CFAM JWG Technology Solutions Subgroup

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TEAM

- **Heather Moyer, Concurrent Technologies Corp (CTC)**
- **Vicki Barbur, CTC**
- **Craig Rieger, Idaho National Laboratory**
- **Frank Serna, Draper**
- **Devu Shila, United Technologies Research Center**
- **Tim Shinbara, Association for Manufacturing Technology**
- **Janet Twomey, Wichita State University**
- Dawn Beyer, Lockheed Martin
- Donald Davidson, DoD CIO
- Gib Goodwin, BriteWerx
- Larry John, ANSER
- Michele Moss, DoD CIO CTR
- Kaye Ortiz, Defined Business Solutions
- Chris Peters, Lucrum Group
- Jimmy Poplin, Defined Business Solutions
- Stephanie Shankles, DoD CIO CTR

Deliverable

The Technology Solutions subgroup deliverable will be a Recommendations Report based on an analysis of cyber attack vectors within the manufacturing environment and a gap analysis of existing and emerging technical solutions to improve cybersecurity in manufacturing

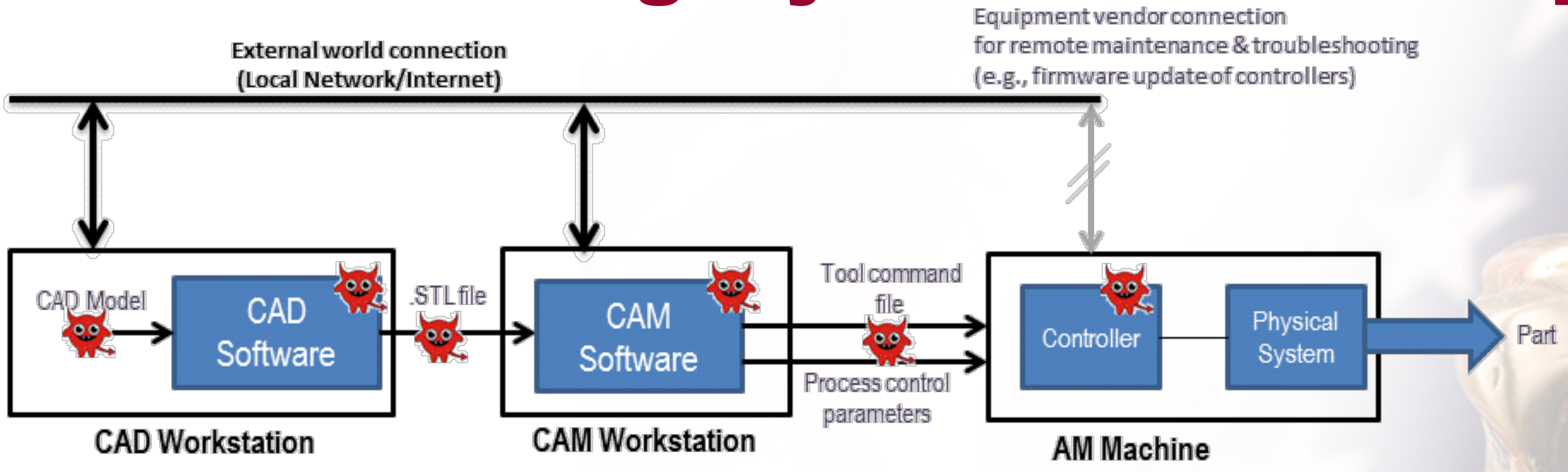
The report will answer the following questions posed in the CFAM terms of reference:

- What technical solutions can be identified, either available now or under development, to increase cybersecurity in the manufacturing environment?
- What new technology-based concepts should be explored?

Approach

- **Develop Confidentiality, Availability, and Integrity use cases based on representative manufacturing scenarios**
- **For each use case, develop attack trees revealing remote, local, and physical attack vectors**
- **Identify cybersecurity technology requirements consistent with NIST SP800-53 security control families**
- **Research existing and emerging technology solutions leveraging existing research and materials where possible and engaging subject matter experts and end users**
- **Develop a technology matrix identifying near-term (including solutions for legacy systems), mid-term, and long-term solutions and gaps**
- **Based on the gap analysis, develop recommendations for additional research as well as suggestions for what the government can do to promote or accelerate the commercialization of solutions**

Integrity Use Case Example


External world connection
(Local Network/Internet)
Equipment vendor connection
for remote maintenance & troubleshooting
(e.g., firmware update of controllers)
CAD Model
CAD Software
CAD Workstation
.STL file
CAM Software
CAM Workstation
Tool command file
Process control parameters
Controller
Physical System
AM Machine
Part

Goal – Attack the quality of the additive manufactured product

Layers – CAD model, .STL/.AMF file, Tool command file, Process Control Parameters, Controllers

🟩 Remote 🟧 Local 🟥 Physical

Attack vectors

- 🟥 Rogue designers inserting malicious logic into the CAD model, STL file or Tool command file
- 🟩 3rd party models or files embedded with unwanted logic
- 🟩 Malicious 3rd party CAD/CAM software that inserts extraneous or deletes logic into the models/files
- 🟩 Tampers models/files/control parameters via Malware infection (by exploiting insecure external communications and software vulnerabilities of CAD/CAM software or Operating systems)
- 🟧 Modifying files or process control parameters by exploiting Insecure local area communications
- 🟥 Update controller firmware by exploiting insecure physical interfaces such as USB

Subject Matter Experts

AMT Technology Issues Committee	via Tim Shinbara
National Cybersecurity Center of Excellence (NCCoE)	Don Woodbury
Society of Manufacturing Engineers	Debbie Holton
Industrial Control Systems-Cyber Emergency Response Team (ICS-CERT)	Bob Timpany
National Cybersecurity and Communications Integration Center (NCCIC)	Bob Timpany
Industrial Internet Consortium Security Working Group	iiconsortium.org
Repository of Industrial Security Incidents	risidata.com
CISCO, Rockwell Automation, Siemens, etc.	
Boeing, Lockheed Martin, GE, Alcoa, etc.	

Next Steps

- Finalize use cases (attack trees)
- Schedule SME interviews
- Ramp up identification of available technologies
- Research emerging technologies