ACR Assist™

Technical White Paper – ACR Assist

Proposed Format for Specifying Point-of-Care Computer-Assisted Reporting/Decision Support Modules for Radiologists

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CONTENTS

1 INTRODUCTION

1.1 Purpose

Explains the following

Schema structure
Description about each elements and attributes with their datatypes
Usage with samples

2 REPRESENTATION

2.1 Colour patterns

Here is the representation style for each component in the schema.
Attributes: sample
Elements: sample
Optional: sample (optional)

2.2 Datatypes

xsd:token - https://www.w3.org/TR/xmlschema-2/#token
xsd:anyURI - https://www.w3.org/TR/xmlschema-2/#anyURI
xsd:nonNegativeInteger - https://www.w3.org/TR/xmlschema-2/#nonNegativeInteger
xsd:integer - https://www.w3.org/TR/xmlschema-2/#integer
xsd:ID - https://www.w3.org/TR/xmlschema-2/#ID
xsd:Boolean - https://www.w3.org/TR/xmlschema-2/#boolean
xsd:decimal - https://www.w3.org/TR/xmlschema-2/#decimal

xsd: IDREF - https://www.w3.org/TR/xmlschema-2/#IDREF
xsd:positiveInteger - https://www.w3.org/TR/xmlschema-2/#positiveInteger
xsd:duration - https://www.w3.org/TR/xmlschema-2/#duration

3 SCHEMA STRUCTURE

3.1 Metadata

The metadata section contains general information about a CAR/DS guideline which may or may not be used by any given implementation.

#	Name	Data Type	Description
1	Label	text	Name of the XML
2	ID	text	XML module's unique identifier
3	SchemaVersion	text	Schema version
4	ModuleVersion	text	Module version. This can be updated each time when the xml has modified.
5	Info(optional)		
5.1	Description (optional)	text	Human readable description about the module.
5.2	References (optional) Contains one or more Citations. Citation		
5.2.1	PubmedId (optional)	xsd:token	Pubmed reference Identifier https://www.ncbi.nlm.nih.gov/pubmed
5.2.2	URI (optional)	xsd:anyURI	Any Reference URI (for e.g.: link to abstract on journal website)
5.2.3	text		citation text (for e.g. : a bibliographic reference to the citation)
5.3	Diagrams (optional) Contains different Diagrams related to the module. Diagram		
5.3.1	IsKeyDiagram (optional)	"true" |"false"	Is it the key diagram (I.e. the diagram which summaries whether this is the overall clinical diagram)
5.3.2	Displaysequence	Integer	Image display sequence number. Images can

	(optional)		be displayed in Displaysequence order
5.3.3	Location	URI	Image URI
5.3.4	Label (optional)	text	Image Label

5.4	HelpText(optional)	text	Help text about the module.
5.5	Contact(optional)		

5.5.1	Name	text	Author/Contact Name
5.5.2	Email	text	Contact Email
5.5.3	Institution(optional)	text	Contact Institution

6	ReportCitationText	text	Citation for the report text

7 Ontology(optional)

Specify body part and modality (like CT-Chest, MR-abdomen) of the imaging exams for which this module can be used

7.1 AnatomicRegions

AnatomicRegions for which this module can be applicable

e.g. :

```
<AnatomicRegions CodingSystem="RADLEX">
 <Region Code="RID88">Adrenal gland</Region>
 <Region Code="RID89">Limb of adrenal gland</Region>
 <Region Code="RID90">Medulla of adrenal gland</Region>
</AnatomicRegions>
```

7.1.1	CodingSystem (optional)	text	The source of coding system used. This should be a URL
7.1.2	Region		

7.1.2.1	Code	xsd:token	Author/Contact Name
7.1.2.2	Text		Region text

7.2 PossibleDiagnoses

For e.g. :

```
<PossibleDiagnoses>
 <Diagnosis CodingSystem="ICD-10" Code="E27.9">Disorder of adrenal gland, unspecified</Diagnosis>
 <Diagnosis CodingSystem="RADLEX" Code="RID4211">Adenoma</Diagnosis>
 <Diagnosis CodingSystem="RADLEX" Code="RID4353">Myelolipoma</Diagnosis>
 <Diagnosis CodingSystem="RADLEX" Code="RID3890">Cyst</Diagnosis>
```

```
<Diagnosis CodingSystem="RADLEX" Code="RID4700">Hemorrhage</Diagnosis>
<Diagnosis CodingSystem="RADLEX" Code="RID5231">Metastasis</Diagnosis>
</PossibleDiagnoses>
```

7.2.1	CodingSystem (optional)	text	the source of coding system used
7.2.2	Diagnosis can contain one or more diagnosis		

7.2.2.1.1	CodingSystem (optional)	text	The source of coding system used. This should be a URL
7.2.2.1.2	Code	xsd:token	Code in coding system

8 ApplicableExams(optional)

contains one or more ApplicableExamCategory

```
<ApplicableExams>
 <ApplicableExamCategory Axis="Modality">CT</ApplicableExamCategory>
 <ApplicableExamCategory Axis="Anatomy">Chest</ApplicableExamCategory>
 <ApplicableExamCategory Axis="Anatomy">Abdomen</ApplicableExamCategory>
</ApplicableExams>
```

8.1	ApplicableExamCategory			
	8.1.1	Axis	"Modality" | "Anatomy"	Value can either Modality or Anatomy
	8.1.2	text		Applicable category text

9 ApplicableSexes

9.1	Value	"Male"| "Female"|"Both"	Applicable sex

10 ApplicableAgeGroups(optional)

10.1	MinimumAge(optional)	xsd:nonNegative Integer	applicable age min
10.2	MaximumAge(optional)	xsd:nonNegative Integer	applicable age max

11	TextCues 11.1 ContextPhrases(optional) Context phrases used to identify parts of the radiology reports where this module may be applicable. 11.1.1 | ContextPhrase | text | phrase to find out the xml 11.2 KeyWords Keywords to find the module 11.2.1 | Keyword | text | Keywords to find out module 11.3 NegationPhrases(optional) Contains text markers which indicate the parts of a report to which the module is not applicable (even though it may contain markers that make it look like it is). 11.3.1 | NegationPhrase | | Keywords to find out xml 11.4 | Regex(optional) | text | Regex matches with test
12	VoiceActivation(optional) Contains phrases intended to be used as triggers for the module to find by voice recognition systems. 12.1 | VoiceCommandPhrase | text | The voice activation phrase for the voice recognition system to find the module.

