Regulatory Requirements for Software, AI and Medical Devices

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MEDICAL DEVICE RESEARCH INSTITUTE

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Today, over **400 ABORIGINAL AND TORRES STRAIT ISLANDER STUDENTS** are enrolled in courses at Flinders University.

Flinders University

Tracey Duffy

First Assistant Secretary, Medical Devices and Product Quality Division at the Therapeutic Goods Administration

Regulation of SaMD and AI

Tracey Duffy

Medical Devices and Product Quality Division

Therapeutic Goods Administration

How is AI being used in the healthcare sector?

Diagnostics

Analysing medical images and genomic data to aid in identifying anomalies or diseases.

Predictive analytics

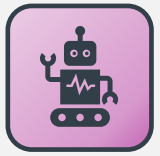
Identifying at-risk patients for conditions (including chronic diseases, sepsis, etc.) readmissions, and adverse drug events - improving patient care and outcomes while reducing costs.

Drug discovery

Analysing datasets to identify potential drug candidates - reducing the lead time to treatment and potentially leading to faster availability of new medications.

EHR system integration

Managing patient data, automating administrative tasks, and improving decision-making by providing relevant patient information – reducing administrative errors, improving patient outcomes.



Virtual healthcare assistants

Constant real time monitoring patients, preventative analytics, early intervention of potential health issues/deteriorations, medication management, companionship and mental health support - better outcomes for long-term and chronic conditions.

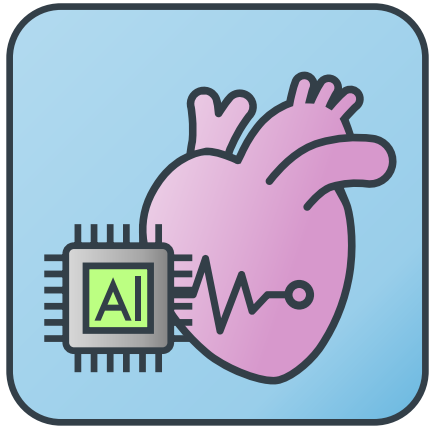
Problem – People knowing when software (including AI) is a medical device and subject to Regulation?

Manufacturer's intended purpose is critical – and is technology agnostic

Software is a medical device when the **manufacturer *intends*** for their product to be used for:

- diagnosis, prevention, monitoring, prediction, prognosis or treatment of a disease, injury or disability
- compensation for an injury or disability
- investigation of the anatomy or of a physiological process
- to control conception.

Software that is an **accessory** to another medical device.



Regulatory framework for SaMD and AI – Key features

- **Australian Register of Therapeutic Goods** (ARTG) entry provides basis for supply
- **Classification rules** determine minimum conformity assessment requirements
- **Quality Management System certification** required for manufacturers (for Class IIa devices and above)
- **Comparable overseas regulator evidence** accepted by TGA to support ARTG entry
  - framework is **aligned with EU**;
  - TGA participates in **Medical Device Single Audit Program** (MDSAP)
- **Essential Principles** set out requirements for safety and performance
- **International harmonisation**

Classification rules – based on risk of harm

There are specific rules for programmed or programmable medical devices or software that is a medical device which will apply to devices that are, or incorporate, an AI system or model.

Factors impacting the classification of a medical device include:

- whether it's used for therapy, administering a medicine
- used in diagnosis, screening, monitoring
- used to specify or recommending treatment or intervention
- whether it's intended for a consumer or clinician
- severity of the impact in providing the information (or not).

