Adventures in Data Labelling

From Concepts to Implementation in Microsoft Purview

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BSidesTO - Oct 19, 2024

whoami

- 30+ years in IT, mostly for critical infrastructure
- Healthcare security professional
- CISSP, GSEC, GCED, GCIH, and others
- Volunteer:
    - Healthcare Infosec Group - Moderator
    - C3X - Builder & Mentor (2018-2020)
    - Hak4Kidz Toronto (2019)
    - B&W Photography Lead (since 2007)

Disclaimer

The thoughts and opinions shared throughout this presentation are mine alone and not those of my past, present, or future employers

Agenda

- Overview
- Data Asset Inventory
- Labelling Models
- Implementing Labelling
- M365 and Purview
  - Sensitivity / Retention
  - IAP & Trainable Classifiers
  - Auto Labelling
  - DLP
- Conclusions
- Resources & links

No need to take photos
Wait for the **last** QR code

Assumptions

- There is no such thing as one size fits all
- This doesn’t have to be perfect

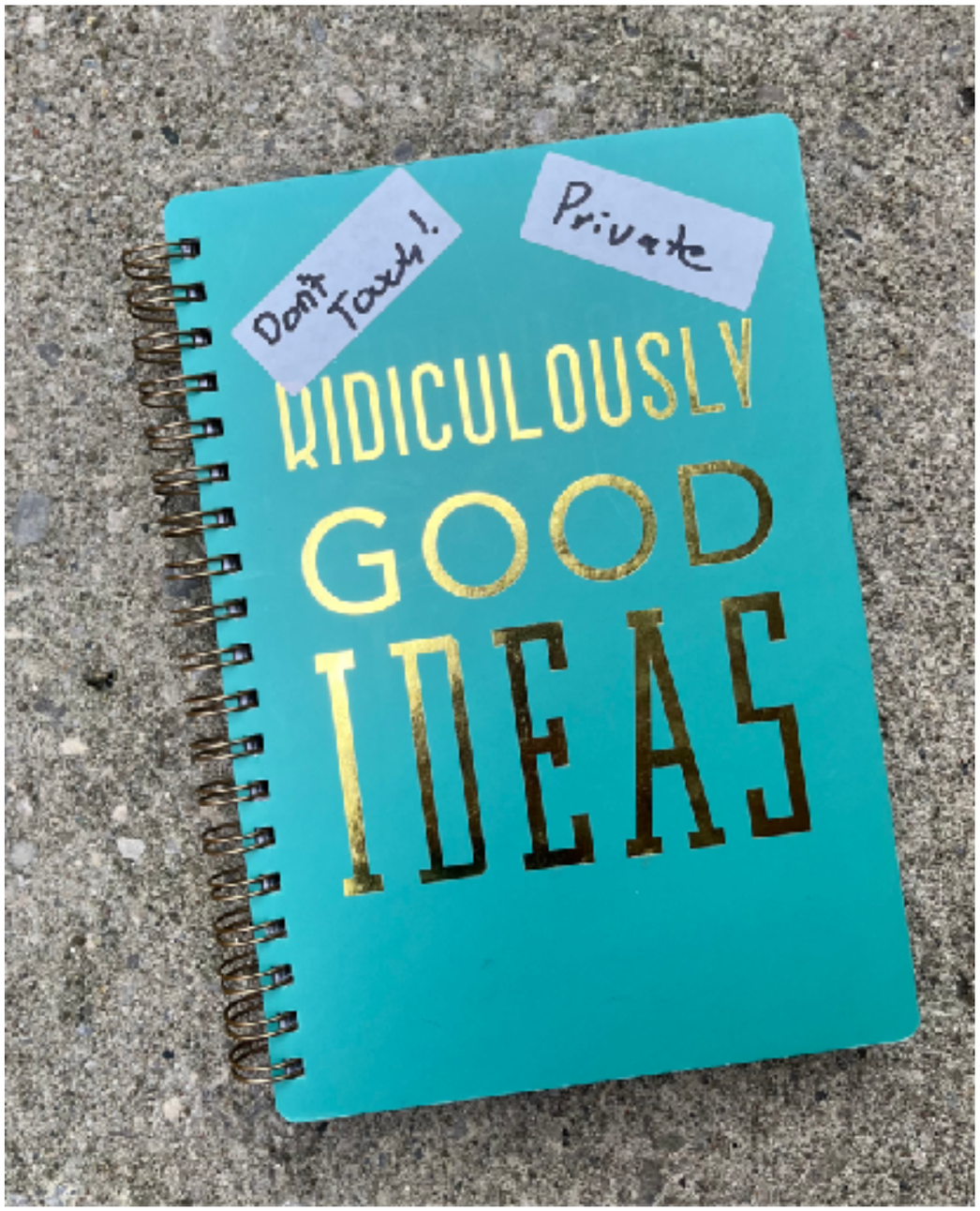
- **We will not cover**
  - Everything
    - There will always be more
    - Embrace the rate of change
  - Pricing - that’s between you and your sales rep
  - How long will it take to implement - talk to your stakeholders

What is this not?

- Ransomware protection
- Magical AI Unicorns
- False positive and false negative free
- Free - there is always a cost

https://deepai.org/machine-learning-model/cyberpunk-generator

What is data labelling?



- Is it important?
- Should I keep it?
- Do I want to share it?
- Who do I want to share it with?
- Why should I keep it?
- How long should I keep it?
- When should I throw it out?

Why label your data?

Questions:

- What is the impact or injury if the data is lost or accessed?
- Do you have any legal, regulatory, or moral obligations?
- How much data do you have of a given type?

Defines:

- Where should you store it?
- How should you store it?
- How should you audit it?
- Retention obligations?
- Disclosure obligations?
- Who do you have to tell when things go wrong?

Outcomes:

- Data inventory aligns to governance frameworks
- Helps with discoverability
- Reduces costs in the event of an incident

Data Asset Inventory

Know your data

- Scan your data with automated tools
- Manual review process

What are you looking for?

- Data type
- Location
- RACI
- Backups
- Retention
- Disposition
- Destruction
- Contractual / Legal / Regulatory obligations
- Controls applied

Why?

- Informs how you will label and classify data
- Allows you to train machine learning models
- Supports eDiscovery, Data Governance, building DLP rules, etc.

Metadata

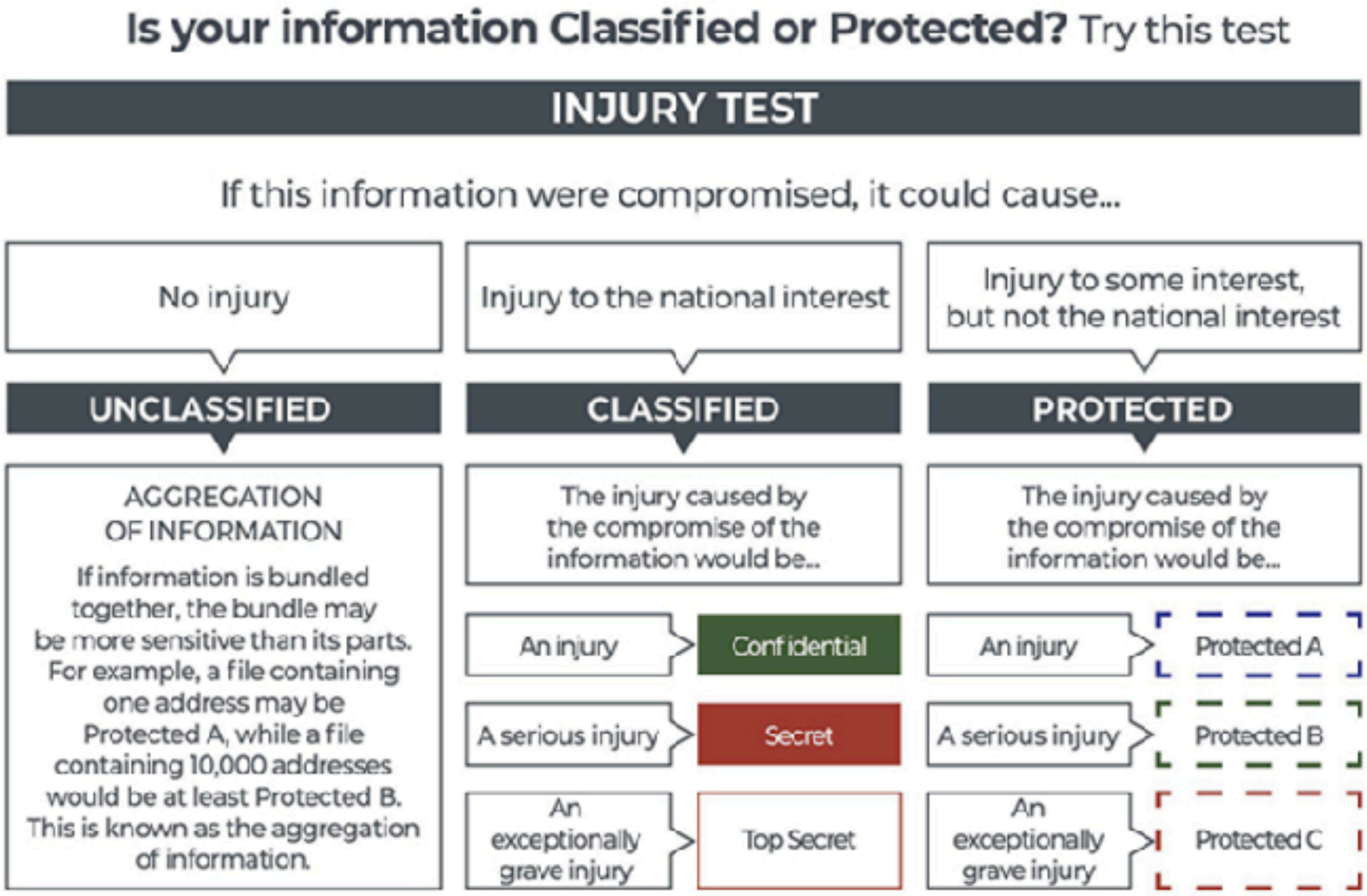
- Document name
- Document format
- Author
- Date created
- Version
- Size
- Summary
- Content tags
- Retention
- Data sensitivity