3.1.1 Sample

```
<Metadata>
  <Label>Label0</Label>
  <ID>ID0</ID>
  <SchemaVersion>SchemaVersion0</SchemaVersion>
  <RuleVersion>RuleVersion0</RuleVersion>
  <Info>
    <Description>Description0</Description>
    <References>
      <Citation PubmedId="PubmedId0" Url="http://www.url.com/">
      </Citation>
      <Citation PubmedId="PubmedId1" Url="http://www.url.com/">
      </Citation>
      <Citation PubmedId="PubmedId2" Url="http://www.url.com/">
      </Citation>
```

```
      <Citation PubmedId="PubmedId3" Url="http://www.url.com/">
      </Citation>
    </References>
    <Diagrams>
      <Diagram IsKeyDiagram="true" DisplaySequence="0">
        <imageElements>http://www.url.com/</imageElements>
        <Label>Label1</Label>
      </Diagram>
      <Diagram IsKeyDiagram="true" DisplaySequence="0">
        <imageElements>http://www.url.com/</imageElements>
        <Label>Label2</Label>
      </Diagram>
    </Diagrams>
    <HelpText>HelpText0</HelpText>
    <Contact>
      <Name>Name</Name>
      <Email>Email</Email>
      <Institution>Institution</Institution>
    </Contact>
  </Info>
  <ReportCitationText>ReportCitationText0</ReportCitationText>
  <Ontology>
    <AnatomicRegions CodingSystem="CodingSystem0">
      <Region Code="Code0">
      </Region>
      <Region Code="Code1">
      </Region>
    </AnatomicRegions>
    <AnatomicRegions CodingSystem="CodingSystem1">
      <Region Code="Code2">
      </Region>
      <Region Code="Code3">
      </Region>
    </AnatomicRegions>
    <PossibleDiagnoses CodingSystem="CodingSystem0">
      <Diagnosis CodingSystem="CodingSystem1" Code="Code4">
      </Diagnosis>
      <Diagnosis CodingSystem="CodingSystem2" Code="Code5">
      </Diagnosis>
    </PossibleDiagnoses>
    <PossibleDiagnoses CodingSystem="CodingSystem3">
      <Diagnosis CodingSystem="CodingSystem4" Code="Code6">
      </Diagnosis>
      <Diagnosis CodingSystem="CodingSystem5" Code="Code7">
      </Diagnosis>
    </PossibleDiagnoses>
  </Ontology>
  <ApplicableExams>
    <ApplicableExamCategory Axis="Modality">
    </ApplicableExamCategory>
    <ApplicableExamCategory Axis="Modality">
    </ApplicableExamCategory>
```

```
  </ApplicableExams>
  <ApplicableSexes Value="Male"/>
  <ApplicableAgeGroups>
    <MinimumAge>50</MinimumAge>
    <MaximumAge>50</MaximumAge>
  </ApplicableAgeGroups>
  <TextCues>
    <ContextPhrases>
      <ContextPhrase>ContextPhrase0</ContextPhrase>
      <ContextPhrase>ContextPhrase1</ContextPhrase>
    </ContextPhrases>
    <KeyWords>
      <KeyWord>KeyWord0</KeyWord>
      <KeyWord>KeyWord1</KeyWord>
    </KeyWords>
    <NegationPhrases>
      <NegationPhrase>NegationPhrase0</NegationPhrase>
      <NegationPhrase>NegationPhrase1</NegationPhrase>
    </NegationPhrases>
    <Regex>Regex0</Regex>
  </TextCues>
  <VoiceActivation>
    <VoiceCommandPhrase>VoiceCommandPhrase0</VoiceCommandPhrase>
    <VoiceCommandPhrase>VoiceCommandPhrase1</VoiceCommandPhrase>
  </VoiceActivation>
</Metadata>
```

3.1.2 Real-world Sample

```
<Metadata>
    <Label>Hello RADS</Label>
    <ID>Hello_Rads_1_0</ID>
    <SchemaVersion>1.0</SchemaVersion>
    <RuleVersion>1.6</RuleVersion>
    <Info>
      <Description>This is a sample xml for characterizing liver lesion for MRI</Description>
      <References>
        <Citation Url="https://nrdr.acr.org/lirads/">
        </Citation>
        <Citation Url="https://nrdr.acr.org/liradsapp/">
        </Citation>
      </References>
      <Diagrams>
        <Diagram DisplaySequence="1" IsKeyDiagram="true">
                <imageElements>https://nrdr.acr.org/lirads/ </imageElements>
          <Label>ACR LI-RADS</Label>
        </Diagram>
      </Diagrams>
      <Contact>
        <Name>ACR Assist</Name>
        <Email>acr-assist@acr.org</Email>
```

```
        <Institution>American College of Radiology</Institution>
      </Contact>
    </Info>
    <ReportCitationText/>
    <Ontology>
      <AnatomicRegions>
        <Region Code=""></Region>
      </AnatomicRegions>
      <PossibleDiagnoses>
        <Diagnosis Code=""></Diagnosis>
      </PossibleDiagnoses>
    </Ontology>
    <ApplicableExams>
      <ApplicableExamCategory Axis="Modality">
      </ApplicableExamCategory>
      <ApplicableExamCategory  Axis="Anatomy"/>
    </ApplicableExams>
    <ApplicableSexes Value="Both"></ApplicableSexes>
    <ApplicableAgeGroups>
      <MinimumAge>1</MinimumAge>
    </ApplicableAgeGroups>
    <TextCues>
      <ContextPhrases>
        <ContextPhrase></ContextPhrase>
      </ContextPhrases>
      <KeyWords>
        <KeyWord>LIRADS Liver lesion</KeyWord>
      </KeyWords>
      <NegationPhrases>
        <NegationPhrase></NegationPhrase>
      </NegationPhrases>
      <Regex/>
    </TextCues>
    <VoiceActivation>
        <VoiceCommandPhrase>LIRADS</VoiceCommandPhrase>
        <VoiceCommandPhrase>Liver lesion</VoiceCommandPhrase>
        <VoiceCommandPhrase>American College of Radiology</VoiceCommandPhrase>
    </VoiceActivation>
  </Metadata>
```

3.2 DataElements

The DataElement definitions specify the input values used to drive a decision tree, the constant values, and possibly intermediate or output values associated with an algorithm. Three main types of DataElements can be described using the data format: external and fixed values, user-provided data, and results of computation. Schema supports the following DataElements.

Following are the different DataElements supported by the schema

- ChoiceDataElement : can be used when there is a pre-defined set of answers are available
- NumericDataElement : represents a number
- IntegerDataElement : represents an integer value
- MultiChoiceDataElement: can be used when there is a pre-defined set of answers and can have one or more answers.
- GlobalValue: similar to constants in any programming language that can be referred to elsewhere in the guideline. These are intended to be used to define threshold values or parameters in a linear regression.
- ComputedElement: effective when it comes to reusing the logic

3.2.1 ChoiceDataElement

#	Name	Data Type	Description / Usage
1.	Id	xsd:ID	DataElement identifier (can be referenced in other parts of module as well as by external systems)
2	CdeId (optional)	xsd:token	Common DataElement Id (intend to refer a standard definition in the ACR/RSNA CDE repository, radelement.org)
3	AllowFreetext(optional)	"true" | "false"	Can be used to get free-text answer if the value is not yet defined
4	IsRequired	"true" | "false"	Whether the DataElement is Required or not.
5	DisplaySequence (optional)	xsd:integer	Suggested order in which this DataElement is displayed together with the other DataElements
6	Label	text	Choice DataElement label (prompt text/display question for entering the value)
7	Hint (optional)	text	Optionally displayed more detailed text for the user describing how the DataElement needs to be filled in.
8	diagrams(optional) Contains one or more diagrams which offer additional information to the user (e.g.: illustrations of how the measurements are to be taken)		

8.1	diagram			
	8.1.1	Location	text	Image location
	8.1.2	Label	text	Image Label
	8.1.3	DisplaySequence(optional)	xsd:integer	Image display sequence if the DataElement contains more than one diagram
	8.1.4	IsKeyDiagram(optional)	"true" | "false"	Whether this is the key diagram

9	VoiceCommand (optional)	text	Voice command to find/activate the DataElement
10	ChoiceInfo Contains all the possible values for the DataElement, only one value can be selected for a choice DataElement (for questions with multiple choice please use the MultiChoiceDataElement)		

10.1	Choice		
10.1.1	Value	xsd:token	Choice value
10.1.2	Label	text	Choice label (how the choice is intended to be displayed for the user in the GUI)
10.1.3	Hint (optional)	text	Further information on the choice which can be optional (e.g.: as a tooltip)
10.1.4	VoiceCommand (optional)	text	Voice command to select this choice as the value for the DataElement
10.1.5	IsDefault	"true" | "false"	Is this the default choice (if no other choice selected, this will be the value for the DataElement)
10.1.6	ReportText (optional)	text	Text to be inserted into the report when the DataElement value is being inserted into the report.

