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Algorithmic Impact Assessment tool

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1. Introduction

The Algorithmic Impact Assessment (AIA) is a mandatory risk assessment tool intended to support the Treasury Board's *Directive on Automated Decision-Making*. The tool is a questionnaire that determines the impact level of an automated decision-system. It is composed of 51 risk and 34 mitigation questions. Assessment scores are based on many factors, including the system's design, algorithm, decision type, impact and data.

The AIA was developed based on best practices in consultation with both internal and external stakeholders. It was developed in the open and is available to the public for sharing and reuse under an open licence.

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2. Using and scoring the assessment

This assessment is organized according to Government of Canada policy, ethical, and administrative law considerations applied to the context of automated decision-making. It draws on Treasury Board of Canada Secretariat's consultations with public institutions, academia, and civil society. The AIA is designed to help departments and agencies better understand and manage the risks associated with automated decision systems. The AIA is composed of questions in various formats to assess the areas of risk defined in Table 1.

Table 1. Risk areas

Risk area	Description
1. Project	
Project phase	Project owner, description and stage (design or implementation)
Reasons for automation	Reasons for introducing automation into the decision-making process
Risk profile	High-level risk indicators for the project (e.g., vulnerability of clients)
Project authority	Need to seek new policy authority for the project
2. System	
About the system	Capabilities of the system (e.g., image recognition, risk assessment)
3. Algorithm	

Risk area	Description
About the algorithm	Limitations on disclosure of the algorithm; ability to explain how it arrives at outputs
4. Decision	
About the decision	Classification and description of the decision being automated (e.g., health services, social assistance, licensing)
5. Impact	
Impact assessment	Type of automation (full or partial); duration and reversibility of the decision; and areas impacted (e.g., rights, privacy and autonomy, health, economic interests, the environment)
6. Data	
Source	Provenance, method of collection, and security classification of data used by the system
Type	Nature of the data used as structured or unstructured (audio, text, image or video)

The AIA also assesses the mitigation measures in place to manage the risks identified. These mitigation questions are organized into the categories defined in Table 2.

Table 2. Mitigation areas

Mitigation area	Description
1. Consultation	
Internal and external stakeholders	Internal and external stakeholders consulted, including privacy and legal advisors; digital policy teams; and subject matter experts in other sectors

Mitigation area	Description
2. De-risking and mitigation measures	
Data quality	Processes to ensure that data is representative and unbiased, as well as transparency measures related to those processes
Procedural fairness	Procedures to audit the system and its decisions, as well as the recourse process
Privacy	Measures to safeguard personal information used or generated by the system

2.1 Scoring

Each area contains one or more questions, and the responses to the questions contribute to a maximum score for the area. The value of each question is weighted based on the level of risk it introduces or mitigates in the automation project. The raw impact score measures the risks of the automation, while the mitigation score measures how the risks of automation are managed. The questions in risk areas 1 to 6 increase the raw impact score, and the questions in mitigation areas 7 and 8 increase the mitigation score.

Table 3. Raw impact score from the risk areas

Risk area	No. of questions	Maximum score
1. Project	16	27
2. System	1	0
3. Algorithm	2	6
4. Decision	2	7
5. Impact	20	42

Risk area	No. of questions	Maximum score
6. Data	10	44
Raw impact score	51	126

Table 4. Mitigation score from the mitigation areas

Mitigation area	No. of questions	Maximum score
7. Consultations	2	2
8. De-risking and mitigation measures	32	44
Mitigation score	34	46

The current score is determined as follows:

- If the mitigation score is less than 80% of the maximum attainable mitigation score, the current score is equal to the raw impact score or
- If the mitigation score is 80% or more than the maximum attainable mitigation score, 15% is deducted from the raw impact score to yield the current score

2.2 Impact levels

The impacts of automating an administrative decision are classified into 4 levels, ranging from Level I (little impact) to Level IV (very high impact). The AIA is intended to identify risks and assess impacts in a broad range of areas, including:

- the rights of individuals or communities
- the health or well-being of individuals or communities
- the economic interests of individuals, entities, or communities

- the ongoing sustainability of an ecosystem

Impact levels are distinguished based on criteria of reversibility and expected duration: automated decisions with little to no impact are reversible and brief, while those with a very high impact are irreversible and perpetual.