Naming standards - based on:

- Department
- Content focus
- Regulatory / Legal obligations

Data Lifecycle Management

Labelling for Sensitivity - Models



Canadian Gov

- Unclassified
- Protected A1
- Protected B1/B2
- Protected C1/C2
- Confidential
- Secret
- Top Secret

Commercial

- Public
- Sensitive
- Proprietary / Confidential / Private

Healthcare

- Public
- Internal
- Confidential
- PHI
- Restricted

Sensitivity - Alternative Models

- Confidential + PII
- Confidential + PHI
- Confidential + PCI

} **Defined for regulated data**

- Confidential-Financial
- Confidential-HR
- Confidential-Legal
- Confidential-Technical
- Confidential-PII-Identifier
- Confidential-PII-Identifying
- Confidential-PII-Confriming

} **Increased granularity for data subject rights**

Labelling for Retention

- HR Records (3 yrs after employee departure)
- Financial (7 years)
- Corporate Records (10 years)
- Patents (20 years)
- Patient records
  - Under 18 (18+25 years)
  - Over 18 (25 years)

- Engineering drawings (Life of subject+15 years)
- Nuclear safety data
  - 30 years beyond decommissioning
    (5+5+5+25+5+25+5+25+10+10+30 = 150 years)

Retention also means disposition, disposal, and destruction.

https://www.oha.com/Legislative%20and%20Legal%20Issues%20Documents1/Records%20Retention%20Toolkit,%20September%202022.pdf

Implementation - Sponsors & Stakeholders

Executive sponsorship

Stakeholders

- IT
- Legal
- Privacy & FOI
- Records Management
- Data Governance
- Finance & Audit
- HR
- Organizational Development & Training
- Public Relations

Special client groups

- Sales
- Accounting
- Engineering
- Research
- Clinical leadership & informatics
- Patient Experience
- Partners and Peers

Implementing Data Labelling

Initiative Support

- Executive sponsorship
- Engage stakeholders

Policy

- Scoped to include
  - Data in all forms
  - Data in all locations
- Descriptions
- Clear examples
- Impact of loss/disclosure
- Storage and controls
- Transport, and handling
- Disposal, declassification

Appendix A: [the EHR Solution] Information and Asset Classil

Classes		Description	Examples Assets
Confidentiality	**Integrity and Availability**		
Public	**LOW**	Information or assets that are used in the normal course of business and that are unlikely to cause harm. **Available to the public.**	• Inform extern websit • Extern
Internal		Information or assets that have a low sensitivity outside of [the EHR Solution] and could have low levels of impact on service levels or performance, or result in low levels of financial loss. **Available to all agents of [the EHR Solution], and Electronic Service Providers of [the EHR Solution] and HICs with a need to know.**	• User r Solutic • High-le planni • High-le inform effecti EHR Sc
Confidential	**MEDIUM**	Information or assets that have a moderate to high sensitivity within [the EHR Solution] and outside of [the EHR Solution], and could have a moderate impact to service levels or performance, or result in moderate levels of financial loss.	• Persor includi identif pay • Inform disclos • Financ

https://ehealthontario.on.ca/files/public/support/Security/Security_Toolkit/Information_and_Asset_Management_Policy_EN.pdf

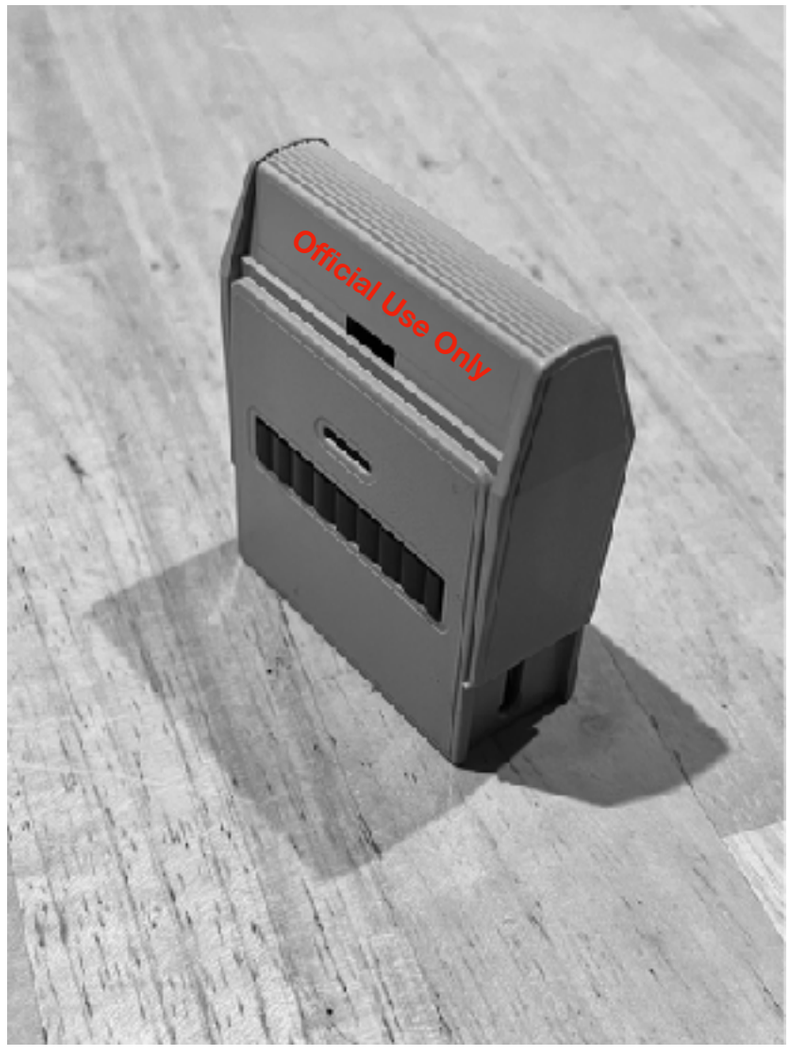
Implementing Data Labelling

Communications plan

- Continuous…
  - Town halls, meetings, Intranet, emails, FAQ
  - Educational materials
  - Quick reference cards
  - Mandatory eLearning module
  - Reminders delivered through multiple methods

Apply controls

- Implement and test in IT systems
- Start small in monitor mode
- Plan for physical data assets
- Unlabelled data is public / unrestricted