11	ImageMap (optional) Includes a pointer to the image that can be displayed as an interactive choice/multi choice question. Areas of the images which radiologist click should select one of the given choices. Image must be provided within the assets of the module.		
11.1	imageElements	text	Image url pointing to the actual image location
11.2	Label(optional)	text	Image Label, text used to referring the image.
11.3	DrawStyle (optional) Draw style used in the image.		

11.3.1	Outline(optional)	text	Default area outline color specified as hex code
11.3.2	HoverFill(optional)	text	Default area fill color when hovering specified as hex code
11.3.3	SelectedFill(optional)	text	Default area fill color when selected specified as hex code

11.4	Map	
11.4.1	Area Specifies region of the image to be which when selected activates a choice automatically. This has same concept as html image map, refer : http://www.w3schools.com/TAGS/tag_map.asp	

11.4.1.1	Shape	"rect" | "poly" | "circle"	Supports three different shapes.
10.4.1.2	Coords	text	Image map coordinates
11.4.1.3	ChoiceValue	xsd:token	Choice value for this image map, which will activated when user clicks within the specified coordinates
11.4.1.4	Outline(optional)	text	Area outline color specified as hex code, which overrides the default defined in draw style
11.4.1.5	HoverFill(optional)	text	area fill color when hovering specified as hex code, which overrides the default defined in draw style
11.4.1.6	SelectedFill(optional)	text	area fill color when selected specified as hex code, which overrides the default defined in draw style

3.2.1.1 Sample

```
<ChoiceDataElement Id="ID000" CdeId="CdeId0" IsRequired="true" DisplaySequence="50">
  <Label>Label0</Label>
  <Hint>Hint0</Hint>
  <Diagrams>
    <Diagram DisplaySequence="0" IsKeyDiagram="true">
      <Location>Location0</Location>
      <Label>Label1</Label>
    </Diagram>
    <Diagram DisplaySequence="0" IsKeyDiagram="true">
      <Location>Location1</Location>
      <Label>Label2</Label>
```

```
    </Diagram>
  </Diagrams>
  <VoiceCommand>VoiceCommand0</VoiceCommand>
  <ChoiceInfo>
    <Choice IsDefault="true">
      <Value>Value0</Value>
      <Label>Label3</Label>
      <Hint>Hint1</Hint>
      <VoiceCommand>VoiceCommand1</VoiceCommand>
      <ReportText>ReportText0</ReportText>
    </Choice>
    <Choice IsDefault="false">
      <Value>Value1</Value>
      <Label>Label4</Label>
      <Hint>Hint2</Hint>
      <VoiceCommand>VoiceCommand2</VoiceCommand>
      <ReportText>ReportText1</ReportText>
    </Choice>
    <Choice IsDefault="false">
      <Value>Value2</Value>
      <Label>Label5</Label>
      <Hint>Hint3</Hint>
      <VoiceCommand>VoiceCommand3</VoiceCommand>
      <ReportText>ReportText2</ReportText>
    </Choice>
  </ChoiceInfo>
  <ImageMap>
    <imageElements>http://www.url.com/</imageElements>
    <Label>Label6</Label>
    <DrawStyle Outline="Outline0" HoverFill="HoverFill0" SelectedFill="SelectedFill0"/>
    <Map>
      <Area Shape="rect" Coords="Coords0" ChoiceValue="ChoiceValue0" Outline="Outline1" HoverFill="HoverFill1"
SelectedFill="SelectedFill1"/>
      <Area Shape="rect" Coords="Coords1" ChoiceValue="ChoiceValue1" Outline="Outline2" HoverFill="HoverFill2"
SelectedFill="SelectedFill2"/>
    </Map>
  </ImageMap>
</ChoiceDataElement>
```

3.2.1.2 Real-world Sample

```
<ChoiceDataElement Id="observationCharacter" IsRequired="true" CdeId="RDE65" DisplaySequence="1">
  <Label>Observation in high risk patient</Label>
  <Hint> Observation : Area with imaging features that differ from those of adjacent liver
    parenchyma \r\n high risk patient:in whom the incidence of HCC is sufficient to justify
    screening or surveillance according to AASLD guidelines </Hint>
  <Diagrams>
    <Diagram>
      <Location>observation.png</Location>
      <Label>observation</Label>
```

```
    </Diagram>
  </Diagrams>

  <VoiceCommand> Observation in high risk patient </VoiceCommand>
  <ChoiceInfo>
    <Choice>
      <Value>treatedObservation</Value>
      <Label>Treated observation</Label>
      <Hint>An observation that has undergone loco-regional treatment</Hint>
    </Choice>
    <Choice>
      <Value>definitelyBenign</Value>
      <Label>Definitely benign</Label>
      <Hint> Cyst Hemangioma Vascular anomaly Perfusion alteration Hepatic fat deposition or
        sparing Hypertrophic pseudomass Confluent fibrosis Focal scar Observation that
        spontaneously disappears at follow-up</Hint>
    </Choice>
    <Choice>
      <Value>probablyBenign</Value>
      <Label>Probably benign</Label>
      <Hint>Probable benign entities (examples) Probable: Cyst Hemangioma Vascular anomaly
        Perfusion alteration Hepatic fat deposition or sparing Hypertrophic pseudomass
        Confluent fibrosis Focal scar LR-2 cirrhosis associated nodule </Hint>
    </Choice>
    <Choice>
      <Value>notDefProbBenign</Value>
      <Label>Neither definite nor probable benign</Label>
    </Choice>
    <Choice>
      <Value>notspecificforhcc</Value>
      <Label>Probable malignancy, not specific for HCC</Label>
      <Hint>Observation is probably malignant, but imaging features are not specific for
        HCC</Hint>
    </Choice>
    <Choice>
      <Value>tumorInVein</Value>
      <Label>Tumor in vein</Label>
      <Hint>Presence of tumor in vein lumen.</Hint>
    </Choice>
  </ChoiceInfo>
</ChoiceDataElement>
```

3.2.2 NumericDataElement

#	Name	Data Type	Description / Usage
1	Id	xsd:ID	DataElement identifier (can be referenced in other parts of module as well as by external systems)

