

# WSU & LMS Tech Companies

PRESENTATION TO FACULTY SENATE (NEW BUSINESS), MARCH 25<sup>TH</sup>, 2024

WICHITA STATE UNIVERSITY

Issue for Faculty Senate:  
Wichita State's  
Relationship with LMS  
(Learning Management  
System) Tech Companies

Today: present my observations & indicate why I feel there may be a concern for Faculty, ask ideas for requests, actions, etc.

Per the "Rules of the Faculty Senate", General Procedure No 15, ("Any member of the Faculty may request in writing that an item be placed on the Senate's agenda"), I requested this item be placed on the Agenda in the Faculty Senate.

The item is: Wichita State's Relationship with Tech Companies.

I would like to explain that Wichita State is in a relationship with tech vendors that is unlike that of WSU Tech, or KU, or K-State, Emporia State, and many others . . . I would like to explain the relationship, and how it differs from the norm for Kansas universities.

I would then like to explain concerns this fact gives rise to in three areas:

1. protecting privacy of student data;
2. protecting faculty members' moral right to claim authorship of their works; and
3. security against cyberattacks.

After explaining the situation, we can discuss the next step, if any, the Faculty Senate ought to take.

Adoption of LMS: WSU v most other Kansas institutions  
 (info per institutions' .edu websites)  
 -- minor revision to slide since last slide set

Institution	Choice of LMS	Company LMS is from	Status of Company
Wichita State	Blackboard Ultra	Anthology Inc	Private Equity
WSU Tech	Canvas	Instructure	Public
University of Kansas (KU)	Canvas	Instructure	Public
K-State	Canvas	Instructure	Public
Emporia State	Canvas	Instructure	Public
Pitt State	Canvas	Instructure	Public
Butler Co CC	Canvas	Instructure	Public
Johnson County	Canvas	Instructure	Public
Hutchinson CC	Canvas	Instructure	Public
Univ of Oklahoma	Canvas	Instructure	Public

## Anthology (Ultra) & OpenAI news in mid- 2023 – what's the relationship?

Quote from Article mentioning Coursera, edX, Pearson, and Anthology:

*"Anthology, the company behind the Blackboard Learn learning management system, **announced earlier this month that it is partnering with OpenAI to develop a course-building aide** for instructors, as well as tools to generate test questions from course content and develop grading rubrics."*

From: "Edtech companies jump on generative AI bandwagon" by Lindsay McKenzie July 31, 2023  
*Edscoop*, <https://edscoop.com/edtech-companies-generative-ai/>

Other sources: announcement from Anthology Inc (video) "Anthology Announces AI Course Building Tools" AT#23 with Nicolaas Matthijs, Vice President of Product Management at Anthology. July 26, 2023.

URL: <https://youtu.be/TWFnHI-wH2w?feature=shared> ; PR Newswire Asia July 18<sup>th</sup>, 2023; Zawya.com 7/29/24

LATER in November 2023: "Anthology uses Azure OpenAI Service to Empower Instructors" with Misty Cobb of Anthology Inc. URL: <https://youtu.be/7HCMGCEXP0U?feature=shared> ; also "Anthology debuts AI-powered authentic assessment for Blackboard Learn Ultra" PRNewswire UK October 26, 2023

Anthology (Ultra) is private (no SEC filing requirements)  
 Instructure (Canvas) is publicly traded (10-K, 8-K filings required)  
 That Anthology is private limits our knowledge of its workings.

