

OFFICE OF THE STATE AUDITOR

DIANA DIZOGLIO

Official Audit Report – Issued December 30, 2024

University of Massachusetts Amherst

For the period July 1, 2022 through June 30, 2023



OFFICE OF THE STATE AUDITOR

DIANA DIZOGLIO

December 30, 2024

Dr. Javier Reyes, Chancellor
University of Massachusetts Amherst
301 Whitmore Building
Amherst, MA 01003

Dear Dr. Reyes,

I am pleased to provide to you the results of the enclosed performance audit of the University of Massachusetts Amherst. As is typically the case, this report details the audit objectives, scope, methodology, findings, and recommendations for the audit period, July 1, 2022 through June 30, 2023. As you know, my audit team discussed the contents of this report with university managers. This report reflects those comments.

I appreciate the overall efforts of you and your staff at the University of Massachusetts Amherst, who I am told demonstrated the utmost professionalism. I am disappointed, however, with reports I received from my team that the UMass Internal Audit Unit exhibited a tremendous lack of cooperation throughout the audit. I am hopeful that we can resolve this issue, moving forward, so that our audit teams can look forward to working together to make government work better. I am available to discuss this audit if you or your team has any questions.

Best regards,



Diana DiZoglio
Auditor of the Commonwealth

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
OVERVIEW OF AUDITED ENTITY	4
AUDIT OBJECTIVES, SCOPE, AND METHODOLOGY	10
DETAILED AUDIT FINDINGS WITH AUDITEE’S RESPONSE.....	15
1. The University of Massachusetts Amherst’s website is not fully accessible for all Massachusetts residents and users.	15
2. The University of Massachusetts Amherst’s learning management system, Blackboard, is not fully accessible for all students.	16
3. The University of Massachusetts Amherst has not implemented workforce cybersecurity awareness training.	21
OTHER MATTERS	23
1. The University of Massachusetts Amherst can further enhance the accessibility of its marketing pages.....	23
2. The University of Massachusetts Amherst can further enhance the accessibility of its cookie banner.	24
3. The University of Massachusetts Amherst does not maintain a full site map of its umass.edu website. ...	25

LIST OF ABBREVIATIONS

ADA	Americans with Disabilities Act
CIS	Center for Internet Security
LMS	learning management system
UMass	University of Massachusetts
URL	uniform resource locator
W3C	World Wide Web Consortium
WCAG	Web Content Accessibility Guidelines
WISP	Written Information Security Policy

EXECUTIVE SUMMARY

In accordance with Section 12 of Chapter 11 of the Massachusetts General Laws, the Office of the State Auditor has conducted a performance audit of the University of Massachusetts (UMass) Amherst for the period July 1, 2022 through June 30, 2023.

The purpose of this performance audit was to determine whether UMass Amherst's website and its learning management system (LMS), Blackboard, adhered to the accessibility standards established by the Web Content Accessibility Guidelines (WCAG) 2.1 for user accessibility, keyboard accessibility, navigation accessibility, language, error identification, and color accessibility. WCAG ensures that all users, regardless of ability, can access the content and functions of UMass Amherst's website and LMS. Further, it supports UMass Amherst's commitment to equal access for students, faculty, and visitors, fulfilling legal¹ and ethical standards.

Additionally, we determined whether UMass Amherst ensured that its employees completed cybersecurity awareness training in accordance with its adopted Center for Internet Security controls. Cybersecurity awareness is important because adhering to internet security policies helps UMass Amherst demonstrate the university's commitment to protecting sensitive information.

Below is a summary of our findings, the effects of those findings, and our recommendations, with links to each page listed.

Finding 1 Page 15	UMass Amherst's website is not fully accessible ² for all Massachusetts residents and users.
Effect	Broken or faulty hyperlinks limit users from having equitable access to critical information and key online services offered by UMass Amherst and increase the likelihood that Massachusetts residents and students will either access outdated or incorrect information or be directed to webpages that no longer exist. Videos that lack sufficient captioning prevent users from engaging with video content in a meaningful way (e.g., lack of context provided through dialog and important sounds). Additionally, hyperlinks without sufficient contrast with the surrounding text negatively impact the user experience by making it difficult to locate other relevant information.

1. Title II of the Americans with Disabilities Act requires that state universities' and colleges' websites be accessible.
2. Accessible is defined in our report as compliance with WCAG.

Recommendation Page <u>16</u>	The university should continually review its webpages to ensure that all hyperlinks lead to related information and have sufficient contrast with the surrounding text in order to provide equitable access to critical information and services offered online by UMass Amherst. The university should also adopt procedures to ensure that videos have captioning features enabled when posted to the umass.edu website.
Finding 2 Page <u>16</u>	UMass Amherst's learning management system (LMS), Blackboard, is not fully accessible for all students.
Effect	<p>The above instances of noncompliance have the following effects on the user:</p> <p>Broken or Faulty Hyperlinks</p> <ul style="list-style-type: none">• This can limit Blackboard users from having equitable access to critical information and key online services offered on the LMS.• This can increase the likelihood that users will either access outdated or incorrect information or be directed to webpages that no longer exist. <p>Missing Search Bars</p> <ul style="list-style-type: none">• This can prevent users from navigating to other relevant information. <p>Hyperlinks without Identifiable Markers or Sufficient Contrast</p> <ul style="list-style-type: none">• This can negatively impact the user experience by making it difficult to locate other relevant information. <p>Zoom in to 200% and 400%</p> <ul style="list-style-type: none">• Users will be unable to read Blackboard content. <p>Bypass Blocks</p> <ul style="list-style-type: none">• Users will be unable to navigate to the important main content of a page quickly. <p>Portrait Mode</p> <ul style="list-style-type: none">• Users will be unable to interact with their course content on their mobile devices effectively. <p>Keyboard Accessibility/Navigation</p> <ul style="list-style-type: none">• Users who have mobility issues will be unable to access certain features and content. <p>Titles</p> <ul style="list-style-type: none">• Users with screen readers will lose comprehension of the feature. <p>Language Attributes</p> <ul style="list-style-type: none">• The lack of language attributes will prevent screen readers from reading the content to users. <p>Error Identification</p> <ul style="list-style-type: none">• If users are not informed of errors when making inputs on data entry, it means that users will be unable to identify their errors and retrieve the content they need.
Recommendation Page <u>20</u>	UMass Amherst should review the accessibility statements and reports of its LMS vendor to determine instances of WCAG noncompliance. UMass management should work with its LMS vendor to ensure that any potential instances of WCAG noncompliance are resolved.
Finding 3 Page <u>21</u>	UMass Amherst has not implemented workforce cybersecurity awareness training.

