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Assessing Security for NI Linux Real-Time Using the NIST Cybersecurity Framework

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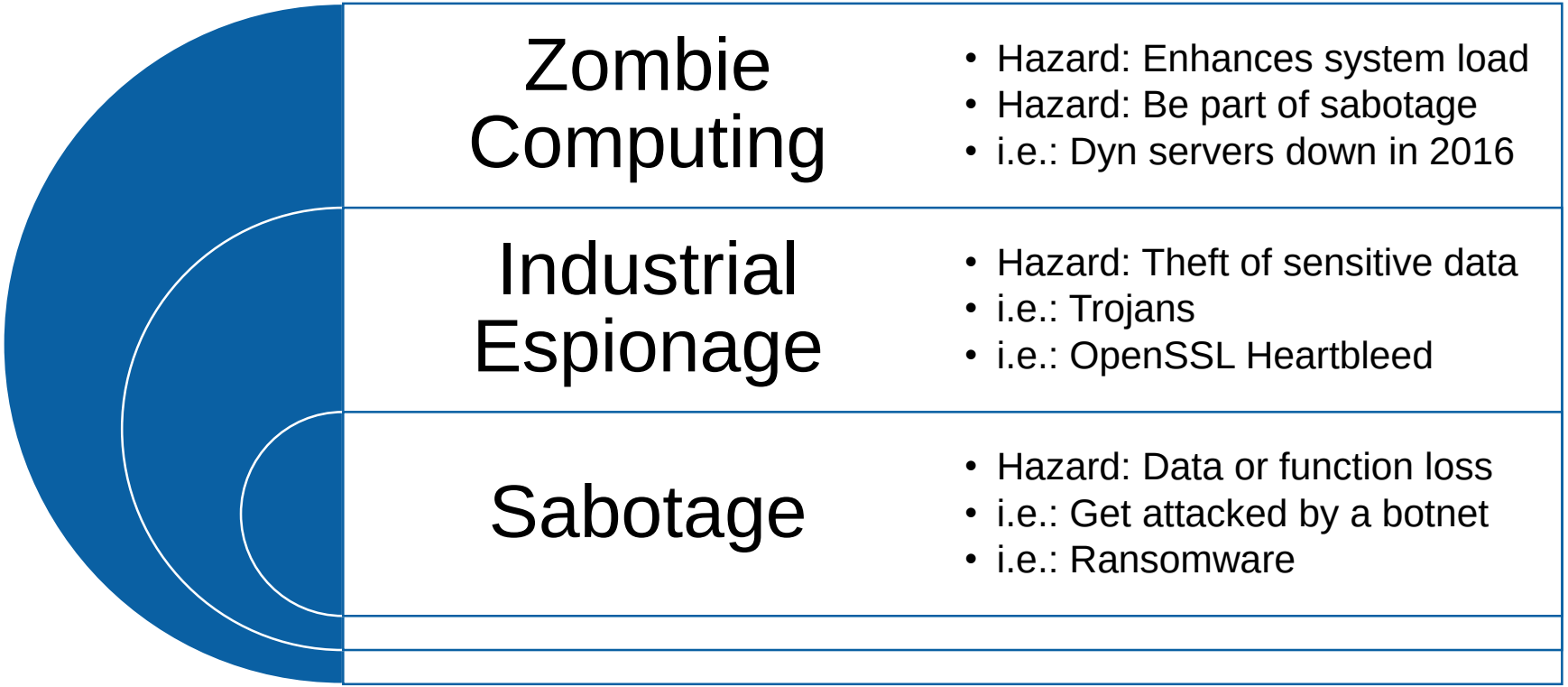
Agenda

- Security is Everyone‘s Matter
- Security is a Continuum
- Security is Collective Effort
- Security is About Doing

