

## Key to Expression Syntax

{curly braces}	An item to be substituted
<angle brackets>	Path to an element of given data type
<i>Italics</i>	An optional item
<i>Italics</i>	An optional statement
ellipsis (...)	Indicates a pattern that can be repeated
vertical bar ( )	Indicates a choice of items or data types
<b>bold</b>	Default value

## Notations and Special Values

code	# <code>{code}</code>		
Coding	{CodeSystem name id url}/{ <i>version string</i> #{code} " <i>display string</i> "}		
Cardinality	<i>min..max</i>	<i>min..</i>	<i>..max</i>
Quantity with units	{decimal or integer} {UCUM code}'		
Comments	// single line comment	/* multi-line comment */	
Flags	MS // must support SU // summary, Σ ?! // modifier	TU // trial use N // normative D // draft	
Binding strengths	<b>required</b>  extensible preferred example		
Triple quote string	""" {string markdown} """		
References	Reference({Resource name id url}) Canonical({name id})		

## Paths

Array element	<array element>[0-based index]
Reference	<Reference>[{Resource Profile name id url}]
Extension	<Extension>[{extension name id URL}]
Sliced array	<array element>[slice-name] <i>[reslice-name]</i>
Caret paths	^<element of StructureDefinition> <element in Profile> ^<element in corresponding ElementDefinition>

## Slicing Rubric

\* <array-path> ^slicing.discriminator.type = {#pattern|#value|#type|#profile|#exists}  
 \* <array-path> ^slicing.discriminator.path = {FHIRPath string}  
 \* <array-path> ^slicing.rules = {**#open**|#closed|#openAtEnd}  
 \* <array-path> ^slicing.ordered = true|false  
 \* <array-path> ^slicing.description = {string}

## Item Keywords

Alias	Alias: {alias name} = {uri urn:oid} // alias name may begin with \$
Extension	Extension: {name} Parent: {Extension name id url} Id: {id} Title: {string} Description: {string or markdown}
Instance	Instance: {id} InstanceOf: {Resource Profile name id url} Usage: { <b>#example</b>   #definition   #inline} Title: {string} Description: {string or markdown}
Invariant	Invariant: {id} Severity: {#error #warning} Description: {string markdown} Expression: {FHIRPath string} XPath: {XPath expression string}
Mapping	Mapping: {id} Source: {Profile name id} Target: {Target specification uri} Id: {Target specification id} Title: {Target description string} Description: {string}
Profile	Profile: {name} Parent: {Resource Profile name id url} Id: {id} Title: {string} Description: {string or markdown}
RuleSet	RuleSet: {name}
Value Set and Code System	ValueSet: {name} or CodeSystem: {name} Id: {id} Title: {string} Description: {string or markdown}

## Code System Rules

Define local code \* {code} "*display string*" "*definition string*"

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## Rules

Assignment	* <element> = {value} ( <i>exactly</i> )
Binding	* <bindable> from {ValueSet name id url} ( <i>{strength}</i> )
Cardinality	* <element> <i>{cardinality}</i>
Contains (inline extensions)	* <Extension> contains {name1} {cardinality1} <i>{flags1}</i> and {name2} {cardinality2} <i>{flags2}</i> and {name3} {cardinality3} <i>{flags3}</i> ...
Contains (standalone extensions)	* <Extension> contains {Extension1 name id url} named {name1} {cardinality1} <i>{flags1}</i> and {Extension2 name id url} named {name2} {cardinality2} <i>{flags2}</i> and {Extension3 name id url} named {name3} {cardinality3} <i>{flags3}</i> ...
Contains (slicing)	* <array> contains {name1} {cardinality1} <i>{flags1}</i> and {name2} {cardinality2} <i>{flags2}</i> and {name3} {cardinality3} <i>{flags3}</i> ...
Flag	* <element1> and <element2> and <element3> ... {flag1} <i>{flag2}</i> <i>{flag3}</i> ...
Insert	* insert {RuleSet name}
Mapping	* <element> -> "{map string}" " <i>comment string</i> " <i>#mime-type code</i>
Obeys	* <element> obeys {Invariant1 id} and {Invariant2 id} ...
Type	* <element> only {datatype1} or {datatype2} or {datatype3} ... * <element> only Reference({ResourceType1 name id url} or {ResourceType2 name id url} or {ResourceType3 name id url} ...)

## Value Set Rules

Include single code	* <i>include</i> {Coding}
Exclude single code	* <i>exclude</i> {Coding}
Include entire code system	* <i>include</i> codes from system {CodeSystem name id url}
Include from value set	* <i>include</i> codes from valueset {ValueSet name id url}
Exclude from value set	* <i>exclude</i> codes from valueset {ValueSet name id url}
Filter syntax: {property} {filter-operator} {value}	
Include codes with filtering	* <i>include</i> codes from system {CodeSystem name id url} where {filter1} and {filter2} and ...
Exclude codes with filtering	* <i>exclude</i> codes from system {CodeSystem name id url} where {filter1} and {filter2} and ...