### Ultra LMS: Anthology, Microsoft & OpenAI

- ▶ Anthology partnership with OpenAI ? –no more info, as neither is publicly traded, so not subject to same regulatory oversight, **little transparency** about relationship required.
- ▶ Anthology lists Microsoft (MS) as a strategic partner\*, and MS is public. So at least **the portion of Anthology's relation to OpenAI that is via MS Azure OpenAI is supposed to be transparent.**
- ▶ Very few other universities have chosen Ultra as their LMS, not sure how many in U.S. have actually fully implemented it. **Few allies to call upon for oversight of Anthology.**

\* Per <https://www.anthology.com/integration-partnerships/partner-directory>; as of February 24, 2024

+ Per [https://www.instructure.com/en-gb/resources/blog/automatic-question-generation-using-open-ai?filled\\_2/24/2024](https://www.instructure.com/en-gb/resources/blog/automatic-question-generation-using-open-ai?filled_2/24/2024)

### Canvas LMS: Instructure, Microsoft & OpenAI

- ▶ Since Instructure is public, it is subject to SEC regulation, which **requires transparency.** There is no mention of OpenAI in Instructure's latest 10-K.
- ▶ Microsoft365/MSEducation – use of MS Teams in Canvas; (and MS “Copilot AI assistant” (uses OpenAI models) for Accessibility.) As both Instructure & MS are public, **transparency is required by the SEC.** Instructure lists MS as one of its 900 partners.
- ▶ Many other universities use Canvas, **and they can jointly put** pressure on MS to reveal its activities.

.++ Some APIs that can be used with Canvas **use OpenAI** (i.e., Learning Mate)+ and Khanmigo. Instructure Partners with Khan Academy for writing coach Khanmigo, which is GPT-4 powered.

## Anthology (Ultra) & OpenAI news in mid- 2023 – what's the relationship? [slide added since last time]

Quote from Anthology's Press Release dated July 17<sup>th</sup> 2023 – what they do reveal:

**“Anthology Accelerates Innovation in Higher Education with Microsoft Azure OpenAI Service:** New AI Enhancements unveiled at Anthology Together”

BOCA RATON, Fla., July 17, 2023 /PRNewswire/ -- Anthology, a leading provider of education solutions that support the entire learner lifecycle, today announced its future of incorporating generative AI capabilities into its ecosystem of EdTech solutions in collaboration with Microsoft.

[. . .]

"While other vendors might be looking at AI within a point solution, Anthology is assessing the power of generative AI technology across our vast stack of EdTech solutions.

## Anthology (Ultra) & OpenAI news in August 2023 – what's the relationship? [slide added since last time]

Quote from Anthology's Press Release dated August 14<sup>th</sup> 2023 – what they do reveal:

Anthology Appoints Bruce Dahlgren as CEO

Dahlgren's appointment comes at a time of significant growth for Anthology. Last month, the organization announced the incorporation of generative AI capabilities into its ecosystem of EdTech solutions through their long-standing collaboration with Microsoft. The company also announced new product features that are facilitated by AI and aimed at improving student success and retention rates.

Why care about OpenAI-Microsoft  
relationship?

Why care about OpenAI- Anthology  
relationship?

IT'S ABOUT TRANSPARENCY ABOUT  
OTHER COMPANIES' ACCESS TO DATA  
VIA A UNIVERSITY'S LMS



## Microsoft and Open AI 8 December 2023. 1/2

**From: “UK and US regulators examine Microsoft’s ties to OpenAI”** [Tim Bradshaw](#), [Cristina Criddle](#) and [Madhumita Murgia](#) in London and Michael Acton in San Francisco. *Financial Times*, December 8 2023. Subscriber only link: <https://on.ft.com/3uPS2BM>

“Competition regulators in the UK and US are examining Microsoft’s multibillion-dollar partnership with OpenAI, one of the tech industry’s most lucrative tie-ups. The UK’s Competition and Markets Authority on Friday said it had begun an “information gathering process”, a necessary precursor to a formal investigation that is likely to begin next year.

“The CMA has decided to investigate and is inviting comments,” the agency said. The US Federal Trade Commission is also looking into Microsoft’s investment in the company. . .”

