

New concept proposal: Assessment, Assessment Event, Assessment Component

Author	Amanda Ramirez Ramos	Date last updated	03.10.2023
Project	General interest	Contact	DCC
Dataset Release	2024.1	Consulted expert	-

1	Rationale	1
2	Proposal	3
3	New Concepts: Assessment Event, Assessment, Assessment Component	4
	Assessment Event	4
	Assessment	5
	Assessment Component	5
	Cardinalities to Administrative Case, Data Provider Institute and Subject Pseudo Identifier	7
4	Discussion	7
	Advantages	7
	Disadvantages	7
	What is the impact on other SPHN concepts?	7
	Remarks on extension / inheritance for other concepts.	7
5	Examples	8
	Addendum: Scores and Scales in SNOMED CT	10

1 Rationale

Categorising findings from clinical or pathological practice into scores is an important method in order to reduce complexity and facilitate informed decision making.

Working definitions:

Scale: A scale is a measurement system, allowing the capturing of data points in predefined categories and / or along a predefined axis.

Score: A score is a categorical representation of data points with predefined precision.

Assessment: An assessment is the act of gathering data in a specific and predefined way (in the context of an assessment scale or an assessment score).

The term “scale” and “score” are often used interrelated and are semantically not clearly delimitable.

The evaluation of the assessment findings can vary:

- Assessment consists of one input variable. This value can be represented quantitatively or qualitatively.
- Assessment consists of more than one input variable. The total value of the assessment is evaluated by either
 - Calculating a total score based on the components of the assessment.
Here the components of the score are not visible anymore, e.g. GCS = 11 (5 + 3 + 3)
 - Concatenating the components of the assessment to depict the total value of the assessment.

The components can still be visible and evaluated, e.g. TNM = T2N1M1, APGAR = 6-8-8'

The SPHN concept for Scores and Assessment Scales should be able to integrate these different kinds of scales.

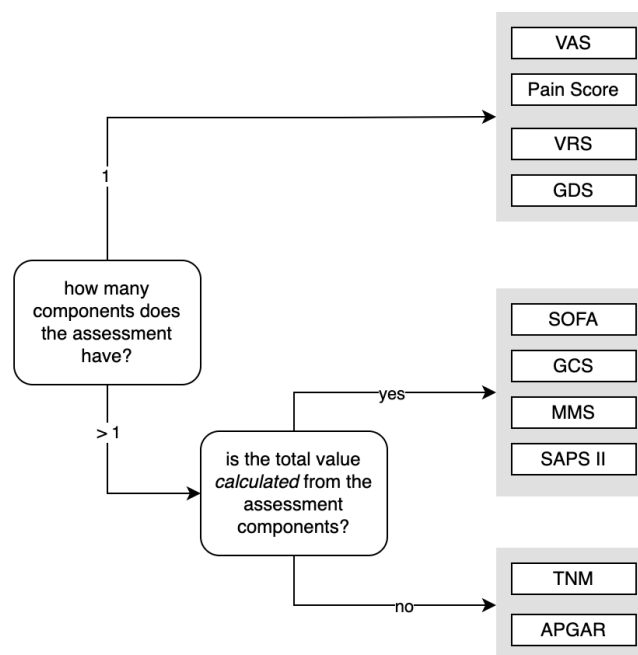


Figure 1: Examples of different Scoring Systems and Scales

¹ In both cases, the values itself can be grouped again into clinically relevant categories (e.g. total APGAR Score 9-9-9 equals “Normal APGAR”), which could fall under the realm of a concept “Interpretation” and is not discussed in this proposal.

2 Proposal

The proposal includes the creation of 3 new concepts. For ease of review, all three new concepts are discussed together in this proposal document.

Assessment Event	The (procedural) event, when an assessment takes place. It has therefore a timestamp and can have a person who performs the event (<i>Performer</i>). The kind of assessment is referenced in the concept "Assessment".
Assessment	The general type and description of the assessment, which was performed, e.g. "Glasgow Coma Scale". An assessment can be composed of components, which are referenced in the concept "AssessmentComponent". The assessment itself can have a result (Result) which holds the <i>total</i> result for the assessment.
Assessment Component	(Sub)part, component or element of an assessment (e.g. "motor response" of the Glasgow Coma Scale). A component can have its own result, which is referenced in the "Result".

