

# SNODENT<sup>®</sup>

SYSTEMATIZED NOMENCLATURE OF DENTISTRY

STARTER GUIDE



## Table of Contents

I.	INTRODUCTION.....	2
II.	SNODENT BASICS .....	3
III.	THE IMPORTANCE OF MAPPING .....	11
IV.	USING SNODENT .....	13
	CONTACT INFORMATION.....	15

## I. INTRODUCTION

---

This Systematized Nomenclature of Dentistry (SNODENT) Guide is intended as a starting point from which anyone interested in oral health information can learn about SNODENT.

The SNODENT User Guide’s audience includes dentists, academics, researchers, public health professionals, consultants, analysts, students, Electronic Dental Records (EDR) vendors, and other dental clinical technology vendors that may be involved in managing and interpreting information created with SNODENT. The Guide should prove helpful in the conduct of activities such as clinical content definition, implementation, and use of the resulting clinical information for research, public health, system design, and quality management.

The SNODENT User Guide will cover:

- SNODENT and its Benefits
- SNODENT and Interoperability in Dentistry
- SNODENT Basics
- SNODENT Model
- Releases
- Mapping
- Implementation

### SNODENT AND ITS BENEFITS

SNODENT is harmonized with Systematized Nomenclature of Medicine-Clinical Terms (SNOMED CT\*), SNODENT is a standard terminology that used effectively may provide new and exciting opportunities for interdisciplinary research including:

- Benefits to public oral health
- Benefits to patients, dentists, and other healthcare providers
- Supporting research for evidence-based oral health

Understanding the intended benefits of SNODENT will enable the development of effective strategies for the adoption, implementation, and use of this oral health terminology. It enables a platform-independent, language-independent, cross-cultural, oral health care record. SNODENT allows precise, highly detailed recording of oral health information.

By using many descriptions for a single clinical concept, it allows for tailoring for individual care settings and locations while maintaining consistency. The recording of clinical data through SNODENT also enables the consistent retrieval, transmission, and analysis of data from patient records across healthcare systems. SNODENT is maintained and updated in collaboration with oral health subject matter experts to represent current oral health knowledge.

SNODENT enables the capture of information at a level of detail appropriate for the provision of oral healthcare and the interoperability of EDRs. It enables patient data to be recorded by different people in different locations, and to be combined into simple information views within the patient record. It provides a standardized way to represent clinical oral health descriptions captured by dentists and enables automated interpretation of their observations.

SNODENT-enabled EDRs benefit individuals by:

- Enabling information to be recorded consistently during office visits
- Enabling analysis of patient care services and outcomes
- Enabling point of care decision support and patient treatment
- Enabling interoperability of clinical details and patient characteristics between providers
- Allowing identification of patients who need follow-up for specific conditions and improved coordination of care
- Enhancing communication with patients by creating a consistent, accurate, and understandable representation of clinical findings
- Supporting templates and dashboards to allow a practitioner to run a query to view aggregated data and to use the information in a meaningful way.

SNODENT-enabled EDRs benefit public health by:

- Identifying and monitoring oral health issues
- Reducing errors and ensuring the high-quality recording of demographic and clinical data
- Enhancing oral health care efficiency by enabling electronic sharing of detailed clinical information

SNODENT-enabled EDRs benefit evidence-based oral healthcare by:

- Providing standardized terms for describing dental disease
- Enabling analysis of patient care services and outcomes
- Improving the cost-effectiveness and quality of care delivered to populations
- Supporting continuous quality improvement (CQI) such as continued assessment of outcomes of care and the establishment of baseline outcomes and future comparisons
- Supporting clinical research and possible data mining for epidemiological studies

## II. SNODENT BASICS

---

This section provides an introduction to:

- SNODENT components and hierarchies
- SNODENT releases

SNODENT components and characteristics provide the base on which to build a higher level of understanding. They also aid in making decisions related to the adoption, implementation, and use of this terminology.

### SNODENT COMPONENTS

SNODENT content is represented through the following components:

- **Concepts** — Representing clinical phrases that are organized into hierarchies
- **Descriptions** — Link appropriate, human-readable terms to concepts
- **Relationships** — Link each concept to other related concepts

## Concepts

SNODENT concepts represent clinical phrases. Every concept has a unique numeric concept **identifier**. Within each hierarchy, concepts are organized from the general to the more detailed. SNODENT concepts allow more specificity to be taken into account when retrieving clinical data.

## Descriptions

SNODENT descriptions link appropriate, human-readable terms to concepts. A concept may have more than one description and they may represent **synonyms** describing that very same concept.

