

UW-Madison Cybersecurity Risk Management Policy

SUMMARY

Cybersecurity is a collective responsibility which requires policy that applies to all components of the University of Wisconsin-Madison. The impact of using diverse but competing approaches in implementing security controls applied to information systems tends to elevate overall cybersecurity risk¹. The management of cybersecurity risk will use a detailed framework to balance among academic / business needs, the potential impact of adverse events, and the cost to reduce the likelihood and severity of those events.

This policy and the associated Risk Management Framework applies to all university information systems and provides a common approach to managing risk to university data and the information systems which process, store or manage the data.

BACKGROUND

Risk is defined as the measure of the extent to which an entity is threatened by a potential circumstance or event, and typically a function of: (i) the adverse impacts that would arise if the circumstance or event occurs; and (ii) the likelihood of occurrence².

Cybersecurity risk may be presented from external sources or by individual actions of those working inside the network or information systems. The concept of cybersecurity risk includes operational risk to information and technology assets that have consequences affecting the availability, integrity or confidentiality, of information or information systems. This includes the resulting impact from physical or technical threats and vulnerabilities in networks, computers, programs and data. The data focus includes information flowing from or enabled by connections to digital infrastructure, information systems, or industrial control systems, including but not limited to, information security, supply chain assurance, information assurance, and hardware and software assurance³. The process described in this policy is a tool used to arrive at an understanding of risk involving information systems. Risk can be modeled as the likelihood of adverse events over a period of time, multiplied by the potential impact of those events. Risk is never reduced to zero. There is always a level of risk that must be accepted as a cost of doing business. Reducing the risk to an acceptable level is also a cost of doing business.

Systems are monitored to assure that the level of cybersecurity risk is maintained at or below an acceptable level. There are policy and procedural safeguards to assure that personal privacy and academic freedom are respected. The content or use of the data is only of interest to the extent that it indicates the presence of a vulnerability or threat, such as incoming data that is part of an attack on university systems, or outgoing data that indicates a system has already

¹ From *Framework for Improving Critical Infrastructure Cybersecurity*, National Institute for Standards and Technology, February 2014

² From NISTIR 7298r2, *Glossary of Key Information Security Terms*, May 2013

³ From *A Taxonomy of Operational Cyber Security Risks* by James Cebula and Lisa Young, Carnegie-Mellon University Software Engineering Institute, dated December 2010.

UW-Madison Cybersecurity Risk Management Policy

been compromised. University or personal data that is stolen by an attacker is no longer private. Scrupulous monitoring helps protect data from unscrupulous use.

The process for managing cybersecurity risk is adapted for UW-Madison from the National Institute of Standards and Technology (NIST) Risk Management Framework (RMF) described in NIST Special Publication 800-37 revision 1. The NIST Special Publications provide a systematic method of managing risk that is particularly well-suited to large public organizations.

The NIST documents recognize that every organization is different. The organizational unit determines what level of cybersecurity risk is acceptable to that unit, constrained by that unit's legal and regulatory environment. The NIST documents provide a wide variety of cybersecurity strategies. The unit selects and implements a combination of strategies designed to reduce the risk to an acceptable level.

POLICY

Cybersecurity risk will be managed to ensure likelihood and impact of threats and vulnerabilities are minimized to the extent practical. Guided by the Principles below, the focus of this policy is protection of University information or data and the associated information system or computing assets, which includes those systems developed or purchased for integration with the existing information technology architecture. Information and data sets not owned by the University may become within scope of this policy if the data will be stored or processed using University assets. The process described in the Implementation Guide to this policy is needed to manage the cybersecurity risk associated with all information systems of any kind that store or process data used to accomplish UW-Madison missions for instruction, research, public service, or administration. The functions of the Risk Executive are stated in the Implementation guide and guide university leaders in making sound risk management decisions.

The process will be phased in. High risk systems will be first, with moderate and low risk systems to follow. The activity level to secure a system will be proportional to the data driven categorization of the information system and intended level of risk with the system in operation.

The Office of Cybersecurity is responsible for providing cybersecurity risk management education to leaders, managers and users, including training on all aspects of the Risk Management Framework and this policy.