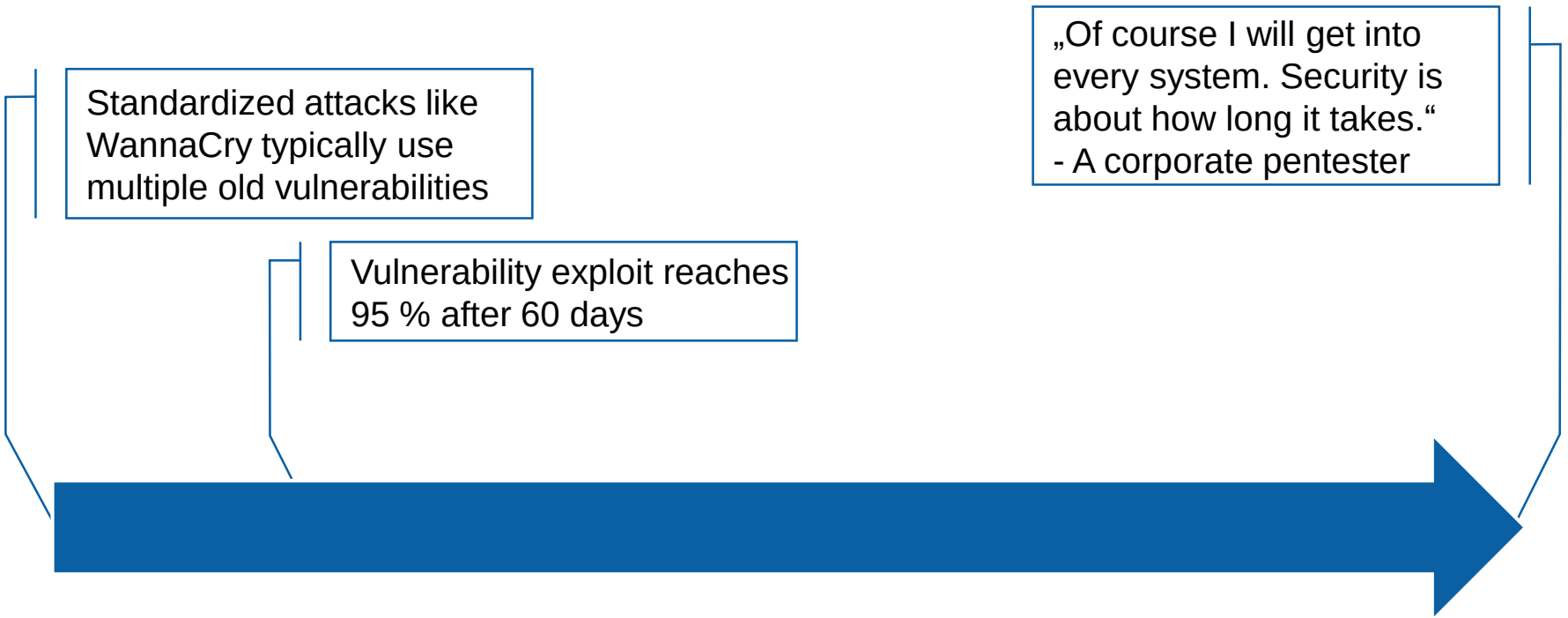
- Security Management Using NIST CSF
- Security Decisions for NILRT Using NIST CSF

- Conclusion
- Outlook
- Key Resources

Security is Everyone‘s Matter



Security is a Continuum



Security is a Continuum

Standardized attacks like WannaCry typically use multiple old vulnerabilities

Vulnerability exploit reaches 95 % after 60 days

„Of course I will get into every system. Security is about how long it takes.“
- A corporate pentester

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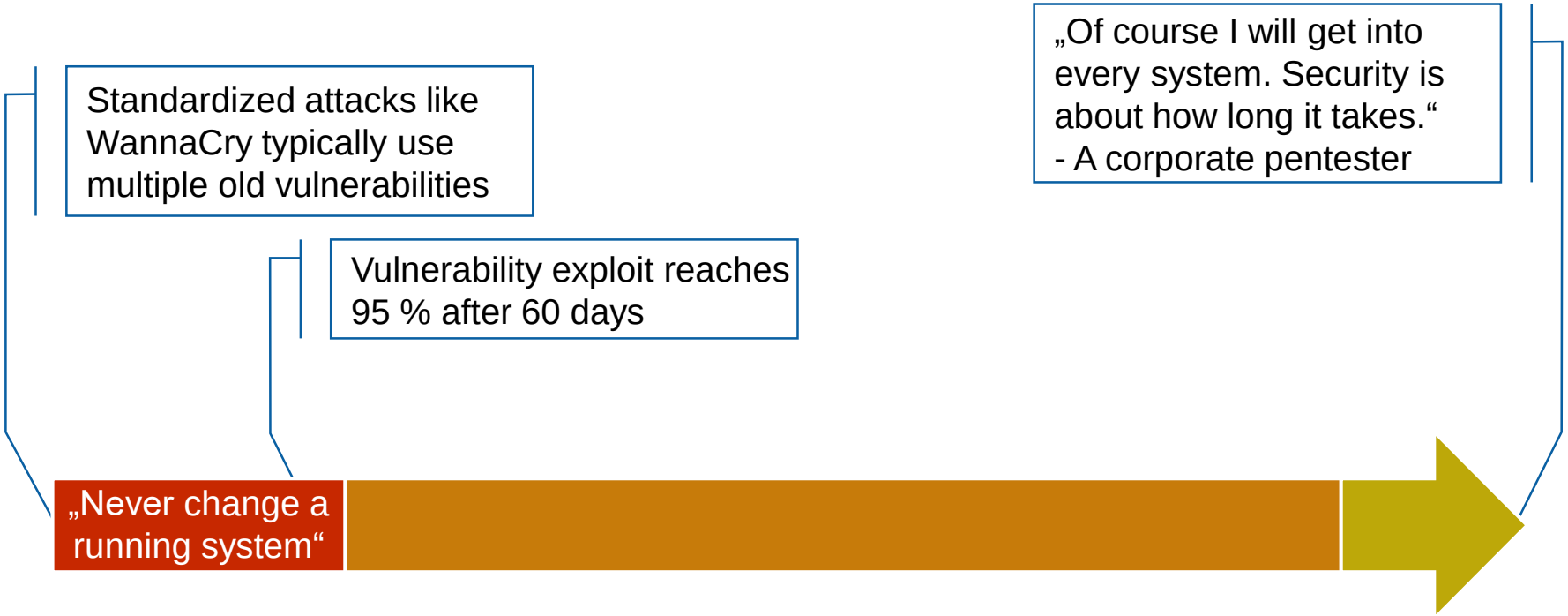
Security is a Continuum