## Relationships

SNODENT relationships link each concept to other concepts that have a related meaning. One type of link is the “is a” relationship which relates a concept to more general concepts. The “is a” relationship defines the hierarchies of SNODENT concepts.

## SNODENT MODEL

Figure 3 depicts the SNODENT components and the various relationships between them. It identifies SNODENT’s structure, detailing the management of the components during SNODENT implementation

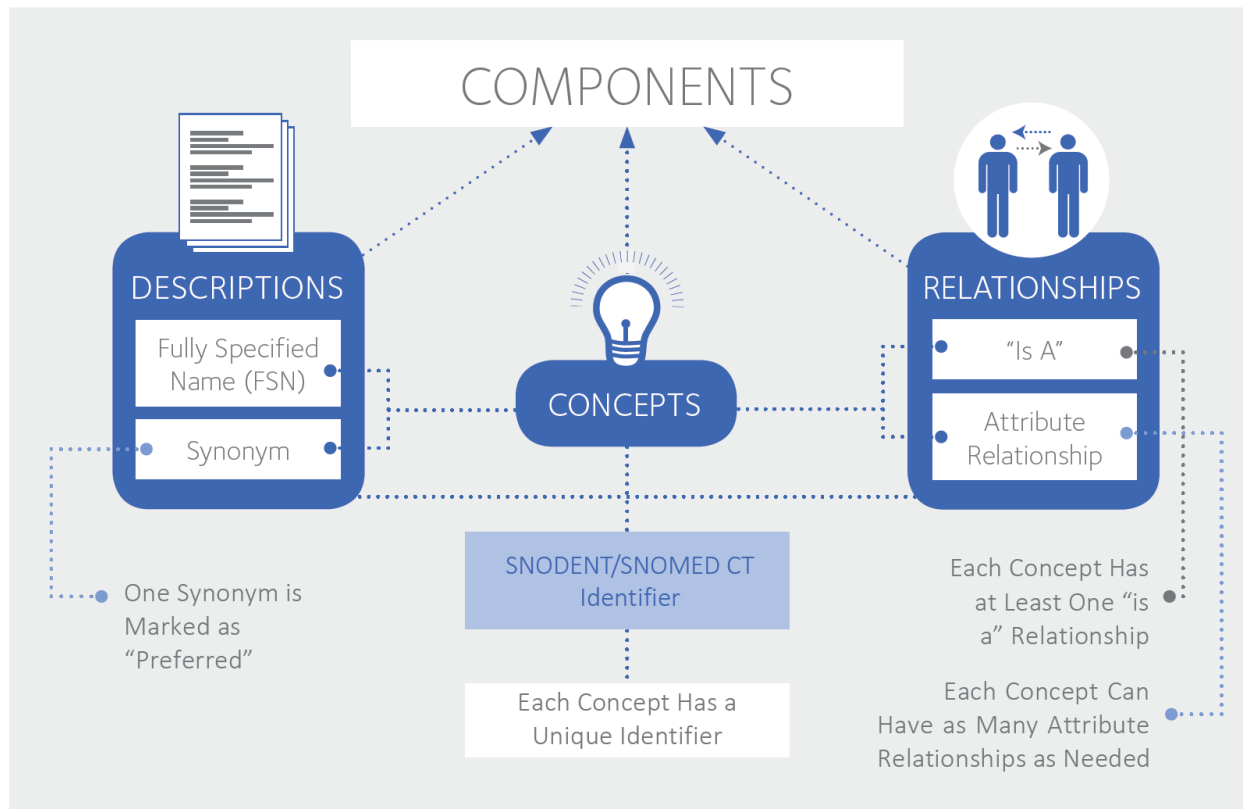


Figure 1. The Components of SNODENT

## DESCRIPTIONS

Human readable descriptions are assigned to each concept. One description is the Fully Specified Name (FSN) and Synonym.

The FSN represents a unique description of a concept and is not displayed in the clinical records. The purpose of the FSN is to differentiate between concepts that may be referred to by the same word or phrase. This name includes a semantic tag that appears in parenthesis at the end of the name, e.g. "disorder".

For example, "cold" could be "common cold (disorder)" or "cold sensation quality (qualifier value)".

SNOMED CT ID	FSN	SYNONYM
82272006	COMMON COLD (DISORDER)	COLD
84162001	COLD SENSATION QUALITY (QUALIFIER VALUE)	COLD

Figure 2. Example of Semantic Tag

A synonym is a term that can be used to select a concept. A concept may have more than one synonym and users may select the terms applicable to a specific clinical meaning. In addition, concepts can have the same synonym and one of them is marked as 'Preferred'. Synonyms allow information to be recorded consistently.