2	CdeId (optional)	xsd:token	Common DataElement Id (intend to refer a standard definition in the ACR/RSNA CDE repository, radelement.org)
3	IsRequired	"true" | "false"	Whether the DataElement is Required or not.
4	DisplaySequence (optional)	xsd:integer	Suggested order in which this DataElement is displayed together with the other DataElements
5	Label	text	Numeric DataElement label (prompt text/display question for entering the value)
6	Hint (optional)	text	Optionally displayed more detailed text for the user describing how the DataElement needs to be filled in.
7	diagrams(optional) Contains one or more diagrams which offer additional information to the user (e.g.: illustrations of how the measurements are to be taken)		

7.1	diagram		
7.1.1	Location	text	Image location
7.1.2	Label	text	Image Label
7.1.3	DisplaySequence(optional)	xsd:integer	Image display sequence if the DataElement contains more than one diagram
7.1.4	IsKeyDiagram(optional)	"true" | "false"	Whether this is the key diagram

8	VoiceCommand (optional)	text	Voice command to find/activate the DataElement
9	Minimum(optional)	xsd:decimal	Minimum allowed value
10	Maximum(optional)	xsd:decimal	Maximum allowed value

3.2.2.1 Sample

```
<NumericDataElement Id="ID000" CdeId="CdeId0" IsRequired="true" DisplaySequence="50">
  <Label>Label0</Label>
  <Hint>Hint0</Hint>
  <Diagrams>
    <Diagram DisplaySequence="0" IsKeyDiagram="true">
      <Location>Location0</Location>
      <Label>Label1</Label>
    </Diagram>
    <Diagram DisplaySequence="0" IsKeyDiagram="true">
      <Location>Location1</Location>
      <Label>Label2</Label>
```

```
    </Diagram>
  </Diagrams>
  <VoiceCommand>VoiceCommand0</VoiceCommand>
  <Minimum>0</Minimum>
  <Maximum>0</Maximum>
</NumericDataElement>
```

3.2.2.2 Real-world Sample

```
<NumericDataElement Id="diameter" IsRequired="true" CdeId="RDE81" DisplaySequence="3">
  <Label>Diameter (mm)</Label>
  <Hint>Size of the lesion (outer edge to outer edge) in mm</Hint>
  <Diagrams>
    <Diagram>
      <Location>diameter1.png</Location>
      <Label></Label>
    </Diagram>
    <Diagram>
      <Location>diameter2.png</Location>
      <Label></Label>
    </Diagram>
    <Diagram>
      <Location>diameter3.png</Location>
      <Label></Label>
    </Diagram>
    <Diagram>
      <Location>diameter4.png</Location>
      <Label></Label>
    </Diagram>
    <Diagram>
      <Location>diameter5.png</Location>
      <Label></Label>
    </Diagram>
  </Diagrams>
  <Minimum>1</Minimum>
</NumericDataElement>
```

3.2.3 IntegerDataElement

#	Name	Data Type	Description / Usage
2.	Id	xsd:ID	DataElement identifier (can be referenced in other parts of module as well as by external systems)
2	CdeId (optional)	xsd:token	Common DataElement Id (intend to refer a standard definition in the ACR/RSNA CDE

			repository, radelement.org)
3	IsRequired	"true" | "false"	Whether the DataElement is Required or not.
4	DisplaySequence (optional)	xsd:integer	Suggested order in which this DataElement is displayed together with the other DataElements
5	Label	text	IntegerDataElement label (prompt text/display question for entering the value)
6	Hint (optional)	text	Optionally displayed more detailed text for the user describing how the DataElement needs to be filled in.
7	diagrams(optional) Contains one or more diagrams which offer additional information to the user (e.g.: illustrations of how the measurements are to be taken)		

7.1	diagram			
	7.1.1	Location	text	Image location
	7.1.2	Label	text	Image Label
	7.1.3	DisplaySequence(optional)	xsd:integer	Image display sequence if the DataElement contains more than one diagram
	7.1.4	IsKeyDiagram(optional)	"true" | "false"	Whether this is the key diagram

8	VoiceCommand (optional)	text	Voice command to find/activate the DataElement
9	Minimum(optional)	xsd:integer	Minimum allowed value
10	Maximum(optional)	xsd:integer	Maximum allowed value

3.2.3.1 Sample

```
<IntegerDataElement Id="ID000" CdeId="CdeId0" IsRequired="true" DisplaySequence="50">
  <Label>Label0</Label>
  <Hint>Hint0</Hint>
  <Diagrams>
    <Diagram DisplaySequence="0" IsKeyDiagram="true">
      <Location>Location0</Location>
      <Label>Label1</Label>
    </Diagram>
    <Diagram DisplaySequence="0" IsKeyDiagram="true">
      <Location>Location1</Location>
      <Label>Label2</Label>
    </Diagram>
```

```
  </Diagrams>
  <VoiceCommand>VoiceCommand0</VoiceCommand>
  <Minimum>0</Minimum>
  <Maximum>0</Maximum>
</IntegerDataElement>
```

3.2.3.2 Real-world Sample

```
<IntegerDataElement Id="patientAge">
  <Label>Age</Label>
</IntegerDataElement>
```

3.2.4 GlobalValue

#	Name	Data Type	Description / Usage
1	Id	xsd:ID	identifier
2	text		Value

3.2.4.1 Sample

```
< Id="ID000">
</GlobalValue>
```

3.2.4.2 Real-world Sample

```
<GlobalValue Id="diameterSmall">10</GlobalValue>
```

3.2.5 MultiChoiceElement

#	Name	Data Type	Description / Usage
3.	Id	xsd:ID	DataElement identifier (can be referenced in other parts of module as well as by external systems)
2	CdeId (optional)	xsd:token	Common DataElement Id (intend to refer a standard definition in the ACR/RSNA CDE repository, radelement.org)
3	IsRequired	"true" | "false"	Whether the DataElement is Required or not.
4	DisplaySequence (optional)	xsd:integer	Suggested order in which this DataElement is displayed together with the other DataElements
5	Label	text	Choice DataElement label (prompt text/display question for entering the value)
6	Hint (optional)	text	Optionally displayed more detailed text for the user describing how the DataElement

			needs to be filled in.
7	diagrams(optional) Contains one or more diagrams which offer additional information to the user (e.g.: illustrations of how the measurements are to be taken)		
7.1	diagram		
7.1.1	Location	text	Image location
7.1.2	Label	text	Image Label
7.1.3	DisplaySequence(optional)	xsd:integer	Image display sequence if the DataElement contains more than one diagram
7.1.4	IsKeyDiagram(optional)	"true" | "false"	Whether this is the key diagram
8	VoiceCommand (optional)	text	Voice command to find/activate the DataElement
9	ChoiceInfo Contains all the possible values for the DataElement, only one value can be selected for a choice DataElement (for questions with multiple choice please use the MultiChoiceDataElement)		
9.1	Choice		
9.1.1	Value	xsd:token	Choice value
9.1.2	Label	text	Choice label (how the choice is intended to be displayed for the user in the GUI)
9.1.3	Hint (optional)	text	Further information on the choice which can be optional (e.g.: as a tooltip)
9.1.4	VoiceCommand (optional)	text	Voice command to select this choice as the value for the DataElement
9.1.5	Default	"true" | "false"	Is this the default choice (if no other choice selected, this will be the value for the DataElement)
9.1.6	ReportText (optional)	text	Text to be inserted into the report when the DataElement value is being inserted into the report.
10	ImageMap (optional) Includes a pointer to the image that can be displayed as an interactive choice/multi choice question. Areas of the images which radiologist click should select one of the given choices. Image must be provided within the assets of the module.		
10.1	imageElements	xsd:anyURI	Image url pointing to the actual image location

10.2	Label(optional)	text	Image Label, text used to referring the image.
10.3	DrawStyle (optional) Draw style used in the image.		

