SNOMED CT Strategy

SNOMED CT Strategy
2020-2023
On behalf of
The
Irish National Release Centre

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Contents

Executive Summary

This strategy outlines the approach, guidelines, and timeline for the complete integration and adoption of SNOMED CT by the Irish health services' into clinical, ICT and informatics practices by 2022. This document also analyses the current state and progress to date of clinical terminology use in Ireland.

SNOMED CT based clinical information, benefits individual patients and clinicians, whole populations, and it supports evidence based care. When implemented in digital clinical systems like Electronic Heath Record (EHR) software applications, SNOMED CT represents relevant clinical information consistently and comprehensively as an essential part of producing electronic health information. SNOMED CT is the designated national standard in Ireland for information in EHRs and for additional health information exchange transactions.

The successful implementation of this strategy is dependent on underlying assumptions and beliefs such as:
- The number of ICT clinical solutions procured and deployed in the next 3 years is going to grow,
- The Department of Health and HSE will jointly support and resource NRC to realise this strategy
- The requirement to have SNOMED CT available for these systems will be critical
- The ICT business owners and vendors need to have an understanding of how SNOMED will be made available in their systems

The SNOMED Governance Group has identified three main goals for 2022. The first is to develop SNOMED expertise by engaging clinical and informatics experts, actively communicating with stakeholders and developing a national position statement of SNOMED adoption.

The second goal is to develop a rigorous focus on quality by ensuring that the SNOMED Governance Board continues to operate effectively, that international quality processes are adopted and assured, and that SNOMED is central to local process for clinical dataset management like the Dataset Specification Management Process.

And, the third goal is to actively enable the adoption of SNOMED by offering tailored training to clinicians, getting influencers on-board with SNOMED and highlighting quick wins, enabling

aspects of Sláintecare through the implementation of SNOMED and influencing new projects to include SNOMED.

SNOMED Overview

As a large complex organization under constant pressure to meet demand and drive innovation, the duty of the HSE to provide high quality patient care is always challenging.

In order to be ready to take on the demands for clinical data exchange and to be prepared for the needs that the evolving eHealth perspective would put on the organization, the Department of Health endorsed the HIQA recommendation in 2016 and in partnership with the HSE procured the SNOMED license for Ireland. This was done to standardise clinical terminology, reduce errors, lower costs, and ultimately deliver better care to Ireland's citizens.

Ireland became the 29th member to join SNOMED International in November 2016.
We are now, a member of a global clinical terminology community, with equal rights and access for all members.
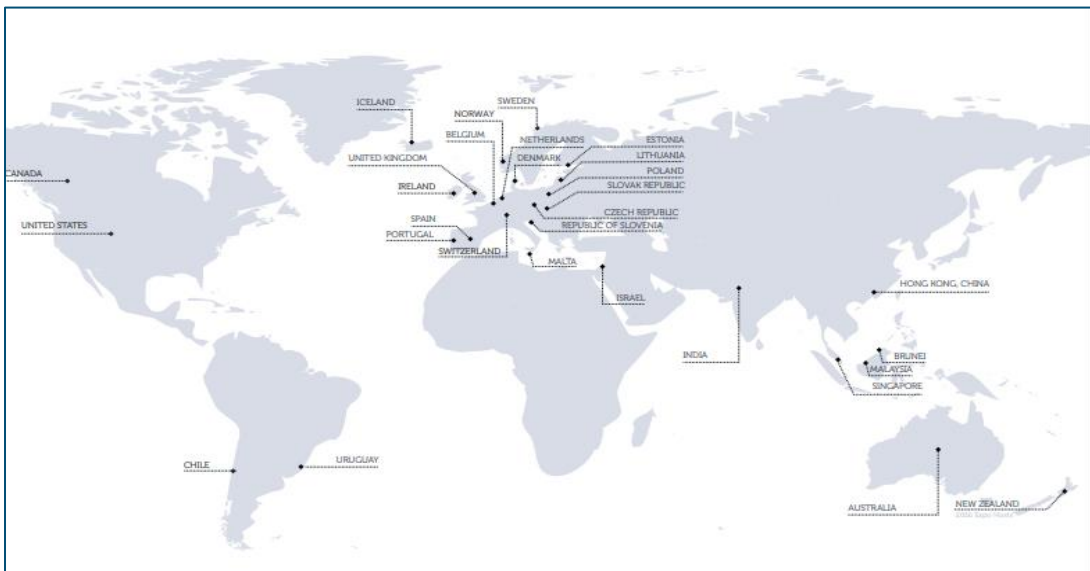
SNOMED was an exciting new service that would help Ireland to be best placed to manage clinical terminology in electronic charts and enable the eHealth Ireland strategy to be delivered. This decision was informed by a number of previous initiatives undertaken by various bodies related to coding standardisation as follows:

2012	WHO eHealth Strategy	2013	eHealth Strategy Ireland published by the DoH
2013	Overview of Healthcare interoperability standards published by HIQA	2014	HIQA recommends SNOMED CT
2013	Guidance document on terminology & classification systems standards published by HIQA	2015	HSE Knowledge & Information Plan

Ireland joined SNOMED to help standardise clinical terminology, allow for clinical data to be exchanged in a standard format, provide tangible return for investment in EHR's and ultimately deliver better care to Ireland's citizens.

This vision and strategy

In 2020 SNOMED International published a new [Strategy](#), their vision is that by 2025, Clinical Terminologies will be used globally, which will result in better health and improved patient outcomes, supported by one language of health.

