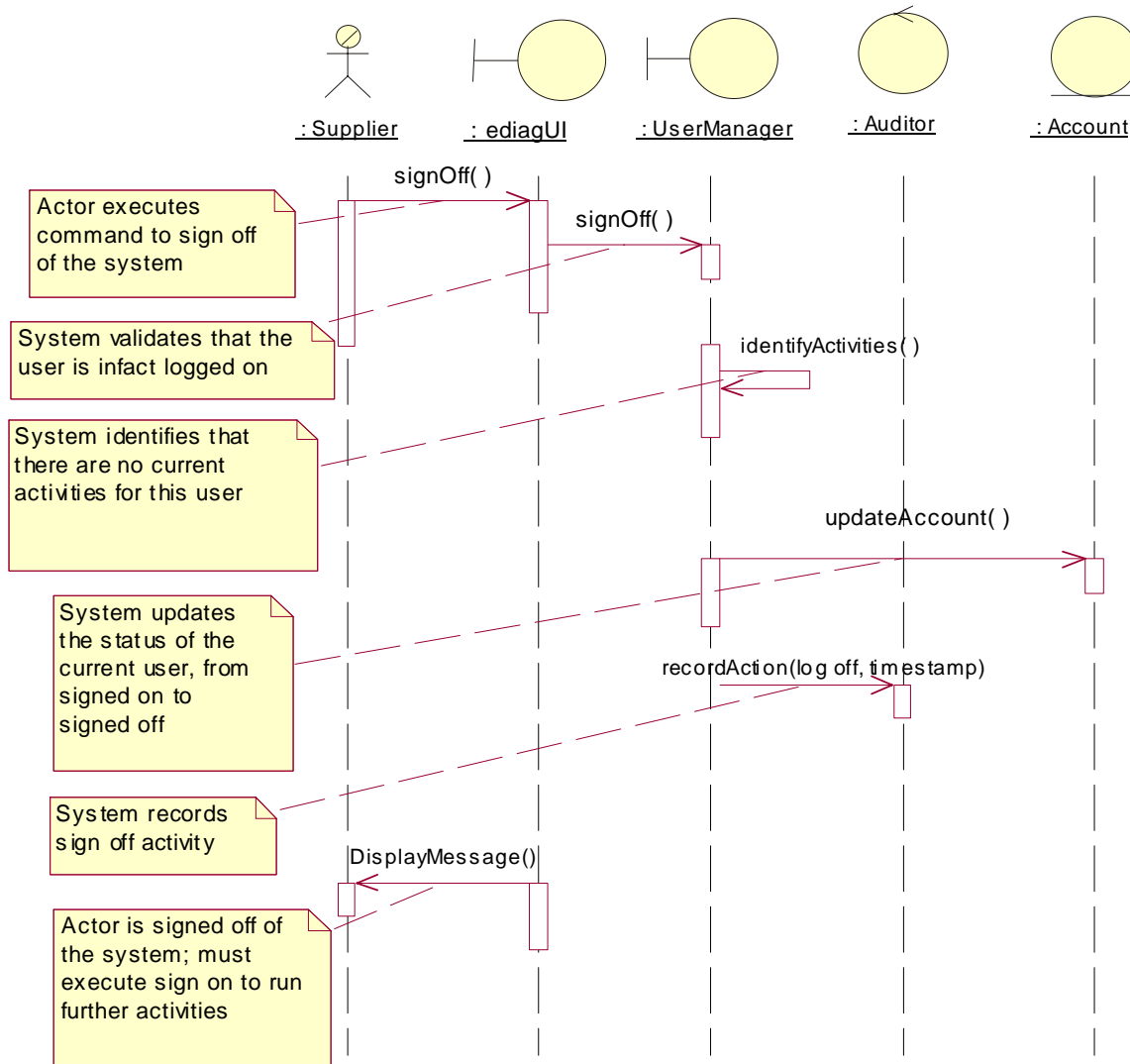
- Single point of access, authorization
- Heterogeneous h/w & s/w
- Encrypt-able

