Designing, Building and Managing a Cyber Security Program Based on the NIST Cybersecurity Framework (NIST CSF)

A Business Case

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Background and Introduction

The following business case outlines the cost to design, implement and manage a cybersecurity program based on the NIST Cybersecurity Framework using the UMASS Controls Factory model. The business case is based on a programs designed and implemented by the University of Massachusetts for its five campuses and six surrounding partner universities.

The first section introduces the digital innovation economy and why enterprises need to build and maintain a reliable, resilient, secure and trusted service delivery infrastructure in order to protect the information it relies on for daily business operations and revenue growth.

The second section introduces the cyber security problem in the context of risk management and the management of risk components which include assets (and their relative value) threats, vulnerabilities and the controls that need to be in place to safeguard an organizations most valuable information resources.

The third section introduces the cost associated with designing, building and maintaining a NIST cybersecurity program using the UMASS Controls Factory program. Areas covered include:

1. **The cost to educate** an enterprise on the UMASS approach to operationalizing the NIST CSF across an enterprise and its supply chain.
2. **The cost to assess the risks** so the enterprise can identify and prioritize the threats and vulnerabilities the organization needs to deal with.
3. **The cost to implement, test and continuously monitor** the cyber security program. The costs will include the fees for enterprises to do it themselves and the cost to outsource the program to UMASS or one of its licensed partners.

The Digital Innovation Economy

Three things are certain in today's business world: first, digital services are now at the center of all businesses; second, business is a moving target and third businesses are under attack from those trying to steal the critical information companies rely on for daily business operations and revenue generation.

The demand for a proactive, collaborative and balanced approach for managing and securing enterprise digital assets and services across stakeholders, supply chains, functions, markets, and geographies has never been greater.

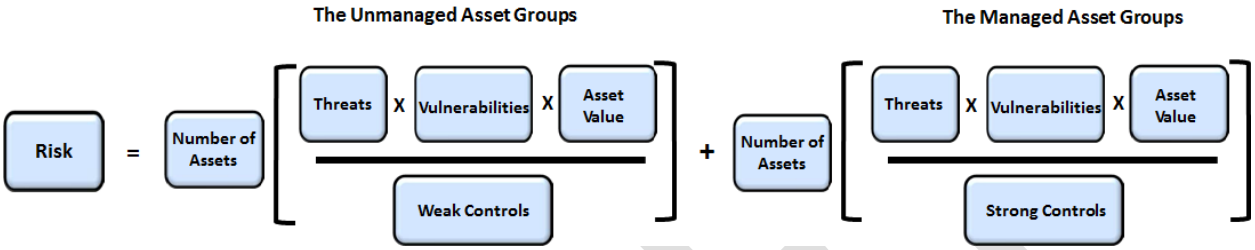
In order to achieve the potential benefits of the innovation economy, an enterprise must ensure that it can build and maintain a reliable, resilient, secure and trusted digital infrastructure.

In order to do this an organization must be able to identify its assets so it can understand its attack surface and the threats and vulnerabilities associated with that attack surface. With the growth of the Internet of Things (mobile devices, security cameras, video recorders, electrical boxes etc.) the attack surface along with its threats and vulnerabilities is constantly changing. To deal with this, organizations must build and maintain a continual service improvement program that delivers the right set of security controls to mitigate the latest cyber threats, remediate the critical vulnerabilities and protect the high value assets.

The Cyber Security Problem

Cybersecurity is all about managing risk. But, before you can manage risk, you need to understand risk. The main idea is that if organizations have a solid understanding of the risk components, including the threats, the vulnerabilities, the assets (and their relative value), and the controls, they will be in a better position to safeguard their most valuable information resources. An effective cybersecurity program involves a thorough understanding, assessment, and handling of these key risk components. The equation for risk is shown below, which identifies the key components of risk.

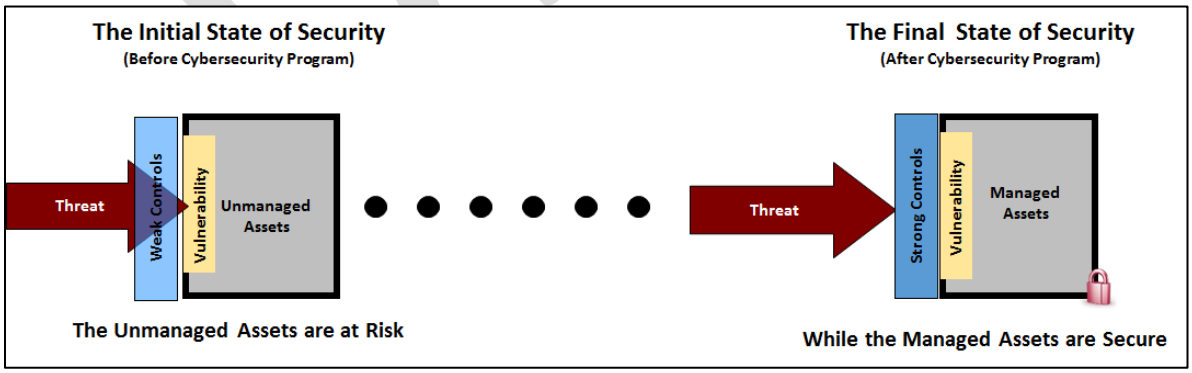
The Risk Equation



So, how do we calculate risk?