10.3.1	Outline(optional)	text	Default area outline color specified as hex code
10.3.2	HoverFill(optional)	text	Default area fill color when hovering specified as hex code
10.3.3	SelectedFill(optional)	text	Default area fill color when selected specified as hex code

10.4 Map

10.4.1 Area

Specifies region of the image to be which when selected activates a choice automatically. This has same concept as html image map, refer : http://www.w3schools.com/TAGS/tag_map.asp

10.4.1.1	Shape	"rect" | "poly" | "circle"	Supports three different shapes.
10.4.1.2	Coords	text	Image map coordinates
10.4.1.3	ChoiceValue	xsd:token	Choice value for this image map, which will activated when user clicks within the specified coordinates
10.4.1.4	Outline(optional)	text	Area outline color specified as hex code, which overrides the default defined in draw style
10.4.1.5	HoverFill(optional)	text	area fill color when hovering specified as hex code, which overrides the default defined in draw style
10.4.1.6	SelectedFill(optional)	text	area fill color when selected specified as hex code, which overrides the default defined in draw style

3.2.5.1 Sample

```
<MultiChoiceDataElement Id="ID000" CdeId="CdeId0"
  IsRequired="true" DisplaySequence="50">
  <Label>Label0</Label>
  <Hint>Hint0</Hint>
  <Diagrams>
    <Diagram DisplaySequence="0" IsKeyDiagram="true">
      <Location>Location0</Location>
      <Label>Label1</Label>
    </Diagram>
    <Diagram DisplaySequence="0" IsKeyDiagram="true">
      <Location>Location1</Location>
      <Label>Label2</Label>
    </Diagram>
  </Diagrams>
  <VoiceCommand>VoiceCommand0</VoiceCommand>
  <ChoiceInfo>
    <Choice Default="true">
      <Value>Value0</Value>
      <Label>Label3</Label>
      <Hint>Hint1</Hint>
      <VoiceCommand>VoiceCommand1</VoiceCommand>
      <ReportText>ReportText0</ReportText>
    </Choice>
    <Choice Default="true">
      <Value>Value1</Value>
      <Label>Label4</Label>
      <Hint>Hint2</Hint>
      <VoiceCommand>VoiceCommand2</VoiceCommand>
      <ReportText>ReportText1</ReportText>
    </Choice>
    <Choice Default="true">
      <Value>Value2</Value>
      <Label>Label5</Label>
      <Hint>Hint3</Hint>
      <VoiceCommand>VoiceCommand3</VoiceCommand>
      <ReportText>ReportText2</ReportText>
    </Choice>
  </ChoiceInfo>
  <ImageMap>
    <imageElements>http://www.url.com/</imageElements>
    <Label>Label6</Label>
    <DrawStyle Outline="Outline0" HoverFill="HoverFill0" SelectedFill="SelectedFill0"/>
    <Map>
      <Area Shape="rect" Coords="Coords0" ChoiceValue="ChoiceValue0" Outline="Outline1"
        HoverFill="HoverFill1" SelectedFill="SelectedFill1"/>
      <Area Shape="rect" Coords="Coords1" ChoiceValue="ChoiceValue1" Outline="Outline2"
        HoverFill="HoverFill2" SelectedFill="SelectedFill2"/>
```

```
    </Map>
  </ImageMap>
</MultiChoiceDataElement>
```

3.2.5.2 Real-world Sample

```
<MultiChoiceDataElement Id="ancillaryFavoringMalignancy" DisplaySequence="7">
                <Label>Are there Ancillary features favoring malignancy? </Label>
                <Hint>Imaging features that modify likelihood of HCC. In isolation, these features do not permit reliable
categorization of observations and hence are considered ancillary.</Hint>
                <Diagrams>
                        <Diagram>
                                <Location>AF_favoringMal1.png</Location>
                                <Label></Label>
                        </Diagram>
                        <Diagram>
                                <Location>AF_favoringMal2.png</Location>
                                <Label></Label>
                        </Diagram>
                        <Diagram>
                                <Location>AF_favoringMal3.png</Location>
                                <Label></Label>
                        </Diagram>
                </Diagrams>
                <ChoiceInfo>
                        <Choice>
                                <Value>Hepatobiliaryphasehypointensity</Value>
                                <Label>Hepatobiliary phase hypointensity</Label>
                                <Hint>Intensity in the hepatobiliary phase that unequivocally is less than that of the
surrounding liver</Hint>
                                <ReportText>Hepatobiliary phase hypointensity</ReportText>
                        </Choice>
                        <Choice>
                                <Value>Transitionalphasehypointensity</Value>
                                <Label>Transitional phase hypointensity</Label>
                                <Hint> Intensity in the transitional phase that unequivocally is less than that of the
surrounding liver</Hint>
                                <ReportText>Transitional phase hypointensity</ReportText>
                        </Choice>
                        <Choice>
                                <Value>Mild-moderateT2hyperintensity</Value>
                                <Label>Mild-moderate T2 hyperintensity</Label>
                                <Hint>Having mildly or moderately higher signal intensity on T2w images than
liver.</Hint>
                                <ReportText>Mild-moderate T2 hyperintensity</ReportText>
                        </Choice>
                        <Choice>
                                <Value>Restricteddiffusion</Value>
                                <Label>Restricted diffusion</Label>
                                <ReportText>Restricted diffusion</ReportText>
```

```
                    </Choice>
                    <Choice>
                        <Value>Distinctiverim</Value>
                        <Label>Distinctive rim</Label>
                        <Hint>Features that specifically favor HCC as opposed to malignancy in general</Hint>
                        <ReportText>Distinctive rim</ReportText>
                    </Choice>
                    <Choice>
                        <Value>Coronaenhancement</Value>
                        <Label>Coronaenhancement</Label>
                        <Hint>Zone or rim of peri-observation enhancement in the late arterial phase or early
portal venous phase occurring after rapid dissipation of contrast material from an arterial phase hyperenhancing
mass.</Hint>
                        <ReportText>Coronaenhancement</ReportText>
                    </Choice>
                    <Choice>
                        <Value>Mosaicarchitecture</Value>
                        <Label>Mosaic architecture</Label>
                        <Hint>Observation that appears to consist of nodules or compartments with differing
appearances (enhancement, attenuation, intensity).  This term can also be applied to lesions with internal enhancing
septations. The nodules, compartments, or septations appear randomly distributed within the observation.</Hint>
                        <ReportText>Mosaic architecture</ReportText>
                    </Choice>
                    <Choice>
                        <Value>Nodule-in-nodulearchitecture</Value>
                        <Label>Nodule-in-nodulearchitecture</Label>
                        <Hint>One or more nodular or nodule-like observations within a larger nodular or
nodular-like observation. </Hint>
                        <ReportText>Nodule-in-nodulearchitecture</ReportText>
                    </Choice>
                    <Choice>
                        <Value>Intra-lesionalfat</Value>
                        <Label>Intra-lesional fat</Label>
                        <Hint>Presence of lipid in higher concentration within a mass than in background
reference tissue (e.g. liver).</Hint>
                        <ReportText>Intra-lesional fat</ReportText>
                    </Choice>
                    <Choice>
                        <Value>Lesionalironsparing</Value>
                        <Label>Lesional iron sparing</Label>
                        <Hint>Relative paucity of iron in a solid mass compared to that of background reference
tissue (e.g. iron-overloaded liver).</Hint>
                        <ReportText>Lesional iron sparing</ReportText>
                    </Choice>
                    <Choice>
                        <Value>Lesionalfatsparing</Value>
                        <Label>Lesional fat sparing</Label>
                        <Hint>Relative paucity of fat in solid mass compared to that of background reference
tissue (e.g. fatty liver).</Hint>
                        <ReportText>Lesional fat sparing</ReportText>
                    </Choice>
```

```
                    <Choice>
                        <Value>Bloodproducts</Value>
                        <Label>Blood products</Label>
                        <Hint>Presence of intra-lesional or peri-lesional hemorrhage in absence of biopsy, trauma or intervention.</Hint>
                        <ReportText>Blood products</ReportText>
                    </Choice>
                    <Choice>
                        <Value>Diameter increaselessthanthresholdgrowth</Value>
                        <Label>Diameter increase less than threshold growth</Label>
                        <Hint>Unequivocal increase in the diameter of an observation, measured on examinations performed on different dates, which is not attributable to artifact, differences in technique between the two examinations, or measurement error.</Hint>
                        <ReportText>Diameter increase less than threshold growth</ReportText>
                    </Choice>
                </ChoiceInfo>
            </MultiChoiceDataElement>
```