PRINCIPLES

The University of Wisconsin-Madison is a leading public institution of learning and higher education. As such, our mission is to create and disseminate knowledge and to learn the truth wherever it may be found. Fundamental to this mission is the academic freedom, the "fearless sifting and winnowing" process emblazoned at the entrance to Bascom Hall by the class of 1910.

Recognizing that the level of monitoring and analysis employed for network defense against cybersecurity threats by using this Risk Management Framework can have a significant chilling effect on learning and academic freedom, the Office of Cybersecurity will operate under the following principles guiding the deployment and use of this framework:

UW-Madison Cybersecurity Risk Management Policy

1. We respect academic freedom and personal privacy as we provide a secure and safe computing environment for teaching, research and outreach as well as to protect the integrity and reputation of UW-Madison.
2. We understand the value of University information as a product of research, data related to teaching and learning, along with the personal data of our students, faculty, researchers, and administrative staff.
3. We are committed to ensuring the appropriate security of all data and specifically ensuring students privacy, and security of staff related information, is not placed at undue risk of exposure.
4. We are accountable to the University community for our deployment and use of network analysis and monitoring tools preserves and strengthens the privacy and academic freedom for faculty, students, staff, and members of our community.
5. We will ensure risk analysis tools and active filtering methods will be used only for the detection of malicious activity, not for examining any other content in the data stream.
6. We evaluate the content of systems and network traffic only to the extent necessary to detect known security threats or emerging indications of compromised systems.
Specifically:
 - a. Our tools and techniques are not used to monitor individual activity. Data generated or collected that may identify individual behavior will be retained no longer than is necessary to identify and evaluate malicious traffic.
 - b. Data generated by the framework and tools is used only to detect threats and compromises. Any personal or private message content captured during the testing and detection processes is ignored, and either not recorded at all, or eliminated immediately in cases where temporary recording is necessary technologically.
 - c. Data collected is accessible only by staff responsible for maintaining the security of computing systems, and only for the purpose of diagnosing and remediating security incidents. This data will not be released for any other purpose, except as may be required to comply with legal requests.
7. We make decisions on network and cybersecurity defensive measures through a defined and shared process that implements the principles above. We will ensure that our processes:
 - a. Allow for temporary situations where immediate defensive action is needed.
 - b. Review those temporary measures through the decision-making process, to determine if they should become ongoing.
8. The procedures that implement the RMF processes are developed with collaboration in mind and will be revised collaboratively as conditions warrant.

The risk management process is established in policy so that the UW-Madison community understands that:

1. UW-Madison is determined to manage cybersecurity risk effectively. Not doing so is likely to have unacceptable consequences to individuals and increase cost to the institution.
2. This is UW-Madison's mandatory and universally applicable process for managing cybersecurity risk.
3. This process can be tailored to specific technologies, processes or services. This policy applies to UW-Madison owned or operated information systems and architectures that are

UW-Madison Cybersecurity Risk Management Policy

installed on campus or accessible through external services (e.g., cloud infrastructure, services or applications, vendor-operated systems using University information, systems operated remotely from other universities, etc.).

4. The process must include policy and procedural controls to assure that privacy and academic freedom are respected.

AUTHORITY

TBD [will depend upon who issues the policy]

ENFORCEMENT

Failure to comply may result in the following:

1. Computing services or devices may be denied access to UW-Madison information resources.
2. UW-Madison employees may be subject to disciplinary action up to and including termination of employment.
3. Contractors or associates may be subject to penalty under the governing agreement. Compliance may be a consideration affecting new or renewed agreements.

CONTACT

TBD [will depend upon who issues the policy]

REFERENCES

Cybersecurity Risk Management Procedures [under development, <https://it.wisc.edu/about/office-of-the-cio/cybersecurity/risk-management-framework/>]

NIST SP 800-37r1, <http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-37r1.pdf>

UW-Madison Cybersecurity Risk Management Framework and Implementation Plan for the Cybersecurity Risk Management Policy

NOTE: THIS SECTION IS PROPOSED TO BECOME A SEPARATE DOCUMENT COVERING PROCESS AND IMPLEMENTATION DETAILS FOR THE RISK MANAGEMENT FRAMEWORK.