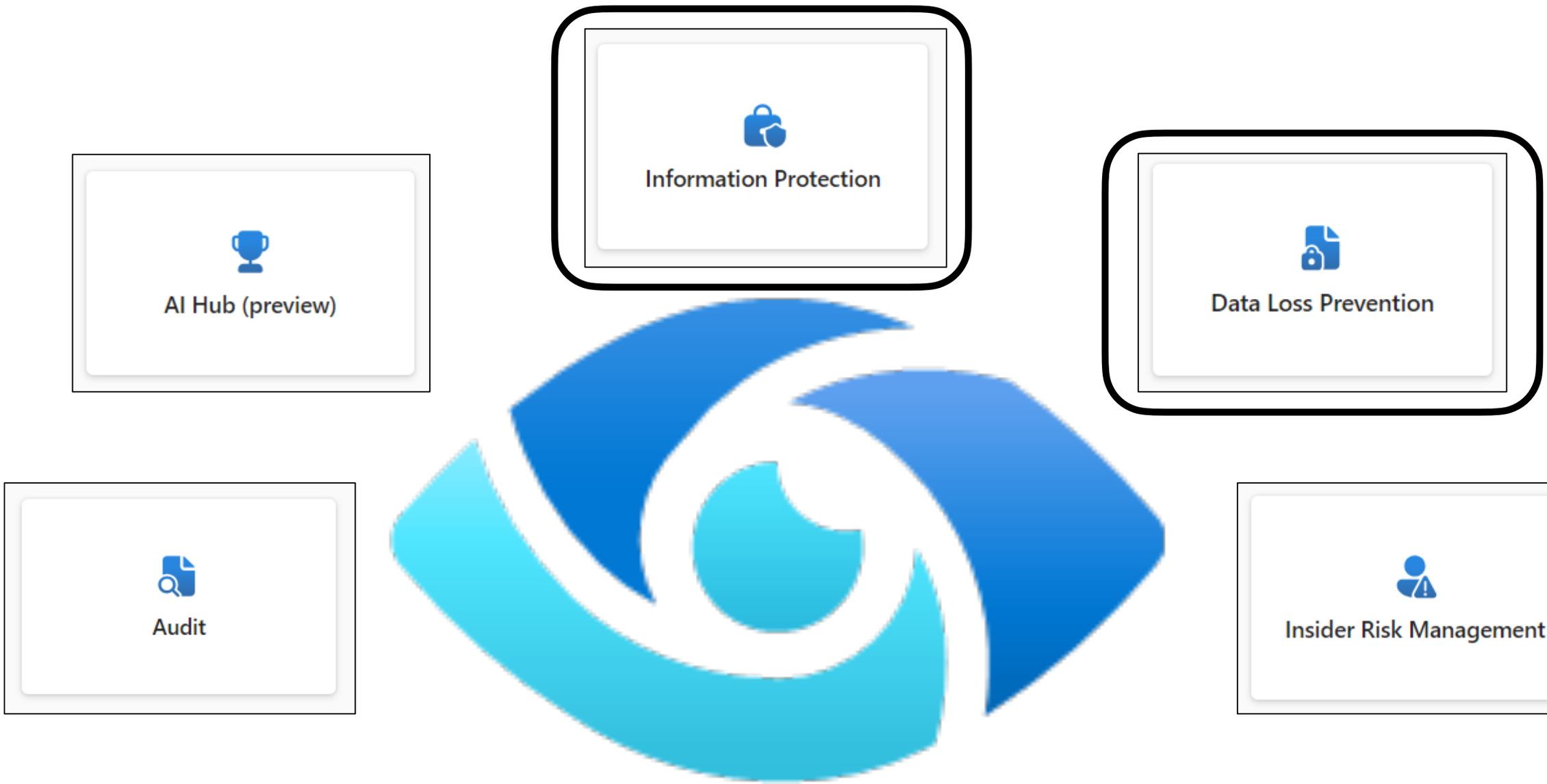
Implementation Challenges

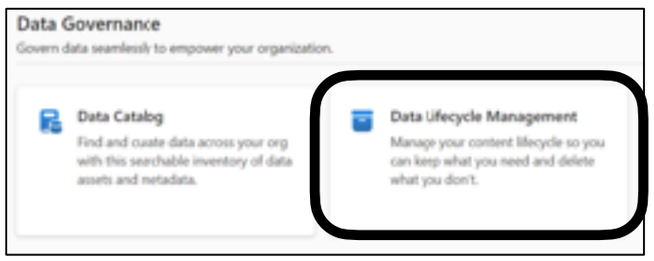
- Did you forget to do an asset inventory?
- Still no executive sponsor?
- Policy stuck in review cycles
- Bad or missing examples
- Education materials are not mandatory
- Nobody read any of it
- Communications plan delayed or missing
- Too many labels - Do not exceed 5
- Tech doesn’t work as expected
- You missed an important business process
- Everyone hates watermarking

Implementing the business side was easy…

Is everybody with me so far?

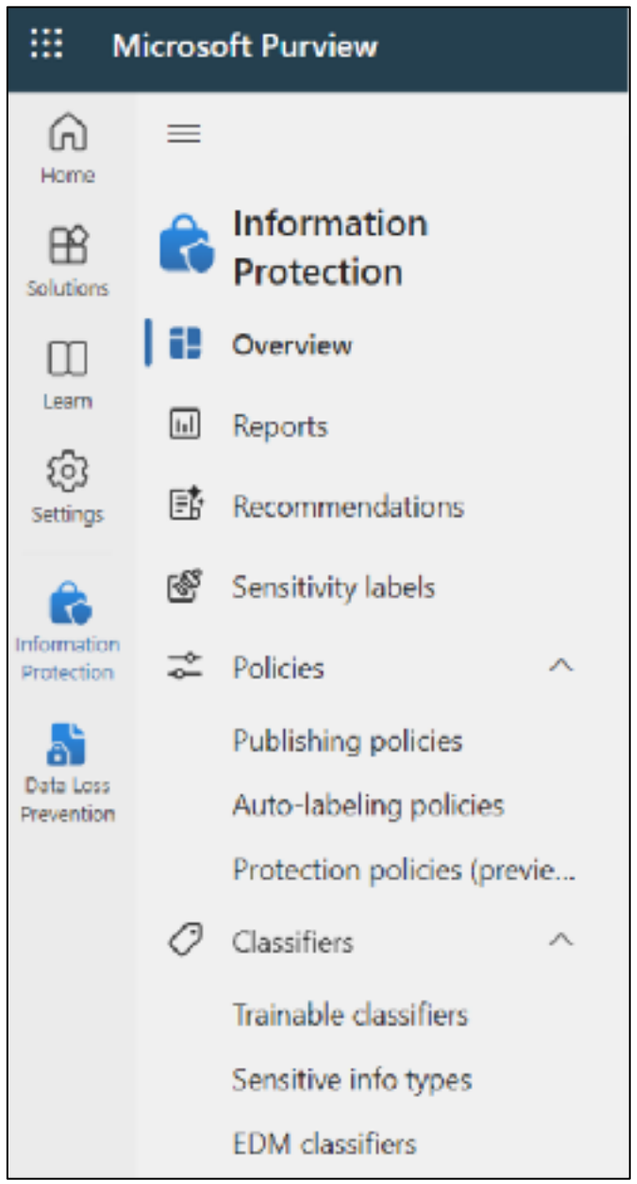
Microsoft Purview





https://learn.microsoft.com/en-us/purview/

Sensitivity Labels



Before you start

- Enable for M365 Groups and Sites
- Enable Co-Authoring with Sensitivity Labels before you start
- Teams needs a Premium License

Implementation

- Plan your labels
- Order matters
- Scope
- Content marking
- Access Controls
- Protection of Sites & Groups
- External Sharing

- Don’t delete a label that’s been used. EVER.

https://learn.microsoft.com/en-ca/purview/sensitivity-labels

Sensitivity Labels

Sensitivity labels

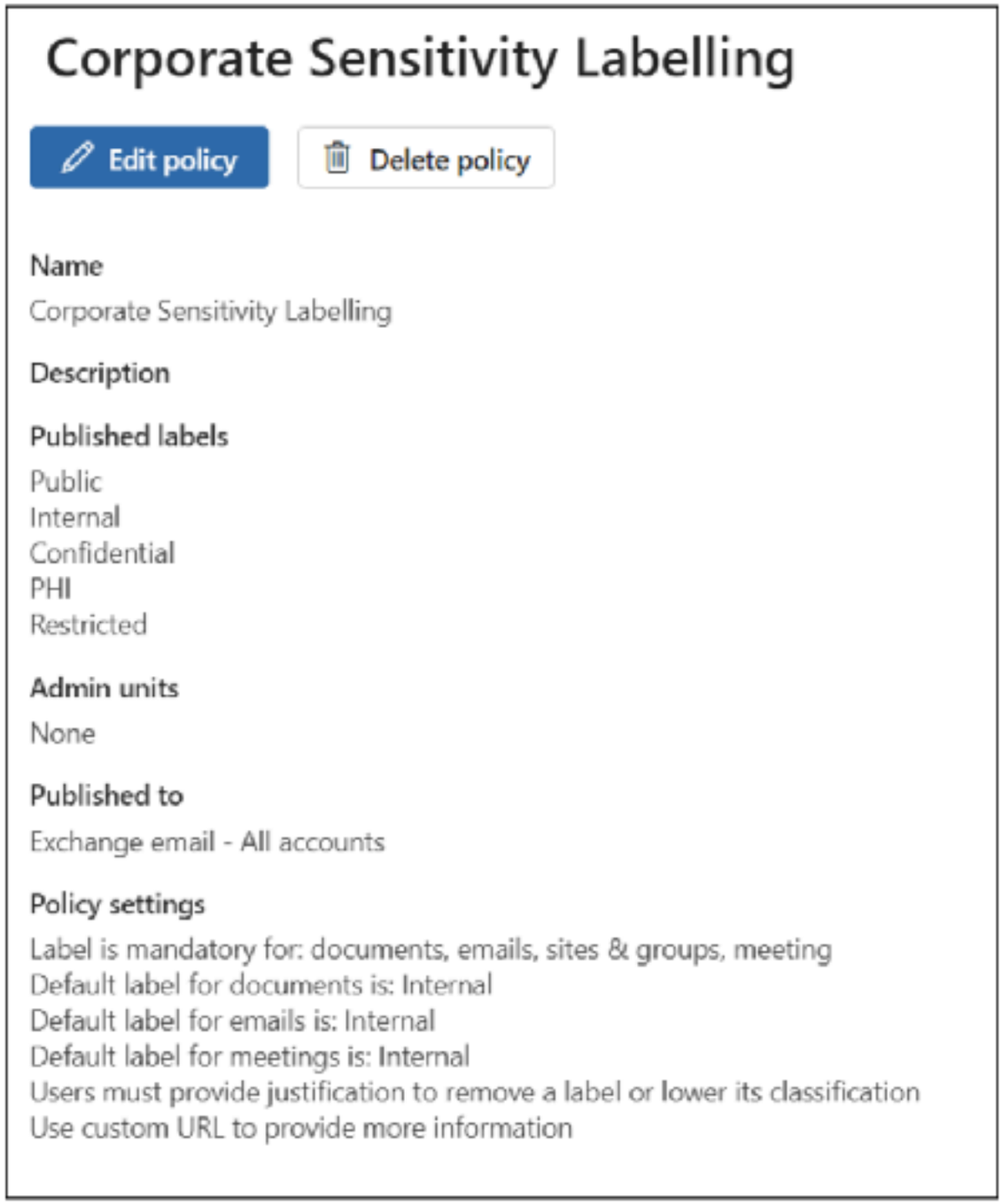
Sensitivity labels are used to classify email messages, documents, sites, and more. When a label is applied (automatically content marking, and control user access to specific sites. Learn more about sensitivity labels

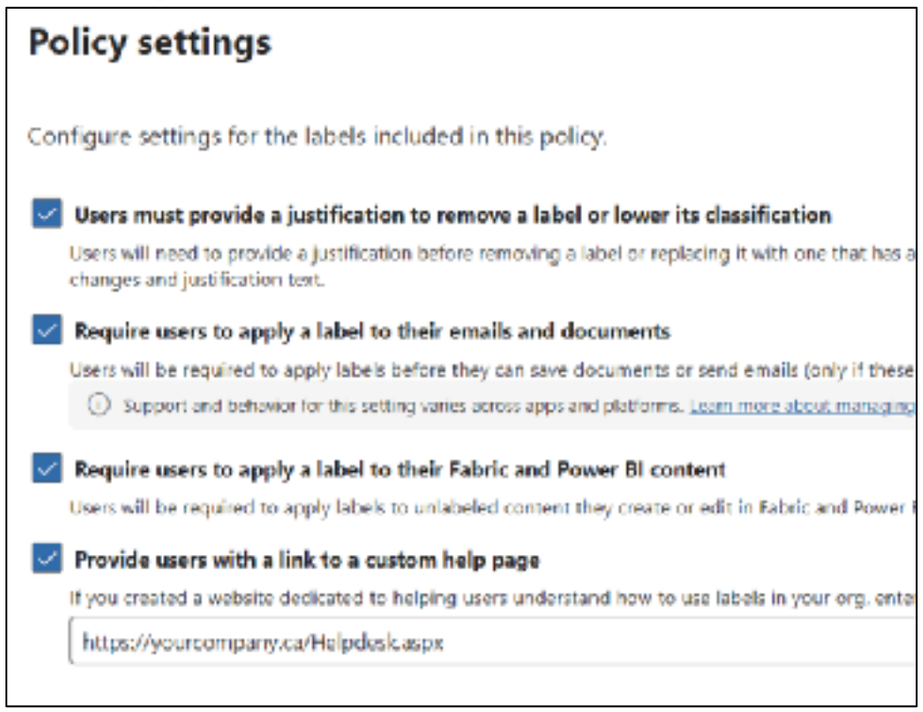
+ Create a label | Publish labels | Export | Refresh