1. Risk is based on the likelihood and impact of a cybersecurity incident or data breach … which is based on the percentage of unmanaged assets v. managed assets
2. Threats involve the potential attack against IT resources and information assets
3. Vulnerabilities are weaknesses of IT resources and information that could be exploited by a threat
4. Asset Value is based on criticality of IT resources and information assets
5. Controls are safeguards that protect IT resources and information assets against threats and/or vulnerabilities (see note)

Managed assets are characterized by strong controls, while unmanaged assets have weak, missing or ineffective controls. All cybersecurity programs focus on protecting the organization's high value assets. Early stage programs typically have a higher percentage of unmanaged assets, which are those with weak security controls. As programs mature, the percentage of managed assets increase and the percentage of unmanaged assets decrease. This means that the controls are stronger and the program is more effective.



The Cyber Security Solution - The NIST Cybersecurity Framework

In February 2013, President Obama issued Executive Order 13636, "Improving Critical Infrastructure Cybersecurity," which called on the Department of Commerce's National Institute of Standards and Technology (NIST) to develop a voluntary risk-based Cybersecurity Framework for the nation's critical infrastructure—that is, a set of industry standards and best practices to help organizations identify, assess, and manage cybersecurity risks. NIST issued the resulting Framework in February 2014.

The Framework is a risk-based approach to managing cybersecurity risk, and is composed of three parts; the Framework Core, the Framework Implementation Tiers, and the Framework Profiles. Each Framework component reinforces the connection between business drivers and cybersecurity activities:

The **Framework Core** is a set of cybersecurity activities, desired outcomes, and references that are common across critical infrastructure sectors. The Core presents industry standards, guidelines, and practices in a manner that allows for communication of cybersecurity activities and outcomes across the organization from the executive level to the implementation/operations level.

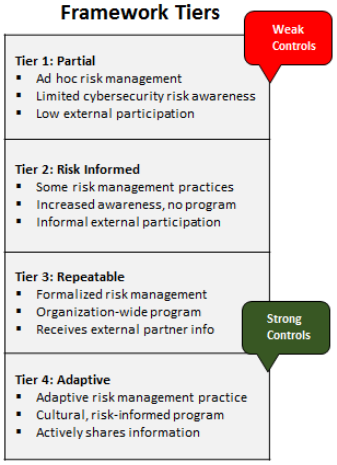
The **Framework Implementation Tiers** provide context on how an organization views cybersecurity risk and the processes in place to manage that risk. Tiers describe the degree to which an organization's cybersecurity risk management practices exhibit the characteristics defined in the Framework (e.g., risk and threat aware, repeatable, and adaptive).

A **Framework Profile** represents the outcomes based on business needs that an organization has selected from the Framework Categories and Subcategories. The Profile is characterized as the alignment of standards, guidelines, and practices to the Framework Core in a particular implementation scenario. Profiles can be used to identify opportunities for improving cybersecurity posture by comparing a "Current" Profile (the "as is" state) with a "Target" Profile (the "to be" state).

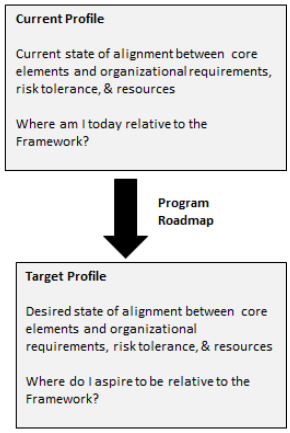
Framework Core

Functions	Categories	Subcategories
Identify	Asset Management (ID.AM) Business Environment (ID.BE) Governance (ID.GV) Risk Assessment (ID.RA) Risk Management (ID.RM)	ID.AM-1 to ID.AM-6 ID.BE-1 to ID.BE-5 ID.GV-1 to ID.GV-4 ID.RA-1 to ID.RA-6 ID.RM-1 to ID.RM-3
Protect	Access Control (PR.AC) Awareness and Training (PR.AT) Data Security (PR.DS) Information Protection Procedures (PR.IP) Maintenance (PR.MA) Protective Technology (PR.PT)	PR.AC-1 to PR.AC-5 PR.AT-1 to PR.AT-5 PR.DS-1 to PR.DS-9 PR.IP-1 to PR.IP-11 PR.MA-1 to PR.MA-2 PR.PT-1 to PR.PT-5
Detect	Anomalies and Events (DE.AE) Security Continuous Monitoring (DE.CM) Detection Processes (DE.DP)	DE.AE-1 to DE.AE-5 DE.CM-1 to DE.CM-8 DE.DP-1 to DE.DP-5
Respond	Response Planning (RS.RP) Communications (RS.CO) Analysis (RS.AN) Mitigation (RS.MI) Improvements (RS.IM)	RS.RP-1 RS.CO-1 to RS.CO-5 RS.AN-1 to RS.AN-4 RS.MI-1 to RS.MI-3 RS.IM-1 to RS.IM-2
Recover	Recovery Planning (RC.RP) Improvements (RC.IM) Communications (RC.CO)	RC.RP-1 RC.IM-1 to RC.IM-2 RC.CO-1 to RC.CO-2