In Ireland we need to establish what a 'quality of care model' using clinical terminology for Irish citizens will look like in 2022. This strategy is aligned with the vision and strategy that SNOMED International has developed. The goal of this strategy is to reinforce and enable, quality care and cost effective delivery, through the adoption of standardised clinical terminology across Ireland.
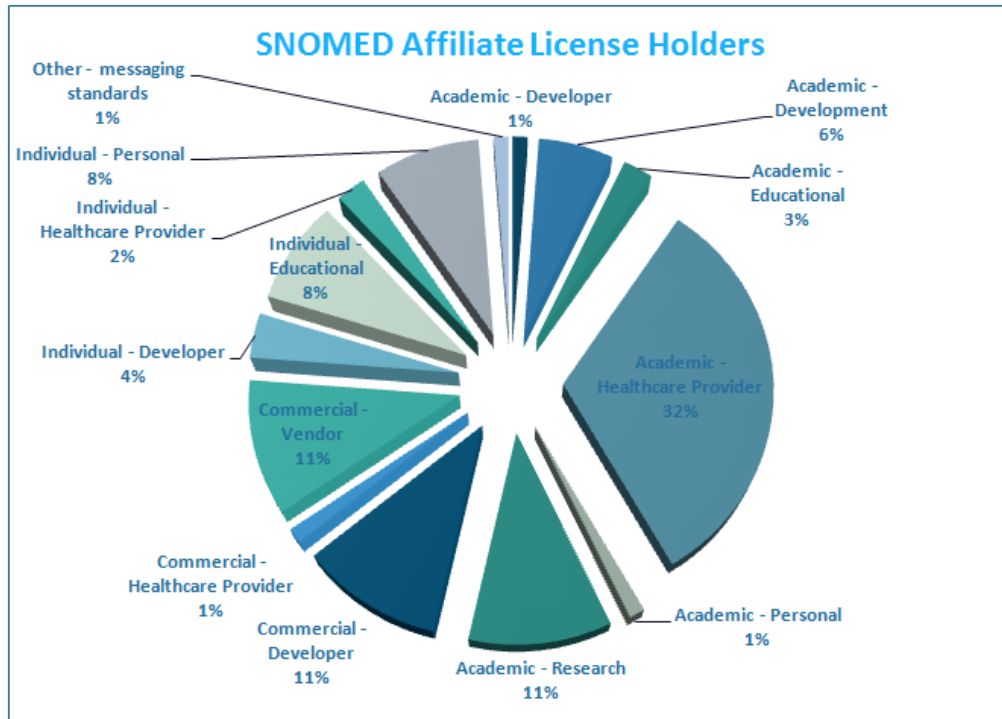
Review of SNOMED in Ireland to date

The SNOMED National Release Centre (NRC) established a SNOMED Governance group on behalf of the HSE,HIQA and DoH in September 2017. A Terms of Reference and an initial one-year strategy document were then developed and approved. To deliver NRC services the following were prioritised:

- Policies and procedures
- Tooling
- Education
- Stakeholder Engagement
- Projects and Implementations
- Governance

Since then the Governance Board has overseen a number of key decisions, including the procurement and deployment of the SNOMED managed service which will allow Ireland to develop author and release new content for the Irish release every 6 months, this might become more frequent during the lifecycle of this strategy.

The Irish NRC currently has approximately 84 affiliate license holders, across various domains. The NRC has had its 3rd release of the Irish Edition of SNOMED in April 2020, and will continue 6 monthly, though the use of the managed service.

SNOMED Affiliate License Holders

- Other - messaging standards 1%
- Academic - Developer 1%
- Academic - Development 6%
- Academic - Educational 3%
- Individual - Personal 8%
- Individual - Healthcare Provider 2%
- Individual - Educational 8%
- Individual - Developer 4%
- Commercial - Vendor 11%
- Academic - Healthcare Provider 32%
- Commercial - Healthcare Provider 1%
- Commercial - Developer 11%
- Academic - Research 11%
- Academic - Personal 1%

This allows Ireland to be agile and adapt to changing needs in the Irish healthcare sector as requirements for clinical terminology develops.
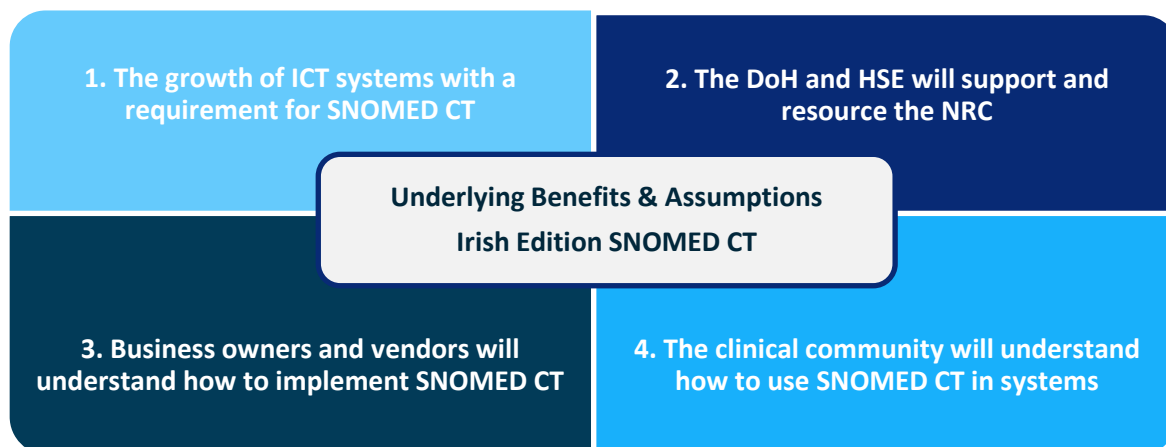
Underlying beliefs and assumptions

Organisations and individual clinicians are coming under intense pressure to produce measurable quality and safety improvements. At the same time, local and national strategic priorities are being keenly debated, service reconfigurations for the HSE are being undertaken, and health policy is being scrutinized by both politicians and the media.

Healthcare organisations often have trouble generating enthusiasm in clinicians for quality initiatives. Healthcare professionals' desire to deliver quality services doesn't always translate into support for change, and responses to quality initiatives can range from apathy to direct opposition. The HSE is not alone in this regard – poor engagement is a "long-standing, multifactorial, and international problem."

However, while some organisations struggle to implement evidence-based protocols and rigorous safety practice, others are making dramatic improvements in quality. Yet even in the most advanced, one of the most common questions raised is, "How can we do an even better job of engaging our clinicians in the quality agenda?"

As HSE facilities and clinical leaders adopt, SNOMED CT there is also a need to understand what their **underlying beliefs and assumptions** are in developing this strategy.