Name	Priority	Scope
Public	0 - lowest	File, Email, Meetings,
Internal	1	File, Email, Meetings,
Confidential	2	File, Email, Meetings,
PHI	3	File, Email, Meetings,
Restricted	4	File, Email, Meetings,

Sensitivity Label Policy

- Publish your labels
- Require labels for everything
- Define a default label - Internal
- Inherit labels from highest labelled attachments
- Users must provide justification to lower a label or remove a label
- Link to your FAQ





https://learn.microsoft.com/en-us/purview/create-sensitivity-labels

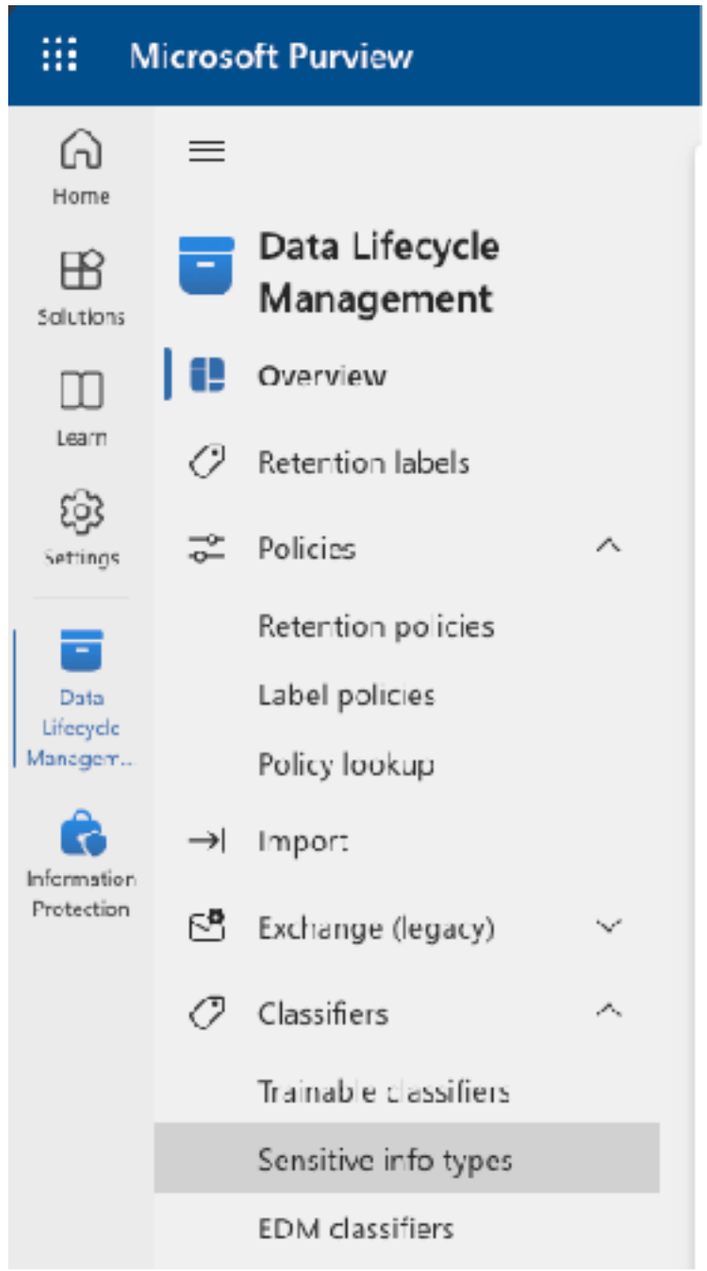
Retention Policies

Apply default policies based on scope

- Exchange mailboxes
- SharePoint classic and communication sites
- OneDrive accounts
- Microsoft 365 Group mailboxes & sites
- Skype for Business
- Exchange public folders
- Teams channel messages
- Teams chats and Copilot interactions
- Teams private channel messages
- Yammer community messages
- Yammer user messages

Policy Options:

- Retain forever
- Delete after a period
- Retain for a period
  - Then delete or do nothing



https://learn.microsoft.com/en-ca/purview/retention

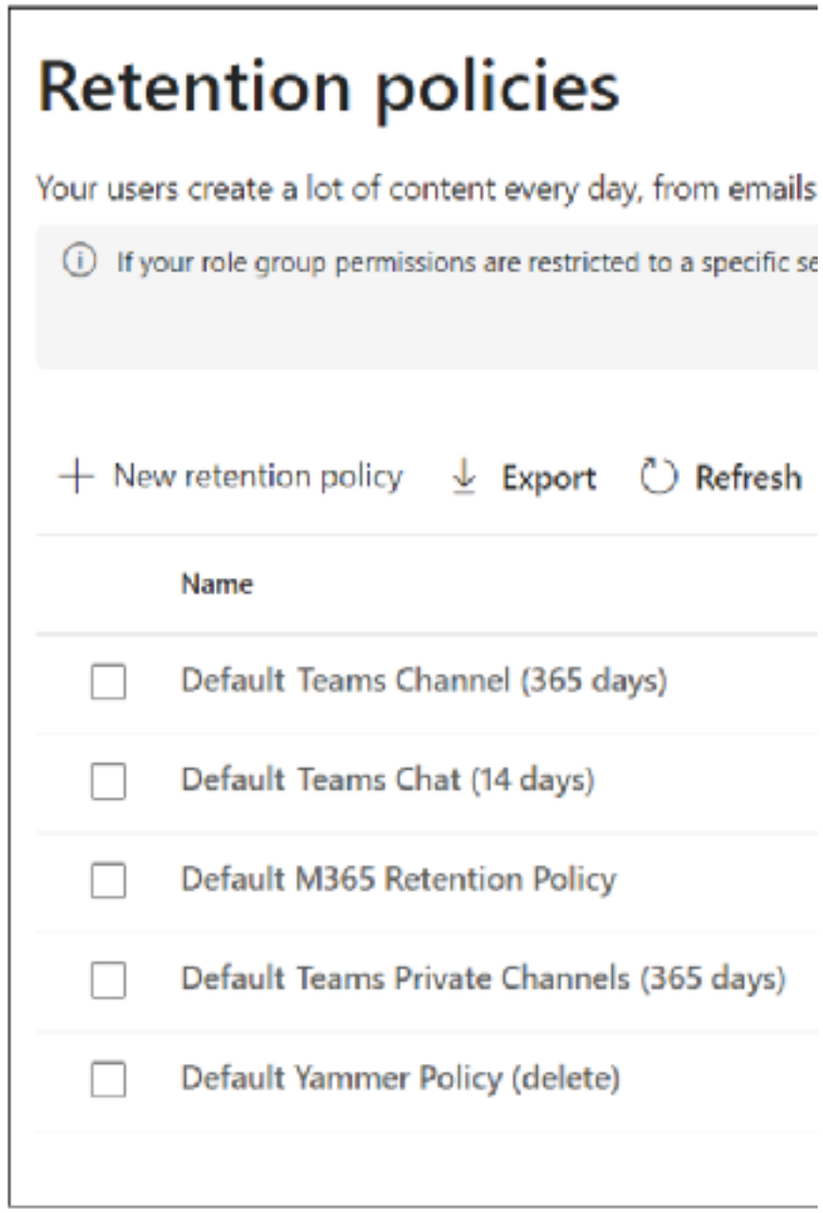
Retention Policies

Requirements

- Legal
- Regulatory
- eDiscovery or FOI impacts

Separate default policies based on type

- Teams Channels - retain 365d /delete
- Teams Private Channels - retain/delete
- Teams Chat & Copilot - delete after 7 days
- Yammer - delete after 1 day
- OneDrive/SharePoint - retain
- Exchange - retain