## Microsoft and Open AI 8 December 2023 (cont'd) 2/2

- ▶ **UK and US regulators examine Microsoft's ties to OpenAI** Tim Bradshaw, Cristina Criddle and Madhumita Murgia in London and Michael Acton in San Francisco. December 8 2023. Subscriber only link: <https://on.ft.com/3uPS2BM>

*'Microsoft's chief executive Satya Nadella told the Financial Times earlier this year: "We have a pretty 360 [degree] relationship with them. We are investors, we have economic interests, we have commercial interests."*

*However, the two companies have never fully explained the details of their alliance.'*

## January 25, 2024 – FTC decides to investigate lack of transparency in MS-OpenAI partnership

From: “Big Tech’s AI partnerships draw inquiry from FTC” *Financial Times*, January 25<sup>th</sup>, 2024. Free link to article: <https://on.ft.com/3OPG3v8>  
<https://on.ft.com/3HwXtZj> (for subscribers)

“Microsoft’s high-profile \$13bn investment into OpenAI is one of the best known partnerships between a Big Tech giant and a start-up in the fast-growing sector, but it has drawn criticism for its opaque structure. [. . .] The FTC (Federal Trade Commission) said it was seeking information about how the relationships worked,”

# January 30, 2024 – civil groups trigger investigation by submission to EU

“30 January 2024

## Submission to European Commission on Microsoft-OpenAI 'partnership' merger inquiry

1. This submission from diverse civil society organisations welcomes DG COMP's investigation into the Microsoft-OpenAI partnership. Our submission, which builds on a recent similar submission to the UK Competition and Markets Authority, is structured in four sections:

1. The Microsoft-OpenAI 'partnership';
2. Why this investment must be investigated;
3. Why Microsoft's investment in OpenAI gives it significant influence; and
4. Competition issues DG COMP should investigate. “

Urls lots of places; here is one:

<https://www.publicnow.com/view/C8AD9BA5242BEC85346AD4B4B9386340E3B78F22?1706633204>

## February 9<sup>th</sup>, 2024 Microsoft and Open AI

- ▶ Quote from article: "Open AI on track to hit \$2 billion revenue milestone as growth rockets" by [Madhumita Murgia](#) in London and [George Hammond](#) in San Francisco. *Financial Times*, February 9<sup>th</sup>, 2024.

*Altman has said OpenAI remains lossmaking because of the vast costs of building and running its models. The spending is expected to continue to outpace revenue growth as it develops more sophisticated models. The company is likely to need to raise tens of billions more in order to meet those costs. [. . .]*

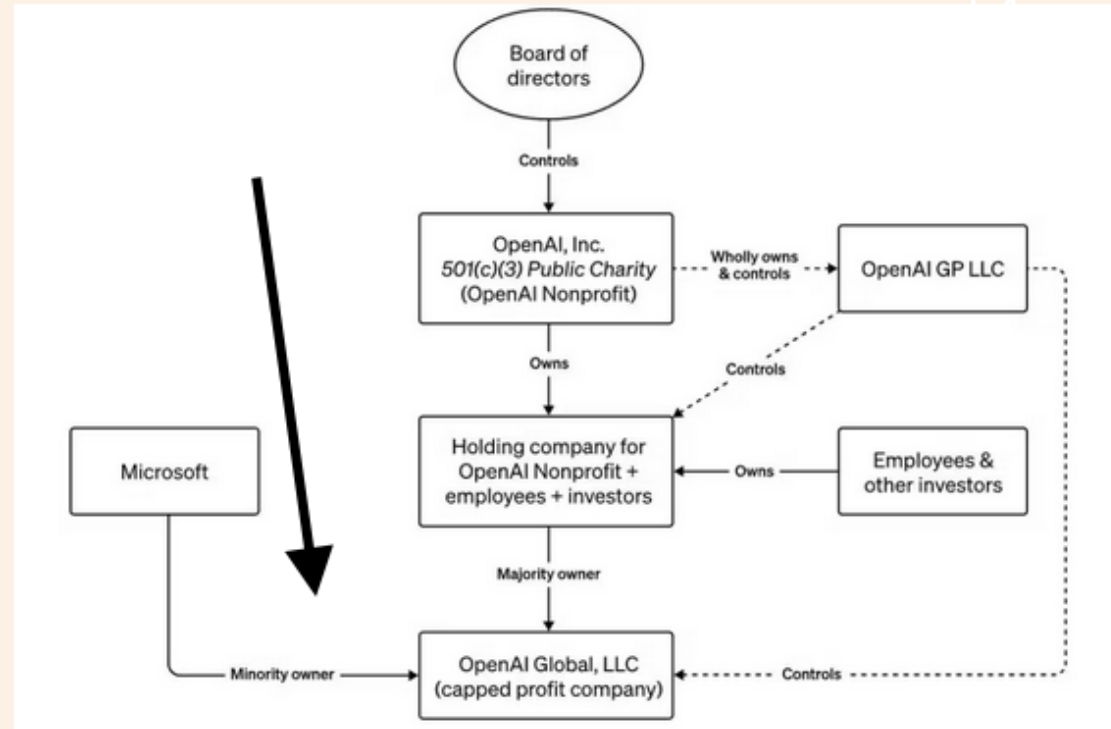
*So far, its biggest backer Microsoft has committed up to \$13bn to OpenAI, as the companies forged an alliance that has put them at the forefront of the AI frenzy. OpenAI's models also underpin Microsoft's AI Copilot, an AI assistant for enterprise users of Microsoft 365, its suite of productivity software including Office, Excel and PowerPoint, which has been rolling out over the past three months."*