Effect	If UMass Amherst does not educate all employees on their responsibility to protect its information assets by requiring cybersecurity awareness training, then UMass Amherst is exposed to an elevated risk of cybersecurity attacks, which may cause financial and/or reputational losses.
Recommendation Page <u>22</u>	UMass Amherst management should update its WISP to require all employees to complete cybersecurity training at hire and at least annually thereafter. UMass Amherst should also devise means by which it can enforce and monitor compliance with an updated training policy. UMass Amherst should enroll all of its employees, contractors, and interns in cybersecurity awareness training.

In addition to the conclusions we reached regarding our audit objectives, we also identified issues not specifically addressed by our objectives. For more information, see [Other Matters](#).

OVERVIEW OF AUDITED ENTITY

The University of Massachusetts (UMass) Amherst is a member of the Massachusetts public higher education system, which consists of 15 community colleges, nine state universities, and five UMass campuses. In 1964, UMass Amherst became one of the five public institutions of higher learning in the UMass system, in accordance with Chapter 75 of the Massachusetts General Laws. UMass is led by a president who oversees the UMass system and by a chancellor at each UMass campus. It is also governed by a board of trustees composed of 22 members, with 17 members who are appointed by the Governor for five-year terms and 5 UMass students who are elected by the student body for one-year terms. The board shapes general policies that govern all five UMass campuses. The chancellor of UMass Amherst, as the administrative head of the campus, reports to the president and is supported by vice chancellors, a provost, and the director of athletics.

As of fall 2023, UMass Amherst had a total enrollment of 31,810 students (23,936 undergraduate and 7,874 graduate students) and approximately 9,373 employees (6,135 full-time and 3,238 part-time employees). According to Section 7 of Chapter 75 of the General Laws, "The [UMass system] trustees shall prepare and submit a detailed budget in such form and manner as the governor, secretary and general court may direct." UMass Amherst had an operating budget of \$1,547,122,000 for the 2023 fiscal year and \$1,458,822,000 for the 2022 fiscal year. UMass Amherst had state appropriations of \$421,771,000 and \$448,412,000 for fiscal years 2022 and 2023, respectively.

Website Accessibility

Americans with Disabilities Act

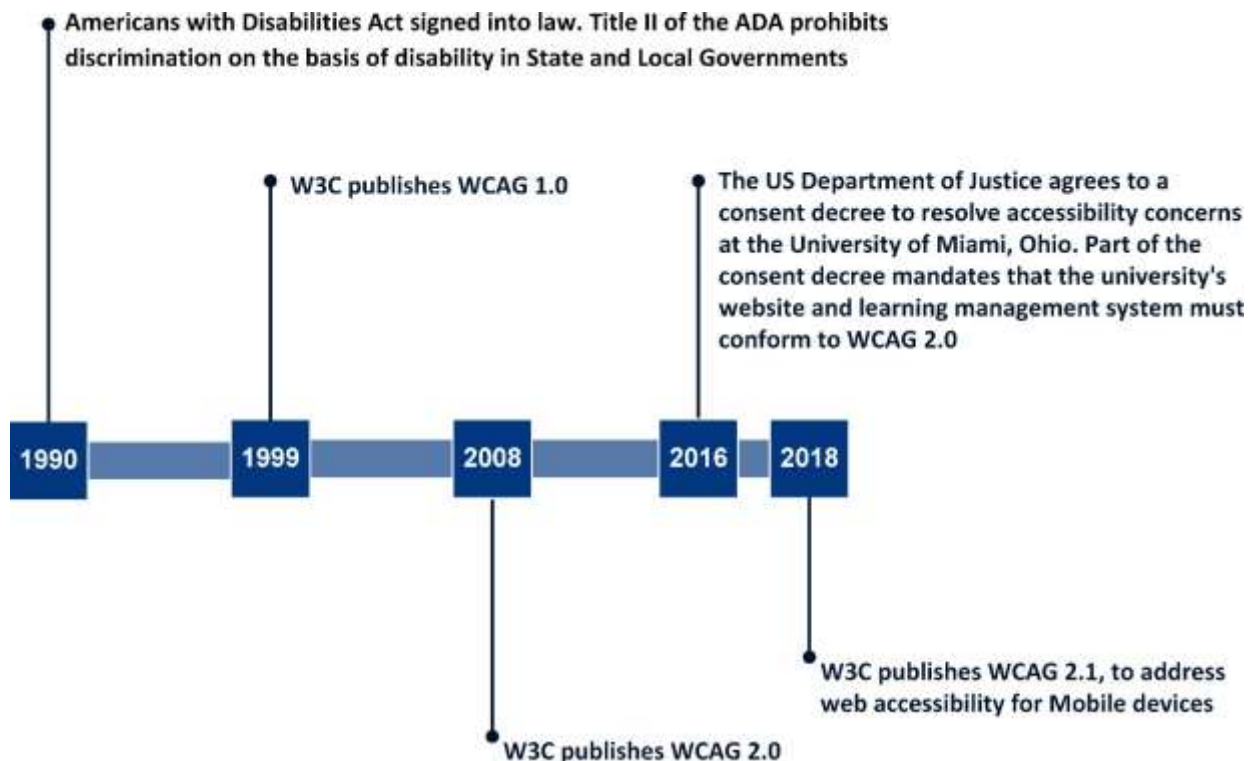
In 1990, the Americans with Disabilities Act (ADA), a comprehensive civil rights law prohibiting discrimination based on disability, came into effect. Title II of the ADA covers state-funded programs such as universities, community colleges, and career and technical education programs, including all activities of state and local governments, regardless of whether these entities receive federal financial assistance. (See 42 US Code § 12131B65). More recently, the Justice Department filed a proposed consent decree to resolve allegations that Miami University in Oxford, Ohio, violated the ADA by using inaccessible classroom technologies and other technologies. As part of the consent decree, Miami University had to ensure that its web content and learning management systems conform with Web Content Accessibility Guidelines (WCAG) 2.0 AA standards. Additionally, the university was required