Class I	**Dental treatment application software.**
Class IIa	**App monitoring progression of muscular dystrophy using data from a connected device.** **Software generating a 3D virtual model from patient scans.**
Class IIb	**Diagnosis of emphysema from tomography scans.** **Recommends options for coronary artery bypass grafting surgery to a surgeon.**
Class III	**Melanoma screening app.** **Robotic surgical unit software recommending parameters.**

Essential Principles for safety and performance

General Principles

Use of medical devices not to compromise health and safety
Design and construction of medical devices to conform with safety principles
Medical devices to be suitable for intended purpose
Long-term safety
The device is not to be adversely affected by transport or storage
Benefits of medical devices to outweigh any undesirable effects
Information to be provided with medical devices

Design and Construction

Chemical, physical and biological properties
Infection and microbial contamination
Construction and environmental properties
Medical devices with a measuring function
Protection against radiation
Medical devices connected to or equipped with an energy source
Clinical evidence
Principles applying to IVD medical devices only

Evidence requirements – for SaMD

Every manufacturer must have evidence to support the safety and performance of their device. For software as a medical device (SaMD), this includes:

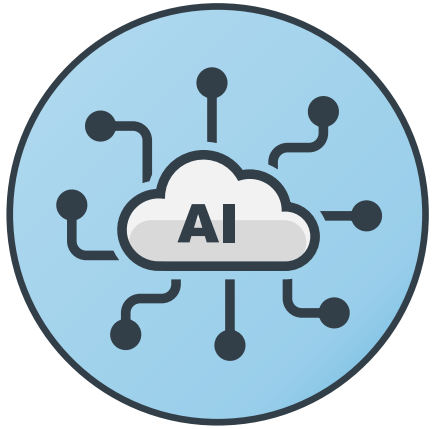
- specific information about the software and how it performs
- clinical evidence proportionate to the risk and classification of the device
- human factors studies - usability and accessibility
- **evidence demonstrating cyber security and compliance with Australian privacy and data protection laws**
- labelling and instructions for use:
  - explaining how the device works
  - identifying any potential risks associated with use of the device
  - information about how to use the device safely
  - for healthcare practitioner users – clinical validation details.

Evidence requirements for software using AI

Manufacturers of software that uses AI or machine learning (ML) must possess evidence that is sufficiently transparent to enable evaluation of safety and performance

These artifacts typically include:

- an overarching statement of the objectives of the AI/ML model
- algorithm and model design, including tuning techniques used
- data used for training and testing – and generalisability where applicable
- risk management to address risks including (but not limited to):
  - overfitting
  - bias
  - performance degradation (data drift, etc.).



Carve-out mechanisms – maybe adding to confusion!

Exempt

The TGA retains some oversight:

- no ARTG entry, notification within 30 days of supply
- required to comply with essential principles
- adverse event reporting
- advertising code
- subject to recall actions or safety alerts.

Excluded

Not regulated by TGA:

- not a medical device
- no ARTG entry
- subject to regulatory oversight provided by bodies other than the TGA
- subject to ACCC and state ombudsman consumer law obligations.

Excluded software

There are 15 conditional exclusions (in 6 groups) that may capture certain software-based devices:

Consumer health products

(e.g. wellness apps, fitness heart rate monitors, medication reminders)

Digitisation

(e.g. digital versions of paper-based patient surveys)

Population-based analytics

(e.g. research or population-based screening – bowel cancer program)

Digital mental health tools

(e.g. meditation and mindfulness applications, CBT)

Enabling technology

(e.g. telehealth and eScript software)

Laboratory Information Management Systems

(e.g. workflow automation software, pathology reporting)

Excluded software

Some products are EXCLUDED from regulation

If a product is excluded, it is not regulated as a medical device by the TGA

- Excluded goods are subject to other regulatory requirements, such as consumer protection laws, and state or territory consumer protection laws
- Excluded goods must still abide by the Advertising Code
- Exclusions are listed in the Therapeutic Goods (Excluded Goods) Determination 2018

NOTE: The **mHealth Assessment Framework** was developed to help consumers and healthcare professionals select credible mobile health applications.

Exclusion 14B

Exclusion 14B applies to software intended to be used by a consumer to promote or facilitate general health or wellness by measuring or monitoring (through non-invasive means) a physical parameter, such as movement, sleep, heart rate, heart rhythm, temperature, blood pressure or oxygen saturation

Emerging concerns

Exclusion may no longer be appropriate

Given the emerging complexity and associated risks with some of these products, exclusion may no longer be appropriate.