OpenAI & MS being investigated, (but not OpenAI & Anthology)

"The peculiar structure of these deals shows how the altruistic origins of Silicon Valley's most prominent start-up are now colliding with the huge commercial promise of AI.

OpenAI was founded in 2015 as a not-for-profit organisation, which now owns the for-profit subsidiaries created in 2019 to facilitate Microsoft's investment.

But, . . . until recently, many of the details of its structure have been obscure to outsiders. "

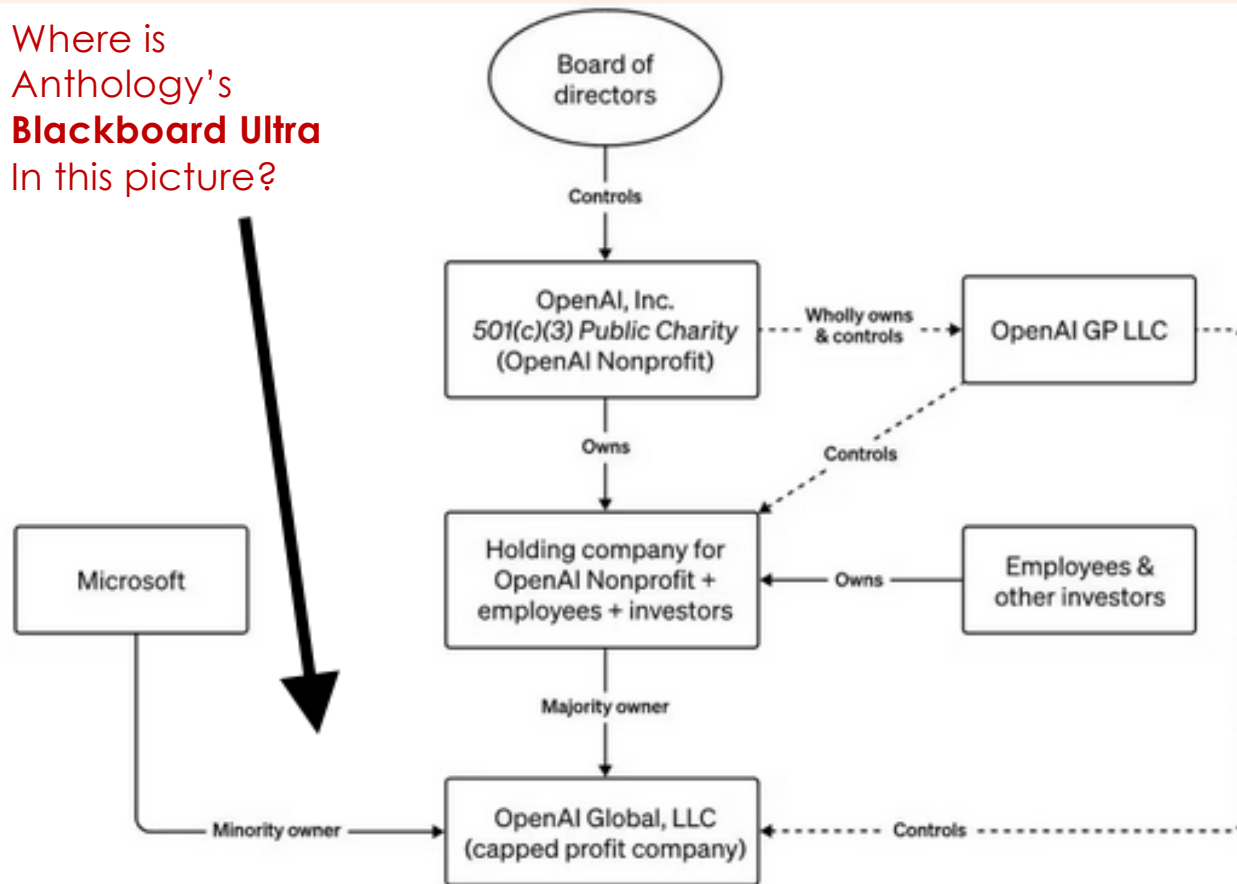


A graphic detailing OpenAI's complex ownership structure on its website, describing Microsoft as a 'minority owner'. A few days ago the wording was changed to 'minority economic interest'

Enlarged version of graphic on next slide.

"How Microsoft's multi-billion dollar alliance with OpenAI really works." by Tim Bradshaw and Madhumita Murgia in London and George Hammond and Camilla Hodgson in San Francisco. Financial Times. December 15 2023

Where is Anthology's **Blackboard Ultra** In this picture?



A graphic detailing OpenAI's complex ownership structure on its website, describing Microsoft as a 'minority owner'. A few days ago the wording was changed to 'minority economic interest'

"How Microsoft's multi-billion dollar alliance with OpenAI really works."

by [Tim Bradshaw](#) and [Madhumita Murgia](#)

In London and [George Hammond](#) and [Camilla Hodgson](#) in San Francisco.

Financial Times.  
December 15 2023

Diagram above of Microsoft & OpenAI pinpointed relationship to be investigated, but what about Anthology?

However, there is **no transparency** about **Anthology (Ultra LMS) and its relationship with Open AI**. The only clue to the relationship is the statement Anthology made quoted on an earlier slide.