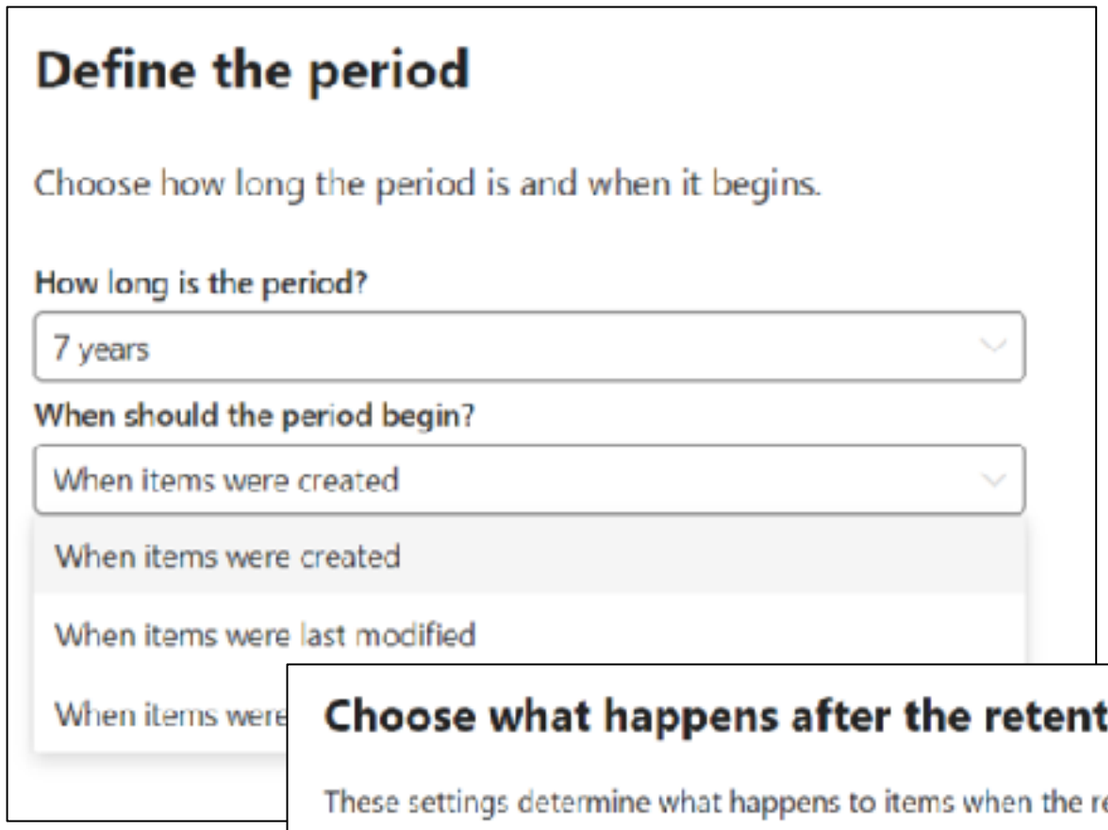


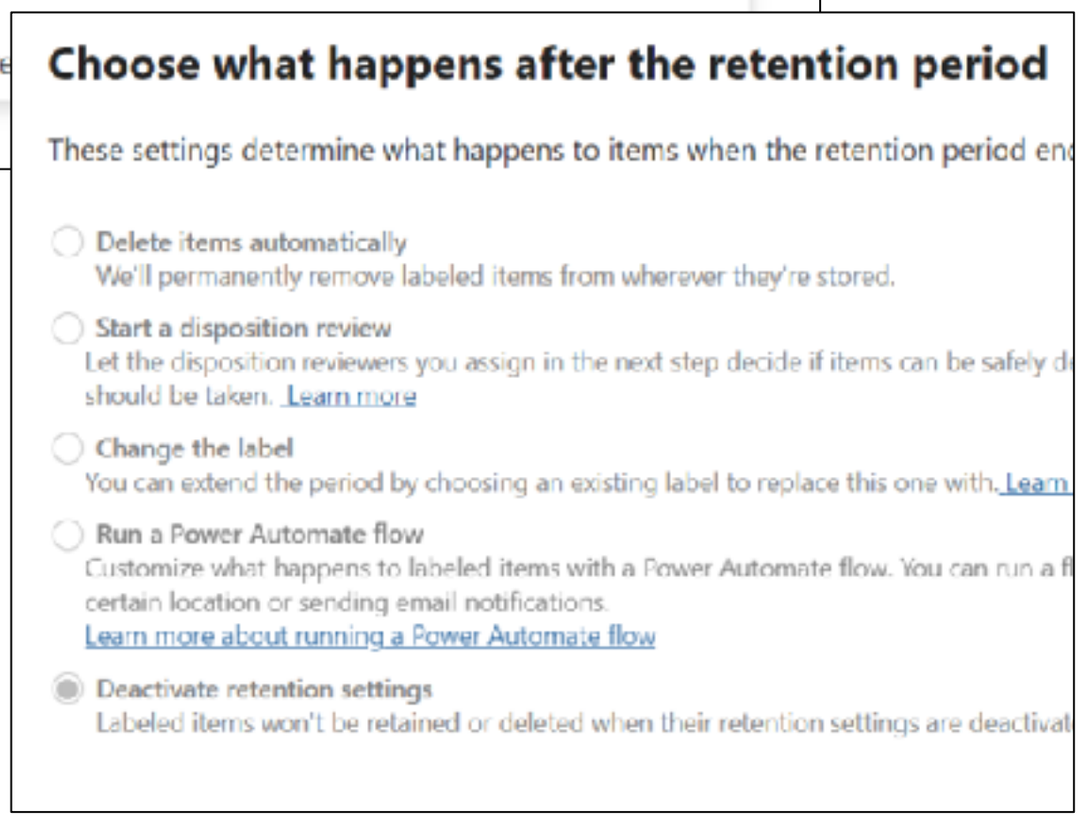
Retention Labels

Align labels to requirements

- Ask Legal, Privacy, FOI
- Finance - 7 years
- HR - 3 years after depart
- Corp Records - 10 years
- Align to industry:
  - Patents - 25 years
  - Patient < 18 - 43 years
  - Patient > 18 - 25 years
- Give staff options - 1, 3, 5 yrs

- Users can adjust in OneDrive
- Use auto-label policies to align by type
- No label means retain forever.





SITs & Trainable Classifiers

Sensitive Info Types

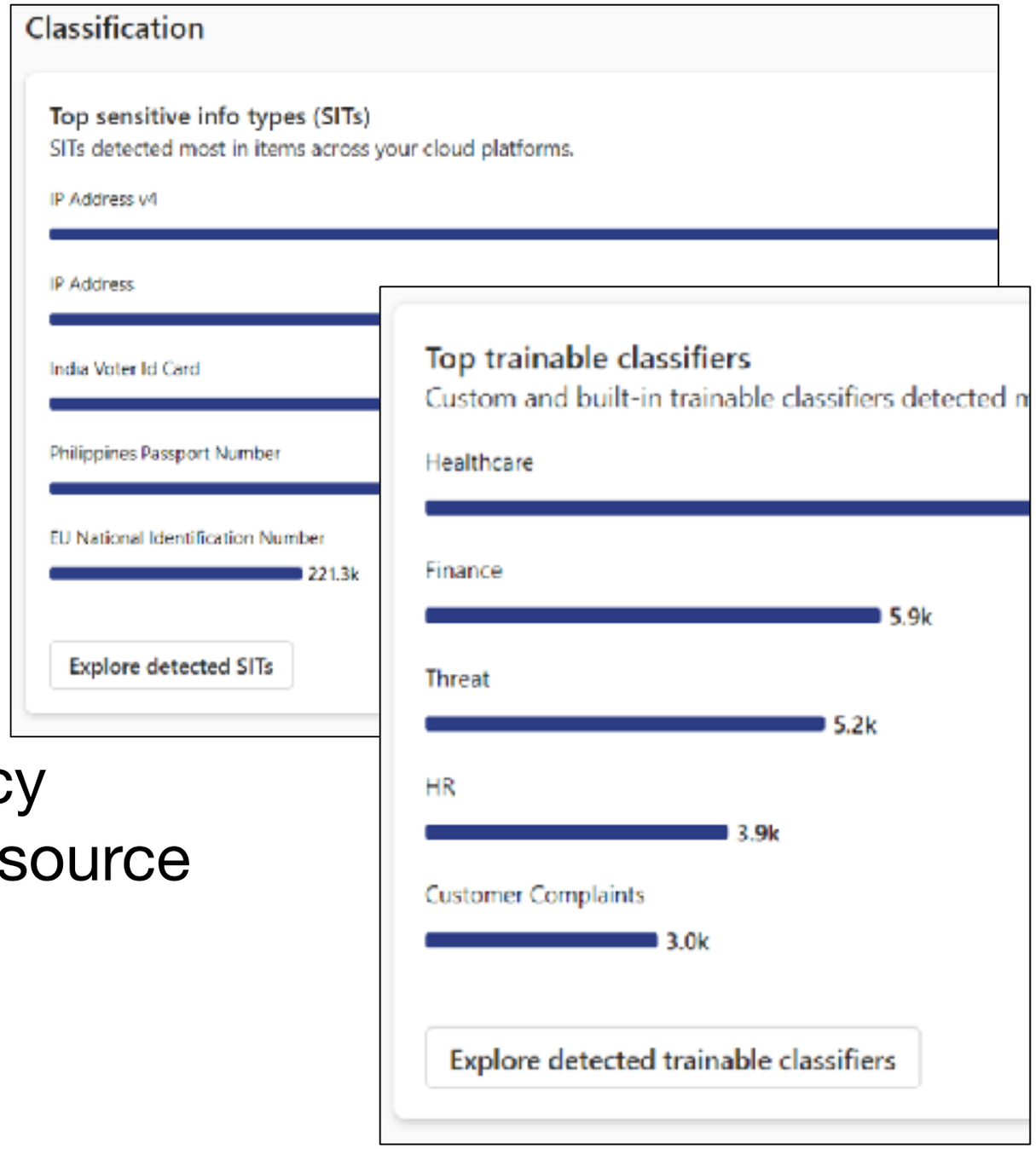
- Predefined RegEx filters
- Custom RegEx, keyword lists
- Eg. IP address, credit cards, Canadian passport numbers, addresses, phone numbers

Trainable classifiers

- Pre-canned data models
- Review / adjust match accuracy
- Create your own - SharePoint source