1. The growth of ICT systems with a requirement for SNOMED CT	**2. The DoH and HSE will support and resource the NRC**
Underlying Benefits & Assumptions **Irish Edition SNOMED CT**	
3. Business owners and vendors will understand how to implement SNOMED CT	**4. The clinical community will understand how to use SNOMED CT in systems**

In March 2019 the SNOMED Governance Board agreed that a new 3-year strategy was necessary. This new strategy was then collaboratively developed, via a number of workshops and Governance Board discussions to reach consensus.

In order to inform this strategy a number of workshops and at Governance Board meetings, it was agreed that a number of key objectives would need to be determined. These include:

Action	Description	Status
An Irish edition of SNOMED CT	Continue to maintain and develop the Irish Edition by the NRC and make it available in the correct formats to vendors and other stakeholders.	Complete
SNOMED Training materials and information events	In order to up skill and inform clinicians, training materials will be developed for general knowledge sharing and specific training will be provided for dedicated EHR implementations by the NRC. Policies, procedures, guidebooks and other training materials will be provided by the NRC to support this.	To commence
SNOMED Adoption	We will identify and support individual champion's actively progressing deployment of SNOMED CT in ICT solutions.	To commence
SNOMED IN POPULATION HEALTH	The NRC will work with HSE analytics team to help understand how to extract SNOMED CT to capture population health data.	To commence

Summary of SNOMED CT Strategy for 2020-2022

To help achieve adoption and deployment of SNOMED CT in clinical ICT solutions, ensuring standardisation of clinical data. This will improve the quality of data in patient records, facilitate interoperability, benefits analytics, thus improving individual and population health

Current State

2020

Little awareness by clinicians' of their role in developing SNOMED CT content

Lack of awareness by ICT business and vendors of how to use SNOMED CT in their solutions.

No clear process for defining standardising and managing datasets in the organisation

Experts in SNOMED
- Create awareness though inclusive involvement of clinical groups & medical informatics experts
- Engage stakeholders
- Develop education and training for specific projects
- Nominate clinical experts to collaboration with International Clinical Reference Groups

Rigorous focus on quality
- Governance structure continuation with representation on integrated governance board
- International quality processes adopted and assured
- Develop local processes for managing clinical datasets

Ensure SNOMED Adoption
- Develop national position statement of adoption
- Influence Projects to adopt SNOMED
- Enable Slainte Care 10.3.2 & 10.3.4 through implementation of SNOMED in EHR's
- Vendor specification for procurement
- Have agile approach to implementation to meet changing requirements
- Define SNOMEDs fit within the broader terminology landscape: LOINC , ICPC2 , ICD 10 AM, ICNP, NANDA

Current State

2022

Irish edition of SNOMED CT is developed, maintained, made available and then deployed by vendors

Clinicians understand how to develop their knowledge of SNOMED CT

End users understand how to manage their data for clinical use

Clinicians' have developed knowledge to shape and inform the development of their terminology

Data Analysts' understand how to extract SNOMED CT data from ICT solutions to inform population health and genomics

1. The growth of ICT systems with a requirement for SNOMED CT

2. The DoH will support and resource the NRC

Underlying Benefits & Assumptions
Irish Edition SNOMED CT

3. Business owners and vendors will understand how to implement SNOMED CT

4. The clinical community will understand how to use SNOMED CT in systems

Current State 2020

There is limited awareness by clinicians of their role in developing SNOMED CT content

Clinicians have not traditionally been involved in standardising how they record clinical information at the point of care and this will be new. Clinicians should have some knowledge of ICD10-AM at various stages, as it has been used for reimbursement purposes through Activity Based Funding and has been traditionally used for its primary use of statistical purposes of mortality and morbidity reporting. The process of use of ICD 10-AM is clinician record medical information on paper based charts and the Health Pricing Office (HPO) manually assign an ICD 10 AM code to it, which forms part of the Diagnostic Related Group (DRG), which in turn informs the financial cost of the hospital stay and also informs statistics, for mortality and morbidity purposes.

Clinicians should be involved in standardising how they record clinical information by using SNOMED CT at the point of care in an electronic chart and understand how this is then mapped to ICD 10 AM and other classifications and terminologies to meet other clinical and business needs within a software application. SNOMED education and familiarisation will be needed to encourage use and adoption

Lack of awareness by ICT business and vendors of how to use SNOMED CT in their solutions.

As the landscape for delivery of standardised clinical data is being developed, there is a lack of awareness by ICT business and vendors of how to use SNOMED CT in their solutions. The OoCIO is responsible for the development and delivery of new ICT systems for the HSE. Heretofore, this role would have primarily focused on the technical solution and meeting the business needs for solutions, however as the requirement for electronic health records develops there will need to be an up skilling of these staff members and inviting clinical input.

The core EHR functionalities include:
- Health Information documentation and data. ...
- Results Management. ...
- Order Entry/Order Management.
- Decision Support.
- Electronic Communication and Connectivity.
- Patient Support.
- Administrative Processes.
- Reporting and Population Health Management.

This will include knowledge sharing and information sessions to understand how SNOMED CT can be used, recorded and retrieved in their systems.

The Irish NRC had developed a vendor specification document to be included in all procurements and has carried out and planned engagements with vendors to inform them of how best to manage SNOMED in their systems

No clear process for defining standardising and managing datasets in the organisation

Currently there are a number of different entities managing data and datasets, where the data elements are identified and specified, however there is no overarching process or availability of how this is managed. In order to address this Enterprise Architecture Team of the OoCIO in HSE developed a dataset specification process, following some insights from NHS, who has established processes and methods for managing data specification, which improves overall data quality.

In 2019 the Data Specification Management Process was developed. This process was identified by the SNOMED Governance Board, to ensure that all clinical datasets were part of data asset management. This process was designed by the Business Architect (Enterprise Architecture), approved and signed off by the SNOMED Governance Board to fulfil that requirement. This process is outlined in this document and it helps ensure that all new datasets have been approved and made available for reuse, across the organisation.