Framework Tiers



Framework Profile

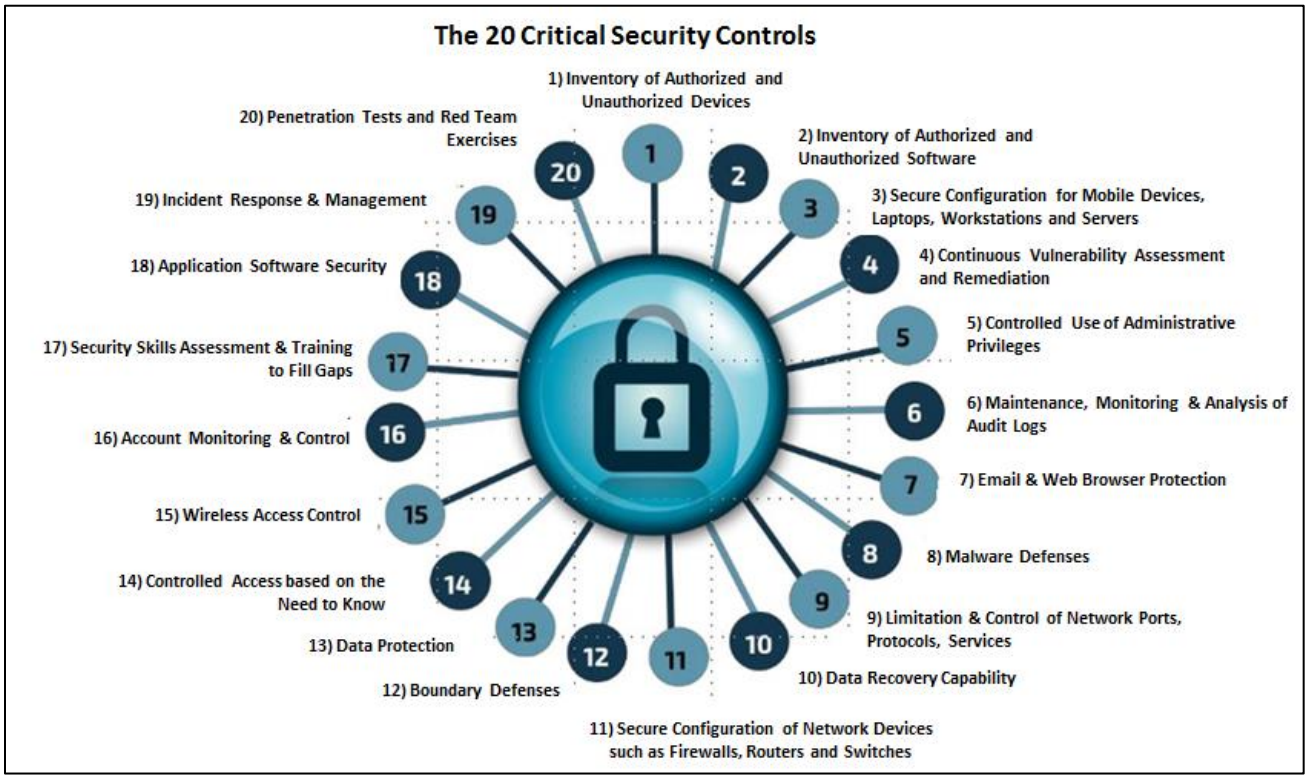


The Framework provides organizations with **a risk-based compilation of guidelines** that can help them identify, implement, and improve cybersecurity practices. The Framework does not introduce new standards or concepts; rather, it leverages and integrates cybersecurity practices that have been developed by organizations like NIST and the International Standardization Organization (ISO).

This means, that organizations must look to other security standards and best practices for the detailed controls. This program focuses on the 20 Critical Security Controls for the technical program and the ISO 27002 security controls for the business program.

The Technical Controls: 20 Critical Security Controls:
The CIS Critical Security Controls (CIS Controls) are a concise, prioritized set of cyber practices created to stop today's most pervasive and dangerous cyber-attacks. The CIS Controls are developed, refined, and validated by a community of leading experts from around the world. Organizations that apply just the first five CIS Controls can reduce their risk of cyberattack by around 85 percent. Implementing all 20 CIS Controls increases the risk reduction to around 94 percent.

The CIS Critical Security Controls provide specific and actionable ways to stop today's most pervasive and dangerous attacks**.** The Controls prioritize and focus a smaller number of actions with high pay-off results. The Controls are derived from the most common attack patterns highlighted in the leading threat reports and vetted across a very broad community of government and industry practitioners.



In addition to being grounded in current attack data, the Controls align with numerous other frameworks, such as PCI-DSS, ISO 27001, US CERT recommendations, NIST SP 800-53, and the NIST Framework. The Controls don't try to replace these other frameworks, but they are frequently used by enterprises to make sense of other frameworks. The Controls are a highly practical approach to prioritize the overarching security strategy for an enterprise. Once a program for cyber security is in place and operational, the Controls can also be used with the Critical Security Controls Measurement Companion to assess the effectiveness of the organization's security efforts.