Each impact level corresponds to a score percentage range. The level of impact assigned to an automation project depends on the range bracket in which the project's score percentage falls (Table 5). Impact levels determine the mitigations required under the *Directive on Automated Decision-Making*. Appendix C of the directive lists mitigation measures required for each of the 4 impact levels. The requirements are designed to be proportionate to the impact level. While the measures are intended to reduce the identified risks, their implementation does not alter the impact level assigned to a project. A project's impact level can only be changed through the completion of a new AIA with updated information about the project. Under the directive (subsection 6.1.3), departments are required to review and update their AIAs on a scheduled basis, including following changes to system functionality or scope of use.

Table 5. Impact level definitions

Impact level	Definition	Score percentage range
Level I	Little to no impact	0% to 25%
Level II	Moderate impact	26% to 50%
Level III	High impact	51% to 75%
Level IV	Very high impact	76% to 100%

3. Instructions

The AIA is available as an online questionnaire on the Open Government Portal. When the questionnaire is completed, the results provide an impact level and a link to the requirements under the directive. The detailed results page will also explain why the system was rated a certain level. The results and the explanation can be printed or saved as a PDF.

The AIA assesses automated decisions on a broad range of topics, including service recipients, business processes, data, and system design decisions. It is best to complete the AIA with a multi-disciplinary team that brings expertise in all of these areas.

Each question in the AIA must be answered. If the answer to a question is unknown, please select the lowest score option for the question. Where applicable, be prepared to provide the documentary evidence upon request.

Section 6 of the directive provides a comprehensive list of the requirements that departments are responsible for. Some of the requirements increase for higher impact levels, including the type of peer review and the extent of human involvement in the decisions. For a complete list of requirements which vary with the impact level, refer to the appendix Impact Level Requirements in the directive. Other requirements are baseline requirements that do not vary according to the impact level, such as consulting with the institution's legal services prior to the development of the system, training employees and providing applicable recourse options to challenge the decisions.

3.1 When to complete the AIA

The AIA should be completed at the beginning of the design phase of a project. The results of the AIA will guide the mitigation and consultation requirements to be met during the implementation of the automated decision system as per the directive.

The AIA should be completed a second time, prior to the production of the system, to validate that the results accurately reflect the system that was built. The revised AIA should be released on the Open Government Portal as the final results.

Reviewing and updating the AIA

The AIA should be reviewed and updated on a scheduled basis, and when the functionality or scope of the system changes (subsection 6.1.3). The schedule of review can be aligned with and informed by the monitoring (subsection 6.3.2) and reporting requirements (subsection 6.5.1).

Risks in automated decision-making are difficult to fully anticipate during the development of a system. Regular reviews throughout the system's life cycle will ensure that the reviews include operational experience and that the AIA remains up to date throughout the lifecycle of the system.

The chosen frequency of review can depend on a variety of factors, including the nature of the system, the context of its deployment and the decision for which it is used.

For example, the AIA may be reviewed and updated more often when:

- the service volumes are high
- the system affects a large number of clients
- the environment the system operates in evolves or changes rapidly
- the impact level of the system is a level 3 or 4

3.2 What to consider when completing an AIA

Collect information about your project

A broad range of information about an automation project is required to fully answer the questions in the risk and mitigation areas of the AIA.

Prior to starting the AIA, it is useful to have information about:

- the administrative decision that the automated decision system will inform, contribute to, or make, the context in which the system will be used, and the way the system will assist or replace the judgement of a human decision-maker
- the clients subject to the decision, including evidence of any vulnerability (for example, socioeconomic, demographic, geographic)
- the potential impacts of the decision on clients, including their duration and reversibility
- the algorithm, including data processing parameters and techniques, and the output
- the input data used by the system, including details on type, source, method of collection, and security classification
- planned or existing quality assurance measures
- planned transparency measures to communicate information about the initiative to clients and the public
- internal and external stakeholders to be consulted
- record of recommendations or decisions made by the system, and any log or explanation generated by the system for such a record
- institutional information technology service management (ITSM) practices

The information above will also be useful in consultations with the stakeholders described below. It can also support engagements with vendors and peer reviewers.