2020 -2022 Strategy Key Goals & Objectives

The key driver of this new strategy is to ensure the adoption of SNOMED CT across Irish eHealth domain areas, requiring clinical terminology in new and existing solutions. This will be pursued via **three key objectives**:

1. Develop SNOMED **Expertise**
2. Develop rigorous focus on **Quality**
3. Enable **Adoption** of SNOMED
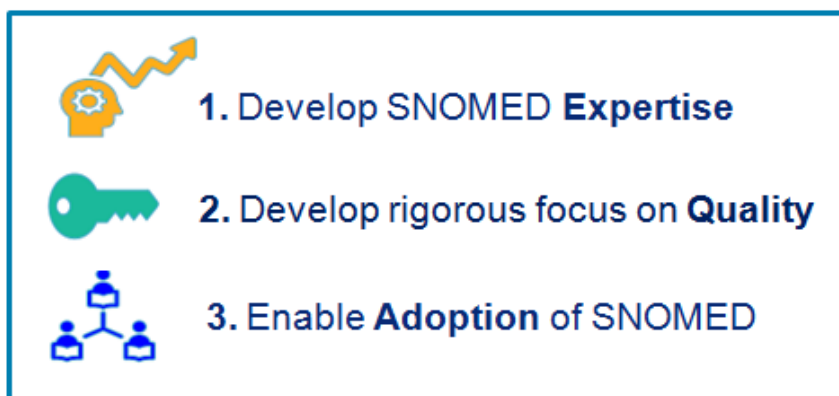
Goal 1: Develop expertise in SNOMED

Engaging clinical and informatics experts

Through the 33 clinical care programmes, there are formal groupings of clinician involved in all aspects of care in HSE. This is one of the areas that could be targeted to engage with SNOMED and allow that community of clinical practice to develop. The other area that could be used to leverage SNOMED capabilities is the Council of Clinical Information Officers (CCIO) The NRC have previously given presentations to this group and will continue to engage in a meaningful way, through webinars, face to face presentations, training material and social media. I.e. twitter.

The clinicians will be provided with specific training and education for specific projects and the NRC will nominate clinical experts to collaborate with International Clinical Reference Groups.

SNOMED International has a number of Clinical Reference Groups. These are:

- Allergies/Hypersensitivity and Intolerance Clinical Reference Group
- Anaesthesia Clinical Reference Group
- Blood Components Clinical Reference Group
- Cancer Synoptic Reporting Project Group
- Clinical Engagement
- Dentistry Clinical Reference Group
- Family Practice and General Practice Clinical Reference Group
- Genomics and Precision Medicine Clinical Reference Group
- Mental and Behavioural Health Clinical Reference Group
- Nursing Clinical Reference Group
- Nutrition Care Process Terminology Clinical Project Group
- Pathology and Laboratory Medicine Clinical Reference Group.

The NRC can nominate clinical representatives to participate in this groups which is extremely beneficial nationally and internationally

Engage stakeholders

At the core of engaging stakeholders is communication. The two main stakeholder groups identified are the vendors as they need to ensure that SNOMED is correctly managed and available within their system, and the second group are the clinicians. There are many other stakeholders such as Data Analytics, Health Pricing Office, Project Management Office OoCIO, Health Research Board, and the Data Dictionary.

The NRC is developing educational sessions for the vendors which will be developed by the SNOMED International technical team. For general information the NRC in conjunction with,

the Nursing CIO will develop master classes along with other training material such as webinars, short videos, and a dedicated webpage. The NRC will also make all training and education from SNOMED International available.

Develop education and training for specific projects

Clinicians will be provided with specific training and education for specific projects and the NRC will nominate clinical experts to collaborate with International Clinical Reference Groups.

Develop national position statement of adoption

Clinicians will have an understanding and knowledge of the usefulness of SNOMED in electronic health records and will enable suppliers and software developers to display and manage the clinical terminology configured by clinical specialists to improve patient care and allow for better patient outcomes by using the clinical data to derive insights into the area of patient care.

Clinicians will enable the standardisation of their clinical data to be recorded, retrieved, managed and analysed in electronic health records using an international standard to allow for the flow of unambiguous information across health care domains so that there is a clear and defined understanding on the clinical information.

SNOMED education and familiarisation will be needed to assist Clinicians to have an understanding and knowledge of the usefulness of SNOMED in electronic health records. Clinicians will work with suppliers and software developers to optimally display and manage the clinical terminology configured by clinical specialists, and to use the clinical data to allow for better patient outcomes by deriving insights into the area of patient care.

Goal 2: Develop a rigorous focus on quality 🗝

Governance structure continuation

The SNOMED Governance Board was established in Sept 2017. It has approved Terms of Reference complete with relevant policies and procedures, to ensure the quality of clinical terminology is maintained and enhanced.

The SNOMED Governance Board must continue to exist and operate effectively in accordance with its Terms of Reference. SNOMED must be represented at and included in all appropriate structures which may affect clinical terminology.

The NRC will continue to have representation on the SNOMED International Member Forum (MF) group and the Department of Health will continue to have a representative on the General Assembly (GA) Governance Board. Both of these roles will act as an interface between Ireland and the International groups, and carry out their role as defined by SNOMED International. The other groups which the MF representative may be a member of internationally are:

- E-learning Advisory Group
- Editorial Advisory Group
- Modelling Advisory Group
- Software Development Advisory Group
- Terminology Release Advisory Group
- Tooling Advisory Group
- Content Management Advisory Group

The MF representative also has authority to nominate representatives from Ireland to the SNOMED International Clinical Reference groups.

International quality processes adopted and assured

The SNOMED Governance Board has adopted and modified policies that are required in order to manage how content is created and managed, modelled on the SNOMED International policies. This ensures that all new content meets international best practice using their editorial guidance.

SNOMED through the NRC will continue to be represented on the eHealth Digital Service Infrastructure (eHDSI or eHealth DSI) as the semantic lead on this project and make representation for Ireland on these groups.

This is the initial deployment and operation of services for cross-border health data exchange under the Connecting Europe Facility (CEF). Currently the groups that the SNOMED representative is a member of include the:

- eHealth Network subgroup on semantics
- The Patient Summary Cluster group
- Open National Contact Point semantic subgroup.

## Develop local processes for managing clinical datasets

The National Release Centre for SNOMED CT has been established under the Enterprise Architecture function in the Office of the Chief Information Officer. It was identified in the Knowledge and Information Plan of 2015, as being a core deliverable to realise how data as an asset could be managed.