BACKGROUND

Risk is defined as the measure of the extent to which an entity is threatened by a potential circumstance or event, and typically a function of: (i) the adverse impacts that would arise if the circumstance or event occurs; and (ii) the likelihood of occurrence⁴.

Cybersecurity risk may be presented from external sources or by individual actions of those working inside the network or information systems. The concept of cybersecurity risk includes operational risk to information and technology assets that have consequences affecting the availability, integrity or confidentiality, of information or information systems. This includes the resulting impact from physical or technical threats and vulnerabilities in networks, computers, programs and data. The data focus includes information flowing from or enabled by connections to digital infrastructure, information systems, or industrial control systems, including but not limited to, information security, supply chain assurance, information assurance, and hardware and software assurance⁵. The process described in this policy is a tool used to arrive at an understanding of risk involving information systems. Risk can be modeled as the likelihood of adverse events over a period of time, multiplied by the potential impact of those events. Risk is never reduced to zero. There is always a level of risk that must be accepted as a cost of doing business. Reducing the risk to an acceptable level is also a cost of doing business.

Systems are monitored to assure that the level of cybersecurity risk is maintained at or below an acceptable level. There are policy and procedural safeguards to assure that personal privacy and academic freedom are respected. The content or use of the data is only of interest to the extent that it indicates the presence of a vulnerability or threat, such as incoming data that is part of an attack on university systems, or outgoing data that indicates a system has already been compromised. University or personal data that is stolen by an attacker is no longer private. Scrupulous monitoring helps protect data from unscrupulous use.

RISK MANAGEMENT FRAMEWORK

The Risk Management Framework, also called the RMF, is derived from the National Institute for Standards and Technology Special Publication 800-37 Revision 1, *Guide for Applying the Risk Management Framework to Federal Information Systems: A Security Life Cycle Approach* and specifically tailored to meet the requirements and culture at UW-Madison. This document describes the RMF processes and implementation details and serves as a guide to determining

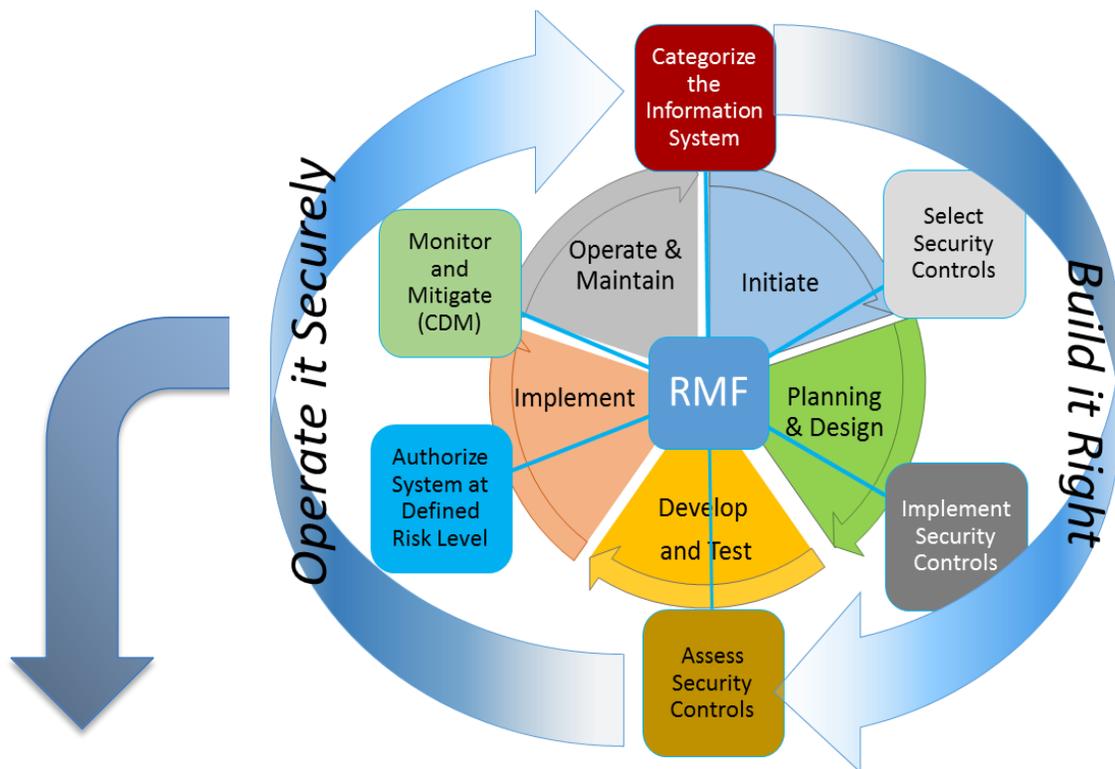
⁴ From NISTIR 7298r2, *Glossary of Key Information Security Terms*, May 2013