to meet with every student who has a disability in order to develop an accessibility plan and procure web technology or software that best meets various accessibility standards.

WCAG

The World Wide Web Consortium (W3C), an international organization that oversees internet standards, released WCAG 1.0 in 1999. These guidelines aimed to offer directions on enhancing the accessibility of web content for people with disabilities. In 2008, W3C published WCAG 2.0. In 2018, W3C published WCAG 2.1, which was built on WCAG 2.0 to improve web accessibility on mobile devices and to further improve web accessibility for people with visual impairments and cognitive disabilities.

Progression of Internet Accessibility Standards



How People with Disabilities Use the Web

According to W3C, people with disabilities use assistive technologies and adaptive strategies specific to their needs to navigate web content. Examples of assistive technologies include screen readers, which read webpages aloud for people who cannot read text; screen magnifiers for individuals with

low vision; and voice recognition software for people who cannot (or do not) use a keyboard or mouse. Adaptive strategies refer to techniques that people with disabilities employ to enhance their web interaction.³ These strategies might involve increasing text size, adjusting mouse speed, or enabling captions. To make web content accessible to people with disabilities, developers must ensure that various components of web development and interaction work together. This includes text, images, and structural code; users' browsers and media players; and various assistive technologies.

UMass Amherst made efforts to create and maintain an accessible website in the following ways. Currently at the university, the Assistive Technology Center team performs accessibility reviews of webpages before they are published. Additionally, the university uses third-party software (called SiteImprove) to run weekly scans of the umass.edu website to identify accessibility issues.

3. Web interaction refers to the various actions that users take while navigating and using the internet. It encompasses a wide range of online activities, including, but not limited to, clicking on links, submitting forms, posting comments on webpages, and engaging with web content and services in other forms.

Common Accessibility Features of a Website*

A site's header can appear throughout an entire site and contain links to main content areas

Alternative text should provide a description of an image so screen readers can describe the image

Screen reader users and persons with motor disabilities rely in part on the Tab key to navigate between major portions of the website's content.

Headings organize web content in a logical manner and allow users to navigate content easily.

The screenshot shows the University of Massachusetts Amherst Admissions page. The header includes the university logo and a navigation menu with links: HOME, ACADEMICS, RESEARCH, STUDENT LIFE, THE UMASS EDGE, THE ARTS, ADMISSIONS, and NEWS & EVENTS. The main heading is "ADMISSIONS". Below it, a section titled "Your Journey Starts Here" contains a paragraph about the university's commitment to inclusion and innovation. A sidebar on the left lists links: Undergraduate Admissions, Graduate Admissions, Undergraduate Online Admissions, Pre-College Admissions, and Financial Aid. Below this, a section titled "The Power of Five" describes the Five College Consortium. Further down, a section titled "From Community College to the UMass Community" describes the MassTransfer program. The footer includes the university logo, social media links, and a table of links organized into four columns: INFO FOR..., RESOURCES, and CONNECT. The table lists various links such as Prospective Students, Academic Calendar, Alumni, Current Students, Campus Maps, Athletics, Faculty and Staff, People Finder, Giving, Parents and Families, Policies, Libraries, Job Seekers, Sites A-Z Directory, and Contact Us. The footer also includes copyright information and a link to the Accessibility page.

University of Massachusetts Amherst

HOME ACADEMICS RESEARCH STUDENT LIFE THE UMASS EDGE THE ARTS ADMISSIONS NEWS & EVENTS

ADMISSIONS

IN THIS SECTION

- [Undergraduate Admissions](#)
- [Graduate Admissions](#)
- [Undergraduate Online Admissions](#)
- [Pre-College Admissions](#)
- [Financial Aid](#)

Your Journey Starts Here

At UMass Amherst, we are a community of fearless leaders, unconventional doers, and free thinking problem solvers who are out to change the world. We believe in the possibility of progress, in the power of inclusion, and in the potential for each of our students to change the world. As a leading research university, our campus contains limitless possibilities to transform your ideas into innovations that can redefine the future. Our student body is composed of bright, bold, unconventional thinkers at all levels on a journey to reshape their world. Start your journey at UMass Amherst.

The Power of Five

The Five College Consortium fosters academic excellence through resources, joint departments, and inter-campus collaboration. Through the consortium, students at UMass Amherst have access to a broader array of courses, academic resources, facilities, and libraries, as well as research, performance, and social opportunities across five campuses within the Connecticut River valley including Amherst, Hampshire, Mount Holyoke and Smith colleges. Through this program, UMass students, faculty, and staff are part of an open-minded, diverse community, one that is committed to creating a better world.

FIVE COLLEGE CONSORTIUM

From Community College to the UMass Community

Through the MassTransfer program, you can complete an approved associate degree at a Massachusetts community college and then seamlessly transfer to UMass into a related bachelor's degree. With individualized advising and help with transfer preparation, we empower you to make the leap toward the next phase of your life.