Since neither Anthology (Ultra LMS) nor Open AI is publicly traded, there are not the same reporting or transparency requirements about either business that there are for publicly owned companies like Microsoft or Instructure (Canvas LMS). So **there is no move to examine it from regulators.**

And **we don't see any civil organizations taking on the question.** And are not likely to.



## Microsoft-OpenAI relationship getting attention

- As a result, there is now a lot of scrutiny of Microsoft and its relationship with OpenAI, in both the US and European Union (EU).
- At least for the MS-OpenAI relationship there are lots of agencies and organizations watching it, and trying to hold Microsoft accountable. This is in addition to regulators, which are not the total solution, as they are vulnerable to “regulatory capture.”

## OpenAI's insatiable desires

-- Altman (CEO of OpenAI) is trying to raise a gigantic amount of money for what he wants to do next: > 7 trillion dollars. "The amounts Altman has discussed would also be outlandishly large by the standards of corporate fundraising—larger than the national debt of some major global economies and bigger than giant sovereign-wealth funds." \*

Actually he will need data as well as money to do what he wants to do next. He has argued that using copyrighted works for training OpenAI's models is legal and necessary for OpenAI.+ Where will he get them?

\* "Sam Altman Seeks Trillions of Dollars to Reshape Business of Chips and AI" by Keach Hagey and Asa Fitch, *Wall Street Journal*. February 8, 2024.

+ "OpenAI: 'Impossible' to train today's leading AI models without using copyrighted materials." by Thomas Claburn, *The Register*. January 8<sup>th</sup>, 2024.