3.2.6 ComputedElement

#	Name	Data Type	Description / Usage
1	Id	xsd:ID	DataElement identifier (can be referenced in other parts of module as well as by external systems)
2	DisplaySequence(optional)	xsd:integer	Suggested order in which this DataElement is displayed together with the other DataElements
3	ShowValue(optional)	"true" | "false"	If true, then the computed value of the ComputedDataElement should be displayed in the interface of the reporting framework.
4	Label(optional)	Text	Computed DataElement label
5	Hint(optional)	text	Optionally displayed more detailed text for the user describing more details about the DataElement.
6	Diagrams(optional) Contains one or more diagrams which offer additional information to the user (e.g.: illustrations of how the measurements are to be taken		

6.1	diagram			
	6.1.1	Location	text	Image location
	6.1.2	Label	text	Image Label
	6.1.3	DisplaySequence(optional)	xsd:integer	Image display sequence if the DataElement contains more than one diagram

	6.1.4	IsKeyDiagram(optional)	"true" | "false"	Whether this is the key diagram
7	ArithmeticExpression		text	Arithmetic expression which will be evaluated to produce the output. This can include values from other DataElement, basic arithmetic operators, many core mathematical functions
8	TextExpression Text expression is the desired computed output value of the computed DataElement, which can include reference to other DataElements.			
	8.1	text		Text Expression.
	8.2	InsertValue Can be used to insert the value of a Dataelement		
		8.2.1 DataElementId	xsd:IDREF	The value of this Dataelement will be inserted
		8.2.2 SignificantDigits(optional)	xsd:integer	This is applicable if the DataElement referred is a NumericDataElement. This defines the number of decimal points can be inserted into the report text.
9	DecisionPoint Text expression can be written as simple text expression, which will be returned as the value of the computed element. It is also possible to insert any Dataelement value in the expression. Contains different Braches each meets a unique condition.			
	9.1	Branch ConditionType Below are the possible conditions in a branch. Condition type enable comparing DataElements to one another to fixed values, operators allows combination of conditions itself		
		9.1.1 AndCondition		It contains conditions if all of those evaluate to true then it evaluates to true
		9.1.2 OrCondition		It contains conditions if any of those evaluate to true then it evaluates to true
		9.1.3 NotCondition		It contains conditions if all of those evaluate to false then it evaluates to true.
		9.1.4 EqualCondition		

Compare a DataElement to a given value and evaluated to “true” if they are equal

comparisonConditionContents

9.1.4.1	dataElementIdAttribute DataElement used for comparison		
9.1.4.1.1	DataElementId	xsd:IDREF	DataElementId to be compared
9.1.4.2	ComparisonValue	xsd:token	Comparison value. Could be an id of a DataElement or a constant value.

9.1.5 GreaterThanCondition

Checks whether DataElement value is greater than given value and evaluated to “true” if so.

9.1.5.1	dataElementIdAttribute DataElement used for comparison		
9.1.5.1.1	DataElementId	xsd:IDREF	DataElementId to be compared
9.1.5.2	ComparisonValue	xsd:token	Comparison value. Could be an id of a DataElement or a constant value.

9.1.6 LessThanCondition

Checks whether DataElement value is lesser than given value and evaluated to “true” if so

9.1.6.1	dataElementIdAttribute DataElement used for comparison		
9.1.6.1.1	DataElementId	xsd:IDREF	DataElementId to be compared
9.1.6.2	ComparisonValue	xsd:token	Comparison value. Could be an id of a DataElement or a constant value.

9.1.7	GreaterThanOrEqualsCondition Checks whether DataElement value is greater than or equal to given value and evaluated to “true” if so		
9.1.7.1	dataElementIdAttribute DataElement used for comparison		
9.1.7.1.1	DataElementId	xsd:IDREF	DataElementId to be compared
9.1.7.2	ComparisonValue	xsd:token	Comparison value. Could be an id of a DataElement or a constant value.
9.1.8	LessThanOrEqualsCondition Checks whether DataElement value is lesser than or equal to given value and evaluated to “true” if so		
9.1.8.1	dataElementIdAttribute DataElement used for comparison		
9.1.8.1.1	DataElementId	xsd:IDREF	DataElementId to be compared
9.1.8.2	ComparisonValue	xsd:token	Comparison value. Could be an id of a DataElement or a constant value.
9.1.9	ContainsCondition Checks whether any part of the DataElement matches with the given value and evaluated to “true” if so		
9.1.9.1	dataElementIdAttribute DataElement used to check contains condition		
9.1.9.1.1	DataElementId	xsd:IDREF	DataElementId to be checked
9.1.9.2	ComparisonValue	xsd:token	Comparison value. Could be a constant value.