MASSTRANSFER PROGRAM

INFO FOR...

- [Prospective Students](#)
- [Current Students](#)
- [Faculty and Staff](#)
- [Parents and Families](#)
- [Job Seekers](#)

RESOURCES

- [Academic Calendar](#)
- [Campus Maps](#)
- [People Finder](#)
- [Policies](#)
- [Sites A-Z Directory](#)

CONNECT

- [Alumni](#)
- [Athletics](#)
- [Giving](#)
- [Libraries](#)
- [Contact Us](#)

© 2024 University of Massachusetts Amherst

[Site Policies](#) [Privacy](#) [Non-Discrimination Notice](#) [Accessibility](#) [Terms of Use](#)

* This webpage was modified to fit in our report.

Blackboard LMS

According to UMass, Blackboard Learn Original is the third-party vendor learning management system (LMS)⁴ chosen by the university to help instructors provide effective and engaging learning in the classroom. The LMS allows instructors to conduct their courses either partly or entirely online and allows students to undertake a variety of actions, including taking tests, submitting homework assignments, watching lecture videos, keeping track of their grades, and engaging in student discussions. Blackboard's website indicates that its products are generally designed and developed in alignment with WCAG 2.1 Level AA success criteria.

In spring 2023, UMass Amherst announced that it had selected a new LMS called Canvas. We did not test Canvas because it was not fully implemented by the university during the audit period. The university made this transition to address accessibility concerns, increase inclusivity for mobile users, and further integrate the learning and teaching experience.

Cybersecurity Awareness Training

Starting in 2008, in reaction to significant data losses faced by organizations in the US defense sector, the Center for Internet Security (CIS) introduced best practice guidelines for computer security known as CIS Controls. There are 18 controls; they are a set of prioritized cybersecurity actions that organizations can implement to protect against the most common cyber threats. CIS Control 14 (Security Awareness and Skills Training) focuses on the importance of developing and sustaining a security awareness program aimed at shaping employee behavior to be more security minded and adequately trained, thereby minimizing cybersecurity risks to the organization.

In the 2010s, the transition to cloud computing led to an increased focus on cloud security. At the same time, the rise of increased cyber threats highlighted the necessity for cooperative strategies to combat emerging digital challenges. As a result of various data breaches and other cyberattacks, there was an effort to invest in cybersecurity measures to protect sensitive information across organizations. The absence of cybersecurity training poses one of the highest risks an organization can face, as untrained employees are often the weakest link in its security defenses. Recognizing this, organizations have

4. A learning management system, or LMS, is a web-based application that functions like a website. Instructors and students can access the classes they are assigned to.

prioritized investments in cybersecurity training to educate their workforce about potential cyber threats, such as phishing scams and malware.

In 2010, the UMass board of trustees passed a new Information Security Policy (Doc. T10-089), which commits the university to adopt controls modeled on ISO 27002.⁵ This includes controls requiring employees to receive cybersecurity awareness training. According to the university's President's Office, in the intervening years, the university adopted CIS Controls, which require the university's campuses to maintain a cybersecurity awareness training program across its entire workforce.

Currently, UMass Amherst has not updated its policies to require all of its employees to complete cybersecurity awareness training, and it does not enroll all of its employees in cybersecurity awareness training, although it is made available to employees who request it. There are no procedures or enforcement mechanisms in place to ensure cybersecurity training completion across UMass Amherst's workforce. Depending on their work functions, certain employees in departments where Health Insurance Portability and Accountability Act, Family Educational Rights and Privacy Act, and/or Payment Card Industry training is required receive different training programs that also include cybersecurity awareness training.

5. ISO 27002 is an information security standard published by the International Organization for Standardization that offers model practices for cybersecurity risk management.

AUDIT OBJECTIVES, SCOPE, AND METHODOLOGY

In accordance with Section 12 of Chapter 11 of the Massachusetts General Laws, the Office of the State Auditor has conducted a performance audit of certain activities of the University of Massachusetts (UMass) Amherst for the period July 1, 2022 through June 30, 2023.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Below is a list of our audit objectives, indicating each question we intended our audit to answer; the conclusion we reached regarding each objective; and, if applicable, where each objective is discussed in the audit findings.

Objective	Conclusion
1. Did UMass Amherst's website and its learning management system (LMS), Blackboard, adhere to Web Content Accessibility Guidelines (WCAG) 2.1 for user accessibility, keyboard accessibility, navigation accessibility, language, error identification, and color accessibility?	No; see Findings <u>1</u> and <u>2</u>
2. Did UMass Amherst ensure that its employees completed cybersecurity awareness training in accordance with Section 1 of Control 14 (Security Awareness and Skills Training) of the Center for Internet Security's (CIS's) Critical Security Controls?	No; see Finding <u>3</u>

To accomplish our audit objectives, we gained an understanding of the aspects of UMass Amherst's internal control environment relevant to our objectives by reviewing applicable policies and procedures and by interviewing UMass Amherst staff members and management. In addition, to obtain sufficient, appropriate evidence to address our audit objectives, we performed the procedures described below.

Web Accessibility

To determine, for the audit period July 1, 2022 through June 30, 2023, whether UMass Amherst's website and its LMS, Blackboard, adhered to WCAG 2.1, for user accessibility, keyboard accessibility, navigation accessibility, language, error identification, and color accessibility, we performed accessibility testing procedures on the following:

- a judgmental sample of the 20 most visited webpages during the last month of the audit period, from a population of 25,187 UMass Amherst webpages;
- a random, statistical sample of 60 selected pages with a confidence level⁶ of 95%, expected error rate⁷ of 0%, and a tolerable error rate⁸ of 5%, from a population of the remaining 25,167 UMass Amherst webpages; and
- all 59 Blackboard student features from a population of 59 student features.