Consult your ATIP office

The institutional Access to Information and Privacy (ATIP) office or other delegated authority for privacy should be consulted to ensure that the privacy impacts of automated decision systems using or processing

personal information, or that otherwise have an impact on individuals' privacy rights, are identified, assessed, and mitigated. Engagements can enable project leads to:

- determine whether the automated decision system will make use of personal information as defined in section 3 of the Privacy Act
- verify whether the proposed system's use of personal information is accounted for in relevant Privacy Impact Assessments (PIAs) and Personal Information Banks (PIBs), and identify actions and approvals required under privacy legislation and policy
- determine applicable requirements in the Policy on Privacy Protection and supporting policy instruments, with the goal of ensuring that the appropriate safeguards are in place for the creation, collection, and handling of personal information throughout the lifecycle of the system, including plans for responsive action in the event of a privacy breach
- inform approaches to notifying the Office of the Privacy Commissioner of Canada of the proposed system and any foreseeable impacts on the privacy of Canadians, as required in the Policy on Privacy Protection
- ensure any personal information collected or created by or for the automation project is demonstrably necessary for the program or activity, as required by the Directive on Privacy Practices
- ensure that appropriate privacy protection clauses are included in contracts, agreements or arrangements with vendors or partners providing automation services, solutions, or products
- ensure the AIA is reviewed by privacy officials prior to its publication on the Open Government Portal, in accordance with the Directive on Open Government

Engage with Legal Services

When completing an AIA, legal services must be consulted to identify and address legal risks arising from the development, procurement, or use of an automated decision system. Consultations should begin at the concept stage of an automation project, prior to the development or procurement of a system. The nature of legal risks significantly depends on the design of the system (for example, training data, model), the context of deployment, and the type of administrative decision being automated. Seeking legal advice on an automated decision system can enable project leads to:

- comply with the directive's requirement to consult with legal services from the concept stage of a project (see subsection 6.3.10)
- identify potential impacts on individual rights and freedoms and develop plans to manage risks
- assess risks to procedural fairness based on factors including, but not limited to, the explainability of system outputs, relevance of system rules and input data to an administrative decision, and availability of recourse options (see subsections 6.2.3, 6.3.1, 6.3.2, and 6.4.1 of the directive)
- confirm whether the program has the requisite authorities to proceed with the proposed automation project, including any associated collection or creation of personal information (in coordination with the relevant ATIP office or other delegated authority for privacy).
- Consider licensing issues, including with respect to trade secrets, and any constraints they may impose on a department's ability to access and test proprietary systems (see subsection 6.2.5 of the directive)

Engage Gender-based Analysis Plus experts

Engage with the institution's diversity and inclusion specialists while completing the AIA. They can assist with impacts and mitigation measures related to diversity, inclusion, bias and intersectionality. They can also assist in completing the Gender-based Analysis Plus as required under subsection 6.3.6.

Contact TBS OCIO

The Office of the Chief Information Officer (OCIO) at the Treasury Board of Canada Secretariat (TBS) is responsible for maintaining the AIA tool and overseeing departmental compliance with the *Directive on Automated Decision-Making*. The team can support departments with interpreting and answering questions in the AIA, and guide them through the publication process.

Departments are encouraged to contact TBS OCIO at ai-ia@tbs-sct.gc.ca for any questions regarding the directive or AIA.

3.3 Releasing the results

Departments are responsible for releasing the final results of the AIA in an accessible format and in both official languages on the Open Government Portal (subsection 6.1.4). The results page of the AIA provides the option to provide translations for the text entered in the AIA. The results page also provides the option to download the results as an accessible PDF to meet this requirement.

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