Exact Data Match

- Train with exact data

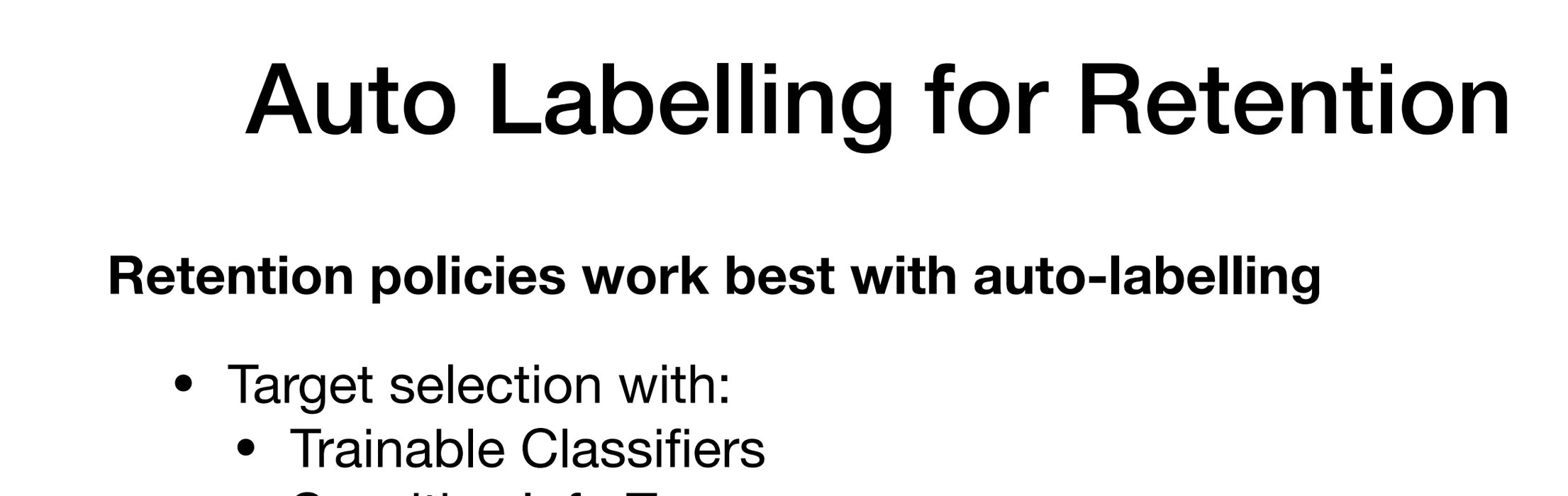


https://learn.microsoft.com/en-ca/purview/trainable-classifiers-learn-about
https://learn.microsoft.com/en-ca/purview/sit-sensitive-information-type-learn-about
https://learn.microsoft.com/en-ca/purview/sit-learn-about-exact-data-match-based-sits

Auto Labelling for Retention

Retention policies work best with auto-labelling

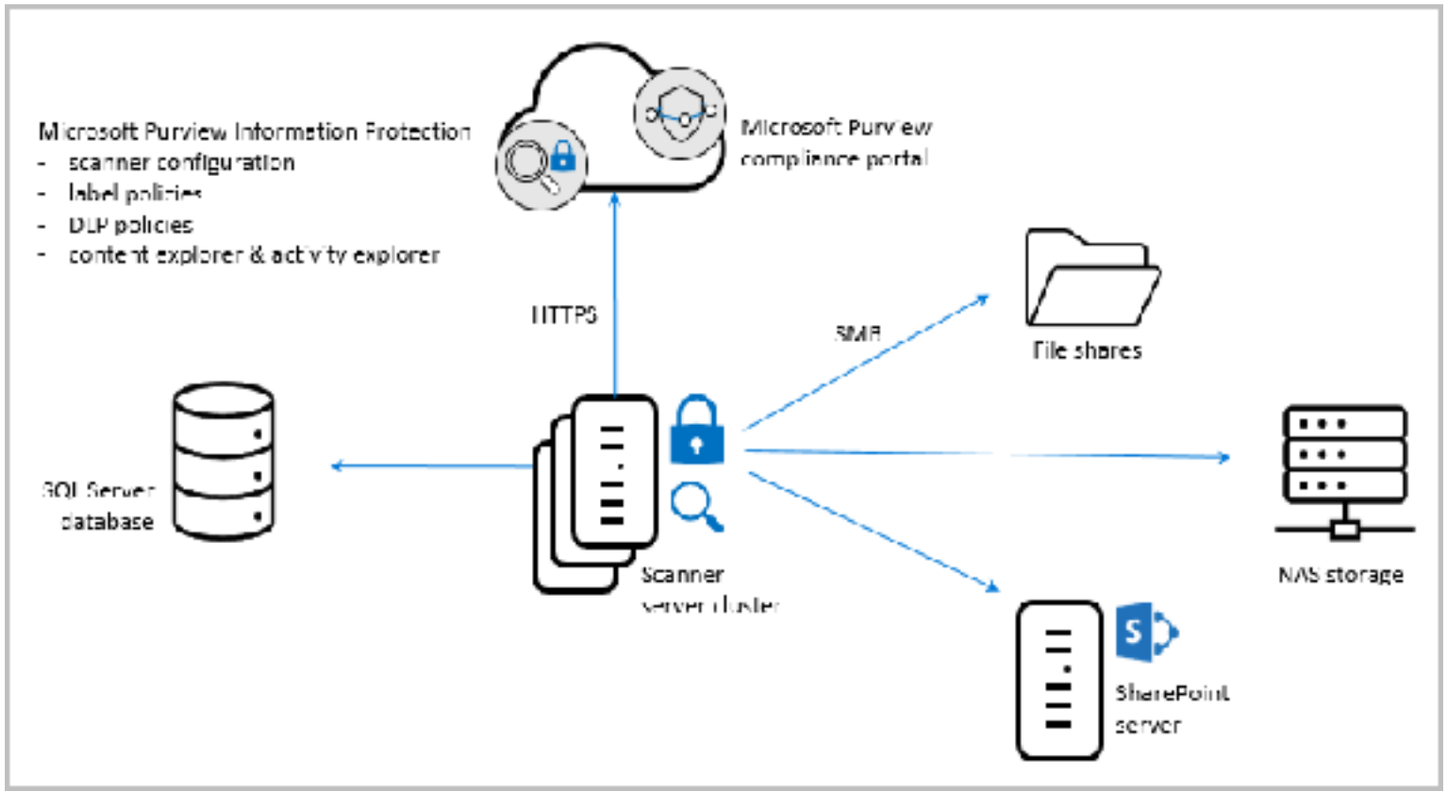
- Target selection with:
  - Trainable Classifiers
  - Sensitive Info Types
  - Keywords
  - OneDrive, SharePoint, or M365 Groups



https://learn.microsoft.com/en-us/purview/apply-sensitivity-label-automatically

Information Asset Protection Scanner

- Scan on prem SMB servers and SharePoint servers
  - Requires service account with read access
- Deploy on a local server
- Requires a SQL server back-end
- Scans are slow and detailed
- Reports in CSV & Purview Data Explorer (when it works)
- C:\Users\aipscanneraccount\AppData\Local\Microsoft\MSIP\Scanner\Reports



https://learn.microsoft.com/en-us/purview/deploy-scanner

Data Loss Prevention

Use

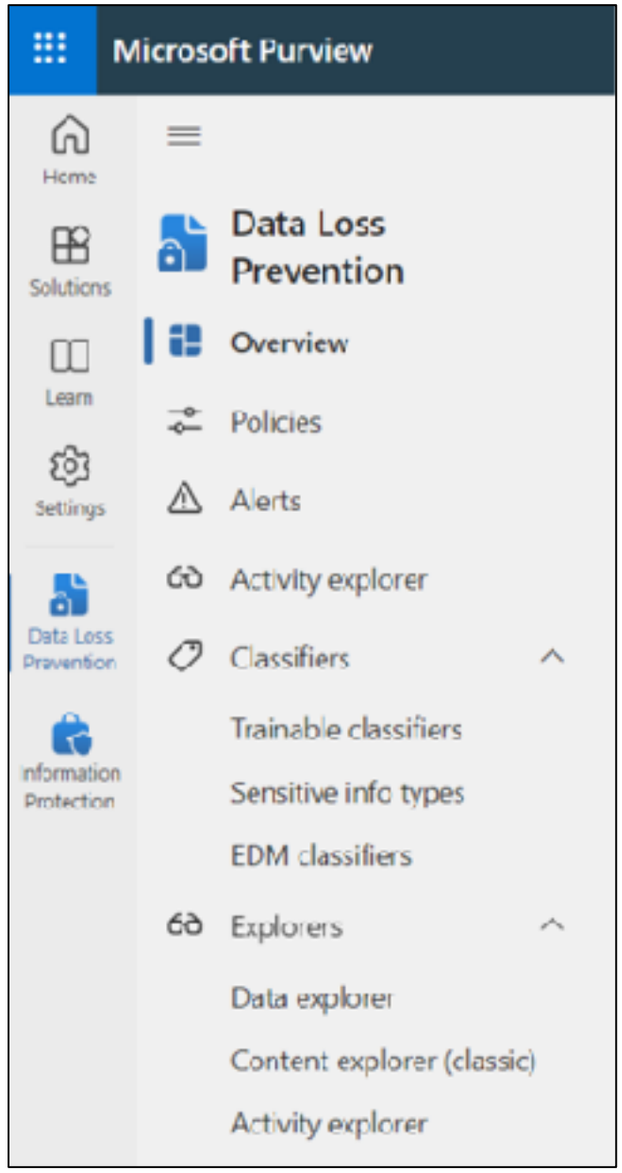
- Trainable classifiers
- Sensitive Info Types
- Exact Data Match
- Sensitivity Labels

Match based on

- Location
- Source type - determines match options
- Shared externally or internal only
- Add in Insider Risk Management