Notations and Special Values	
code	#confirmed
Coding and CodeableConcept	<a href="http://snomed.info/sct#363346000">http://snomed.info/sct#363346000</a> "Malignant neoplastic disease (disorder)" ICD10CM#C004
Cardinality	0..1   1..1   2..* (two-sided) ..1   1..   2.. (one-sided)
Comments	// end of line or single line /* This comment continues over multiple lines */
References	Reference(Patient) Reference(Patient or Practitioner) Canonical(MyPatient)

Paths	
Nested element	stage.assessment
Array element	name[0].given[1]
Choice [x] element	valueQuantity, valueReference
Reference choices	performer[Organization]
Extensions	extension[terminationReason] extension[ <a href="http://hl7.org/fhir/StructureDefinition/location-distance">http://hl7.org/fhir/StructureDefinition/location-distance</a> ]
Sliced arrays	component[DiastolicPressure]
Resliced arrays	component[RespiratoryScore][OneMinute]
StructureDefinition escape (caret syntax)	^abstract component[VariationCode] ^short

Slicing Rubric	
* component ^slicing.discriminator.type = #pattern	
* component ^slicing.discriminator.path = "code"	
* component ^slicing.rules = #open	
* component ^slicing.ordered = false	
* component ^slicing.description = "Slice on component.code"	

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Item	Keywords
Alias	Alias: UCUM = <a href="http://unitsofmeasure.org">http://unitsofmeasure.org</a> Alias: race = urn:oid:2.16.840.1.113883.6.238 Alias: \$GenderIdentity = <a href="http://hl7.org/fhir/StructureDefinition/patient-genderIdentity">http://hl7.org/fhir/StructureDefinition/patient-genderIdentity</a>
Code system	CodeSystem: AJCC_FairUse Title: "AJCC Fair Use" Description: "A small subset of AJCC staging codes used for IG examples."
Extension	Extension: TreatmentTerminationReason Id: treatment-termination-reason Title: "Treatment Termination Reason" Description: "Reason for stopping a treatment."
Instance	Instance: TumorMarkerExample01 InstanceOf: TumorMarker Usage: #example Description: "Epidermal growth factor example."
Invariant	Invariant: us-core-8 Description: "Patient.name.given or Patient.name.family or both SHALL be present" Expression: "family.exists() or given.exists()" Severity: #error XPath: "f:given or f:family"
Mapping	Mapping: USCancerPatientToArgonaut Source: USCancerPatient Target: " <a href="http://unknown.org/Argonaut-DQ-DSTU2">http://unknown.org/Argonaut-DQ-DSTU2</a> " Id: argonaut-dq-dstu2 Title: "Argonaut DSTU2"
Profile	Profile: USCancerPatient Parent: USCorePatientProfile Id: mcode-cancer-patient Title: "Cancer Patient" Description: "A patient diagnosed with cancer"
Rule set	RuleSet: ExperimentalProfileRules
Value set	ValueSet: AnatomicalOrientationVS Title: "Anatomical Orientation Value Set" Description: "Values for anatomical orientation."

Code System Rule	
Local code definition	* #NED "No Evidence of Disease" "No physical evidence of disease on exam or imaging tests."

Rules	
Assignment	* status = #arrived * code = SCT#18165001 "Jaundice (finding)" * onsetDateTime = "2019-04-02" * subject = Reference(EveAnyperson) * valueQuantity = 2.5 'mm' * valueQuantity = UCUM#mm "millimeters"
Binding	* bodySite from CancerBodyLocationVS (preferred) * valueCodeableConcept from <a href="http://loinc.org/vs/LL1971-2">http://loinc.org/vs/LL1971-2</a> (required) * valueQuantity from LengthUnitsVS (extensible)
Cardinality	* severity 0..0 * subject 1..
Contains (inline extension)	* extension contains treatmentIntent 0..1 MS and terminationReason 0..* MS
Contains (standalone extension)	* extension contains \$GenderIdentity named genderIdentity 0..1 MS and <a href="http://hl7.org/fhir/StructureDefinition/patient-disability">http://hl7.org/fhir/StructureDefinition/patient-disability</a> named disability 0..1 MS
Contains (slicing)	* component contains GeneStudied 0..* MS and VariationCode 0..* and GenomicDNAChange 0..1
Flag	* deceased[x] MS ?! SU * reasonCode and extension[terminationReason] MS
Insert	* insert USCoreTerminologyRuleSet
Mapping	* -> "Patient" * identifier.system -> "Patient.identifier.system"
Obeys	* obeys us-core-6 and us-core-9 * name obeys us-core-8
Type	* value[x] only CodeableConcept * effective[x] only dateTime or Period * subject only Reference(CancerPatient) * assriter only Reference(Practitioner or Patient)

Value Set Rules	
Single code	* SCT#54102005 "G1 grade (finding)"
Exclude single code	* exclude SCT#12619005
All codes in system	* include codes from system HGVS
Filter Rules for SNOMED-CT (assumes code system aliased as 'SCT')	
Subsumption	* include codes from system SCT where concept is-a #123037004 "Body Structure"
Exclude subsumption	* exclude codes from system SCT where concept is-a #128462008 "Secondary malignant neoplastic disease (disorder)"