The NRC identified the need for and initiated the development of a process for managing datasets.   In conjunction with other core EA partners and various stakeholders involved in HSE data (Subject Matter Experts) a process called the 'Dataset Specification Management Process' (DSMP) was developed, piloted and put into operation.

The Subject Matter Experts (SME's) include representatives from

- SNOMED CT
- NHSCDD
- Information Governance (EA)
- Integrated Information Services (IIS)
- Health Research Board (HRB)
- Hospital In-Patient Enquiry (HIPE) – Healthcare Pricing Office (HPO)
- Business Information Unit (BIU)
- HSE Primary Care Reimbursement Service (PCRS)
- Technical Architecture

The DSMP process ensures that all new datasets have been approved to be made available for reuse. There are 4 phases in the DSMP highlighted in the diagram below:

Initiate	Dataset Specification Con-Call	SME Engagement	Dataset Specification Standardisation & Approval
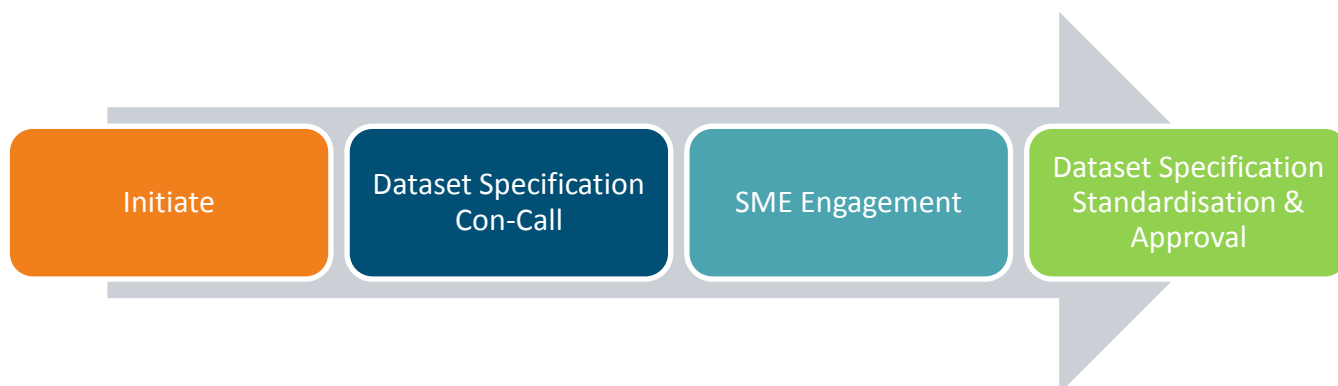
This process was developed in early 2019 and went into practice in September 2019. The number of datasets managed through this process is constantly growing, some examples include:

- National Early Warning Scoring system (NEWS),
- HIQA Patient Summary,
- Maternal and New-born Gynaecology discharge summary
- Make Every Contact Count (MECC)
- COVID-19 dataset which was developed by the NRC in response to the crisis

SNOMED CT plays a key role in this process, as it is always the first SME to engage with a new or existing dataset specification, to ensure correct clinical coding for relevant data elements.

Goal 3: Ensure SNOMED Adoption

Persuading clinicians to adopt a new way of recording and retrieving clinical data in clinical digital systems like an EHR, requires putting forth a "compelling vision" of what the technology is and what it's going to do. First, the SNOMED community must demonstrate the new service offers economic and rational benefits for the organization and the individual.

The SNOMED community must help clinicians understand what's in it for them explaining, that SNOMED can enable clinicians to record clinical information accurately and unambiguously, and improve overall data quality. Showing how SNOMED can empower patients to have clearly defined clinical information available in a patient portal, therefore improve overall clinical communication between care providers. The best argument for adopting SNOMED in any system is that the terminology standard will make life better and improve overall data quality.

Customise Training some clinicians might prefer online training sessions; others may need a bit more handholding and support in the form of a personal coach. The NRC will carry out some initial information sessions and then define a training schedule to meet clinicians needs.

Get influencers on-board. Developing a network of champions is critical and the NRC, with support from the SNOMED Governance Board and HSE Management, will need people who are able to work horizontally across the organization and who have good communication and networking skills.

Highlight quick wins once clinicians begin to use the terminology more and more, draw attention to the positive impact it's having on the organization. "Publicising quick wins helps build a case for change" and encourages further adoption. Use of communication tools such as Twitter, eHealth Ireland and HSE Live websites.

Other terminologies/Classifications

Neither a classification system nor a clinical terminology system alone can serve all purposes for which health information is currently used or indeed will likely be used in the future.

Hierarchy of clinical terminologies and classifications
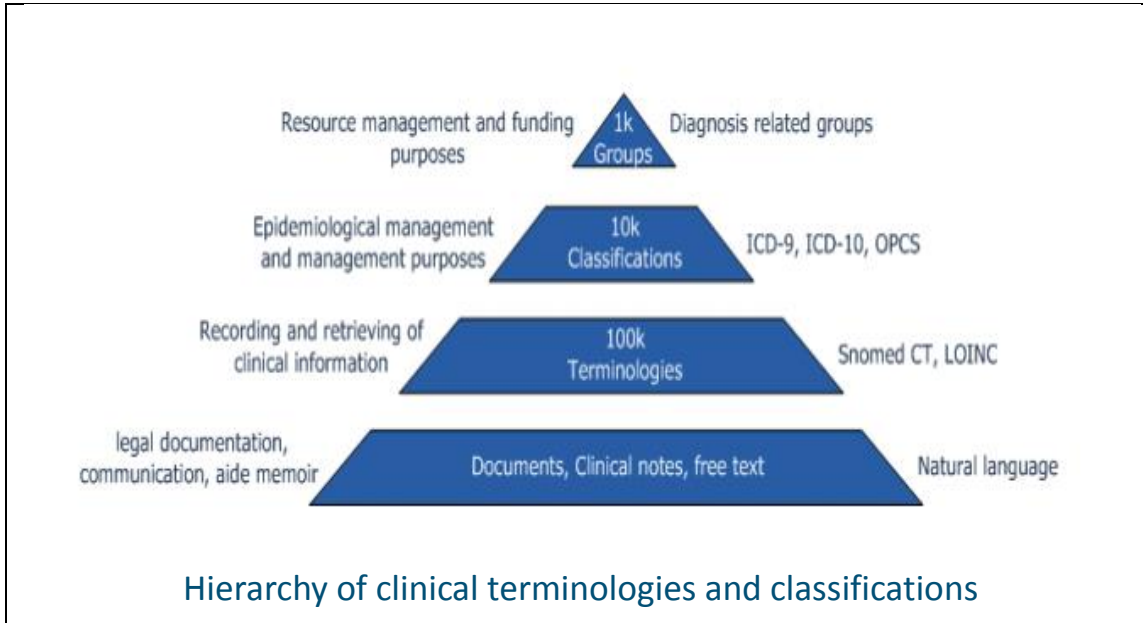
In Ireland we have a history of using ICD 10 AM for classification, which informs our activity based funding as well as mortality and morbidity statistics. ICD-10 AM is used for statistical purposes using paper based patient records.