Digital mental health tools

May be present within the market as:

- apps that provide therapy (CBTs)
- internet based services
- symptom checkers
- suicide prevention apps.

Consumer health products

May be available:

- as a wearable fitness monitor
- alongside products that do meet the definition of a medical device with no discernible difference (sold at a pharmacy, measuring a physical parameter, etc).

Digitisation

Conversion of paper-based forms to digital forms – they are becoming smarter.

Simple calculators are now performing complex drug calculations that consider multiple factors, interrogate EMRs.

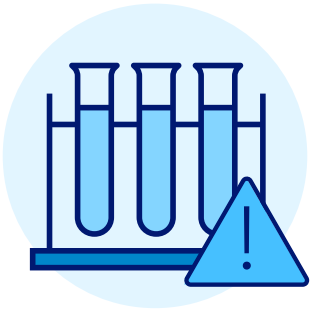
Exempt software – need to meet these qualifications

Clinical Decision Support System (CDSS) software is exempt when it is:

- **Intended** for the sole purpose of **providing or supporting** a **recommendation** to a **health professional**; and
- **Not intended** to **directly process or analyse** a medical image or signal from another medical device; and
- **Not intended** to **replace the clinical judgement of a health professional** in relation to making a clinical diagnosis or decision about the treatment of patients

Reported issues

Application of the term “clinical decision support” (CDS)



Incorrect application of the conditional exemption to in vitro diagnostic medical device (IVD) software

Inability to assess the performance of a CDSS software product

Public consultation (closed)

We put forward the following four proposals for change:

1. **Introduce a definition for CDSS software**
2. **Clarify diagnostic software (including IVDs) and processing of data**
3. **Ensure transparency for users on basis of outputs**
4. **Improve guidance for stakeholders**

CDSS consultation summary

All four proposed amendments received majority support

- The TGA has reviewed the feedback and is generating a report for ministerial and internal approval/agreement.
- The TGA is considering regulatory and legislative impacts of the proposed amendments on the wider government review into the regulation of artificial intelligence (AI).
- Amendments **clarifying the existing regulations** are in draft.

What are wearable devices and how are they used?

Wearable digital health technologies (DHTs) are devices that record behavioural or physiological data

- Can be used in medical decision making or to capture general wellbeing and fitness data
- Includes wristbands, patches, watches, and clothing worn on the body

Wearables generally perform 4 main functions in the health context:

Monitoring

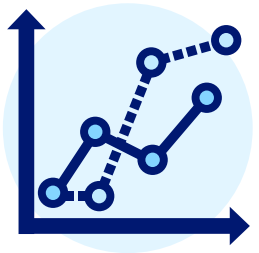
Practice of continuous data collection

Screening

Identification of specific conditions and individuals associated with a condition.

Detection

Analysis of wearable data



Prediction

Infer health trends or events of interest based on monitoring.

When is a wearable a medical device?

A wearable device – such as a wristband or watch – or the software that drives it, is a medical device when the manufacturer **intends** for their product to be used for: **diagnosis**, **prevention**, **monitoring**, **prediction**, **prognosis** or **treatment** of a disease, injury or disability.

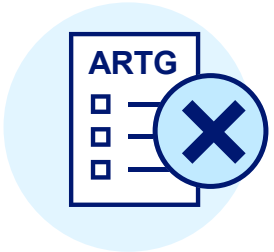
Whether a wearable meets the definition of a medical device…

- Depends on the manufacturer's **intended purpose**
- Is **technology agnostic** (AI, ML, bioinformatic pipeline, etc)
- Is not based on how it is **supplied** (online, in hardware, app, cloud-based, etc)

Not all health-related wearables and software are a medical device

Regulation of data collection components

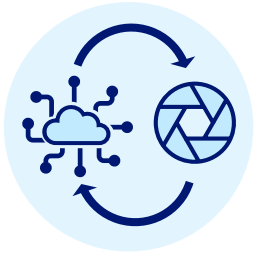
The TGA regulates the software or app - not the sensor in a finished consumer good