Mozilla (nonprofit devoted to internet safety) started a petition to MS, asked others to sign

### **“Ask Microsoft: Are you using our personal data to train AI?”**

We had four lawyers, three privacy experts, and two campaigners look at Microsoft's new Service Agreement, and none of our experts could tell if Microsoft plans on using your personal data – including audio, video, chat, and attachments from 130 products, including Office, . . . , Teams, and Xbox – to train its AI models.

If nine experts in privacy can't understand what Microsoft does with your data, what chance does the average person have? That's why we're asking Microsoft to say if they're going to use our personal data to train its AI. “

<https://foundation.mozilla.org/en/campaigns/microsoft-ai/>

Recall that, on chart above,  
Anthology-OpenAI relationship would be invisible:

So, we cannot determine the nature of a direct Anthology-OpenAI relationship or examine any agreements associated with it. We cannot ask Anthology the same thing Mozilla and numerous regulatory agents are pressing Microsoft about on its relationship with OpenAI.

Nor can we be sure where Anthology sits in the MS-OpenAI relationship, since ties and agreements between Anthology (private) and OpenAI (private) need not be revealed.

# Concerns WSU's situation gives rise to

## Student privacy

Personal information is shared with many parties.

--- Student's creative work: We don't know what can happen after the 'baked in AI' in Blackboard Ultra gets access to it, since student information is shared with so many other parties. (Details on later slides.) We don't know what those agreements with other parties permit Anthology to share.

## Faculty ownership of content

-- Completely in the dark re Anthology's agreements with other parties it shares information with, so not clear faculty will be able to maintain moral rights over their creative and intellectual work.

Personal information can be shared with many parties; what can 'personal. Information' include? (Details in later slides.)

## Security against cyberattacks

Facts all making this worse:

- Anthology does not have the oversight that publicly traded companies do;
- Few if any other Anthology users so few in same boat as us;

Anthology does have security program for developing its software, but regarding vulnerabilities it puts a responsibility on the university (Details in later slides]

## WSU ARC2024 session on Tech Decisions

### ARC 2024 (January) session “Tech Decisions & How They Are Made”

- ▶ Discussed decision to move to Blackboard Ultra from current Blackboard – explained why they felt that now is the right time to make the move to Ultra.
- ▶ Did not discuss decision in terms of any *alternatives* such as Canvas. Only decision discussed in that 2024 session was *when* to make the move to Anthology’s new LMS Blackboard Ultra, not whether Ultra was the best choice among other alternatives that other schools in Kansas and elsewhere were using, such as Instructure’s LMS Canvas.

## Anthology's LMS and 'AI tools' – remarks by WSU folks at ARC2024

36:58

There's a lot of AI tools that are baked into Blackboard.

37:01

We're actually one of the institutions that has turned on and is exploring the use of Blackboard's AI tools more than any of the other institutions that are subscribing at that level.

37:14

I know Carolyn was telling me a little bit about that insight that we're sort of leading the pack on that, which is fun . . .

CONCERN  
#1

Protecting  
Privacy of  
Student Data &  
Personal  
Information:  
risks of AI use



## Doesn't Anthology have privacy/security measures?

Yes, it has policies for compliance, but in regard to AI, Anthology's approach for AI is to 'empower' institutions to access AI features, and to figure out and put in place appropriate policies and measures themselves, including ones on privacy and security.

**January 24, 2024**

- ▶ **New AI Policy Framework from Anthology Empowers Higher Education to Balance the Risks and Rewards of AI**
- ▶ **BOCA RATON, Fla., January 24, 2024** - "Anthology, the leading provider of education solutions that support the entire learner lifecycle, today announced the availability of its AI Policy Framework, a resource to support higher education institutions who are interested in developing and adopting specific policies and programs on the ethical use of AI within their institution. The AI Framework provides guidance on how to evaluate its broad implications, how to draft and implement policies, as well as a model for establishing governance."