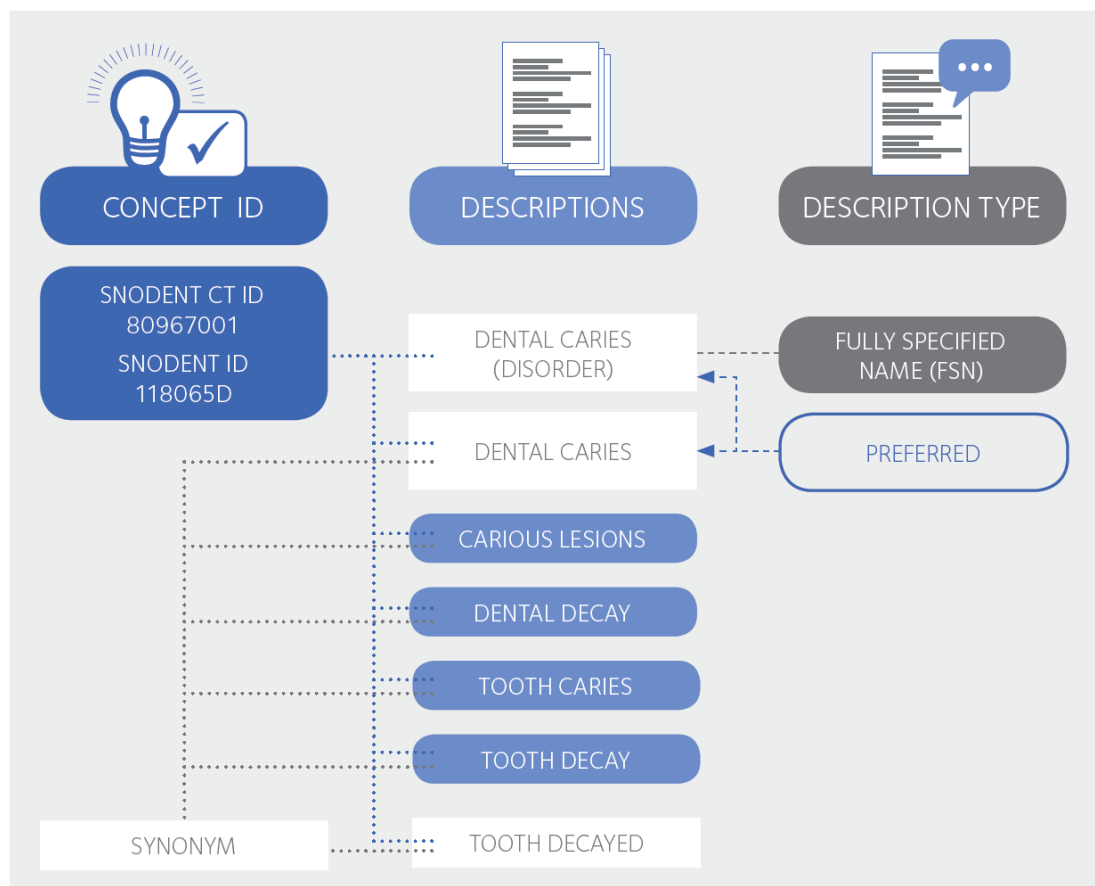


Figure 3. Example of Descriptions for a Single Concept

## RELATIONSHIPS

Relationships represent the association between concepts and organize them to facilitate access in clinical applications.

CONCEPT (SOURCE)	RELATIONSHIP TYPE	CONCEPT
SNOMED CT ID 80967001 SNODENT ID 118065D DENTAL CARIES (DISORDER)	IS A	SNOMED CT ID 312128007 SNODENT ID 101050D BACTERIAL ORAL INFECTION
SNOMED CT ID 80967001 SNODENT ID 118065D DENTAL CARIES (DISORDER)	IS A	DISORDER OF HARD TISSUES OF TOOTH
SNOMED CT ID 80967001 SNODENT ID 118065D DENTAL CARIES (DISORDER)	STRUCTURE OF HARD TISSUE OF TOOTH FINDING SITE	SNOMED CT ID 128456003 SNODENT ID 167836D STRUCTURE OF HARD TISSUE OF TOOTH (BODY STRUCTURE)

Figure 4. Sample of Relationship

### SUBTYPE RELATIONSHIPS

Subtype relationships define relationships and are known as “is a” relationships. The “is a” relationships form the hierarchies of SNODENT. The level of clinical detail of the specific concepts increases with the depth of the hierarchies.