The following table shows what the **differences are between ICD 10 AM and SNOMED CT, and why they need to co-exist.**

	SNOMED	ICD 10
Type	Terminology System	Classification System
Purpose	Information Input	Information Output
Function	Describes and defines clinical information for primary data purposes	Aggregates and categorises clinical information for secondary data purposes
Origin	Created by clinicians	Created by statisticians

Mappings are maintained between SNOMED CT and other core classification systems. Irelands' membership of SNOMED International, gives us access to all of these mappings as a download with a RF2 file from the Irish NRC. Some of the core mappings include:

- World Health Organization (WHO) classifications (e.g., versions ICD-10 and ICD-O of the International Classification of Diseases),

- International Classification of Primary Care (ICPC-2),

- International Classification for Nursing Practice (ICNP),

- LOINC.(Appendix 1)

Enable Slainte Care through implementation of SNOMED

Sláintecare is the ten-year programme to transform our health and social care services. It is the roadmap for building a world-class health and social care service for the Irish people.

The specific areas that are relevant to the delivery and implementation of SNOMED CT are 10.3.2 and 10.4.3.

SNOMED is can contribute to success in Section 10.3.2. In order to support effective clinical decision making, clinicians and all relevant stakeholders need to be able to understand and leverage the use of SNOMED CT within their systems as the one reference point that will allow for interoperability across systems and inform patient records to an international standard.

10.3 Develop new ICT systems to support the health workforce.	10.3.1 Provide a digital workplace to enable health service professionals to operate in a modern digitised environment.	2018 and ongoing
	10.3.2 Develop clinical ICT systems, to provide the required infrastructure to support effective clinical decision making.	2018 and ongoing
	10.3.3 Provide telehealth solutions to support delivery of care in the community closer to patients and their families.	2018 and ongoing

 As SNOMED CT is a clinical terminology standard it will be required in order to deliver Section 10.4.3.

10.4 Develop new ICT infrastructure to support integrated care.	10.4.1 Implement financial/corporate systems to improve accountability and ensure money can follow patient activity.	2018 and ongoing
	10.4.2 Provide cloud infrastructure for the whole health service to support a more secure and safe data environment.	2018 and ongoing
	10.4.3 Provide for improved information architecture, including standards, information and identity to underpin the delivery of integrated care.	2018 and ongoing

Influence Project to Adopt

As new and developing projects emerge, and as clinicians and other stakeholders become more knowledgeable about SNOMED and its use, this strategy will endeavour to empower end-users and projects, to influence others in the use of SNOMED and its adoption.

The CCIO and Nursing CIO have an on-going programme of engagement with clinicians. This involves scheduling appointments with key clinicians in order to inform about and to provide them with information on the benefits of SNOMED.

Having the endorsement of the Chief Information Officer (CIO) has been identified as a key enabler. To date the CIO has engaged with the Chief Clinical Information Officer (CCIO), representatives from the Department of Health (DoH) and Enterprise Architecture (EA) and has subsequently approved the inclusion of the NRC developed , SNOMED vendor specification document in all procurements.

SNOMED Vendor specification for procurement

The Irish NRC developed a vendor specification document in 2019 (Appendix 2), to inform all procurements how to incorporate and use SNOMED within their systems. The NRC manager engaged with other NRCs globally to ascertain how they inform the vendor to manage SNOMED in their systems. They provided a number of documents, which the Irish NRC amalgamated and refined for Irish procurements of systems.

This was ratified and endorsed by the SNOMED Governance Board and the SNOMED International Team. This specification document will be used all vendors will ensure that SNOMED is represented and used in the same manner in all systems thus ensuring consistency and re-usability and allowing end-users to have confidence and assurance that the health record will persist and be made available on retrieval in a uniform manner. The project management office of the OoCIO has been informed of this new practice.

Have agile approach to implementation to meet changing requirements

As healthcare and technology evolves and changes rapidly, there will be a requirement to ensure that this strategy and the NRC is agile and can be flexible to meet changing needs and requirements as they occur.

Underlying Beliefs and assumptions

In order for this strategy to develop there are a number of underlying assumptions and beliefs that underpin this.
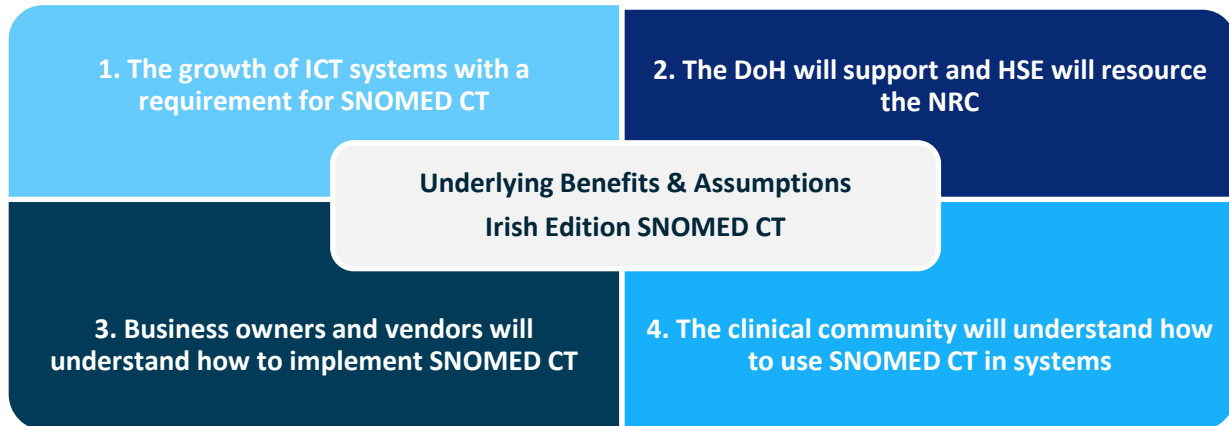
1. The number of ICT clinical solutions procured and deployed in the next 3 years is going to grow