⁵ From *A Taxonomy of Operational Cyber Security Risks* by James Cebula and Lisa Young, Carnegie-Mellon University Software Engineering Institute, dated December 2010.

UW-Madison Cybersecurity Risk Management Framework and Implementation Plan for the Cybersecurity Risk Management Policy

cybersecurity risk to information systems and network architectures. The UW-Madison Risk Management Framework (RMF) is designed to provide departmental directors, researchers, and information technologists with a tool to determine risk to data and operations of each network or system connected to or serviced by the campus information technology architecture. The RMF consists of six steps that guide the development of a system with information security controls built in. Once development is completed, a formal risk assessment and continued operating checks ensure maintenance of defined risk levels. The tables and graphic below describe the steps:

Figure 1: The Risk Management Framework



| Step | Activity Title | Description |
|------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pre | Planning | Conducting discovery with the System Owner to aid in their understanding of the RMF and associated tools and processes. Identification of time and resources occurs here. |
| 1 | Categorize the System | A data driven process where the security requirements of the system are defined by the highest classification of data handled by, or stored within, the system or processes |
| 2 | Select Security Controls | Assignment of the administrative, physical and technical controls required to protect the data are drawn from an agreed security controls framework (e.g., NIST 800-53) |
| 3 | Implement and | During design and development, the selected controls are incorporated in the system design, validated to provide the desired protections, and verified as operational. |

UW-Madison Cybersecurity Risk Management Framework and Implementation Plan for the Cybersecurity Risk Management Policy

| Step | Activity Title | Description |
|------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Validate Controls | |
| 4 | Risk Assessment | Independent to the development team, a documented assessment is performed to test the selected controls. Residual risk is determined with mitigating factors applied. This stage leads to a formal declaration of risk for the system or network. |
| 5 | Authorize the System | A final risk review is conducted with a formal declaration of risk provided to the responsible Risk Executive who makes the determination whether to (1) operate the system at the defined risk level; (2) further mitigate risk; or (3) decline to allow continued operation. |
| System is Operational | | |
| 6 | Monitor and Mitigate | Continually assess the operational controls against evolving vulnerability, threat and impact factors. Disruption to operations or loss of data occurs when controls fail, system upgrades occur without proper testing or external factors dictate, determine and implement mitigating controls or return the system to an earlier RMF step. This step is also known as Continuous Diagnostics and Mitigation. |

The RMF aligns with the system development life cycle and requires input documentation and information for each step. Output artifacts are produced that are used in planning, development and testing, and certification of risk leading to implementation as shown in the table below.

| Step | Activity Title | Project Phase | Input Documents and Activities | Output Documents and Activities |
|------|--------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Categorize the System | Planning and Design | <ul style="list-style-type: none"> Data definition including Classification FISMA determination from Contract Data description System description from SDLC CIS Benchmarks | <ul style="list-style-type: none"> Cybersecurity Project Charter System Security Plan (SSP) Questionnaire checklist Data Security Triage Form IT Security Baseline for Research and Academic Computing Template Interview Checklist(s): e.g., FISMA Controls, HIPPA Test Plan, SA Checklist |
| 2 | Select Security Controls | | <ul style="list-style-type: none"> Complete and Validated SSP Questionnaire checklist | <ul style="list-style-type: none"> Security Controls Inventory |