Protocol Recommendation

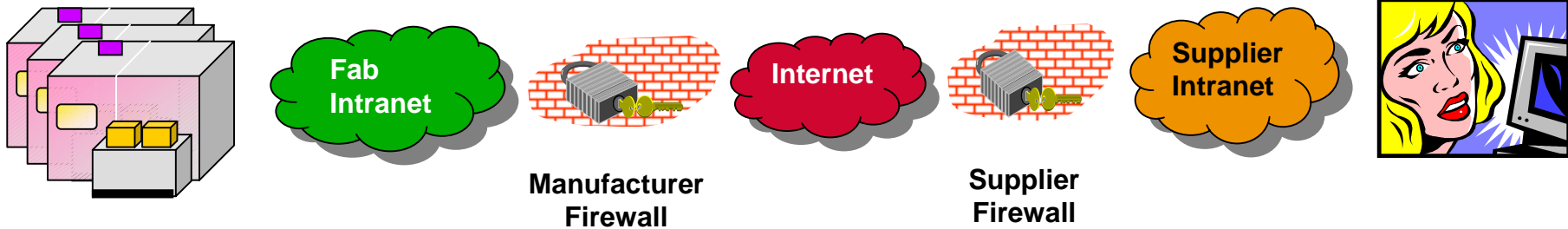
- HTTP on SSL
- Working with security team (looking at PKI + LDAP)

Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Performance Monitoring and Remote Operation
Level 2: Analysis	Automated Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

Sign Off



Use Case – Stage Files for Download



Pre-conditions:

- Signed on
- Authorized to stage files

Post-conditions:

- Files available for download

Essential Criteria

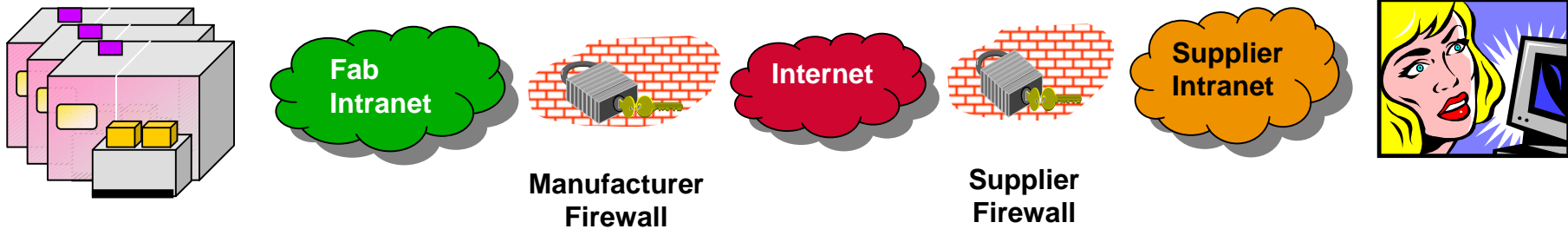
- Single point of access, authorization
- Multiple data formats
- Heterogeneous h/w & s/w
- Ability to specify continuous update
- Ability to set storage limitations
- Ability to restrict “stageable” files
- Staged files stored off-tool

Protocol Recommendation

- New to this iteration

Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Performance Monitoring and Remote Operation
Level 2: Analysis	Automated Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

Use Case – Download Files



Pre-conditions:

- Signed on
- Authorized for download

Post-conditions:

- Requested files are downloaded

Essential Criteria

- Single point of access, authorization
- Multiple data formats
- Heterogeneous h/w & s/w
- Encrypt-able
- Ability to control access by company, geography, site, etc.
- Only staged files can be downloaded
- Equipment computer resources do not participate in the download

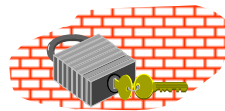
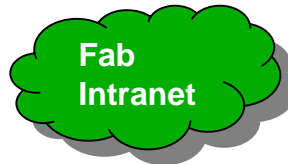
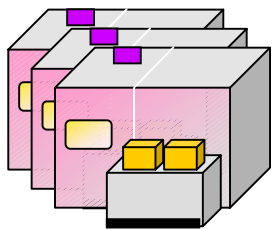
Protocol Recommendation

- **FTP/HTTP on SSL**

INTERNATIONAL SEMATECH

Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Performance Monitoring and Remote Operation
Level 2: Analysis	Automated Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

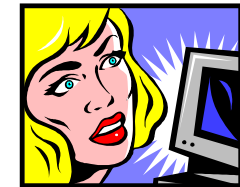
Use Case – Upload Files



Manufacturer Firewall



Supplier Firewall



Pre-conditions:

- Signed on
- Authorized to upload

Post-conditions:

- Files uploaded to e-diagnostics system

Essential Criteria

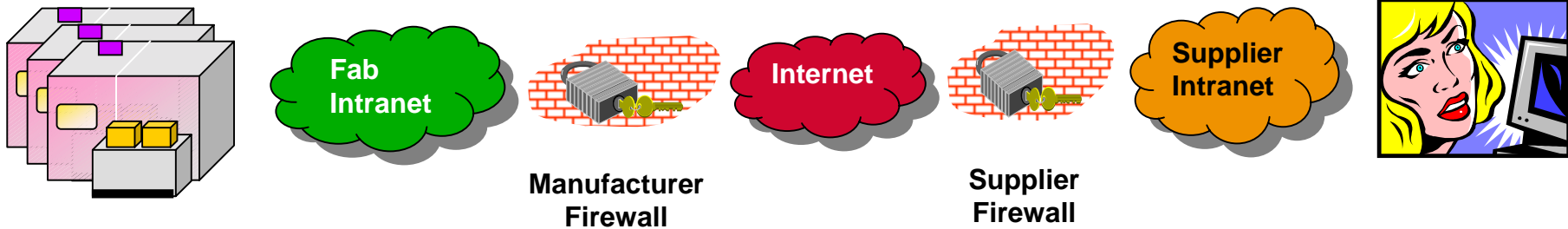
- Single point of access, authorization
- Multiple data formats
- Heterogeneous h/w & s/w
- Encrypt-able
- Uploaded files not stored on tools
- Require separate privilege to upload files to tool computers
- Ability to enforce storage limits
- Ability to specify file storage lifetime

Protocol Recommendation

- New to this iteration

Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Performance Monitoring and Remote Operation
Level 2: Analysis	Automated Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

Use Case – Transfer Files to Tool



Pre-conditions:

- Signed on
- Authorized to transfer to tool

Post-conditions:

- File(s) Transferred to tool computer(s)

Essential Criteria

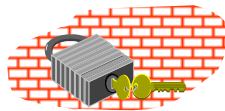
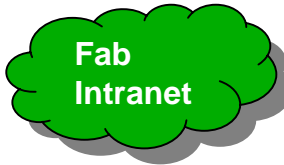
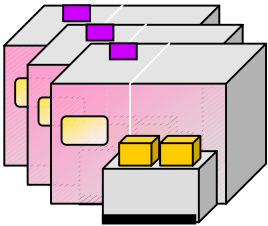
- Single point of access, authorization
- Multiple data formats
- Heterogeneous h/w & s/w
- Transferred files placed in a single location specifically for uploads
- Ability to restrict privilege by company, geography, site, etc.

Protocol Recommendation

- New to this iteration

Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Performance Monitoring and Remote Operation
Level 2: Analysis	Automated Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

Use Case – Collaborate



Manufacturer Firewall



Supplier Firewall



Pre-conditions:

- User is authenticated
- Max session count not exceeded

Post-conditions:

- Real time n-way collaboration session established

Essential Criteria

- Shared file viewing
- Encrypt-able
- Participants able to selectively share information
- Multiple simultaneous participants
- Support for meeting host role

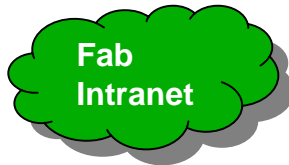
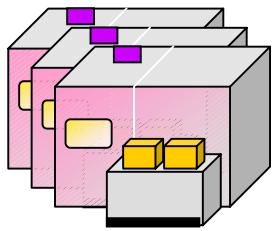
Protocol Recommendation

- T.120 over TCP



Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Performance Monitoring and Remote Operation
Level 2: Analysis	Automated Data Reporting and Analysis
Level 3: Prediction	Proactive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

Use Cases – Conduct a Remote Tool Session



Manufacturer Firewall



Supplier Firewall



Pre-conditions:

- Authenticated, authorized
- Equipment in non-production state

Post-conditions:

- User able to view equipment config/state
- User able to change equipment config/state