It is the era of technology in healthcare, however it is acknowledged that there is a gap in what technology has so far delivered in respect of healthcare. Indeed, "between the health care that we now have, and the health care we could have, lays not just a gap, but a chasm." **Report by the Institute of Medicine (IOM) titled Crossing the Quality Chasm: A New Health System for the 21st Century, https://www.ncbi.nlm.nih.gov/books/NBK222271/**

Everything would indicate that the technology sector is going to exhort a seismic influence over healthcare in the coming years. In order to be ready for this change and to ensure that our health data is consistent, clinically validated, persistent and logical SNOMED CT will be required to be the terminology that can be used.

2. The Department of Health and HSE will support and resource NRC to realise this strategy

The National Release Centre (NRC) for SNOMED is the entity that has responsibility under the guidance of SNOMED International to implement, guide and develop SNOMED CT in a member country. Adequately resourcing the NRC is one of the keys to the successful adoption of SNOMED in any member country. To date there has only been one resource allocated to SNOMED in Ireland. This will need to be addressed in the very near future. Resources for the Irish SNOMED NRC will need to grow in line with other NRCs

internationally which typically have between 5 and 7 dedicated resources in European countries.

3. The requirement to have SNOMED CT available for these systems will be critical

The Irish NRC has procured the 'managed service' from SNOMED International, thus allowing Ireland to develop its own extension and thereby making a bi-annual release available. This allows Ireland to be self-sufficient in the development of SNOMED content and allows full transparency and ownership by Irish clinicians

4. The ICT business owners and vendors need to have an understanding of how SNOMED will be made available in their systems

SNOMED International also provides 3 online courses to inform vendors and end-users, which include a foundation course, implementation course, and 2 levels of authoring courses.

All of the online courses have a 126 presentations taking approx. 5 to 30 minutes duration with all the relevant topics, such as:

- Learning about SNOMED CT,
- Introduction to SNOMED CT

And also include more complex topics such as**:**

- SNOMED CT Logical Design
- Subsumption and equivalence of expressions and Description Logic

There will also be a requirement to develop training and information for individual system deployments as they occur. **The clinical community involved in the procurement and deployment of these systems need to be up-skilled to understand the power and effectiveness of SNOMED CT.** There will be a requirement for clinicians to become up-skilled in the use and logic of SNOMED.

The NRC will make available training material from SNOMED International and will also develop national guidelines, information sessions and packs.

The SNOMED International training material is currently made available on HSELanD. – https://www.hseland.ie/social/en-us/projectsandresources/snomed-ct.aspx or https://elearning.ihtsdotools.org/

Future State in 2022

An Irish edition of SNOMED CT is developed maintained and made available and deployed by vendors

The Irish NRC has procured the managed service and is now carrying out a bi-annual release of SNOMED Irish Edition. This allows Ireland to be self-sufficient in creating content that is particular to our organisations whilst also allowing Ireland to develop content that maybe applicable to the global community.

Training materials are developed to enable a broad range of users and stakeholders to increase their knowledge of SNOMED CT to demonstrate how it can benefit them and patients using services

A full and developed training plan will be in place, using current tooling such as HSELanD and developing new channels/portals as required, including webinars, presentations, master classes and specific training for certain projects

There is increased adoption of SNOMED CT by a broad range of health and social care practitioners, with individual champions actively progressing the adoption and deployment of SNOMED CT in ICT solutions.

Building a community of practice, with a knowledgeable cohort of clinicians will require the development of champions who will help extend the use and knowledge of SNOMED.

End users will understand how to manage their data for clinical use

End-users are any person that will be using a digital healthcare system, like an EHR, for the recording of clinical information where SNOMED CT is the terminology in use.
There will be clear guidelines, processes and policies on how clinicians can influence and create reference sets within their own systems and for their own clinical use.

Data analysts will understand how to extract SNOMED CT data from ICT solutions to inform population health and genomics

SNOMED CT is ontology and is built on relationships; it is an International standard and lends itself to analytics and population health data mining. In order to leverage its use for these purposes, it needs to be understood by the analysts. There is a specific course for analysts in order to understand how to use SNOMED for these purposes and a community of knowledge experts will need to be developed in order to leverage its use.

Appendix 1: Further Information on SNOMED

Since the inception of the Structured Nomenclature of Pathology, SNOP, in 1965, the various versions of SNOMED have developed both in terms of content and underlying representation. Development of content is clearly illustrated by the number of elements in the various systems. SNOP comprised "about 15,000 distinct medical objects, processes, and concepts" (ORbodenreide). It developed further into SNOMED-2, and later SNOMED International, which contained 150,000 concepts in the mid-1990s (ORbodenreide) Its successor, SNOMED Reference Terminology (SNOMED RT), contained over 120,000 active concepts. The initial version of SNOMED CT, the merger of SNOMED RT and the UK-based Clinical Terms Version 3, released January 2002, consisted of 278,000 active concepts, a number that has grown to 341,000 in the January 2018 release of SNOMED CT.

The latter is especially important in the context of the specifications of the U.S. Meaningful Use incentive program, in which LOINC is the primary choice for specifying attributes, and SNOMED CT the system of use for the relevant attribute values. In other words, LOINC is used to specify the question (e.g., 29308-4: "what is the diagnosis?"), and SNOMED CT to specify the answer (e.g., 3723001: "Arthritis"). Adoption of this principle by both the Regenstrief Institute and SNOMED International has formed the basis for a cooperation agreement in 2013 [1].