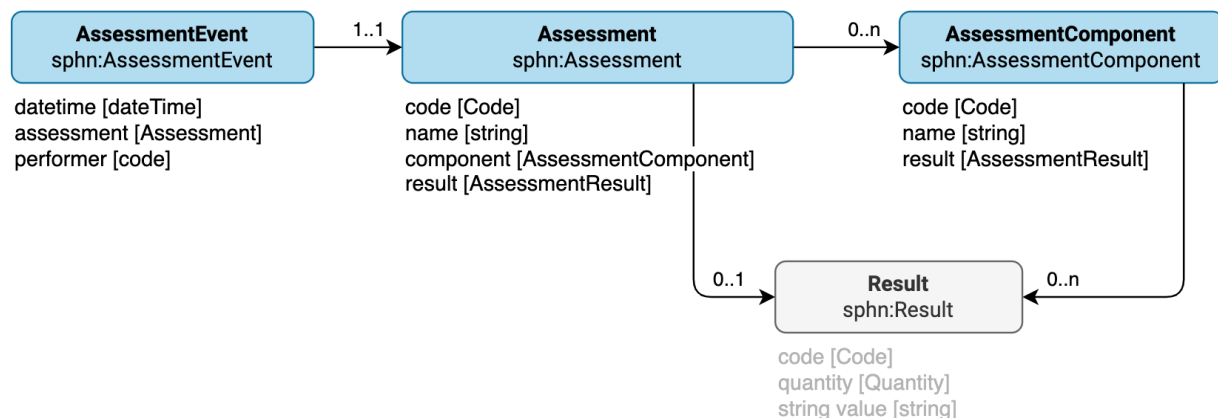


Figure 2: Overview of new concepts and relations between the concepts

3 New Concepts: Assessment Event, Assessment, Assessment Component

Assessment Event

Concept or concept compositions or inherited	General concept name	General description	Contextualized concept name	Contextualized description	Type	Standard and Value set or subset	Meaning binding	Cardinalities
Concept	Assessment Event	evaluation at a given time, which takes into account a predefined scale, classification, staging or scoring system	Assessment Event	evaluation at a given time, which takes into account a predefined scale, classification, staging or scoring system			386053000 Evaluation procedure (procedure)	
composedOf	assessment	evaluation tool associated to the concept	assessment	evaluation tool associated to the assessment event	Assessment			1:1
composedOf	datetime	datetime of the concept	datetime	datetime when the assessment event was performed	temporal			1:1
composedOf	performer	type of person who performs or reports the concept	performer	type of person who performs or reports the assessment event	Performer	SNOMED CT descendant of: 125676002 Person (person) or descendant of: 14679004 Occupation (occupation)		0:1

Assessment

Concept or concept compositions or inherited	General concept name	General description	Contextualized concept name	Contextualized description	Type	Standard & Value set or subset	Meaning binding	Cardinalities
Concept	Assessment	assessment scale, classification, staging or scoring system	Assessment	assessment scale, classification, staging or scoring system			273249006 Assessment scales (assessment scale)	
composedOf	code	coded information specifying the concept	code	coded information specifying the assessment	Code	SNOMED CT descendant of: 254291000 Staging and scales (staging scale)		0:1
composedOf	name	name associated to the concept	name	name associated to the assessment	string			0:1
composedOf	component	part of the concept	component	part of the assessment	AssessmentComponent			0:n
composedOf	result	evaluation outcome associated to the concept	result	evaluation outcome associated to the assessment	Result			0:1 ²

Assessment Component

² The assessment (not the component) should link to maximum one result, which represents the “total” result. If more than one result is available, assessment components should be instantiated.

Concept or concept compositions or inherited	General concept name	General description	Contextualized concept name	Contextualized description	Type	Standard and Value set or subset	Meaning binding	Cardinalities
Concept	Assessment Component	component of an assessment; can have its own result	Assessment Component	component of an assessment; can have its own result			445536008 Assessment using assessment scale (procedure)	
composedOf	code	coded information specifying the concept	code	coded information specifying the assessment component	Code	SNOMED CT descendant of: 363787002 Observable entity (observable entity)		0:1
composedOf	name	name associated to the concept	name	name of the type of the assessment component, if a code is not available	string			0:1
composedOf	result	result of the assessment component	result	result of the assessment component	Result			0:1

Cardinalities to Administrative Case, Data Provider Institute and Subject Pseudo Identifier

General concept name	Cardinality for concept to Administrative Case	Cardinality for concept to Data Provider Institute	Cardinality for concept to Subject Pseudo Identifier
Assessment Event	0:1	1:1	1:1
Assessment	0:1	1:1	1:1
Assessment Component	-	-	-

4 Discussion

Advantages

- The concept is similarly modelled as other SPHN concepts (e.g. Labtests).
- The concept can be extended to include other assessment-like concepts (e.g. Questionnaire, TNM, Grading, Staging, Oncology Assessment etc.)

Disadvantages

- To keep the possibilities for extension open, it's difficult to decide upon the value sets. We decided to keep them as open as possible to allow for easy inheritance.
- The concepts are quite broad, which allows for reusability but also needs alignment across data providers on how to code specific data elements (e.g. what is considered a component of an assessment)

What is the impact on other SPHN concepts?

- The concept *Simple Score* would become obsolete.
- Other concepts could be represented (in future releases) with these concepts by inheriting from the "Assessment"-Complex, e.g. Tumor Grading, Tumor Staging, TNM, Questionnaire, Oncology Assessment etc.

Remarks on extension / inheritance for other concepts.

- **Tumor Grading and Staging:**
 - Prefixes/suffixes etc. need to be added as additional composedOfs.
- **PROMs and Questionnaires:**
 - Additional information needs to be added as composedOf (e.g. "version" of a questionnaire, "index" of a questionnaire item etc.).