Essential Criteria

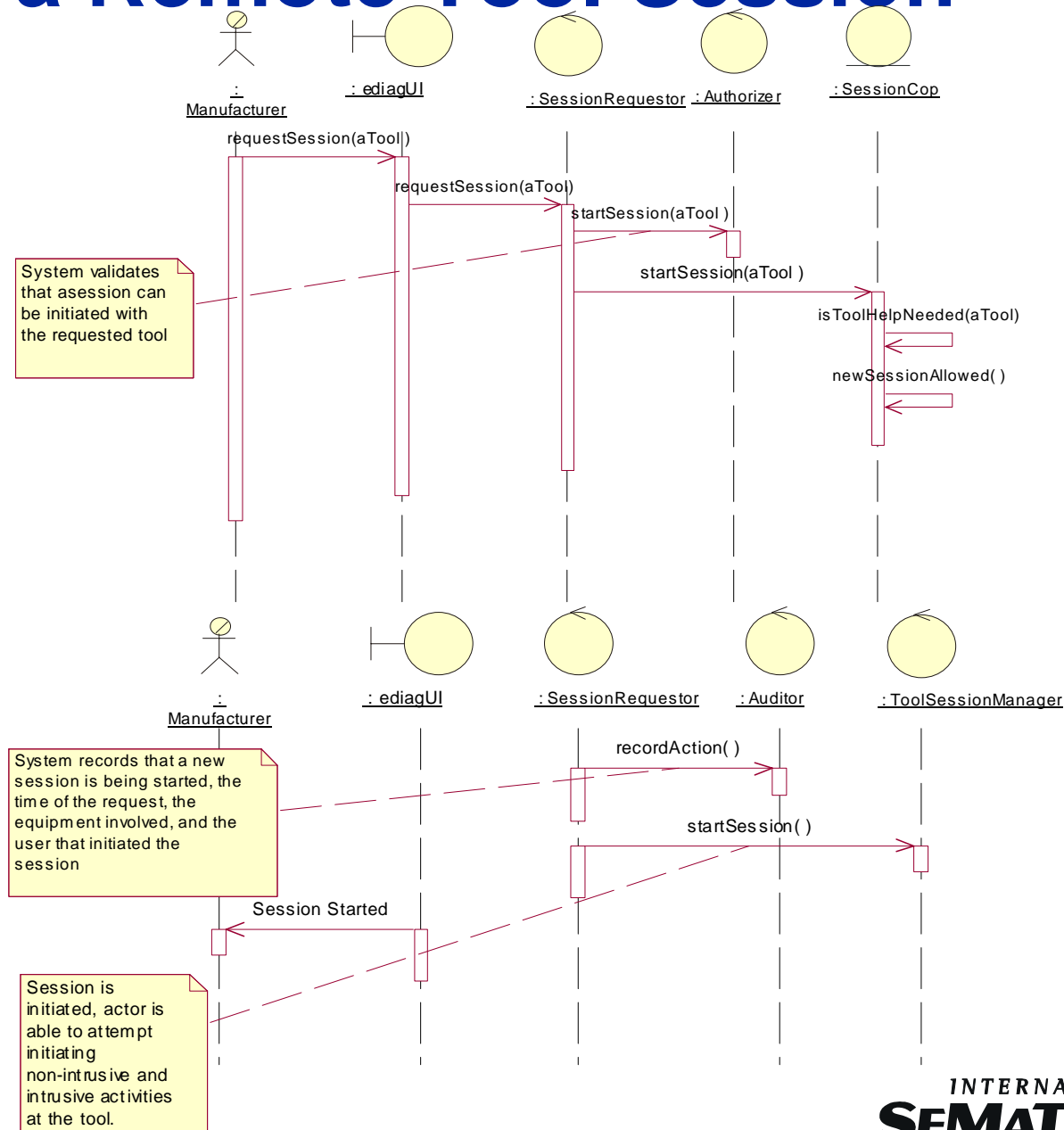
- Fab can authorize/deny any operations
- Fab can abort session at any time
- Single sign-on for like tools
- Proxy-friendly