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Security is Collective Effort

Start knowing

ni.com/security

Get NI consulting

(Contact NI Sales)

Reach out to the community

ni.com/linuxrtforum

Get IT consulting

(Consider your IT & big players like Tresys)

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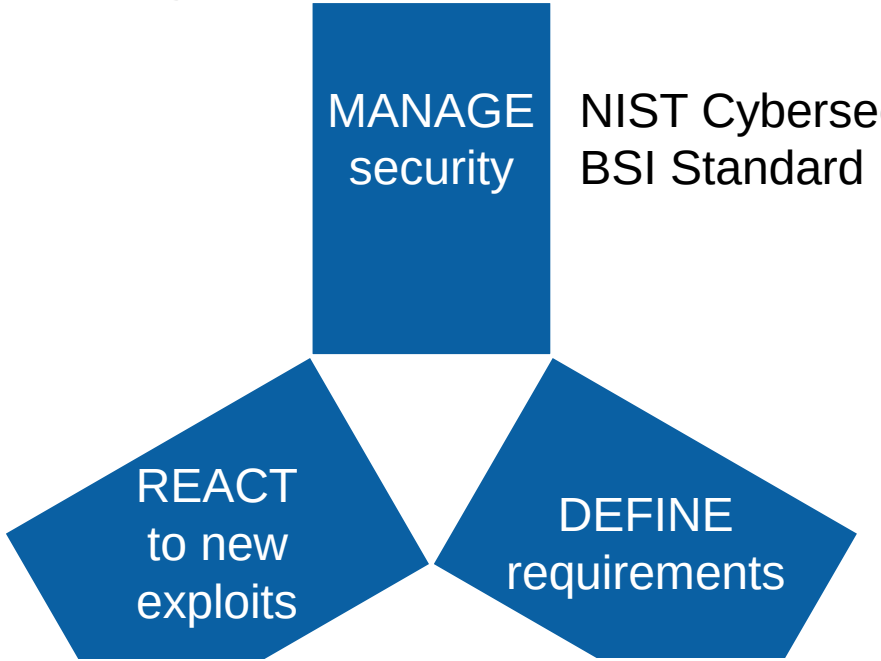
Security is About Doing



NIST Cybersecurity Framework
BSI Standard 100 / 200

NI Security Notifications
Vendor Security Notifications
CVE Feeds

NIST Guide to ICS
BSI ICS Security Compendium

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Security Management Using NIST CSF

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Security Management Using NIST CSF

Function	Categories	Subcategories	References
Identify (ID)	ID.AM Asset Management	ID.AM-2: Software platforms and applications within the organization are inventoried	
Protect (PR)			
Detect (DE)			
Respond (RS)			
Recover (RC)			

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Security Decisions for NILRT Using NIST CSF

Function			
Identify	ID.AM Asset Management		
	ID.AM-2: Software platforms and applications within the organization are inventoried	List Linux software ▪ Use `opkg list` via PuTTY ▪ PuTTY and opkg are explained in NI Linux Real-Time User Guide	User Guide
		List NI software ▪ Get a MAX Report ▪ Includes installed NI SW and SW version ▪ Also documents firmware and kernel version	NI MAX
		List your software ▪ Use source code control, i.e. SVN or Git ▪ Create a tag for every release	Web