<https://www.anthology.com/news/new-ai-policy-framework-from-anthology-empowers-higher-education-to-balance-the-risks-and>

A few of the questions WSU is supposed to ask itself; there are six pages of them

- ▶ “Does the institution have sufficient knowledge and expertise regarding the technology and the risks involved (or should it aim to upskill key stakeholders and/or look for external expertise)?”
- ▶ “What are the risks and harms of using generative AI in a manner that is illegal or unethical for the institution? (See for instance the NIST AI Risk Management Framework for a description of typical risks and harms and how they can be managed)?”
- ▶ “Are there similar efforts (e.g., privacy, security, compliance, risk management programs, procurement/vendor risk management) that can be leveraged for aspects of the development and implementation of the generative AI policies?”

-- From Anthology's 'Policy Framework' at [https://www.anthology.com/sites/default/files/2024-01/Mastering%20AI%20Policies-A%20Framework%20for%20Institutional%20Alignment-v4\\_11-23.pdf](https://www.anthology.com/sites/default/files/2024-01/Mastering%20AI%20Policies-A%20Framework%20for%20Institutional%20Alignment-v4_11-23.pdf)

## So, what does WSU have to work with regarding Anthology's promises about privacy?

- ▶ “This summary highlights the key points of our Privacy Statement. You can find details on each point by clicking on the links.” Some *selected* points:
- “We care about your privacy and have a dedicated data privacy program. We do not and will not sell or rent your data unless this is required in the context of a change in our business structure.
- We share personal information with our affiliates, subsidiaries, and vendors that help provide our products and services. We also share personal information with partners and other third parties in certain circumstances.
- We conduct marketing to promote our products and services. This marketing is aimed at staff of our current and potential clients and partners. We do not use or disclose student information for behavioral targeting of advertisements to students.
- We may transfer your information to locations outside of your country.

Reference: <https://www.anthology.com/trust-center/privacy-statement>, 24 February 2024

CONCERN  
#2

# Protecting Faculty Members' Moral Rights of Authorship

## What are 'moral rights' of authorship?

- ▶ **Moral rights** are rights of creators of copyrighted works generally recognized in civil law jurisdictions and, to a lesser extent, in some common law jurisdictions.<sup>[1]</sup>
- ▶ The moral rights include the right of attribution, the right to have a work published anonymously or pseudonymously, and the right to the integrity of the work.<sup>[2]</sup> The preserving of the integrity of the work allows the author to object to alteration, distortion, or mutilation of the work that is "prejudicial to the author's honor or reputation".<sup>[3]</sup> Anything else that may detract from the artist's relationship with the work even after it leaves the artist's possession or ownership may bring these moral rights into play. Moral rights are distinct from any economic rights tied to copyrights. Even if an artist has assigned his or her copyright rights to a work to a third party, he or she still maintains the moral rights to the work.<sup>[1]</sup>

## Lack of knowledge & control

- ▶ Do we know what the terms 'information', 'data', and 'personal information' in the Privacy statement mean?
- ▶ Based on Privacy statement, and our ignorance of Anthology's agreements and relationships with its partners and third parties due to it not being publicly traded, it looks like we just can't know what can happen to our course content once the 'baked in' AI in Blackboard Ultra gets hold of it. We don't know who it will be shared with nor will we be told when they get it or what they are doing with it.  
ALSO, that so few higher ed institutions are choosing Ultra raises concern If Anthology gets sold, looks like faculty will have very little control over our works.
- ▶ (The same holds for all student work.)

CONCERN  
#3

# Security Against Cyberattacks

## Observations about Anthology & Vulnerability

Three things exacerbate concerns over risks and consequences of cyberattack:

- ▶ If not many others using Ultra, expertise with it will not be as common;
- ▶ If not many others using Ultra, we will have few allies making demands on Anthology re Ultra;
- ▶ There is less oversight of risk due to Anthology not being a public company



## Company statements on Vulnerability Differ, too

On the surface at least, the company statements on vulnerability differ in emphasis, just looking at public statements on their websites:

Anthology's Security Policy

<https://www.anthology.com/trust-center/security> 24 February 2024

Instructure's Security Policy

<https://www.instructure.com/trust-center/security> 24 February 2024

## Anthology on Vulnerability Management

- ▶ “Anthology's vulnerability management program is governed by this public-facing Vulnerability Management Commitment and Disclosure Policy. No software is perfect - in the event a security vulnerability is identified in a released product, Anthology's Security Team is ready to respond.
- ▶ Anthology is committed to resolving security vulnerabilities carefully in accordance with the risk of the vulnerability. Such resolutions may lead to the release of a Security Advisory and/or any needed product update for our clients. In order to protect our clients and their data, we request that vulnerabilities be responsibly and confidentially reported to us so that we may investigate and respond.”

From Anthology's Vulnerability policy <https://www.anthology.com/trust-center/security> 24 February 2024

## Instructure on Vulnerability Management

### Security Monitoring

- ▶ . . . the Instructure Learning Platform is actively monitored by Instructure's Operations and Security teams on behalf of all customers. . . . Instructure continually monitors system usage, performance, health, and security. Our Ops team uses a combination of internal and external industry-standard monitoring and alerting systems as well as custom alerting systems to ensure maximum coverage. Any incident alerts triggered are sent to the appropriate teams via PagerDuty.

### Logging & Detection Capabilities

- ▶ . . . Instructure provides robust and considerable network and security monitoring to protect our customers and detect potential threats before they have a chance to have any impact. Some detection safeguards include leveraging services such as AWS GuardDuty to alert and inform on security incidents occurring against Instructure's services hosted in AWS. All output is sent to Instructure's centralized logging management system for further analysis and alert generation.

Instructure's Security Policy <https://www.instructure.com/trust-center/security> 24 February 2024

## My observations about Anthology & Vulnerability

- ▶ Anthology's policy appears more reactive than proactive compared to Instructure's policy. (Anthology emphasizes responsibility of user to report vulnerabilities and its commitment to respond; Instructure emphasizes more proactive measures regarding vulnerabilities.) But it is hard for me to know.
  - ▶ As a humanities faculty member, for an assessment, I must defer to experts for judgment on this, but I do feel it is fair for faculty members to inquire about fact that Anthology's approach appears notably different (not as proactive) from Instructure's (Canvas LMS), and to request an explicit evaluation of the significance of this difference by impartial experts, especially in light of the three exacerbating factors identified above.

Ref: Anthology's Vulnerability policy <https://www.anthology.com/trust-center/security> 24 February 2024

Ref: Instructure's Security Policy <https://www.instructure.com/trust-center/security> 24 February 2024

CONCLUSION

Faculty  
Requests in  
response to  
WSU being in  
this position?

Thank you for  
listening.

WHAT DO YOU THINK?

## News since original slide set – Financial Times, February 26<sup>th</sup> 2024

Microsoft announced new relationships with other generative AI companies:

- ▶ Feb 26, 09:16. Financial Times
- ▶ Madhumita Murgia in London
- ▶ **Microsoft strikes deal with Mistral in push beyond OpenAI**
- ▶ Microsoft has struck a deal with French artificial intelligence start-up Mistral as it seeks to broaden its involvement in the fast-growing industry beyond OpenAI.

## News since original slide set – March 19<sup>th</sup> 2024

Financial Times, March 19<sup>th</sup>, 2024. **Microsoft hires DeepMind co-founder Mustafa Suleyman to run new consumer AI unit**

“Suleyman, a British entrepreneur who co-founded DeepMind in London in 2010, will report to Microsoft chief executive Satya Nadella, the company announced on Tuesday. He will launch a division of Microsoft that brings consumer-facing products including Microsoft’s Copilot, Bing, Edge and GenAI under one team called Microsoft AI.”

[...]

Microsoft will also hire most of Inflection’s staff, including Karén Simonyan, co-founder and chief scientist of Inflection, who will be chief scientist of the AI group. Microsoft did not clarify the number of employees moving over but said it included AI engineers, researchers and large language model builders who have designed and co-authored “many of the most important contributions in advancing AI over the last five years”.