Not required to be included in the ARTG

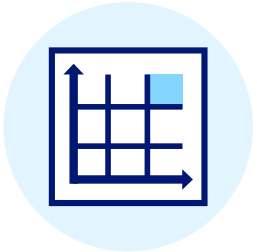
The data collection component(s) themselves are not required to be included in the ARTG **if integrated into a finished consumer smart device**

The SaMD must be included in the ARTG for supply in Australia



SaMD must be validated against the data collection component(s)

The data collection components or smart device must also be validated for the intended use of the SaMD



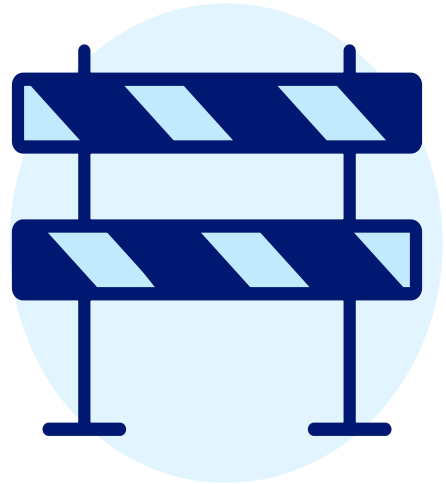
Scrutiny commensurate with the level of risk

Software which diagnoses a life-threatening disease or condition requires a high level of scrutiny applied to the validation of any sensors used to perform its intended use, such as a camera

Challenges with monitoring, screening, detection

Wearables offer benefits by enabling personalised data-driven interventions, but there are some challenges:

- **Data quality –** variability of sensors and inconsistent data collection make it difficult to coordinate and assess the quality of data collected
- **Overestimation** – some wearables may detect or predict non-problematic conditions and abnormalities as problematic
- **Data privacy** – potential privacy issues when communicating wirelessly to other devices, if transmitted user data can be intercepted
- **Data ownership is unclear** – data collection involving multiple stakeholders can create uncertainty about who owns the data collected by wearables
- **Large amounts of data** – providers are largely unequipped to manage or understand the massive new sets of data created by wearables



Software and AI – our observations…..

General challenges:

- Rapid development and **diversity** of AI products (generative AI like ChatGPT, Bard etc).
- **Lack of transparency** – unable to verify performance and manage risks.
- Anecdotal reports of errors in AI – **validation** is critical to ensure **accuracy** and **generalisability.**
- **Privacy** and **consent** continue to be significant (massive data lakes are being collected).

Regulator-specific challenges:

- Balancing innovation with safety.
- Education: ensuring healthcare providers and consumers are supported to make good decisions.
- Aligning internationally: maintaining consistency and interoperability.
- Post-market monitoring: managing the risks of unintended bias, model performance degradation and off-label use.

Artificial intelligence – emerging concerns

LLMs **not validated** for a **medical purpose.**

AI is **not always immediately visible** in the design.

"Scope or function creep" of deployed software.

Many developers are **new to regulation** and are **not aware** that they have regulatory obligations.

Clinical practitioners are **not always aware** of the extent to which they are **accepting the risk for use** of software.

Data for training and testing of the AI is often **not related to use case population** or is **too small to be valid.**

The AI model and its design is **not always based on good clinical or scientific evidence.**

Globally

International approaches to AI regulation

IMDRF working groups:

- AI and Machine Learning Working Group: work on new guidance for AI Lifecycle Management
- SaMD Working Group: work on the essential principles and Predetermined Change Control Plans (PCCPs)

Experiences of various international approaches to AI regulation are emerging:

- UK MHRA
- Health Canada
- EU – AI Act

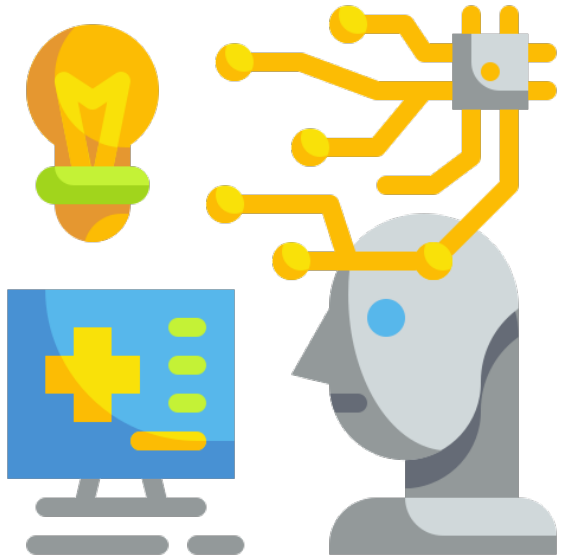
Digital Think Tank – with US FDA, UK MHRA, EU and Health Canada

Multilateral Digital Mental Health Technologies Project

Software and AI

General challenges (whole of economy and government)

- Rapid development and **diversity** of AI products.
- Increasingly **pervasive.**
- **Lack of transparency.**
- Anecdotal reports of errors in AI – **validation** is critical to ensure **accuracy** and **generalisability.**
- User **understanding and use.**
- **Privacy** and **consent**.



Software and AI

Moving to meet the challenges

- Safe and Responsible AI budget measure.
- Whole of economy approach.
- Co-ordinated by the Department of Industry, Science and Resources.
- Key features include development of a strategic approach to AI across the whole of economy and government including adoption of a set of guardrails.
- Legislative review of priority areas including health and aged care (TGA relevance!!).

Clarifying and strengthening regulation

TGA – priority review of legislation

- How prepared are we for the rising use of AI?
  - Mitigating risks
  - Leveraging opportunities
- How well does our legislation meet the intent of the proposed guardrails?
- What changes, if any, do we need to make to our framework to ensure the safe and responsible use of AI models and systems in our regulated environment?

Phase 1: Targeted stakeholder consultation

Stakeholders across the regulated environment identified:

- use case examples and emerging use of AI models and systems in healthcare settings
- key areas of legislation requiring review
- risks and opportunities associated with the use of AI
- broader issues in the healthcare sectors related to the increasing use of AI models and systems.

- ***The existing regulatory framework broadly aligns with the proposed guardrails.***
- ***Some amendments to the existing regulatory framework may be required to ensure all risks are mitigated and opportunities leveraged.***

More than 300 participants

Clinicians, and health professionals and providers.

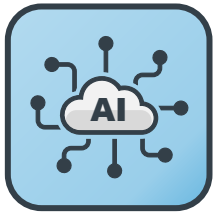
Regulatory experts from medical device-related sectors including the software sector.

Consumer representatives.

State and territory governments.

Other federal regulators.

Representatives from clinical trial and research groups.



Phase 2: Public consultation themes

- **Potential changes to the *Therapeutic Goods Act 1989.***
- **Potential changes to medical devices regulations.**
- **Potential alterations to the essential principles.**
- **Potential review of excluded software.**
- **Maintaining international harmonisation.**
- **Transparency.**
- **Guidance, education, information, and communication.**

We asked about language and definitions in legislation

Capturing new practices appropriately

AI models and systems have changed the way therapeutic goods are deployed and used

Emerging challenges and questions include:

- Who is responsible for these activities (especially in continuously learning and generative AI)?
- Original deployer or user of the system may not have sufficient awareness or oversight of the activities the software performs.
- Consumers, including health professionals, using these kinds of models and systems may not be aware of performance parameters or limitations of the software.