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Security Decisions for NILRT Using NIST CSF

Function			
Identify			
Protect	PR.AC Access Control		
	PR.AC-1	Identities and credentials are managed for authorized devices and users	Set admin pw	User Guide
	PR.AC-2	Physical access to assets is managed and protected	Lead seals or locks	
	PR.AC-3	Remote access is managed	VPN	Consulting
	PR.AC-4	Access permissions are managed, incorporating the principles of least privilege and separation of duties	SELinux	Consulting
	PR.AC-5	Network integrity is protected, incorporating network segregation where appropriate	Firewall VPN	User Guide Consulting

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Security Decisions for NILRT Using NIST CSF

Function				
Identify				
Protect	PR.DS Data Security			
	PR.DS-1	Data-at-rest is protected	Access Control Cryptography Firewall Integrity Checking	Guide / Cons Web User Guide Guide / Web
	PR.DS-2	Data-in-transit is protected	Cryptography Firewall VPN	Web User Guide Consulting

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Security Decisions for NILRT Using NIST CSF

Function				
Identify				
Protect	PR.PT Protective Tech			
	PR.PT-1	Audit/log records are determined, documented, implemented, and reviewed in accordance with policy	Linux Logs SW Logs	Web
	PR.PT-2	Removable media is protected and its use restricted according to policy	Disable USB	Web
	PR.PT-3	Access to systems and assets is controlled, incorporating the principle of least functionality	Access Control Physical Control	Guide / Cons
	PR.PT-4	Communications and control networks are protected	Firewall VPN	User Guide Consulting

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Security Decisions for NILRT Using NIST CSF

Function				
Identify				
Protect				
Detect	DE.CM Continuous Mon			
	DE.CM-1	The network is monitored to detect potential cybersecurity events	Firewall Intrusion Detection	Guide / Web Web / Cons
	DE.CM-2	The physical environment is monitored to detect potential cybersecurity events	Surveillance	
	DE.CM-3	Personnel activity is monitored to detect potential cybersecurity events	Access Control Intrusion Detection Surveillance	Guide / Cons Web / Cons

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Security Decisions for NILRT Using NIST CSF

Function				
Identify				
Protect				
Detect	DE.CM Continuous Mon			
	DE.CM-4	Malicious code is detected	Virus Scanner	Web
	DE.CM-5	Unauthorized mobile code is detected	Integrity Checking Intrusion Detection Virus Scanner	Guide / Web Web / Cons Web
	DE.CM-7	Monitoring for unauthorized personnel, connections, devices, and software is performed	Access Control Integrity Checking Intrusion Detection	Web / Cons Web / Cons Consulting

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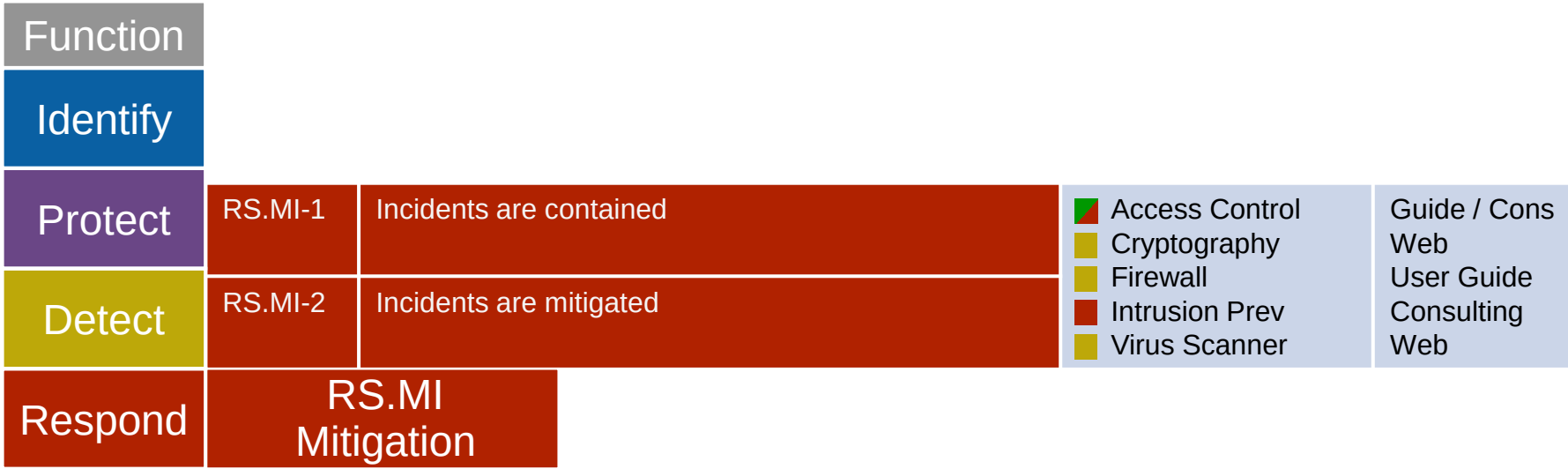
Security Decisions for NILRT Using NIST CSF