		9.1.10	HasAnyNChoicesCondition This can be used to compare the number of choices selected from a MultiChoice DataElement and evaluated to “true” if so		
			9.1.10.1	dataElementIdAttribute DataElement used to check contains condition	
				9.1.10.1.1 DataElementId	xsd:IDREF — MultiChoice DataElementId to be checked
			9.1.10.2	MinimumChoices	xsd:positiveInteger — Constant value which can be compared with the number of choices selected.
	9.2	Recursive. Can be ArithmeticExpression, TextExpression or DecisionPoint			
10	DefaultBranch Recursive. Can be ArithmeticExpression, TextExpression or DecisionPoint				

3.2.6.1 Sample:

```
<ComputedDataElement Id="ID000" DisplaySequence="50" ShowValue="false">
  <Label>Label0</Label>
  <Hint>Hint0</Hint>
  <Diagrams>
    <Diagram DisplaySequence="0" IsKeyDiagram="true">
      <Location>Location0</Location>
      <Label>Label1</Label>
    </Diagram>
    <Diagram DisplaySequence="0" IsKeyDiagram="true">
      <Location>Location1</Location>
      <Label>Label2</Label>
    </Diagram>
  </Diagrams>
  <DecisionPoint>
    <Branch>
      <AndCondition>
        <LessThanCondition DataElementId="ID000" ComparisonValue="ComparisonValue0"/>
        <NotCondition>
        </NotCondition>
        <GreaterThanCondition DataElementId="ID000" ComparisonValue="ComparisonValue1"/>
      </AndCondition>
      <DecisionPoint/>
    </Branch>
    <Branch>
      <LessThanCondition DataElementId="ID000" ComparisonValue="ComparisonValue2"/>
      <DecisionPoint/>
```

```
    </Branch>
    <DefaultBranch>
      <ArithmeticExpression>ArithmeticExpression0</ArithmeticExpression>
    </DefaultBranch>
  </DecisionPoint>
</ComputedElement>
```

3.2.6.2 Real-world Sample

```
<ComputedDataElement Id="washoutcapsulethreshold">
  <DecisionPoint>
    <Branch>
      <AndCondition>
        <EqualCondition DataElementId="washout" ComparisonValue="no"/>
        <EqualCondition DataElementId="capsule" ComparisonValue="no"/>
        <EqualCondition DataElementId="thresholdgrowth" ComparisonValue="no"/>
      </AndCondition>
      <TextExpression>None</TextExpression>
    </Branch>
    <Branch>
      <OrCondition>
        <AndCondition>
          <EqualCondition DataElementId="washout" ComparisonValue="yes"/>
          <EqualCondition DataElementId="capsule" ComparisonValue="no"/>
          <EqualCondition DataElementId="thresholdgrowth" ComparisonValue="no"/>
        </AndCondition>

        <AndCondition>
          <EqualCondition DataElementId="washout" ComparisonValue="no"/>
          <EqualCondition DataElementId="capsule" ComparisonValue="yes"/>
          <EqualCondition DataElementId="thresholdgrowth" ComparisonValue="no"/>
        </AndCondition>

        <AndCondition>
          <EqualCondition DataElementId="washout" ComparisonValue="no"/>
          <EqualCondition DataElementId="capsule" ComparisonValue="no"/>
          <EqualCondition DataElementId="thresholdgrowth" ComparisonValue="yes"/>
        </AndCondition>
      </OrCondition>
      <TextExpression>One</TextExpression>
    </Branch>
    <DefaultBranch>
      <TextExpression>twoormore</TextExpression>
    </DefaultBranch>
  </DecisionPoint>
</ComputedElement>


<ComputedElement Id="famHxLungCancerFactor">
  <DecisionPoint>
```

```
    <Branch>
      <EqualCondition DataElementId="famHxLungCancer" ComparisonValue="true"/>
      <ArithmeticExpression>0.2961</ArithmeticExpression>
    </Branch>
    <DefaultBranch>
      <ArithmeticExpression>0</ArithmeticExpression>
    </DefaultBranch>
  </DecisionPoint>
</ComputedElement>
```

3.3 Rules

The Rules section consists of a root DecisionPoint element containing multiple Branch elements, each of which consists of a condition which if true leads to a DecisionPoint element or to an EndPointRef element.

<table>
<tr><th>#</th><th>Name</th><th>Data Type</th><th>Description / Usage</th></tr>
<tr><td>1</td><td>Id</td><td>xsd:ID</td><td>Identifier</td></tr>
<tr><td>2</td><td>Label</td><td>text</td><td>Decision point label.</td></tr>
<tr><td>3</td><td>Description(optional)</td><td>text</td><td>Decision point description</td></tr>
<tr><td>4</td><td colspan="3">Branch
A branch either ends on an endpoint or on a decision point. The decision point can contain one more branches based on different conditions.

<table>
<tr><td>4.1</td><td>Label(optional)</td><td>text</td><td></td></tr>
<tr><td>4.2</td><td colspan="3">NotRelevantDataElements(optional)
This property can be used to specify the list the DataElements which are not relevant down this branch. It is suggested that NotRelevantDataElements been either deactivated or hide on this branch.

<table>
<tr><td>4.2.1.1</td><td colspan="3">DataElementRef

<table>
<tr><td>4.2.1.1.1</td><td>DataElementId</td><td>xsd:IDREF</td><td>Dataelement identifier which is no relevant</td></tr>
</table>
</td></tr>
</table>
</td></tr>
<tr><td>4.3</td><td>AndCondition</td><td></td><td>It contains conditions if all of those evaluate to true then it evaluates to true</td></tr>
<tr><td>4.4</td><td>OrCondition</td><td></td><td>It contains conditions if any of those evaluate to true then it evaluates to true</td></tr>
<tr><td>4.5</td><td>NotCondition</td><td></td><td>It contains conditions if all of those evaluate to false then it evaluates to true.</td></tr>
</table>
</td></tr>
</table>

4.6 EqualCondition

Compare a DataElement to a given value and evaluated to “true” if they are equal

4.6.1	DataElementId	xsd:IDREF	DataElementId to be compared.
4.6.2	ComparisonValue	xsd:token	Comparison value. Could be an id of a DataElement or a constant value.

4.7 GreaterThanCondition

Checks whether DataElement value is greater than given value and evaluated to “true” if so.

4.7.1	DataElementId	xsd:IDREF	DataElementId to be compared.
4.7.2	ComparisonValue	xsd:token	Comparison value. Could be an id of a DataElement or a constant value.

4.8 LessThanCondition

Checks whether DataElement value is lesser than given value and evaluated to “true” if so

4.8.1	DataElementId	xsd:IDREF	DataElementId to be compared.
4.8.2	ComparisonValue	xsd:token	Comparison value. Could be an id of a DataElement or a constant value.

4.9 GreaterThanOrEqualsCondition

Checks whether DataElement value is greater than or equal to given value and evaluated to “true” if so

4.9.1	DataElementId	xsd:IDREF	DataElementId to be compared.
4.9.2	ComparisonValue	xsd:token	Comparison value. Could be an id of a DataElement or a constant value.

4.10 LessThanOrEqualsCondition

Checks whether DataElement value is lesser than or equal to given value and evaluated to “true” if so

4.10.1	DataElementId	xsd:IDREF	DataElementId to be compared.
4.10.2	ComparisonValue	xsd:token	Comparison value. Could be an id of a DataElement or a constant value.