*Clarity is required for who is **responsible** for the outputs of these systems, particularly when their activities constitute a breach of the Act or other laws.*

We asked about classification rules 4.5 (1) and 4.5 (2)

Accounting for prediction or prognosis

Currently all AI models that:

- Meet the definition of a medical device; and
- Are solely intended to provide a prediction or prognosis for a disease or condition are regulated as Class I medical devices

*Class I may not be appropriate, particularly when information is used to determine **treatment plans** or **interventions** which could have a significant and detrimental impact on patients if the prediction or prognosis is not accurate.*

We asked about changes to the essential principles (EPs)

Safety and performance requirements for all medical devices

Principles-based regulation:

- provides flexibility
- accommodates emerging technologies
- allows approaches to evolve over time without continuous review and updating of legislative frameworks

The EPs we considered most likely to require amendment:

- **EP 12.1:** Specific requirements for programmed or programmable medical devices or software that is a medical device.
- **EP 13:** Information to be provided with all medical devices

We asked about excluded software

Some products are EXCLUDED from regulation

If a product has been excluded, it will not be regulated as a medical device by the TGA and does not have to:

- hold evidence demonstrating compliance with TGA's technical requirements
- have third party certification.

Excluded goods remain subject to other regulatory requirements, such as consumer protection laws, and state or territory consumer protection laws.

Excluded goods must also still abide by the Advertising Code.

Exclusions are listed in the Therapeutic Goods (Excluded Goods) Determination 2018 (the Determination).

Potential review of Excluded Software

Consumer health products
(e.g. wellness apps, fitness heart rate monitors, medication reminders)

Calculators
(e.g. digital versions of paper-based patient surveys)

Digital mental health tools
(e.g. meditation and mindfulness applications, CBT)

Laboratory Information Management Systems
(e.g. workflow automation software, pathology reporting)

We asked about international alignment and harmonisation

The TGA seeks to align with approaches taken by other jurisdictions where possible

Mutual recognition and the ability to use evidence and certification from comparable overseas regulators streamlines the Australian process for sponsors who are bringing their therapeutic goods to market.

These measures ultimately reduce costs and lead times for Australian consumers who are seeking access to therapeutic goods, without introducing unacceptable risks.

Stakeholders indicated

- International harmonisation of medical device regulation is a key feature underpinning the timely entry of innovative devices to the Australian market.
- Failing to maintain international alignment is likely to delay or prevent the supply of some therapeutic goods to the Australian market.

We asked about transparency

Consumers and clinicians want to be able to identify the use of AI models and systems

Stakeholders have identified there is unlikely to be one approach that would adequately address the need for greater transparency.

Indicated the ability to identify the use of AI is more important where an AI model or system has been used to generate a result or propagate data that may require their review or input to ensure accuracy.

A number of options were put forward for improving transparency.

Stakeholders (including consumers) are seeking information about:

- whether a therapeutic good has been approved by the TGA
- what was used to support the approval to supply a therapeutic good
- any special conditions or limitations about the use of a therapeutic good
- the ARTG inclusion for the therapeutic good
- the datasets that were used to train the AI.

We asked about guidance, education, information and communication

Options for improving the information available

We asked:

- Is the use of AI models and systems adequately covered by the current guidance and information available on the TGA website? If not, what changes or additional material are required?
- Are there places other than the TGA website where information about the regulation of therapeutic goods should be made available?
- Are there specific resources that should be developed to support clinicians and consumers? If yes, what are they and where should they be provided?

Opportunities to clarify and strengthen regulation

TGA – priority review of legislation high level outcomes

- The existing regulatory framework broadly aligns with the proposed guardrails.
- Some amendments to the existing regulatory framework and additional guidance/information may be required to ensure all risks are mitigated and opportunities leveraged.
- Work is underway around the world to address the increasing use of AI appropriately – TGA remains engaged with work undertaken in other jurisdictions

- ***How prepared are we for the rising use of AI?***
  - ***Mitigating risks***
  - ***Leveraging opportunities***
- ***How well does our legislation meet the intent of the mandatory guardrails proposed by DISR?***

Where to next?

Potential future changes and approaches to AI regulation

- Failure to maintain international harmonisation and alignment would be detrimental to this sector.
- While our existing framework and approach is largely fit for purpose, stakeholders need more support to meet these requirements.
- Minor changes are needed to ensure the framework continues to be appropriate.
- More transparency, education and communication is needed for all stakeholders.
- A multi-faceted approach is needed to achieve these outcomes.

Australian Government

Department of Health and Aged Care

Therapeutic Goods Administration