20 Critical Controls Mapping to the NIST Cybersecurity Framework:

			NIST Cybersecurity Framework (CSF) Core Functions				
CIS Critical Security Controls (V 6.0)	Asset Family	Tier	IDENTIFY	PROTECT	DETECT	RESPOND	RECOVER
CSC-01: Inventory of Authorized and Unauthorized Devices	Systems		ID.AM	PR.DS			
CSC-02: Inventory of Authorized and Unauthorized Software	Systems		ID.AM	PR.DS			
CSC-03: Secure Configuration of Endpoints, Servers, etc.	Systems			PR.IP			
CSC-04: Continuous Vulnerability Assessment &Remediation	Systems		ID.RA	PR.IP	DE.CM	RS.MI	
CSC-05: Controlled Use of Administrative Privileges	Systems			PR.AC PR.AT PR.MA			
CSC-06: Maintenance, Monitoring and analysis of Audit Logs	Systems			PT.PT	DE.AE DE.DP	RS.AN	
CSC-07: Email and Web Browser Protections	Systems			PR.PT			
CSC-08: Malware Defenses	Systems			PR.PT	DE.CM		
CSC-09: Limitation and Control of Ports, Protocols, Services	Systems			PR.IP			
CSC-10: Data Recovery Capability	Systems						RC.RP
CSC-11: Secure Configuration of Network Devices	Networks			PR.IP PR.PT	DE.AE		
CSC-12: Boundary Defense	Networks			PR.AC PR.MA	DE.AE		
CSC-13: Data Protection	Applications			PR.AC PR.DS PR.PT			
CSC-14: Controlled Access Based on Need to Know	Networks			PR.AC PR.DS PR.PT			
CSC-15: Wireless Access Control	Networks			PR.AC			
CSC-16: Account Monitoring and Control	Applications			PR.AC	DE.CM		
CSC-17: Security Skills Assessment and Appropriate Training	Applications			PR.AT			
CSC-18: Application Software Security	Applications			PR.PT			
CSC-19: Incident Response and Management	Applications				DE.AE	RS.RP	RC.CO
CSC-20: Penetration Tests and Red Team Exercises	Applications		ID.RA			RS.IM	RC.IM

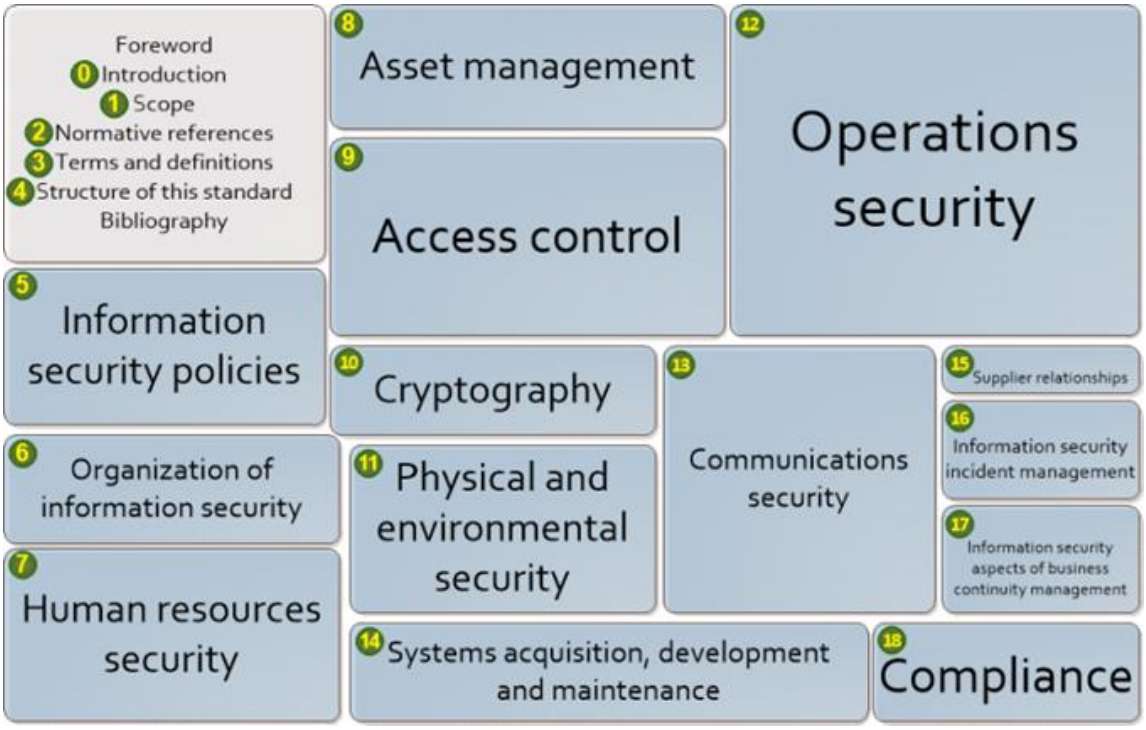
The Business Controls: ISO 27002 Code of Practice

Organizational assets are subject to both deliberate and accidental threats while the related processes, systems, networks and people have inherent vulnerabilities. Changes to business processes and systems or other external changes (such as new laws and regulations) may create new information security risks. Therefore, given the multitude of ways in which threats could take advantage of vulnerabilities to harm the organization, information security risks are always present.