If two concepts are directly linked by a single “is a” relationship, the first concept is said to be a “child” of the destination concept, which is referred to as a “parent”. The “is a” relationships also provide the polyhierarchical structure of SNODENT, because a concept can have more than one “is a” relationship to other concepts (so a child concept may have multiple parent concepts). For example, “dental caries” has an “is a” relationship with “bacterial oral infection” and with “disorder of hard tissues of teeth” as shown in Figure 5.

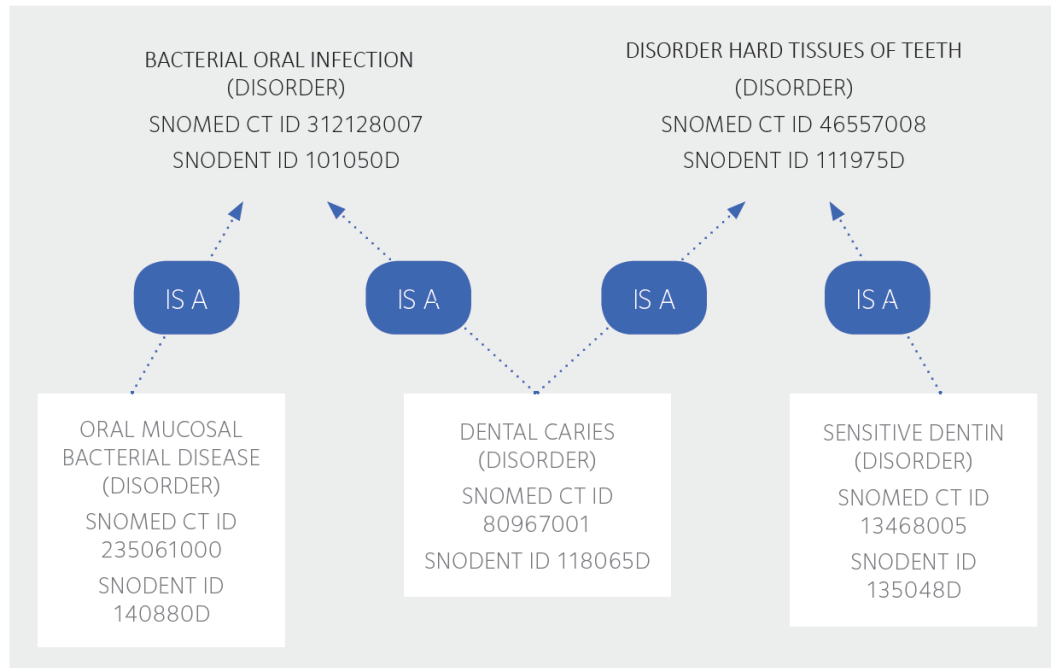


Figure 5. Example of “is a” Relationships

SNODENT relationships and hierarchies allow the clinical information to be retrieved and used to meet requirements at various levels (e.g., retrieval of subtypes of “disorder of mouth” or “oral infection” would both include “dental caries”).

### SNODENT CONCEPTS AND HIERARCHIES

SNODENT concepts are organized in hierarchies. Within a hierarchy, concepts range from the more general to the more detailed. Related concepts are linked with the “is a” relationship. Examples of some of the hierarchies include “clinical finding”, “body structure”, “observable entity” and “organism”.