User Accessibility

- We determined whether the webpage could be viewed in both portrait and landscape modes.
- We determined whether, when zoomed in to 200%, content on the webpage was undamaged and remained readable.
- We determined whether, when zoomed in to 400%, content on the webpage was undamaged and in a single column.

Keyboard Accessibility

- We determined whether all elements⁹ of the webpage could be navigated using only a keyboard.
- We determined whether any elements on the webpage prevented a user from moving to a different element when using only a keyboard to navigate the webpage.
- We determined whether the first focusable control¹⁰ is a link that redirects to the main content of the website. This is known as either a bypass block¹¹ or a skip link.

Navigation Accessibility

- We determined whether the website contained a title that was relevant to the website content.
- We determined whether there was a search function present to help users locate content.
- We determined whether related hyperlinks allowed navigation to the intended webpages.
- We determined whether headings within websites related to the content of the header's section.

6. Confidence level is a mathematically based measure of the auditor's assurance that the sample results (statistic) are representative of the population (parameter), expressed as a percentage.

7. Expected error rate is the number of errors that are expected in the population, expressed as a percentage. It is based on the auditor's knowledge of factors such as prior year results, the understanding of controls gained in planning, or a probe sample.

8. The tolerable error rate (which is expressed as a percentage) is the maximum error in the population that is acceptable while still using the sample to conclude that the results from the sample have achieved the objective.

9. An element is a part of a webpage that contains data, text, or an image.

10. The first focusable control is the first element a user will be brought to on a webpage when navigating with a keyboard.

11. This is a link that brings users to the main content of a webpage.

Language

- We determined whether video content found within the website had all important sound¹² and dialogue captioned.
- We determined whether the language used on the webpage was tagged with the correct language attribute.
- We determined whether words that appeared on the webpage matched the language to which the webpage was set.

Error Identification

- We determined whether mandatory fields on forms alerted users if the field was left blank.
- We determined whether there was a label for any element that required user input.
- We determined whether the label was programmed correctly.
- We determined whether there were examples given to assist the user in correcting mistakes (for example, a warning when entering a letter in a field meant for numbers).

Color Accessibility

- We determined whether there was at least a 3:1 contrast in color and additional visual cues to distinguish hyperlinks, which WCAG recommends for users with colorblindness or other visual impairments.

Cybersecurity Training

To determine whether UMass Amherst employees completed cybersecurity training in accordance with CIS Control 14, we interviewed knowledgeable UMass Amherst staff members and reviewed related documentation.

We used statistical sampling methods for testing, but we did not project the results of our testing to any population.

Data Reliability Assessment

Web Accessibility

To determine the reliability of the site map that we received from UMass Amherst, we interviewed knowledgeable UMass Amherst staff members and checked that variable formats (e.g., dates, unique

12. Important sounds are defined as sounds that convey additional meaning or context for the viewer. For example, a horn may indicate a negative sound or a warning, while a bell might indicate something positive.

identifiers, and abbreviations) were accurate. Additionally, we ensured that none of the following issues affected the site map: abbreviation of data fields, missing data (e.g., hidden rows or columns, blank cells, and absent records), and duplicate records. We also ensured that all values in the data set corresponded with expected values.

We selected a random sample of 20 uniform resource locators (URLs)¹³ from the UMass Amherst site map and traced them to the corresponding webpages on UMass Amherst's website, checking that each URL and page title matched the information on the UMass Amherst webpage. We also selected a random sample of 20 webpages from UMass Amherst's website and attempted to trace each URL and page title to the site map to ensure that there was a complete and accurate population of URLs on the site map. We were unable to trace 13 webpages from UMass Amherst's website to the site map provided by UMass Amherst. We asked UMass Amherst about this and determined that, due to the decentralized administration of UMass Amherst's website, UMass Amherst management would be unable to provide a site map that listed all the URLs on the UMass Amherst website. See Other Matters 3 below. Although we determined that the URL list provided by UMass Amherst management was not a complete URL list, we proceeded with selecting a sample from the URL list provided and performed the following additional procedure: We received a URL list that listed the 20 most-visited websites during the last month of the audit period. To determine the reliability of that list, we sampled all 20 URLs and traced them to the corresponding webpages on the UMass Amherst website, checking that each URL and page title matched the information on the UMass Amherst website.

LMS Accessibility

As part of our review of UMass Amherst's Blackboard system, we requested and received access to an online course. To determine the reliability of the Blackboard course we received access to, we interviewed knowledgeable UMass Amherst staff members regarding the student features of the website. Additionally, we used publicly available information from Blackboard's website to determine what features are available for students and conducted inquiries to determine which features were available to UMass Amherst students during the audit period. We were able to identify 59 features that were available to UMass Amherst students during the audit period. We then traced all 59 features available to UMass Amherst students from the list we obtained from UMass Amherst and from

13. A URL uniquely identifies an internet resource, such as a website.

publicly available sources to the Blackboard course to ensure that we received access to a complete and accurate course.

DETAILED AUDIT FINDINGS WITH AUDITEE'S RESPONSE

1. The University of Massachusetts Amherst's website is not fully accessible for all Massachusetts residents and users.

The University of Massachusetts (UMass) Amherst's website is not fully accessible. We determined that 11 webpages out of a sample of 80 of UMass Amherst's webpages were not accessible in accordance with Web Content Accessibility Guidelines (WCAG) for navigational accessibility, language, or color accessibility. Of these, we determined that 8 had broken hyperlinks, 2 contained videos without proper captioning, and 1 had links without sufficient contrast¹⁴ with the surrounding text.