Effective information security reduces these risks by protecting the organization against threats and vulnerabilities, and then reduces impacts to its assets. Information security is achieved by implementing a suitable set of controls, including policies, processes, procedures, organizational structures and software and hardware functions. These controls need to be established, implemented, monitored, reviewed and improved, where necessary, to ensure that the specific security and business objectives of the organization are met.

ISO/IEC 27002:2013 gives guidelines for organizational information security standards and information security management practices including the selection, implementation and management of controls taking into consideration the organization's information security risk environment(s). It is designed to be used by organizations that intend to select controls within the process of implementing an Information Security Management System (ISMS); implement commonly accepted information security controls; develop their own information security management guidelines.

ISO 27002: 2013 Code of Practice for Information Security Management



ISO 27002 Controls Mapping to the NIST Cybersecurity Framework:

		NIST Cybersecurity Framework (CSF) Core				
ISO 27002: Code of Practice for Information Security Controls	Tier	IDENTIFY	PROTECT	DETECT	RESPOND	RECOVER
ISO-05: Information Security Policies		ID.GV				
ISO-06: Organization of Information Security		ID.AM ID.GV ID.RA	PR.AC PR.AT PR.DS	DE.DP	RS.CO	
ISO-07: Human Resource Security		ID.GV	PR.AT PR.DS PR.IP			
ISO-08: Asset Management		ID.AM	PR.DS PR.IP PR.PT			
ISO-09: Access Control			PR.AC PR.DS PR.PT			
ISO-10: Cryptography						
ISO-11: Physical and Environmental Security		ID.AM ID.BE	PR.AC PR.DS PR.IP			
ISO-12: Operations Security		ID.RA	PR.DS PR.IP PR.PT	DE.CM	RS.AN RS.MI	
ISO-13: Communications Security		ID.AM	PR.AC PR.DS PR.PT			
ISO-14: System Acquisition, Development and Maintenance			PR.DS PR.IP	DE.CM DE.DP		
ISO-15: Supplier Relationships		ID.BE	PR.MA	DE.CM		
ISO-16: Information Security Incident Management			PR.IP	DE.AE DE.DP	RS.RP RS.CO RS.AN	RC.RP
ISO-17: Information Security Aspects of Business Continuity Management		ID.BE	PR.IP			
ISO-18: Compliance		ID.GV ID.RA	PR.IP	DE.DP		

The Risk Management Controls: The Baldrige Excellence Builder

The *Baldrige Cybersecurity Excellence Builder* is a voluntary self-assessment tool that enables organizations to better understand the effectiveness of their cybersecurity risk management efforts. It helps leaders of organizations identify opportunities for improvement based on their cybersecurity needs and objectives, as well as their larger organizational needs, objectives, and outcomes.

Using this self-assessment, organizations can

- determine cybersecurity-related activities important to your business strategy and critical service delivery;
- prioritize your investments in managing cybersecurity risk;
- determine how best to enable your workforce, customers, suppliers, partners, and collaborators to be risk conscious and security aware, and to fulfill their cybersecurity roles and responsibilities;
- assess the effectiveness and efficiency of your use of cybersecurity standards, guidelines, and practices;
- assess the cybersecurity results you achieve; and
- identify priorities for improvement.

Like the *Framework for Improving Critical Infrastructure Cybersecurity* (*Cybersecurity Framework*) and the *Baldrige Excellence Framework,* the *Baldrige Cybersecurity Excellence Builder* is not a one-size-fits-all approach. It is adaptable and scalable to your organization's needs, goals, capabilities, and environment. It does not prescribe how you should structure your organization's cybersecurity policies and operations. Through interrelated sets of open-ended questions, it encourages you to use the approaches that best fit your organization.

The *Baldrige Cybersecurity Excellence Builder* is intended for use by the leaders and managers in your organization who are concerned with and responsible for mission-driven, cybersecurity-related policy and operations. These leaders and managers may include senior leaders, chief security officers, and chief information officers, among others.

Key areas of focus include:

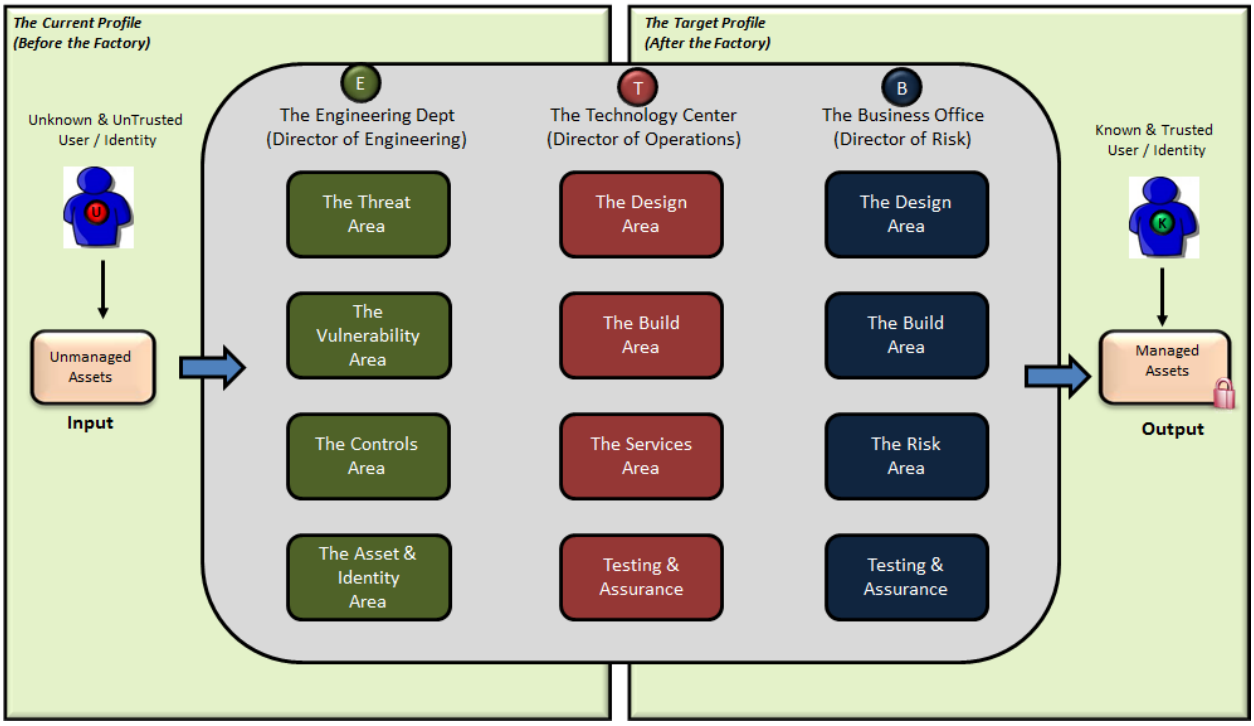
1. Senior and Cybersecurity Leadership: How do your senior leaders lead cybersecurity policies and operations?
2. Governance and Societal Responsibilities: How do you govern cybersecurity policies and operations and fulfill your organization's societal responsibilities?
3. Strategy Development: How do you develop your cybersecurity strategy?
4. Strategy Implementation: How do you implement your cybersecurity strategy?
5. Voice of the Customer: How do you obtain information from your customers?
6. Customer Engagement: How do you engage customers by serving their needs and building relationships?
7. Measurement, Analysis, and Improvement of Performance: How do you measure, analyze, and then improve cybersecurity-related performance?
8. Knowledge Management: How do you manage your organization's cybersecurity related knowledge assets?
9. Workforce Environment: How do you build an effective and supportive workforce environment to achieve your cybersecurity goals?
10. Workforce Engagement: How do you engage your workforce to achieve a high performance work environment in support of cybersecurity policies and operations?
11. Work Processes: How do you design, manage, and improve your key cybersecurity work processes?
12. Operational Effectiveness: How do you ensure effective management of your cybersecurity operations?
13. Process Results: What are your cybersecurity performance and process effectiveness results?
14. Customer Results: What are your customer-focused cybersecurity performance results?
15. Workforce Results: What are your workforce-focused cybersecurity performance results?
16. Leadership and Governance Results: What are your cybersecurity leadership and governance results?
17. Financial Results: What are your financial performance results for your cybersecurity operations?

The UMASS NIST Cybersecurity Controls Factory Model
Operationalizing the NIST Cybersecurity Framework Across and Enterprise and its Supply Chain

The controls factory concept is used to help organize the engineering, technical and business functions of a NIST cyber security program. The program is completely adaptable which means that each of the modules can easily be updated, replaced or modified with minimal impact on the overall solution. It allows for changes in the cybersecurity threat landscape, new vulnerabilities and the addition of incremental improvements while still keeping a focus on the critical assets and identities.

The Engineering Department organizes all of the engineering functions / capabilities such as threats, vulnerabilities, assets and controls. The Technology Center organizes the key technical capabilities such as technology / solution design (design guides), technology build (build guides), managed security solutions (from MSSPs), and testing / assurance functions. The Business Office organizes business functions focused on people and policy including design (based on ISO 27002), build (sample policies, communications plan, and gap analysis templates), cybersecurity advisory services and employee roles, business testing and assurance based on ISO 27002. It includes a capability for executives to evaluate Risk Management practices based on the Baldridge Cybersecurity Executive Builder.

The Controls Factory (Our Model)



Please note that the capabilities are modular. This means if there are changes within a particular functional area, it can be updated without impacting other related functions. For example, if an organization wishes to implement NIST 800-171 controls as the foundation for business controls, the Business Office Design Area would replace ISO 27002 code of practice with NIST 800-171 security controls. All of the other business functions would be modified to align with NIST 800-171. The Engineering Department would adjust all capabilities that were based on ISO 27002 with similar capabilities based on NIST 800-171. The Technology Center capabilities would not change, because they are based on the Critical Security Controls. This approach provides maximum flexibility for organizations who choose to build their programs based on the control factory model.