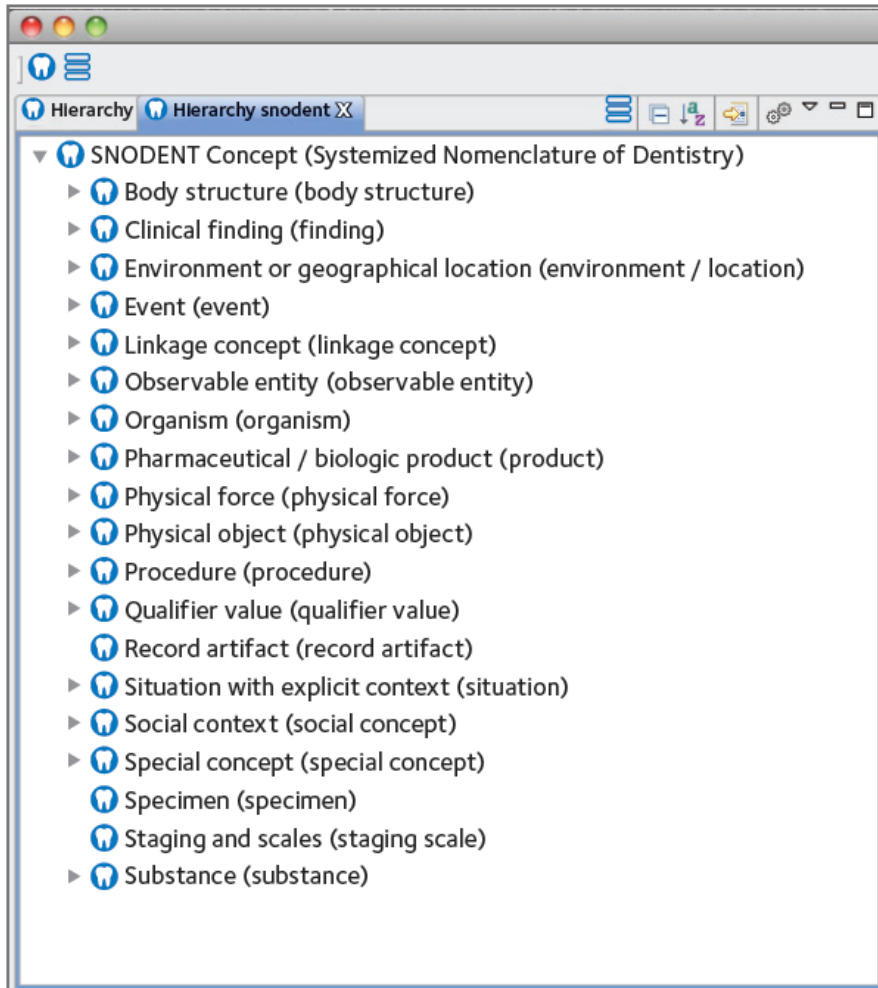


Figure 6. SNODENT Components and Hierarchies

The top of the SNODENT hierarchy is occupied by the **root concept** ("SNODENT concept"). All concepts are descended from this root concept through one sequence of "is a" relationships.

The direct subtypes of the root concept are referred to as **top-level concepts** that name the main branches of the subtype hierarchy. Each of these **top level-concepts**, together with its many subtype descendants, forms a major branch of the hierarchy containing similar types of concepts. As the hierarchies descend, the concepts within them become more granular. Figure 7 depicts the **top-level concepts** with a brief description of the content.



<b>body structure</b>	Represents normal and abnormal anatomical structures e.g. <i>"bone structure of jaw (body structure)," "eruption (morphologic abnormality)"</i>
<b>clinical finding</b>	Represents the result of a clinical observation, assessment or judgment and includes normal and abnormal clinical states e.g. <i>"bleeding (finding)," "Hematoma of oral cavity (disorder)," "Hematoma of gingiva (disorder)"</i>
<b>event</b>	Represents occurrences excluding procedures and interventions e.g. <i>"abuse (event)," "Drug not available for administration (event)"</i>
<b>observable entity</b>	Represents a question or assessment which can produce an answer or result e.g. <i>"ability to taste (observable entity)," "ability to chew (observable entity)"</i>
<b>organism</b>	Represents organisms of significance in human and animal medicine e.g. <i>"fungus (organism)," "superkingdom bacteria (organism)"</i>
<b>pharmaceutical/ biologic product</b>	Represents drug products e.g. <i>"anesthetic (product)," "topical anesthetic (product)"</i>
<b>physical force</b>	Represents physical forces that can play a role as mechanisms of injury e.g. <i>"friction (physical force)," "ultraviolet radiation (physical force)"</i>
<b>physical object</b>	Represents natural and man-made objects e.g. <i>"dental appliances (physical object)," "occlusal appliance (physical object)"</i>
<b>qualifier value</b>	Represents the values for some SNODENT attributes, where those values are not subtypes of other top level concepts e.g. <i>"left," "abnormal"</i>
<b>situation with explicit context</b>	Represents conditions and procedures that have not yet occurred, that refer to a person other than the patient or that have occurred at some prior time e.g. <i>"family history: diabetes mellitus (situation)," "no pain (situation)"</i>
<b>social context</b>	Represents social conditions and circumstances significant to health care e.g. <i>"voluntary body piercing (life style)," "voluntary body tattooing (life style)"</i>
<b>special concept</b>	Represents concepts that do not play a part in formal logic of the concept model of the terminology but which may be useful for specific uses e.g. <i>"Disorder of hematopoietic system (navigational concept)," "Thrombotic disorder (navigational concept)"</i> .
<b>substance</b>	Represents general substances, the chemical constituents of pharmaceutical/ biological products, body substances, dietary substances and diagnostic substances e.g. <i>"Amalgam (silver) dental filling material (substance)," "Dental cement (substance)"</i>