Broken or faulty hyperlinks limit users from having equitable access to critical information and key online services offered by UMass Amherst and increase the likelihood that Massachusetts residents and students will either access outdated or incorrect information or be directed to webpages that no longer exist. Videos that lack sufficient captioning prevent users from engaging with video content in a meaningful way (e.g., lack of context provided through dialog and important sounds). Additionally, hyperlinks without sufficient contrast with the surrounding text negatively impact the user experience by making it difficult to locate other relevant information.

Authoritative Guidance

The Web Accessibility Initiative's WCAG 2.1 states,

Success Criteria 2.4 .5,

More than one way is available to locate a Web page within a set of Web pages except where the Web Page is the result of, or a step in, a process.

Success Criteria 1.2 .2,

Captions are provided for all prerecorded audio content in synchronized media, except when the media is a media alternative for text and is clearly labeled as such.

Success Criteria 1.4 .1,

Color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

14. WCAG defines a sufficient contrast as a 3:1 contrast in color and additional visual cues to distinguish hyperlinks.

Reasons for Issue

UMass Amherst management told us that they have a very decentralized website and that it is difficult to monitor every branch for WCAG compliance. The accessibility issues identified on UMass Amherst's website appear to stem from gaps in implementing and maintaining WCAG standards. The issues identified in this finding reflect broader challenges, such as insufficient accessibility reviews during the audit period and limited integration of accessibility as a priority, demonstrated by a lack of controls in web design and maintenance processes.

Recommendation

The university should continually review its webpages to ensure that all hyperlinks lead to related information and have sufficient contrast with the surrounding text in order to provide equitable access to critical information and services offered online by UMass Amherst. The university should also adopt procedures to ensure that videos have captioning features enabled when posted to the umass.edu website.

Auditee's Response

The University understands the importance of ensuring the accessibility of its webpages for all users. It is important to note that accessibility is and has been a priority of the campus and webpage reviews were performed before a launch and weekly during the audit scope period. The campus will continue to perform weekly accessibility reviews and resolve issues as they are identified. Also, the campus has fixed all accessibility issues identified in the audit.

Auditor's Reply

Based on its response, UMass Amherst has taken, and continues to take, measures to address our concerns regarding this matter.

2. The University of Massachusetts Amherst's learning management system, Blackboard, is not fully accessible for all students.

UMass Amherst's learning management system (LMS), Blackboard, is not fully accessible. We determined that 42 of the Blackboard student features out of the 59 Blackboard student features we tested were not accessible for user accessibility, keyboard accessibility, navigational accessibility, error identification, or color accessibility. Specifically, we determined the following:

User Accessibility

- One student feature restricted the view of the webpage and could not be viewed fully in portrait mode.
- Two student features had text that did not properly resize.
- Thirty-three student features could not be enlarged without issue.

Keyboard Accessibility

- Five student features could not be navigated using a keyboard alone.
- One student feature trapped the focus¹⁵ of keyboard users.
- Two student features did not provide a bypass block¹⁶ as the first focusable element¹⁷ as a way to skip to a page's main content.

Navigational Accessibility

- Eleven student features had broken links or links that lead to the incorrect location.

Error Identification

- Two student features did not identify user input errors.

Color Accessibility

- One student feature did not have sufficient contrast to convey the required information.

The above instances of noncompliance have the following effects on the user:

Broken or Faulty Hyperlinks

- This can limit Blackboard users from having equitable access to critical information and key online services offered on the LMS.
- This can increase the likelihood that users will either access outdated or incorrect information or be directed to webpages that no longer exist.

15. This is a situation where the user is locked into using only a limited section of the webpage until the page is either refreshed or the computer is restarted.

16. This is a link that brings users to the main content of a webpage.

17. This is the first element a user will be brought to on a webpage when navigating with a keyboard.

Missing Search Bars

- This can prevent users from navigating to other relevant information.

Hyperlinks without Identifiable Markers or Sufficient Contrast

- This can negatively impact the user experience by making it difficult to locate other relevant information.

Zoom in to 200% and 400%

- Users will be unable to read Blackboard content.

Bypass Blocks

- Users will be unable to navigate to the important main content of a page quickly.

Portrait Mode

- Users will be unable to interact with their course content on their mobile devices effectively.

Keyboard Accessibility/Navigation

- Users who have mobility issues will be unable to access certain features and content.

Titles

- Users with screen readers will lose comprehension of the feature.

Language Attributes

- The lack of language attributes will prevent screen readers from reading the content to users.

Error Identification

- If users are not informed of errors when making inputs on data entry, it means that users will be unable to identify their errors and retrieve the content they need.

Authoritative Guidance

The Web Accessibility Initiative's WCAG 2.1 states,

Success Criterion 1.3.4 Orientation (Level AA)

Content does not restrict its view and operation to a single display orientation, such as portrait or landscape, unless a specific display orientation is essential.

Success Criterion 1.4.10 Reflow (Level AA)

Content can be presented without loss of information or functionality, and without requiring scrolling in two dimensions for:

- *Vertical scrolling content at a width equivalent to 320 CSS pixels;*
- *Horizontal scrolling content at a height equivalent to 256 CSS pixels.*

Except for parts of the content which require two-dimensional layout for usage or meaning.

Success Criterion 1.4.4 Resize Text (Level AA)

Except for captions and images of text, text can be resized without assistive technology up to 200 percent without loss of content or functionality.

Success Criterion 2.1.1 Keyboard (Level A)

All functionality of the content is operable through a keyboard interface without requiring specific timings for individual keystrokes, except where the underlying function requires input that depends on the path of the user's movement and not just the endpoints.

Success Criterion 2.1.2 No Keyboard Trap (Level A)

If keyboard focus can be moved to a component of the page using a keyboard interface, then focus can be moved away from that component using only a keyboard interface, and, if it requires more than unmodified arrow or tab keys or other standard exit methods, the user is advised of the method for moving focus away.