Protocol Recommendation

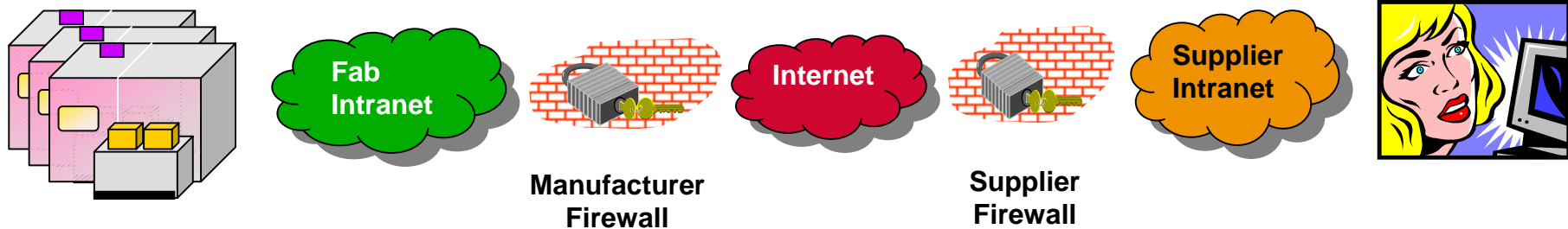
- SSL on TCP

Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Performance Monitoring and Remote Operation
Level 2: Analysis	Automated Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

Conduct a Remote Tool Session



Use Case – Enable Data Collection



Pre-conditions:

- Authenticated, authorized

Post-conditions:

- Equipment data is published for off-tool storage

Essential Criteria

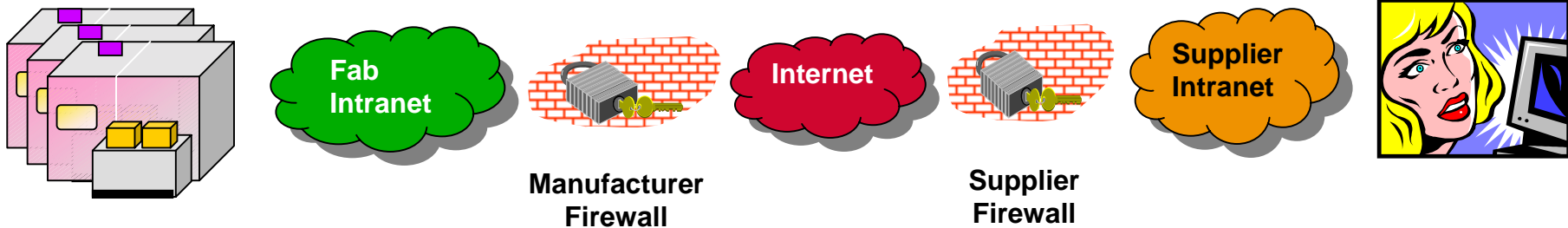
- Multi-platform
- Guaranteed Delivery
- Encrypt-able
- High Performance

Protocol Recommendation

- Evaluate XML on HTTP
- CORBA Middleware

Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Partition for Monitoring and Remote Operation
Level 2: Analysis	Advanced Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

Use Case – Monitor Equipment Operation



Pre-conditions: • Data collection is enabled

Post-conditions: • Supplier able to view equipment data in near-real time

Essential Criteria

- Multi-platform
- Encrypt-able
- Graphics-capable
- Firewall-friendly

Protocol Recommendation

- HTTP on SSL (browser front end)

Capability Taxonomy	
Level 0: Connection	Basic remote connectivity with connection management.
Level 1: Collection and Control	Remote Partitioning, Monitoring and Remote Operation
Level 2: Analyze	Advanced Data Reporting and Analysis
Level 3: Prediction	Predictive Maintenance, Self Diagnosis, and Automated Notification
Level 4: Correlation	Cross-tool correlation

Emerging Topics

- **Newly identified capability**
 - Access to supplier infrastructure from within factories (e.g., on-site field service engineer access)
 - Addition to capability model
- **Capability level 0**
 - Mobile access: explicit goal for e-diagnostics?
- **Capability level 1 – Remote Tool Sessions**
 - For executing diagnostics applications on the tool, a remote console access model is less securable and auditable than an explicit diagnostic management application could be. Will need to structure requirements to accommodate.

Summary

- **Active participation from ICM's, suppliers, and 3rd party vendors**
- **Currently in 2nd iteration on system definition for capability Level 0 (+ Remote Tool Sessions)**
 - First iteration identified & detailed some use cases, recommended communication protocols
 - Completed analysis on about 70% of identified use cases
- **Goals are preliminary system requirements and design definition for (at least) Level 0 and Level 1**
 - Pre-work for SEMI standardization process