Actions

- Send a nudge
- Send email
- Alert
- Email reports
- Block access or encrypt data



https://learn.microsoft.com/en-us/purview/dlp-learn-about-dlp

Data Loss Prevention - Conditions

EXO	OD	SP	Teams	Instances	On Prem Repos	Power BI	EDR	Condition
X	X	X	X	X	X	X	X	Content contains
X							X	Content is not labeled
X	X	X	X	X				Content is shared from Microsoft 365
X	X	X					X	Document could not be scanned
	X	X						Document created by
	X	X						Document created by member of
X	X	X					X	Document didn’t complete scanning
	X							Document is shared
X	X	X					X	Document name contains words or phrases
X							X	Document name matches patterns
X	X	X					X	Document or attachment is password protected
X	X	X			X		X	Document property is
X	X	X					X	Document size equals or is greater than
X	X	X			X		X	File extension is
X			X				X	Insider risk level for Adaptive Protection is
X			X					Recipient domain is
X			X					Recipient is
X			X					Sender domain is
X			X					Sender is

Data Loss Prevention

Name

Low volume of content detected DLP - Canada Financial Data

Conditions
Content contains any of these sensitive info types:
Credit Card Number
Canada Bank Account Number

Content is shared from Microsoft 365
with people outside my organization

Exceptions
Except if content is shared from Microsoft 365
only with people inside my organization

Actions
Notify users with email and policy tips
Restrict access to the content for external users
Send alerts to Administrator
Restrict third-party apps

High volume of content detected DLP - Canada Financial Data

Policies

Use data loss prevention (DLP) policies to help identify and protect your organization's sensitive info. For ex

If your role group permissions are restricted to a specific set of users or groups, you'll only be able to manage policies

Create policy | Export | Refresh

Name	Priority
Allow T4	0
Disable Auto-Shared Recording	1
DLP - Canada Personal Health Act (PHIPA) - Ontario	2
DLP - Canada Financial Data	3
DLP - Possible Credential Leak	4
DLP - Potential Generic Credential Leak	5
DLP - All Healthcare Terms	6
DLP - Block sharing sensitive docs - Email	7
DLP - Block sharing sensitive docs - SP/OD	8

https://learn.microsoft.com/en-us/purview/dlp-policy-reference#rules

Data Loss Prevention

Adjust

- Auto-Label credentials as Restricted
- Auto-label PII, Legal Contracts, NDAs, SIN numbers as Confidential, Medical Forms as PHI
- Confidential, PHI - Encrypt and Do Not Forward

Allow

- PII - if labeled as Confidential, PHI if labelled as PHI
  - SIN, Passport Number, Drivers License
- The Employee Discount book - it has plaintext passwords… seriously.
- Sharing externally for authorized users - use Admin Groups

Nudge

- ToolTip popup for sensitivity data types - should you be doing this?
  - Warn - Credentials, SIN, Passport, Credit Card, Bank Accounts, SWIFT codes
  - PHI in Teams
- Enhance email notifications to educate users of proper handling of sensitive info

Deny

- Restricted/Top Secret labelled
- Classifier detected PHI labelled as Public or Internal
- Block unlabelled mail
- Sharing credentials, credit cards, bank account numbers through Teams

https://blueprint.asd.gov.au/configuration/purview/data-loss-prevention/policies/

Limitations and Frustrations

- Sensitivity Label watermarks are global
- Sensitivity Label identifiers are different for each tenant
  - You have to build incoming auto-classification rules based on markings
- Retention policies have a limited range (1000 items)
  - https://learn.microsoft.com/en-us/purview/retention-limits
- Tuning trainable classifiers is slow methodical work
  - You have to read things you never wanted to know
- Microsoft wants to sell you PS to do this
- Every other vendor wants to sell you PS to do this
- Nobody is sharing any of this stuff
- The documentation for the IAP scanner is disjointed and horrible
- Very limited tuning options in DLP rules
- DLP is limited in actions you can take
- DLP alerting during simulation is noisy
- The alert management interface in Defender and Purview are awful
- Everything in M365 is slow

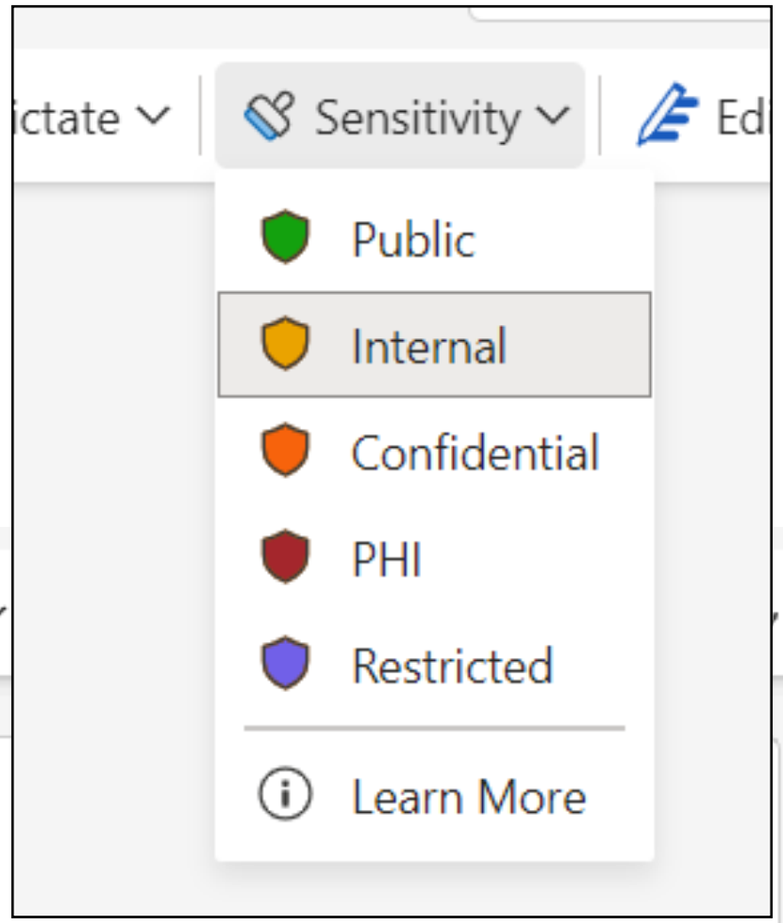
What could go wrong?

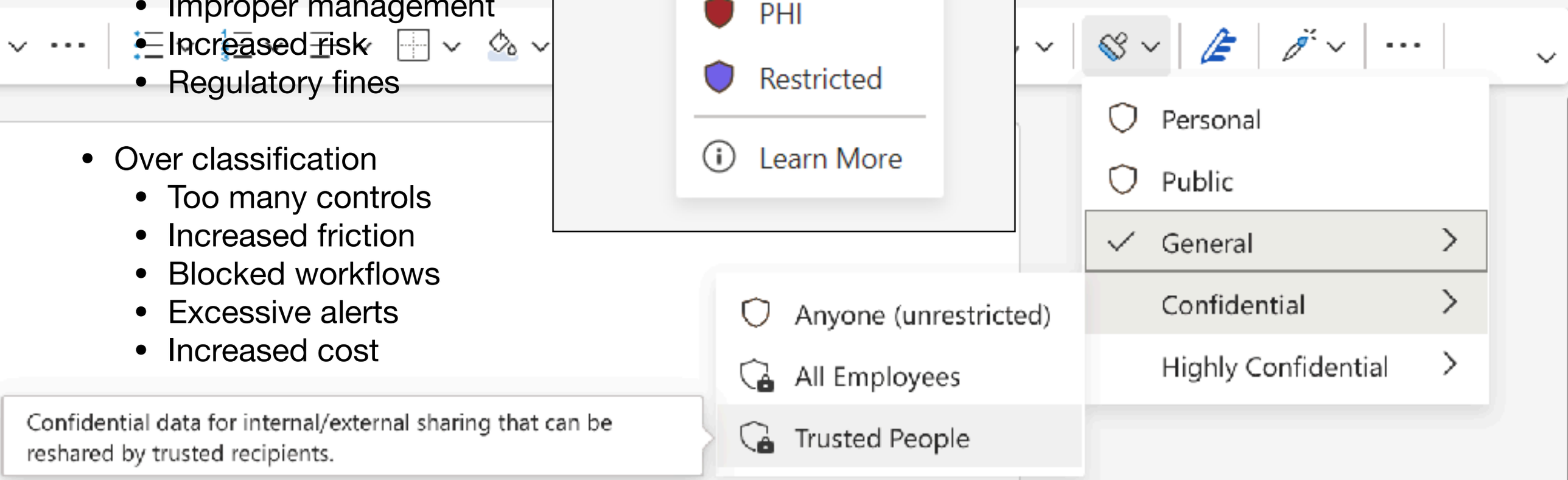
- Too many labels = Too complicated
- Lack of support

- Lack of education
  - Poorly delivered
  - Unclear examples
  - Staff are confused

- Under classification
  - Not enough controls
  - Improper management
  - Increased risk
  - Regulatory fines

- Over classification
  - Too many controls
  - Increased friction
  - Blocked workflows
  - Excessive alerts
  - Increased cost