Figure 7. SNODENT Top-Level Concepts

## SNODENT ATTRIBUTES

Concepts can have properties and roles, also called relationship types or attributes, which are typically specific to a given terminology's domain. For example, SNOMED CT which deals with clinical medicine has attributes such as "Pathological Process" and "Finding Site".

Some SNODENT attributes have a hierarchical relationship to one another known as attribute hierarchies. In an attribute hierarchy, one general attribute is the parent of one or more specific subtypes of that attribute. Subtypes of a concept defined using the more general attribute can be defined using a more specific subtype of that attribute.

IDENTIFIERS	CONCEPT	ATTRIBUTE
SNOMED CT ID 80967001 SNODENT ID 118065D	DENTAL CARIES (DISORDER)	ASSOCIATED MORPHOLOGY: CARIES FINDING SITE: STRUCTURE OF HARD TISSUE OF TOOTH CAUSATIVE AGENT: SUPERKINGDOM BACTERIA PATHOLOGICAL PROCESS: INFECTIOUS PROCESS

Figure 8. Example of Attributes

### Attributes Used to Define SNODENT Concepts

The SNODENT defining attributes are used to represent the meaning of concepts in these six hierarchies:

- Clinical Finding Concepts
- Evaluation Procedure Concepts
- Body Structure Concepts
- Pharmaceutical/Biologic Product Concepts
- Situation with Explicit Context Concepts
- Physical Object Concepts

## SNODENT CHARACTERISTICS

SNODENT features include:

- Granular clinical content to serve as an oral health resource
- Consistent oral health content for use in EDRs
- Mapping to other standard terminologies

SNODENT has a broad coverage of oral health-related topics. It can be used to describe a patient's oral health history, the details of a periodontal procedure, the spread of epidemics, and much more. At the same time, the terminology enables clinicians to record data at the appropriate level of granularity.

Specific applications tend to focus on specific subsets of SNODENT, for example, concepts related to dental caries, periodontal diseases, or pediatric conditions. These subsets can be used to present relevant parts of the terminology, depending on the clinical context. This means for example, that a drop-down list to select diagnoses in an EDR in a pediatric facility can be tailored to that particular clinical setting.

SNODENT maps work to provide explicit links to health-related classifications and coding schemas used in the United States such as ICD-10-CM and CDT. They facilitate the use of SNODENT-based clinical data for other purposes, such as reimbursement or statistical reporting.

## SNODENT RELEASES

The American Dental Association may, as part of a license agreement, provide a range of products and services, including:

- SNODENT terminology files consisting of:
  - Concepts
  - Descriptions
  - Identifiers
- Derivative works that assist with the use of SNODENT
  - Identification of subsets of SNODENT content
  - Maps to other code systems and classifications
- Implementation guidance for successful use of SNODENT, including:
  - Participation in the ADA community through the meetings of special interest groups

## III. THE IMPORTANCE OF MAPPING

---

Clinical information recorded during a dental office visit includes data that may be used either for reporting, research, claims, etc. This information may be recorded using a coding system such as ICD-10-CM and CDT.

Maps are associations between particular codes in one code system and codes in another code system that have the same meaning.

### MAPPING APPROACHES

The approaches used when undertaking mapping include human mapping, automatic mapping, or a combination of both.

**Automatic mapping** is when computer algorithms are used to create maps between code systems for example between the ICD-10-CM and SNODENT.

Significant care must be taken with automatic mapping since errors can result if no strict parameters and constraints are in place before initiating the process.

**Human mapping** is the use of human knowledge to create maps between code systems. The process requires a thorough review of every concept in the coding systems. The main steps to be completed when mapping two or more code systems include:

- Evaluating mapping as a solution

- Producing mapping requirements
- Developing the maps
- Reviewing activity

SNODENT mapping uses a combination of both human and automated approaches. The map from SNODENT to ICD-10-CM are released as separate files in Excel and flat file formats. These maps are directional and specify a mapping from a SNODENT concept to one or more ICD-10-CM codes.