Success Criterion 2.4.1 Bypass Blocks (Level A)

A mechanism is available to bypass blocks of content that are repeated on multiple Web pages.

Success Criterion 2.4.5 Multiple Ways (Level AA)

More than one way is available to locate a Web page within a set of Web pages except where the Web Page is the result of, or a step in, a process.

Success Criterion 3.3.1 Error Identification (Level A)

If an input error is automatically detected, the item that is in error is identified and the error is described to the user in text.

Success Criterion 1.4.1 Use of Color (Level A)

Color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

Reasons for Issue

UMass management shared with us that they expected Blackboard to be largely WCAG accessible due to the marketing of the product and availability and review of the Voluntary Product Accessibility Template.¹⁸ UMass management expressed that UMass Amherst was in the process of changing its LMS from Blackboard to Canvas, with accessibility being one of the factors leading to the change.

Recommendation

UMass Amherst should review the accessibility statements and reports of its LMS vendor to determine instances of WCAG noncompliance. UMass management should work with its LMS vendor to ensure that any potential instances of WCAG noncompliance are resolved.

Auditee's Response

The University understands the importance of utilizing an LMS that is accessible. As noted in the report, the campus transition to Canvas, a new LMS vendor, was underway in the spring of 2023 before the start of this audit. Blackboard's accessibility issues were one of the factors that led the campus to transition from Blackboard to Canvas. The University did monitor Blackboard's accessibility statements during the audit scope period. It will continue to review Canvas' accessibility statements and reports to determine if it meets accessibility requirements since the vendor is responsible for maintaining their LMS' accessibility.

Auditor's Reply

The university states in its response that it monitored Blackboard's accessibility statements during the audit scope period. However, as part of our audit testing, we determined that 42 of the Blackboard student features out of the 59 Blackboard student features we tested (71%) were not accessible for user accessibility, keyboard accessibility, navigational accessibility, error identification, or color accessibility.

18. The Voluntary Product Accessibility Template is a report prepared by the vendor that describes how well the product conforms to accessibility standards.

Based on our audit results, and even with a new vendor for this service (Canvas), we recommend that UMass Amherst implement our recommendation in order to be in compliance with WCAG.

3. The University of Massachusetts Amherst has not implemented workforce cybersecurity awareness training.

UMass Amherst has not implemented cybersecurity awareness training in accordance with Center for Internet Security (CIS) Control 14. At UMass Amherst, the Written Information Security Policy (WISP) does not require employees to complete cybersecurity training at hire and at least annually thereafter. Additionally, while cybersecurity training courses are made available to employees who request it, employees are not required to complete the training per the WISP and are not enrolled in it, annually or at hire.

If UMass Amherst does not educate all employees on their responsibility to protect its information assets by requiring cybersecurity awareness training, then UMass Amherst is exposed to an elevated risk of cybersecurity attacks, which may cause financial and/or reputational losses.

Authoritative Guidance

According to UMass system management, UMass Amherst follows Section 1 of Control 14 (Security Awareness and Skills Training) of the CIS's Critical Security Controls for the cybersecurity awareness training of their employees. This control states,

Establish and maintain a security awareness program. The purpose of a security awareness program is to educate the enterprise's workforce on how to interact with enterprise assets and data in a secure manner. Conduct training at hire and, at minimum, annually. Review and update content annually, or when significant enterprise changes occur that could impact this Safeguard.

Reasons for Issue

UMass Amherst management told us that given the size of the campus's workforce, it is difficult to implement policy and enforce compliance. The issue arises primarily due to a lack of clear policy mandates and insufficient prioritization of cybersecurity awareness training within UMass Amherst's WISP. Although high-risk areas are addressed with specific cybersecurity training requirements (e.g., employee training needed for Health Insurance Portability and Accountability Act or Payment Card Industry compliance), other departments are lacking clear policy.

Recommendation

UMass Amherst management should update its WISP to require all employees to complete cybersecurity training at hire and at least annually thereafter. UMass Amherst should also devise means by which it can enforce and monitor compliance with an updated training policy. UMass Amherst should enroll all of its employees, contractors, and interns in cybersecurity awareness training.

Auditee's Response

Cybersecurity awareness training is only one part of a highly sophisticated and comprehensive cybersecurity program deployed by the campus to detect and prevent threats to the campus' information technology infrastructure, assets and data. All new employees will be required to take the training as part of the on-boarding process. Annually, all employees will be required to take a refresher course and emails will be sent out with the link to the learning management system training site. Furthermore, management will monitor whether employees have timely completed training. The training material will be reviewed periodically and if necessary, the material will be revised for any new and applicable authoritative guidelines.

UMass Amherst will update its WISP to reflect the new cybersecurity awareness training requirements.

Auditor's Reply

Based on its response, UMass Amherst will take measures to address our concerns regarding this matter. We note that the requirement to provide this training is not new and will follow up on this in approximately six months as part of our post audit review process.

OTHER MATTERS

1. The University of Massachusetts Amherst can further enhance the accessibility of its marketing pages.

During our audit, we determined that 1 webpage of our sample of 80 University of Massachusetts (UMass) Amherst webpages did not have a search bar. After discussing with UMass Amherst management, we determined that this page was used as a landing page for a marketing campaign. This makes the page part of a process, and therefore, a search bar or other navigable elements are not required for Web Content Accessibility Guidelines (WCAG) 2.1 compliance. However, certain industry sources argue that including a search bar and other navigable elements would improve accessibility.

A lack of a navigation bar or search bar prevents users from easily exploring the website or finding additional information.

Authoritative Guidance

The Web Accessibility Initiative's WCAG 2.1 states,

Success Criteria 2.4 .5,

More than one way is available to locate a Web page within a set of Web pages except where the Web Page is the result of, or a step in, a process.