- Beware that numerical values can differ, even though the same answer was given (see the results in the above example for “PROM”; even though the answer was two times “Ja”, once it is counted as 1 and once as 0). This needs to be addressed.
- The Assessment result will probably need amendments for other datatypes (e.g. booleans, datetimes etc.)
- The *string value* result in the above “PROM” example could also fall in the realm of another concept “*Interpretation*”.
- The type of the composedOf “*performer*” will probably be it’s own concept. It could be beneficial to look, which valueset for this composedOf is necessary to cover the needs for PROMs and Questionnaires.

5 Examples

For the sake of simplicity, the code concept was not further indented.

GCS without Subscores	AssessmentEvent datetime [datetime]: 01.01.2023 assessment [Assessment] code [Code]: 386554004 Glasgow coma scale (assessment scale) name [string]: - component [AssessmentComponent]: - result [Result] code [Code]: 61102007 Glasgow coma scale, 11 (finding) string value [string]: - quantity [Quantity]: - performer [code]: -
GCS with Subscores	AssessmentEvent datetime [datetime]: 01.01.2023 assessment [Assessment] code [Code]: 386554004 Glasgow coma scale (assessment scale) name [string]: - component [1/3] [AssessmentComponent] code [Code]: 281396004 Glasgow Coma Scale motor response subscore (observable entity) name [string]: - result [Result] code [Code]: 74957005 Glasgow coma scale, 5 (finding) string value [string]: - quantity [Quantity]: - component [2/3] [AssessmentComponent] code [Code]: 281397008 Glasgow Coma Scale verbal response subscore (observable entity) name [string]: - result [Result] code [Code]: 26394007 Glasgow coma scale, 3 (finding) string value [string]: - quantity [Quantity]: - component [3/3] [AssessmentComponent] code [Code]: 281395000 Glasgow Coma Score eye opening subscore (observable entity) name [string]: -

	<p>result [Result] code [Code]: 26394007 Glasgow coma scale, 3 (finding) string value [string]: - quantity [Quantity]: -</p> <p>result [Result] code [Code]: 61102007 Glasgow coma scale, 11 (finding) string value [string]: - quantity [Quantity]: -</p> <p>performer [Performer]: -</p>
APGAR	<p>AssessmentEvent datetime [datetime]: 01.01.2023 assessment [Assessment] code [Code]: 1287344004 Apgar score (assessment scale) name [string]: - performer [Performer]: - component [1/3] [AssessmentComponent] code [Code]: 169895004 Apgar score at 1 minute (observable entity) name [string]: - result [Result] code [Code]: 169899005 Apgar at 1 minute = 3 (finding) string value [string]: - quantity [Quantity]: - component [2/3] [AssessmentComponent] code [Code]: 169909004 Apgar score at 5 minutes (observable entity) name [string]: - result [Result] code [Code]: [Code]: 169918002 Apgar at 5 minutes = 8 (finding) string value [string]: - quantity [Quantity]: - component [3/3] [AssessmentComponent] code [Code]: 169922007 Apgar score at 10 minutes (observable entity) name [string]: - result [Result] code [Code]: 169932000 Apgar at 10 minutes = 9 (finding) string value [string]: - quantity [Quantity]: -</p> <p>result [Result] code [Code]: - string value [string]: 3-8-9 quantity [Quantity]: -</p>

Addendum: Scores and Scales in SNOMED CT

A collection of SNOMED CT Codes related to some assessment scales.

Score	Assessment Code	Assessment Component Code	Values
APGAR	1287344004 Apgar score (assessment scale)	Time: 1min, 5min, 10min e.g. 169922007 Apgar score at 10 minutes (observable entity)	preferred [Code]: e.g. 169901001 Apgar at 1 minute = 4 (finding) if only interpretation available [Code]: e.g. 275307002 Apgar normal (finding)
Glasgow Coma Scale (GCS)	386554004 Glasgow coma scale (assessment scale)	281395000 Glasgow Coma Score eye opening subscore (observable entity) ³ 281397008 Glasgow Coma Scale verbal response subscore (observable entity) 281396004 Glasgow Coma Scale motor response subscore (observable entity)	preferred [Code]: e.g. 32856008 Glasgow coma scale, 8 (finding)
Sequential Organ Failure Assessment (SOFA)	459231000124102 Sequential Organ Failure Assessment (assessment scale)	860694000 Central nervous system function (observable entity) 70337006 Cardiovascular function (observable entity) 78064003 Respiratory function (observable entity) 404995006 Blood coagulation status (observable entity) 79036002 Liver function (observable entity) 11953005 Renal function (observable entity)	preferred [Quantity] preferred unit: {#}
Simplified Acute Physiology Scale II (SAPS II)	273812009 Simplified acute physiology scale II (assessment scale)	Age, Heart Rate, BP etc.	preferred [Quantity] preferred unit: {#}

³ This is an error in SNOMED CT, two of the subparts are called "Scale" and one is called "Score".