- SNODENT concept ID — The SNODENT concept which is the source of the map
- SNOMED CT concept ID — The SNOMED CT concept
- ICD-10-CM code — The ICD-10-CM code which is the target of the map

**ICD-10-CM Map advice** — Either “Exact”, “Narrow to Broad”, “Broad to Narrow,” or “Partial.”

“Exact” indicates that the SNODENT concept and the ICD-10-CM term are synonymous. “Narrow to Broad” indicates that the SNODENT concept is more specific than the ICD-10-CM term. “Broad to Narrow” indicates that the SNODENT concept is more general than the ICD-10-CM term. “Partial” indicates that there is some overlap in meaning between the SNODENT concept and ICD-10-CM term, but neither completely contains the other. There may be multiple maps for a concept.

Upon completion, the maps were reviewed by subject matter experts, and lessons were learned and documented for future mapping activities.

## RELEASES

Release types:

SNODENT is distributed by the American Dental Association as a set of downloadable files. Interested parties wishing to implement SNODENT in a software application should understand the semi-annual release schedule, structure, and content of the release files. SNODENT is currently released following the SNOMED CT release.

## DISTRIBUTION FILES AND FORMATS

There are individual files with specified columns for the concepts and descriptions of SNODENT.

All components in the release files have permanent unique SNODENT Identifiers and SNOMED CT ID Identifiers.

There are also individual files for each SNOMED CT Subset. These files contain:

- Concepts
- Descriptions
- Identifiers
- Maps to ICD-10-CM and CDT to support the implementation of a smaller subset in Dental practices or Dental Schools

## IV. USING SNODENT

---

When implemented in software applications, SNODENT can be used to represent clinical oral health information consistently, reliably, and comprehensively.

SNODENT must be implemented as part of a clinical application. It may be implemented in different ways that are dependent on the design of existing systems before the introduction of SNODENT, available technology, and support for health informatics standards.

Key determinants include:

- **Scope of Use**  
The design of the application in combination with the objectives of its users are key variables in a successful implementation.
- **Record Structure**  
To facilitate the effective use of clinical information, SNODENT should be used within a well-designed data repository that stores information consistently.
- **Expression Storage**  
Support for storing precoordinated and postcoordinated SNODENT expressions determines the extent to which SNODENT can be used to represent detailed information within an EDR.
- **Data Entry**  
The clinical data entry should not result in inconsistent representations of the same information. The most efficient approaches constrain the choice of available concepts for data entry that is specific to the clinical context.
- **Retrieval and Analysis**  
Data repositories can be designed to optimize the use of SNODENT for selective data retrieval and to support analysis.
- **Communication**  
SNODENT may be used in standard electronic clinical documents and messaging for improved communications.