SNOMED CT also has collaborations for specific domains. In the context of rare diseases, collaboration with Orphanet leads to harmonization of content between SNOMED CT and ORDO, the Orphanet ontology of rare diseases (ORbodenreide). Medical device terminology is addressed in collaboration with the Global Medical Device Nomenclature Agency (GMDNA). Finally, Kaiser Permanente's Convergent Medical Terminology (CMT) provides concepts and descriptions to be considered for inclusion.

Moreover, SNOMED CT forms the backbone for the development of national extensions by member countries of SNOMED International. National extensions typically contain concepts that are important in a given country, but not in scope for the international release of SNOMED CT. Other extensions, such as the veterinary extension, contain content specific to a given community of practice.

Future Directions

Since 2009, the provision of a script to convert SNOMED CT into OWL (Web Ontology Language) representation have enabled the use of SNOMED CT in generic tools based on Semantic Web technologies, such as Protégé [21] and description logic reasoners, such as SnoRocket, Pellet, and FaCT++ [22]. This has resulted in a broad range of interests and

developments. On the one hand, there are organizations that rely on the terminology as provided by SNOMED CT, mainly using the hierarchical relationships. On the other hand, there is an interest in the use of reasoners, which are essential for processing fully defined concepts in an extension, and in expanding the language underlying SNOMED CT, for example to include so-called concrete domains (e.g., dose strength of medication) or to support negation, e.g., to explicitly express "non-viral disorders" **(ORbodenreide)** . The challenge is to provide a balance between these seemingly conflicting requirements, for which SNOMED International has launched a "proposal to enhance SNOMED CT's logic capabilities" late 2017 **(ORbodenreide)** . This proposal will lead to the introduction of new tables, in which the OWL representation of SNOMED CT content will be provided. In the longer run, this OWL representation may allow for the use of a more expressive language, but the resulting relationships table will still reflect the current expressivity. This accommodates concomitant use of simpler tools for processing the SNOMED CT hierarchy and use of a more expressive language that can be processed using default description logic reasoners

LOINC Content

Regenstrief continues to update LOINC and publish twice-yearly releases. New concepts are added to LOINC based on submissions from end users. The current version (December 2017, version 2.63) contains more than 86,000 terms covering the full scope of laboratory testing (chemistry, microbiology, molecular pathology, etc.) and a broad range of clinical measurements (e.g., vital signs, ECG, patient-reported outcomes,etc.). In addition to distributing the terminology, Registries makes available at no cost a variety of supporting tools and resources, including the Regenstrief LOINC® Mapping Assistant (RELMA®) and online search application

The SNOMED to ICD-10 map is released on January 31 and July 31 as a derivative of the SNOMED CT International Release. The map is a directed set of associations from SNOMED CT source concepts to ICD-10 target classification terms. The SNOMEED CT source domains for the map are limited to subtypes of 404684003 clinical finding ,272379006 event and 243796009 situations with explicit content

As of July 31 2015 release, all SNOMED CT concepts in scope have been mapped. An algorithmic approach was used in the completion of the map. Algorithms have been incorporated into the mapping tool for the July 31 2016 release. SNOMED International welcomes the opportunity to work with organisations or institutions who are interested in undertaking usage validation of the SNOMED CT to ICD-10 map.

SNOMED International also publishes a map between the SNOMED CT International General/Family Practice subset (GP/FP subset) and the International Classification of Primary Care,2nd Edition (ICPC-2). The GP/FP subset focuses on two semantic data types commonly used in general/family practice electronic health records: Reasons for Encounter (RFE's) and Health Issues.

The SNOMED CT to ICD_9_CM Epidemiological and Statistical Map was deprecated with support effective 31 January 2016 and without support effective July 31 2016.SNOMED International recognises that some Members and Affiliates continue to use ICD-9-CM.It is important to note that the SNOMED CT to ICD_9_CM Epidemiological and Statistical Maps will continue to be available after the deprecation of the SNOMED International Confluence site to any users who wish to access it during their transition to SNOMED CT or ICD_10_CM.

The SNOMED CT to ICD_10 maps are released as a simple map reference set in the SNOMED CT International release. The SNOMED CT source domains for the maps are limited to subtypes of 400177003 Neoplasm and /or hematoma (morphologic abnormality) and 91723000 Anatomical structures (body structure) for ICD_O morphological codes and Topographical codes.

Appendix 2: [Irish National Release Centre Vendor Engagement Procurement Specification (Hyperlink)](#)

Example of the procurement response that will identify the various system requirements and how they meet the requirement according to the vendor specification document, now included in all software procurements for the HSE that have a clinical component.

Irish National Release Centre Vendor Engagement Procurement Specification					
ID	Response	ID	Response	ID	Response
SCT-001		SCT-026		SCT-051	
SCT-002		SCT-027		SCT-052	
SCT-003		SCT-028		SCT-053	
SCT-004		SCT-029		SCT-054	
SCT-005		SCT-030		SCT-055	
SCT-006		SCT-031		SCT-056	
SCT-007		SCT-032		SCT-057	
SCT-008		SCT-033		SCT-058	
SCT-009		SCT-034		SCT-059	
SCT-010		SCT-035		SCT-060	
SCT-011		SCT-036		SCT-061	
SCT-012		SCT-037		SCT-062	
SCT-013		SCT-038		SCT-063	
SCT-014		SCT-039		SCT-064	
SCT-015		SCT-040		SCT-065	
SCT-016		SCT-041		SCT-066	
SCT-017		SCT-042		SCT-067	
SCT-018		SCT-043		SCT-068	
SCT-019		SCT-044		SCT-069	
SCT-020		SCT-045			
SCT-021		SCT-046			
SCT-022		SCT-047			
SCT-023		SCT-048			

SCT-024		**SCT-049**		
SCT-025		**SCT-050**		

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Slainte Care Implementations Strategy https://www.gov.ie/en/publication/0d2d60-slaintecare-publications/#slaintecare-2019-action-plan

Recent Developments in Clinical Terminologies — SNOMED CT, LOINC, and RxNorm
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6115234/#ORbodenreider-21