Security Decisions for NILRT Using NIST CSF

Function			
Identify	RC.RP-1: Recovery plan is executed during or after an event	Standalone: Replication and Development (RAD) Utility	NI Web
Protect		Automatized replication via LabVIEW: nisyscfg.lvlib	NI Help
Detect		Rescue data using a live CD, i.e. ▪ Gparted ▪ System Rescue CD ▪ Ubuntu	Web
Respond		In case of not-recoverable OS contact NI Support	NI Support
Recover	RC.RP Recovery Planning		

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Conclusion

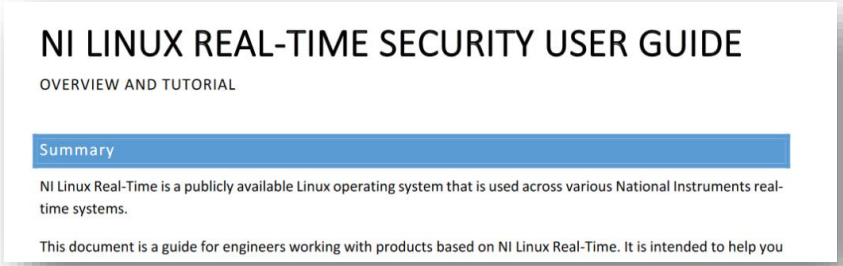
- The IIoT forces ICS developers to address cybersecurity
- A scalable framework like the NIST Cybersecurity Framework helps assessing the right amount of effort
- NI Linux Real-Time enables you to implement state-of-the-art security features

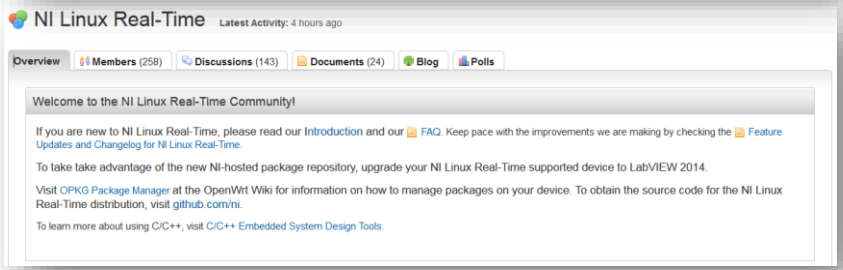
Outlook

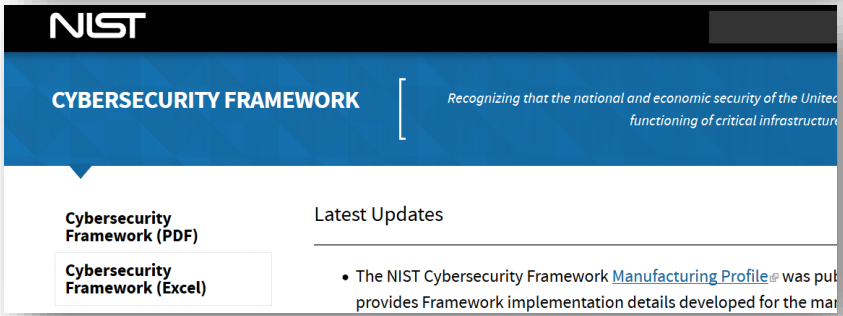
- “Never change a running system” versus cybersecurity
- Understanding the consequences of general, intermediate, and extreme security implementations
- Creating a toolchain that is security-aware

Key Resources

- ni.com/security
  - NI Linux Real-Time Security User Guide
  - Security Updates
- ni.com/linuxrtforum
  - Tutorials & documentation
  - NI-attended discussion forum
- https://www.nist.gov/cyberframework
  - Manage Security with the CSF







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