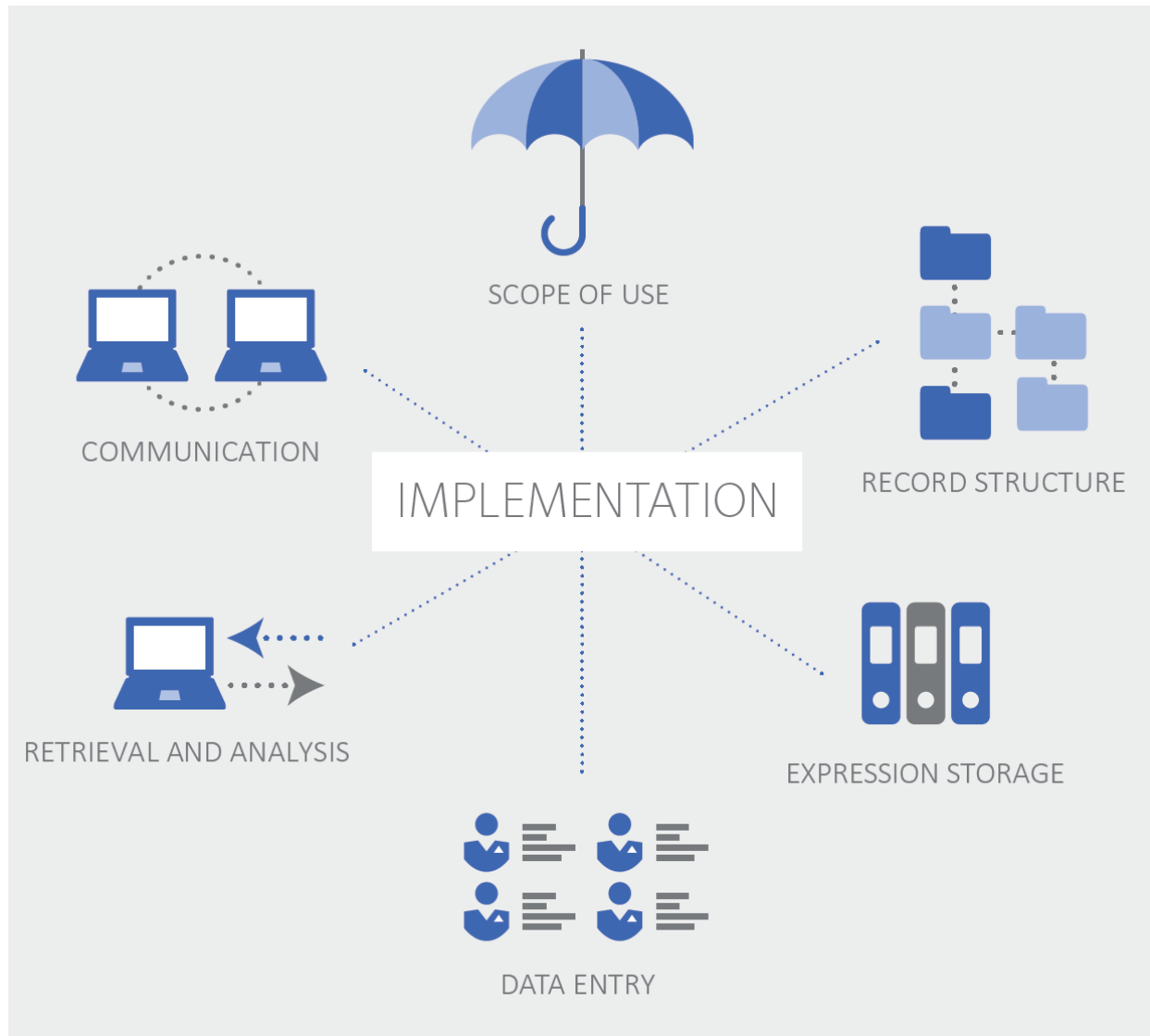


Figure 9. Implementation Factors of SNODENT

## IMPLEMENTATION IN SOFTWARE APPLICATIONS

Vendors of dental information systems and EDRs will need to incorporate diagnostic terms into their systems so the codes/terms will be part and parcel of the entire practice management system. The functions required to implement SNODENT in an EDR are:

- **Terminology services** — Functions that can be performed without reference to data stored in a particular application record structure.
- **Record services** — Functions that involve storing, retrieving, or processing application data.

Most users only require a small subset of the content of SNODENT. Some applications and users will not require all of the concepts and descriptions used in SNODENT. Usability studies indicate that less than 300 of 8,000 terms are used on a frequent basis in *General Dentistry* settings.

The use of SNODENT makes oral health information available in a structured form that can be queried and used to trigger decision support prompts. An efficient user interface to capture the assigned diagnostic term/code is critical. Data entry will need to be intuitive through several mechanisms. Efficient

data entry solutions might include the use of tools for rapid access to nested pick lists of the most utilized terms, or a graphical representation that gives the ability to chart conditions/pathology on-screen. Inputting the conditions would then generate the desired term/code.

Providers should be trained to document within their clinical records, diagnoses, findings, and observations that can be mapped to SNODENT for proper structuring of the data. Then EDRs, along with procedural terminology (CDT codes), may become a foundation for treatment planning and patient education. Templates and dashboards can be incorporated to allow a practitioner to run a query to view aggregated data and to use the information in a meaningful way.

### **Enabling Interoperability**

Oral health information can be recorded using SNODENT, independent of the EDR in use.

### **Using SNODENT for Reporting**

Because it is harmonized with SNOMED CT, SNODENT concepts are semantically consistent. Therefore, there is one unique SNODENT identifier representing a single concept. SNODENT supports recording at appropriate levels of granularity by using relevant terms.

## **LEARNING MORE ABOUT SNODENT**

This guide is intended as a practical and useful starting point from which anyone with a general interest in health care information can begin learning about SNODENT. It provides a broad overview of SNODENT from which to start a more detailed exploration.

American Dental Association provides many other materials on its website that you are welcome to explore. The website also provides access to information and a tutorial video: [ADA.org/SNODENT](https://ada.org/SNODENT).

## **CONTACT INFORMATION**

---

Contact: American Dental Association  
Center for Dental Benefits, Coding and Quality

Phone: 312.440.2500  
email: [snodent@ada.org](mailto:snodent@ada.org)  
[ADA.org/SNODENT](https://ada.org/SNODENT)