The UMASS NIST CSF Delivery & Pricing Model

This following outlines the approach and costs associated with using the UMASS Controls Factory model to operationalize the NIST CSF program across an enterprise and it supply chain. The program is designed so that it can be designed and maintained by the client, UMASS Cybersecurity Services or by a UMASS licensed partner.

UMASS Cybersecurity Training Services

NIST CSF Training, Exams & Do IT Yourself Guides

Programs include Foundation and Practitioner trainings on how to design, build and manage a NIST CSF program using the UMASS Control Factory model. Programs are delivered online videos with digital courseware and online mentoring. Clients have the option to add onsite or online instructor/mentor services for training review or program design sessions. All programs come with membership in our Linkedin My itSM Mentoring Community and PDU and CPE credits.

1. **NIST CSF Foundation Video Training** that introduces IT, Cyber Security and Business professionals to the concepts of building a Cybersecurity program based on NIST CSF and the UMASS Controls Factory model
   12 Month License - $395 per student
2. **NIST CSF Practitioner Video Training** that teaches IT and Cyber Security professionals how to design, implement and manage a NIST CSF program based on the UMASS Controls Factory model
   12 Month License - $895 per student
3. **NIST CSF Foundation Exam Voucher** for students looking to sit for the UMASS NIST CSF Foundation Exam
   Exam Voucher - $350 per student
4. **NIST CSF Practitioner Exam Voucher** for students looking to sit for the UMASS NIST CSF Practitioner Exam
   Exam Voucher - $350 per student
5. **NIST CSF Self Assessment Guide** that teaches IT and Cyber Security professionals how to perform a NIST CSF assessment
   $395 per student
6. **NIST CSF Technology Design Guide** that teaches IT and Cyber Security professionals how to design, and implement the technology required for a continuous monitoring program.
   $395 per student

Cybersecurity Certification Training Services

Programs include trainings for CISSP, SSCP, Security+, Advanced Security Practitioner, A+, Network+, CISA and CISM certification. Programs are delivered online videos with digital courseware and online mentoring. Clients have the option to add onsite or online instructor/mentor services for training review or program design sessions. All programs come with membership in our Linkedin My itSM Mentoring Community and PDU and CPE credits.

7. **Cybersecurity Training & Online Mentoring** for CISSP, CISA, CISM, SECURITY+ and CASP Certification
   12 Month License - $895
   Exam Voucher – Purchased from Accreditor or Certification Partner (Prometric, Pearson VUE etc.)

RESILIA™ Employee Cybersecurity Awareness Training Services

The RESILIA employee cybersecurity awareness training program includes online modules covering topics in phishing, social engineering, online safety, social media, BYOD (Bring Your Own Device), removable media, password safety, personal information, information handling and remote and mobile working. Delivery methods include games, animations and simulations with assessment testing and reporting tools.

8. **NIST CSF RESILIA™ Cybersecurity Awareness Training**
   Pricing Based on # of Users & Hosting Method. Training can be delivered from cloud or Client LMS.

UMASS Cybersecurity Professional Services

NIST CSF Assessment Services

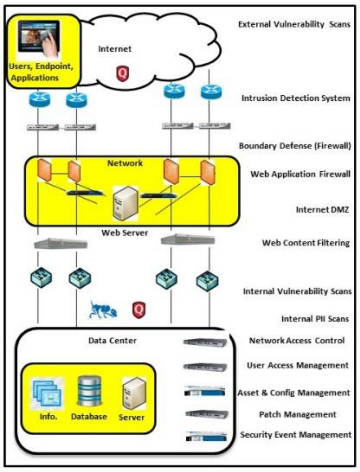
Once the education programs are completed, enterprises have the option to build their own or outsource that responsibility to UMASS or one of its licensed partners. The NIST CSF assessment is based on 80 hours for a typical engagement. Deliverables include a detailed scorecard and report (identifying strengths and weaknesses with respect to the 20 critical controls and sub controls), a management report showing the overall security posture (current state) as well as a remediation roadmap that identifies target state, and highlights the top priority items to remediate, as well as possible managed solutions that could be utilized to remediate current security gaps.

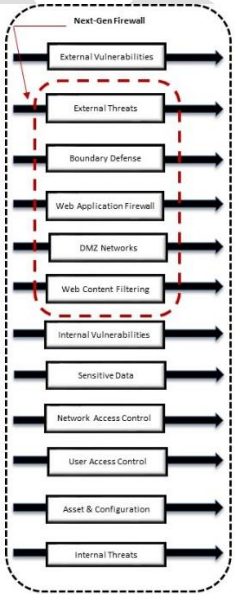
9. **NIST CSF Assessment Service Cost** - **$15,000. Additional fees will apply if more than 80 hours is required**

NIST CSF Continuous Monitoring Service

Once the education and assessment programs are completed, enterprises have the option to build their own or outsource that responsibility to UMASS or one of its licensed partners. The UMASS program is managed 24/7 by industry experts working with student interns form the universities cyber security degree programs. For the Do It Yourself option, UMASS does offer CSC (Critical Security Controls) design guides and mentoring services for the Security Architecture Diagram listed below.