UW-Madison Cybersecurity Risk Management Framework and Implementation Plan for the Cybersecurity Risk Management Policy

| Step | Activity Title | Project Phase | Input Documents and Activities | Output Documents and Activities |
|--------------------------------------|---------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 | Implement and Validate Controls | Develop and Test | <ul style="list-style-type: none"> Configure Security Controls as determined. | <ul style="list-style-type: none"> Completed Package Artifacts <ul style="list-style-type: none"> SSP Topology, Data Flow, System Security Boundary Ports & Protocols Table Security Controls Workbook (Pre-Assessment) Submitted Cybersecurity Risk Acceptance Request Form |
| 4 | Risk Assessment | | <ul style="list-style-type: none"> Provide All Audit Scan (host based scans & application based testing) Completed Security Controls Checklist validated by scanning and manual review Develop and Execute Testing Plans (Artifacts not provided will be created by the Office of Cybersecurity) Step Three Deliverables | <ul style="list-style-type: none"> Scanning tool (i.e., Qualys) generated Risk Assessment Report plus Analyst notes Executed CCI and NIST checklists Updated systems POAM Validated Step Three Artifacts Residual Risk Report |
| 5 | Authorize System | Implement | <ul style="list-style-type: none"> Residual Risk Report Step Four deliverables | <ul style="list-style-type: none"> Chief Information Security Officer signed Risk Letter plus Risk Executive's Endorsement/Approval to Operate |
| Project Handoff to Operations | | | | |
| 6 | Mitigate and Monitor | Operate | <ul style="list-style-type: none"> Approved scanning tool Control Validation Plan Step Five deliverables | <ul style="list-style-type: none"> Provide Monthly Risk Reports & POAM updates Security Control Validation Report |

Process for Managing Cybersecurity Risk

This section describes process specific activities necessary to carry out this policy.

1. Assessing Risk (RMF Step 4)

The academic / functional unit and the Office of Cybersecurity cooperatively assess the cybersecurity risk associated with a system.

2. Certify Risk (RMF Step 5)

UW-Madison Cybersecurity Risk Management Framework and Implementation Plan for the Cybersecurity Risk Management Policy

The UW-Madison Chief Information Security Officer (CISO) signs the Risk Assessment to certify that the represented risk is accurate. The CISO may include recommended risk reduction strategies.

3. Accept Risk (RMF Step 5)

The risk of operating the system is accepted by the Risk Executive on behalf of UW-Madison. This is a leadership decision and should be based on the following:

- a. Assessed risk and impact should a system be compromised or data lost
- b. Recommended remediation to include consideration for cost to implement
- c. Impact on the business process should the system, while in operation, lose availability of the system or data, encounter data integrity issues, or breach confidentiality of Restricted or Sensitive data.
- d. The Risk Executive role is guided by the following:
 - (1) Risk Executives will be named within 60 days of this policy being finalized.
 - (2) The Risk Executive should be an executive or director (e.g., Dean or their appointee, department chair, director of a research lab, etc.) within the academic / functional unit, or in the line of authority above that unit. The Risk Executive must have the authority to accept the risk of operating the system on behalf of the institution and should be in the unit who will ultimately be responsible for paying for a breach (i.e., Dean or their appointee, department, research lab, etc.). The Risk Executive balances the business needs, the potential financial and reputational cost of adverse events, and the cost of reducing the likelihood and severity of those events.
 - (3) Delegation of the Risk Executive role is not encouraged. If delegation of the work is made under the Risk Executive's authority, the responsibility will not.
 - (4) Risk Executives may access the expertise, training and support available from the Office of Cybersecurity for advice in making their risk determination or for additional guidance.
 - (5) The Risk Executive must be afforded a sufficient understanding of the information system through the technical experts and managers associated with the system. After reviewing the Risk Assessment and recommendations of the Office of Cybersecurity, the Risk Executive will:
 - a) accept the risk as certified, or
 - b) assure that action is taken to reduce the risk to an acceptable level, or
 - c) decline to authorize the system to operate.

4. Reduce Risk (RMF Step 5 and 6)

The acceptable level of risk may be constrained by legal, regulatory or contractual requirements, and is subject to review by university leadership.

If the certified level of risk is unacceptable:

- a. The Risk Executive assures that changes are made to the system that reduce the risk to an acceptable level.

UW-Madison Cybersecurity Risk Management Framework and Implementation Plan for the Cybersecurity Risk Management Policy

- b. The assessment and certification described in *Assess Risk* and *Certify Risk* are revised following confirmation of corrective actions. The reduced level of risk is then accepted as described in *Accept Risk*.