Additionally, private industry sources, like Bureau of Internet Accessibility, state,

Many landing pages remove the navigation bar to improve conversion rates. This isn't strictly necessary, and it can be frustrating for people who want to explore your website without reentering the URL. . . .

The [landing page with a navigation bar] has an effective [call to action (CTA)] and strong sales copy, but the navigation bar is still accessible. The page's layout keeps the user's attention on the CTA button, but it doesn't prevent users from visiting other parts of the website.

Reasons for Issue

UMass Amherst told us that this webpage was used for generating marketing leads and is designed to guide users to engage with the marketing materials. It indicated that navigational tools, like a search bar or navigation menu, will lead users from the landing (marketing) page.

Recommendation

UMass Amherst should consider adding a navigation bar and search box on its landing page as a way of further enhancing user accessibility.

Auditee's Response

The University will take this under consideration; however, a marketing landing page is a webpage that does not include searchable content and is made to be seen only by people who have clicked on a digital ad from platforms such as Facebook, Instagram, and Google Search. This is a common practice and an industry standard.

Auditor's Reply

As noted above, best practices state that including a search bar and other navigable elements improves website accessibility. A lack of a navigation bar or search bar prevents users from easily exploring the website or finding additional information. Given these reasons, we recommend that UMass implement our recommendation in this area.

2. The University of Massachusetts Amherst can further enhance the accessibility of its cookie banner.

During our audit, we determined that the first focusable element of 46 webpages out of our sample of 80 webpages was not a bypass block but was the cookie banner. WCAG criteria states that the first focusable element of a webpage must be a bypass block to the main content. At the same time, however, General Data Protection Regulations require that users be given the option to protect their privacy when logging on to a website (including from cookies). The cookie banner should not take priority over the bypass block, the bypass block should be configured to override the cookie banner so it is most accessible to users.

A lack of bypass blocks that allow users to skip to the main content of a webpage without first selecting their cookie settings may keep disabled users from easily obtaining the information they need.

Authoritative Guidance

Success Criterion 2.4.1 Bypass Blocks (Level A)

A mechanism is available to bypass blocks of content that are repeated on multiple Web pages.

Reasons for Issue

Cookie settings have been commonplace since 2018 and were implemented in response to the European Union General Data Protection Regulation, which required them. The competing standards between General Data Protection Regulations and WCAG has caused a lack of clarity regarding accessible implementation, leading to institutions designing cookie banners to be the first focusable element.

Recommendation

Accessibility industry sources suggest that the best practice would be to ensure that the skip link to main content comes first, followed by a skip link that allows users to skip to the cookie banner. UMass Amherst should consider adding these skip links to its website.

Auditee's Response

The University will take this under consideration; however, it is required to follow European Union General Data Protection Regulations that require its users be given the option to protect their privacy when initially logging on to a website, including from cookies.

Auditor's Reply

Based on its response, UMass Amherst is taking measures to address our concerns regarding this matter.

3. The University of Massachusetts Amherst does not maintain a full site map of its umass.edu website.

During our audit, we determined that UMass Amherst does not keep a full and complete inventory of the number of webpages and web addresses on the umass.edu website. As part of our audit procedures, we selected a random sample of 20 webpages from UMass Amherst's website and attempted to trace the uniform resource locators (URLs) and page titles to the site map we received to ensure that there was a complete and accurate population of URLs on the site map. We were unable to trace 13 webpages from UMass Amherst's website to the site map provided by UMass Amherst management. We asked UMass Amherst management about this and were told that, due to the decentralized administration of UMass Amherst's website, UMass Amherst management was unable to provide a site map that listed all the URLs on the UMass Amherst website.

If UMass Amherst does not have a complete inventory of webpages for its umass.edu website, then it exposes itself to an increased risk of being unable to track or manage the webpages under the umass.edu domain. This can cause users to be provided with out-of-date and inaccessible information. It is

significantly more difficult for UMass Amherst to maintain webpages that are not actively tracked by university personnel.

Authoritative Guidance

The National Institute of Standards and Technology SP 800-53 Revision 5¹⁹ states,

CM-8 SYSTEM COMPONENT INVENTORY

Control:

- a. Develop and document an inventory of system components that:*
 - 1. Accurately reflects the system;*
 - 2. Includes all components within the system;*
 - 3. Does not include duplicate accounting of components or components assigned to any other system;*
 - 4. Is at the level of granularity deemed necessary for tracking and reporting; and*
 - 5. Includes the following information to achieve system component accountability: [Assignment: organization-defined information deemed necessary to achieve effective system component accountability]; and*
- b. Review and update the system component inventory [Assignment: organization-defined frequency].*

Reasons for Issue

While UMass reports that it is moving toward a more centralized model so that the umass.edu website can be more uniform, it currently operates a largely decentralized website with each department responsible for maintaining its own website and content. In addition, there is a lack of proactive management oversight and governance. Specifically, UMass Amherst did not implement a process to appropriately oversee this decentralized model or ensure departmental accountability for the inventory of accessible websites.

19. The National Institute of Standards and Technology provides security and privacy controls used by organizations to protect their operations and assets.

Recommendation

UMass Amherst management should complete an inventory of its umass.edu website and adopt procedures to ensure that it maintains a full list of webpages, while continuing its effort to centralize the administration of the website.

Auditee's Response

The University will take this recommendation under consideration. It is important to note that during the audit scope period the University proactively managed the oversight and governance of its website and will continue to do so.

Auditor's Reply

As noted above, we determined during our audit that UMass Amherst does not keep a full and complete inventory of the number of webpages and web addresses on the umass.edu website. If UMass Amherst does not have a complete inventory of webpages for its umass.edu website, then it exposes itself to an increased risk of being unable to track or manage the webpages under the umass.edu domain. This can cause users to be provided with out-of-date and inaccessible information. Given these reasons, we encourage UMass to implement our recommendation in this area.