10. **NIST CSF Managed Service Cost** – **$20,000 per year to monitor 25 devices.**





External vulnerability scanning
- Systems and networks vulnerable to external attacks
- Identify missing patches or system misconfigurations

External threat mitigation
- Actively block threats from Internet
- Includes DDoS mitigation, content filtering, suspicious traffic

Network firewall policy analysis
- Separate trusted network from untrusted Internet
- Reports produced for high-risk firewall policies

Web Application Firewalls
- Focus on application level threats (OWASP Top 10)
- Mitigate known attack vectors

DMZ for web-facing applications
- Semi-trusted security zone for controlled access
- Separate security zones for isolating applications

Web Content Filtering
- Continuous website monitoring for malicious code
- Web reputation & block access to suspicious websites

Internal vulnerability scanning
- Systems and networks vulnerable to internal attacks
- Identify missing patches or system misconfigurations

Internal PII Scanning
- Scan for sensitive data on desktops/laptops and share drives
- Discover sensitive data on websites, databases, e-mail, ...

Network Access Control (NAC)
- NAC validates devices based on MAC filtering.
- Ensures device is patched and secure before allowing access

User Access Management
- **Control User Access (AuthN and AuthZ)**

Continuous management of university assets & configurations
- Assets – servers, desktops/laptops, networks
- Configuration – University standard configurations

Continuous monitoring / alerting for internal threats
- Alert for privileged user account creation & deletion
- Alert for log-on failures and account lockouts

Database security technologies

Technology

The following technologies / tools are included:

- Asset and Configuration Management Solution
- Patch Management Solution
- Endpoint Management Solution
- Anti-Virus Solution
- Next Generation Firewall Solution (IPS, URL Filtering, WAF, Policy Analysis, etc.)

- Vulnerability Management Solution
- Security Incident and Event Management (SIEM) Solution
- Data Loss Protection (DLP) Solution
- Network Access Control (NAC) Solution
- Identity and Access Management Solution
- Privileged Identity Management (PIM) Solution
- Database Security Solution

NIST CSF Instructor & Mentoring Service

NIST CSF Instructor or Mentoring Services for situations where the client wants to deliver an instructor led onsite, online and blended learning program or would like the services of a Mentor to guide them through the design and implementation process.

11. **$1,500 per day** (client has the option to provide its own instructor)

About UMASS Cybersecurity Solutions

UMASS Cybersecurity Solutions is a new initiative from the University of Massachusetts (UMass). The initiative started in May 2015, when the UMass CISO was approached by The Boston Consortium with a request to provide Cybersecurity Services to under-resourced academic institutions in New England. Key representatives of the UMass President's Office met with the management team from The Boston Consortium to discuss how UMass could assist consortium members with the design, implementation and operations of their NIST cybersecurity programs. After a detailed discussion and review of the key UMass capabilities, a pilot program was initiated. The NIST CSF pilot program has since expanded to include a full suite of training and professional services which are now being delivered to organizations operating across the globe.

About the Authors

Larry Wilson is the Chief Information Security Officer (CISO) in the UMASS President's office and is responsible for developing, implementing and managing the University of Massachusetts Information Security Policy and Written Information Security Program (WISP).The University program is based on a "Controls Factory" approach Larry created to help organizations operationalize the NIST Cyber Security Framework and its industry best practices (ISO 27001, SANS 20 Critical Controls etc.) across an enterprise and its supply chain. Larry's approach has been implemented consistently across all five UMASS campuses plus six other universities in the Commonwealth of Massachusetts.

Prior to joining UMASS, Larry was the Vice President, Network Security Manager at State Street Bank. Larry's industry experience includes IT audit manager for Deloitte Enterprise Risk Services (ERS) consulting practice. In this role he managed a staff responsible for developing and completing a Sarbanes Oxley compliance audit for MasterCard International.

Larry holds a Master of Science degree in Civil / Structural Engineering from the University of New Hampshire. His industry certifications include CISSP, CISA and ISA (PCI Internal Security Assessor). He serves on the Advisory Board for Middlesex Community College and CISO Advisory Board for Oracle. He co-chairs the Massachusetts State University and Community College Information Security Council, and serves as Certification Director for ISACA New England. Larry has been teaching CISA certification training for ISACA for 5 years

His major accomplishments include Finalist for Information Security Executive® (ISE®) of the Year for both the Northeast Region and North America; the SANS People who made a difference in Cybersecurity award in 2013 and one of the top two most influential people in cyber security as selected by Security Magazine in 2016.

Rick Lemieux is a managing partner and the Vice President of Business Development at itSM Solutions LLC and the creator of the itSM Mentor IT and Cyber Security Workforce Development Training Portal. He is responsible for overseeing the company's Sales, Marketing & Business Development programs. Rick has been involved in developing and marketing IT and Cyber Security best practice solutions for the past 15 years. Prior to itSM, Rick, led the Sales and Business Development teams at software companies focused on automating best practices across enterprises and its supply chain. Rick is certified professional in IT Service Management and was recently identified as one of the top 5 IT Entrepreneurs in the State of Rhode Island by the TECH 10 awards for his work in delivering innovative, online workforce development solutions.