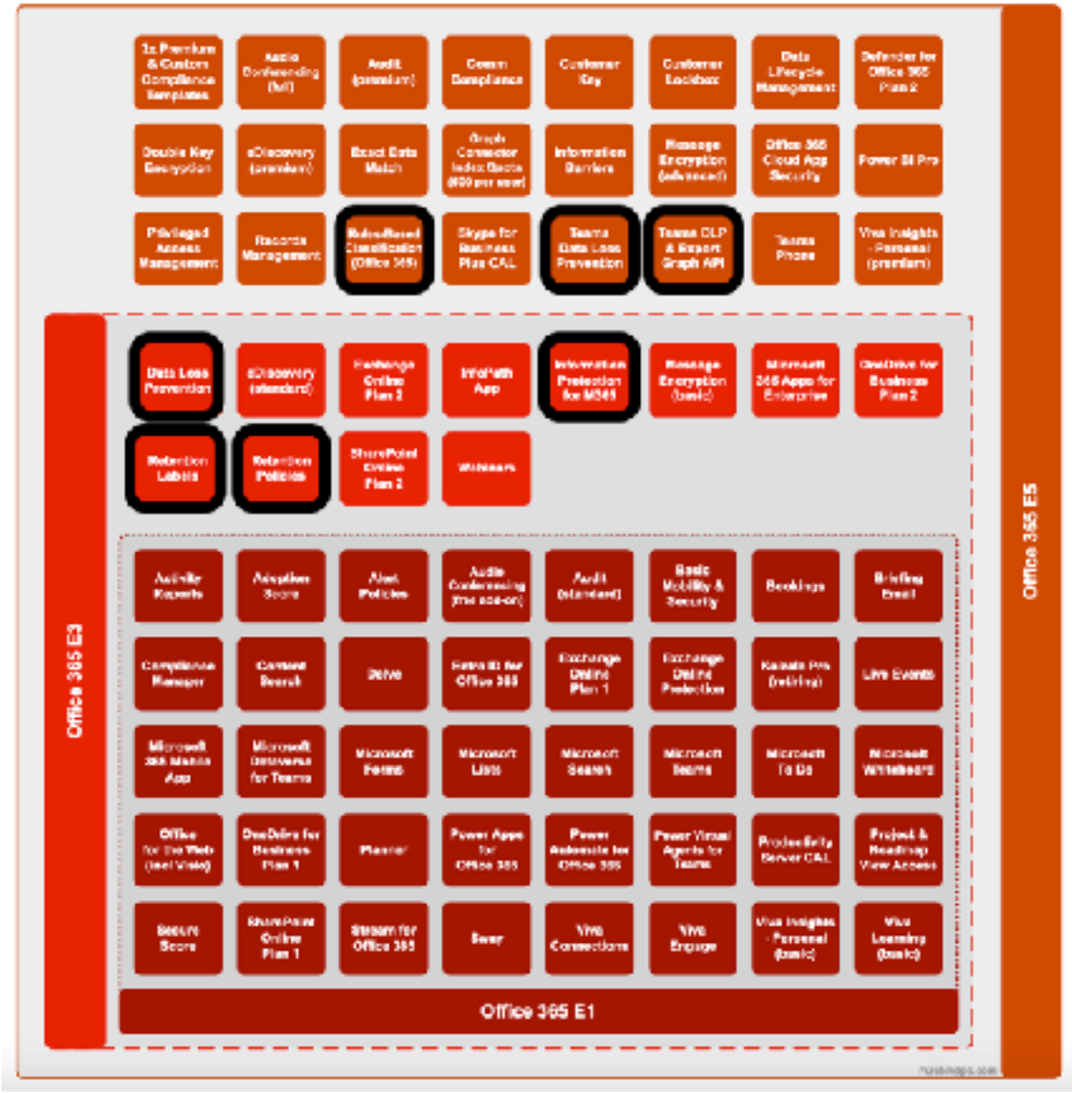




What about licensing?

E3 includes:

- Information Protection for M365
- Retention Labels
- Retention Policies
- DLP



E5 Compliance:

- Trainable Classifiers
- Rules-Based Classification
- Endpoint DLP
- Teams DLP
- Teams DLP & Export Graph API

- Everything is in M365 F5/A5/E5 except Teams Premium support for Sensitivity Labels

https://m365maps.com/files/Microsoft-365-Enterprise-Landscape.htm

But wait, there’s more

Conclusions

Start with

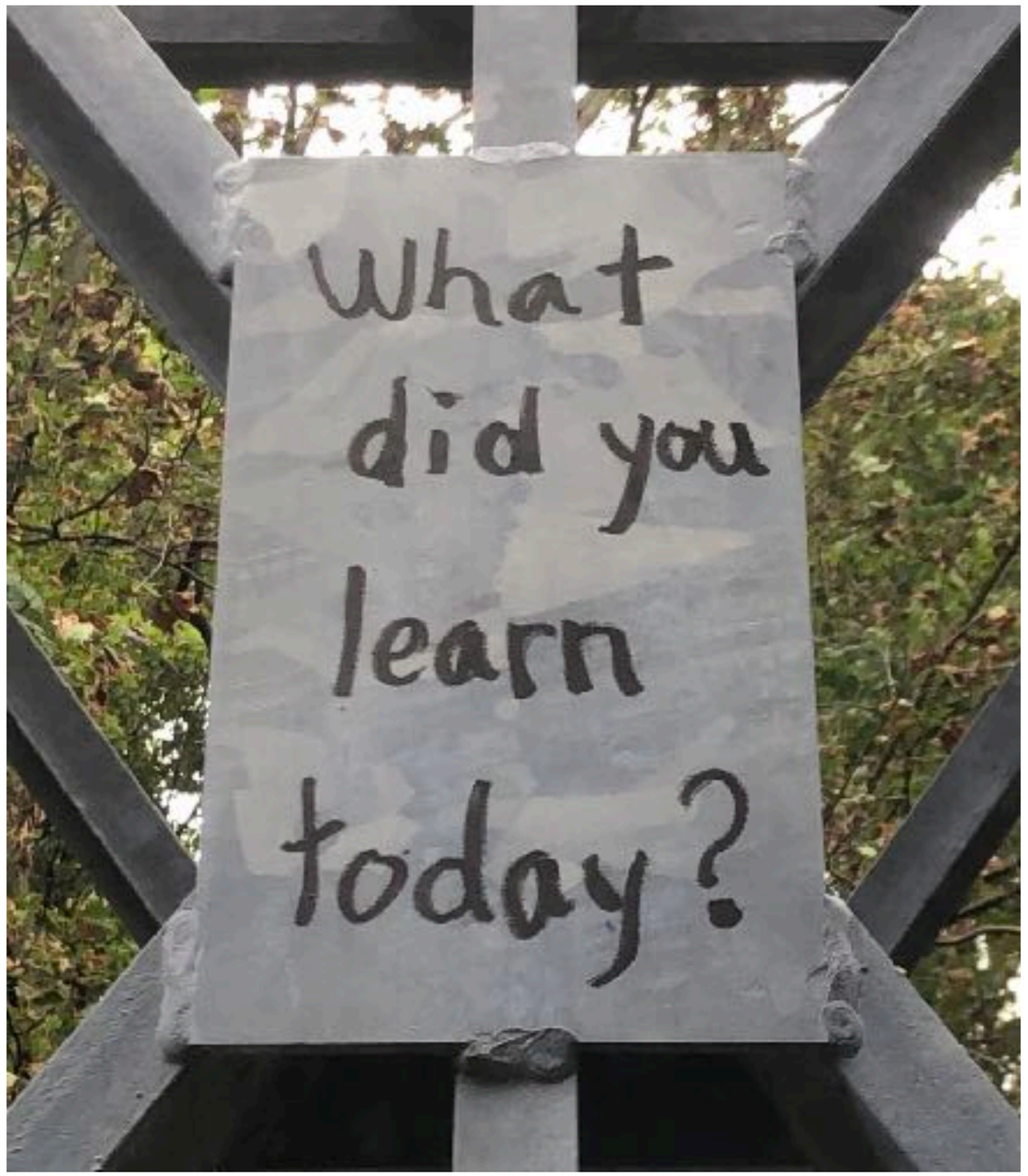
- A plan
- A policy
- Stakeholder engagement
- Education
- Awareness

Then deploy

- Sensitivity Labels
- Retention Policies
- Retention Labels
- IAP Scanner
- Trainable Classifiers
- Auto Labelling
- DLP

Follow with

- Run policies in simulation mode
- Iterate, iterate, iterate
- Use DLP as a nudge before you use it as a cudgel
- Be ready with pre-canned responses to alerts



Resources & Links

M365Maps - Enterprise Landscape
https://m365maps.com/files/Microsoft-365-Enterprise-Landscape.htm

Australian Government - Digital Transformation Authority - Protected Utility Blueprint
https://blueprint.asd.gov.au
https://blueprint.asd.gov.au/configuration/purview/

eHealth Ontario - Information Asset Management Standard
https://ehealthontario.on.ca/files/public/support/Security/Security_Toolkit/Information_and_Asset_Management_Policy_EN.pdf

National Defence - Working with Sensitive Information Infographic - Injury Test
https://www.canada.ca/en/department-national-defence/maple-leaf/defence/2020/12/working-with-sensitive-information.html

National Defence - Levels of Security
https://www.tpsgc-pwgsc.gc.ca/esc-src/documents/levels-of-security.pdf
https://www.tpsgc-pwgsc.gc.ca/esc-src/protection-safeguarding/niveaux-levels-eng.html

DCMA - Classifying Information - Section 4
https://www.dcma.mil/Portals/31/Documents/Policy/DCMA-MAN-3301-08.pdf

Australian Government - Classification System
https://www.protectivesecurity.gov.au/publications-library/policy-8-classification-system

NIST - Guide to Protecting the Confidentiality of Personally Identifiable Information (PII) - Section 3 - Impact Levels
https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-122.pdf

Canada - Treasury Board - Standard Classes of Records
https://www.canada.ca/en/treasury-board-secretariat/services/access-information-privacy/access-information/info-source/standard-classes-records.html

Ontario Hospital Association - Record Retention Toolkit
https://www.oha.com/Legislative and Legal Issues Documents1/Records Retention Toolkit, September 2022.pdf

Data Labelling: The Authoritative Guide (for ML)
https://scale.com/guides/data-labelling-annotation-guide

Not horrible example blogs showing setting up DLP policies:
https://www.gitbit.org/course/ms-500/learn/preventing-accidental-and-malicious-data-loss-with-dlp-policies-ispgsme8w
https://alberthoitingh.com/2023/11/10/running-the-aip-scanner-in-detect-only-mode/

Questions?

Thank you

Contact Info:

singleusermode@infosec.exchange
nixuser23@gmail.com

Do not contact me on LinkedIn unless you talk to me first.

This QR code is safe

https://github.com/nixy23/bsidesto2024