Following the Risk Assessment and subsequent acceptance by the Risk Executive, information systems with vulnerability, threat and impact changes that elevate the level of risk will have to be corrected or mitigated back to the assessed level (or lower) within the following time limits:

- a. Issues that elevate the risk level to Critical should be corrected or mitigated to no greater than High within 72 – 96 hours or the system should be disconnected.
- b. Issues that elevate the risk to High should be corrected or mitigated to Moderate within 15 calendar days.
- c. Issues that elevate the risk to Moderate should be corrected or mitigated to Low within 45 calendar days.
- d. If the issue occurs on a system evaluated at Low risk, but does not elevate the risk to Medium, it should be corrected within 180 days.

In all cases, the Risk Register should be updated along with the existing risk assessment and plan of action and milestones.

5. Monitor Risk (RMF Step 6)

The academic / functional unit and the Office of Cybersecurity continually monitor the system to assure that the level of risk remains at or below the level accepted in *Accept Risk*.

- a. There must be policy and procedural safeguards to assure that monitoring activity respects privacy and academic freedom.
- b. The design and implementation of monitoring is included in the assessment and certification described in *Assess Risk* and *Certify Risk*. Monitoring must be designed and implemented to, at a minimum:
 - (1) detect known security vulnerabilities and threats, and
 - (2) detect known indications that the system may be compromised;

Where the identified problems are individually or collectively significant enough to increase the level of risk above the level accepted in *Accept Risk*.

- c. Identified problems must be sufficiently mitigated to return the level of risk to the level accepted in *Accept Risk*.

6. Re-evaluate Risk

Risk evaluation occurs throughout the system life cycle as follows:

- a. The schedule for risk evaluation is part of the assessment and certification described in *Assess Risk* and *Certify Risk*. A typical schedule includes a formal evaluation every three years and an informal evaluation annually.
- b. Change management is part of the assessment and certification described in *Assess Risk* and *Certify Risk*. Changes to the system that increase risk may require more immediate evaluation.

UW-Madison Cybersecurity Risk Management Framework and Implementation Plan for the Cybersecurity Risk Management Policy

- c. Following an evaluation, the assessment and certification described in *Assess Risk* and *Certify Risk* are revised, the risk is accepted or reduced as described in *Accept Risk* and *Reduce Risk*, and monitoring continues as described in *Monitor Risk*.

Special cases

Non-UW-Madison-owned devices and services used for university business may be treated as part of a UW-Madison information system, and if so, are subject to this policy. There must be policy and procedural controls in place to assure respect for property and privacy.

IMPLEMENTATION

The Office of Cybersecurity will maintain a separate and detailed implementation plan for each information system that is jointly developed with the System Owner. The Office of Cybersecurity will assist distributed Information Technology groups with developing implementation plans tailored to their group's needs. Training on the processes, tools and use of or completion of artifacts will be provided by the Office of Cybersecurity with the details considered to be out of scope for this document. Ongoing security awareness training will be provided and access to training tools will be widely publicized on the Office of Cybersecurity web pages (<https://it.wisc.edu/about/office-of-the-cio/cybersecurity/risk-management-framework/>).

With the volume of systems and networks at UW-Madison, a full implementation of the Risk Management Framework will take three to five years to complete. Implementation will initially focus on systems handling or storing data classified as Restricted, then Sensitive. Since exposure or loss of Internal or Public data does not pose an immediate operational or financial risk, those information systems will be reviewed as resources allow.

Information systems proposed to undergo Risk Assessment are entered into the Risk Register managed by the Office of Cybersecurity. A Risk Analyst will be assigned as resources become available. Organizations desiring to accelerate the process can contact the Chief Information Security Officer for guidance and options for meeting Risk Analyst resource requirements.

ENFORCEMENT

Failure to comply with the Cybersecurity risk Management Policy or the details of this Implementation Plan may result in the following:

1. Computing services or devices may be denied access to UW-Madison information resources.
2. UW-Madison employees may be subject to disciplinary action up to and including termination of employment.
3. Contractors or associates may be subject to penalty under the governing agreement. Compliance may be a consideration affecting new or renewed agreements.

CONTACT

Questions and comments to this document can be directed to the Office of Cybersecurity at cybersecurity@cio.wisc.edu.