4.11	ContainsCondition Checks whether any part of the DataElement matches with the given value and evaluated to "true" if so	
	4.11.1 DataElementId — xsd:IDREF — DataElementId to be compared. 4.11.2 ComparisonValue — xsd:token — Comparison value. Could be an id of a DataElement or a constant value.	
4.12	HasAnyNChoicesCondition This can be used to compare the number of choices selected from a MultiChoice DataElement and evaluated to "true" if so	
	4.12.1 DataElementId — xsd:IDREF — DataElementId to be compared. 4.12.2 ComparisonValue — xsd:token — Comparison value. Could be an id of a DataElement or a constant value.	
4.13	EndpointRef Reference to the endpoint which is the output of the rule set.	
	4.13.1 EndPointId — xsd:IDREF — The endpoint id reference. 4.13.2 Label(optional) — text — Endpoint reference label, which can be used in reference documentation and/or graphical representations. 4.13.3 Description(optional) — text — Endpoint reference description	
4.14	DecisionPoint Recursive, starts another DecisionPoint	

5	DefaultBranch(optional) Default branch if no other branch in the decision point that evaluates to true	
5.1	Label(optional)	text — Default branch label, which can be used in reference documentation and/or graphical representations.
5.2	NotRelevantDataElements(optional) This property can be used to specify the list the DataElements which are not relevant down this branch. It is suggested that nonrelevantDataElements been either deactivated or hide on this branch. 5.2 DataElementRef	

	.1.	5.2.1.1 DataElementId — xsd:IDREF — DataElementId which is not relevant
5.3	EndpointRef Reference to the endpoint which is the output of the rule set	
	5.3.1 EndPointId — xsd:IDREF — The endpoint id reference.	
	5.3.2 Label(optional) — text — Endpoint reference label, which can be used in reference documentation and/or graphical representations	
	5.3.3 Description(optional) — text — Endpoint reference description	
5.4	DecisionPoint Recursive, starts another DecisionPoint	

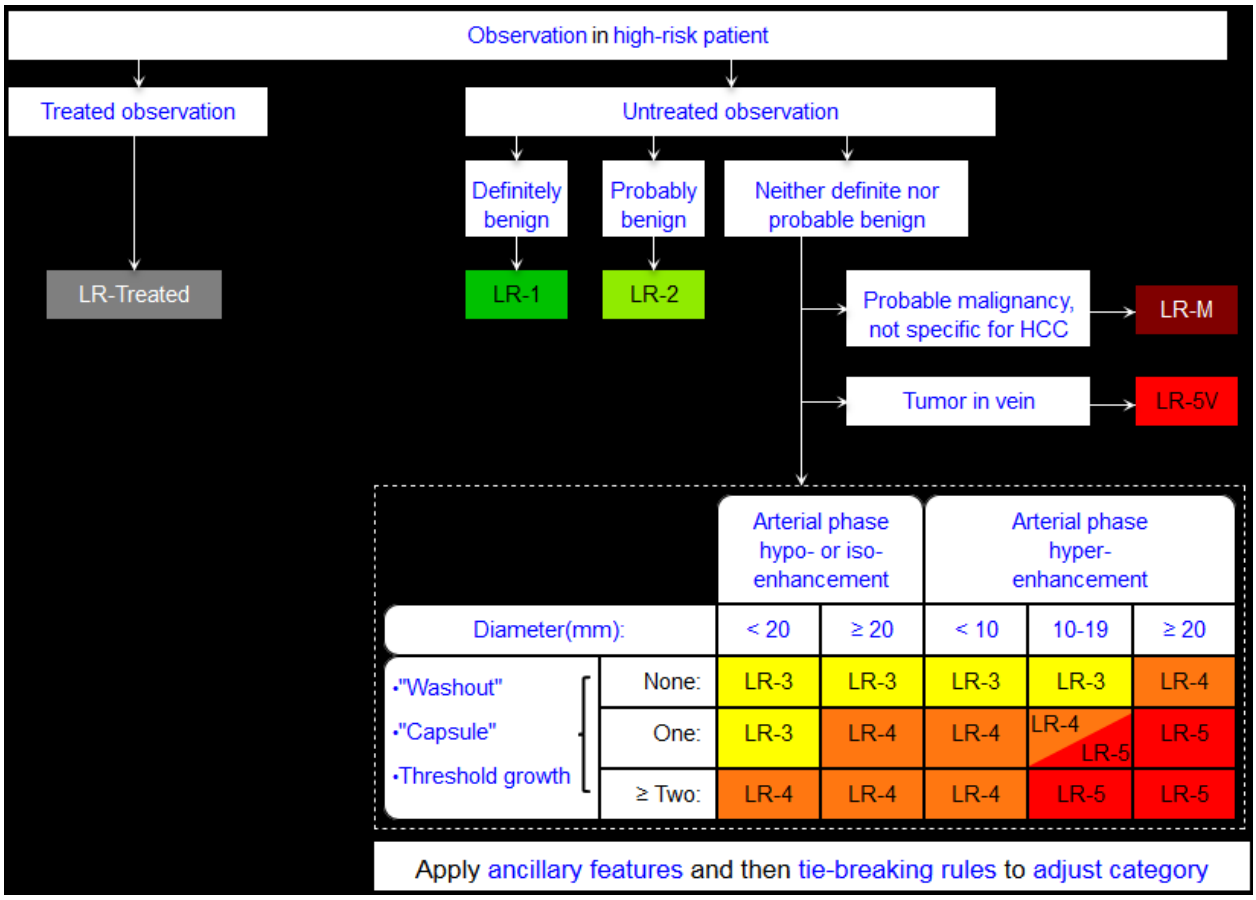
3.3.1 Sample

```
<Rules >
  <DecisionPoint>
    <Label>Label0</Label>
    <Description>Description0</Description>
    <Branch>
      <Label>Label1</Label>
      <NotRelevantDataElements>
        <DataElementRef DataElementId="ID000"/>
        <DataElementRef DataElementId="ID001"/>
      </NotRelevantDataElements>
      <EqualCondition DataElementId="ID002" ComparisonValue="ComparisonValue0"/>
      <DecisionPoint/>
    </Branch>
    <Branch>
      <Label>Label2</Label>
      <NotRelevantDataElements>
        <DataElementRef DataElementId="ID003"/>
        <DataElementRef DataElementId="ID004"/>
      </NotRelevantDataElements>
      <OrCondition>
        <AndCondition> </AndCondition>
        <GreaterThanOrEqualsCondition DataElementId="ID005"
          ComparisonValue="ComparisonValue1"/>
        <ContainsCondition DataElementId="ID006" ComparisonValue="ComparisonValue2"/>
      </OrCondition>
      <DecisionPoint/>
```

```
    </Branch>
    <DefaultBranch>
      <Label>Label3</Label>
      <NotRelevantDataElements>
        <DataElementRef DataElementId="ID007"/>
        <DataElementRef DataElementId="ID008"/>
      </NotRelevantDataElements>
      <DecisionPoint/>
    </DefaultBranch>
  </DecisionPoint>
</Rules>
```

3.3.2 Real-world Sample

Hello_RADs diagram and its Rules section representation.




```
<Rules>
  <DecisionPoint>
    <Label>Observation character</Label>
    <Branch>
      <Label>Treated Observation</Label>
      <NotRelevantDataElements>
```

```
        <DataElementRef DataElementId="diameter"/>
        <DataElementRef DataElementId="arterialEnhancement"/>
        <DataElementRef DataElementId="washout"/>
        <DataElementRef DataElementId="capsule"/>
        <DataElementRef DataElementId="thresholdgrowth"/>
        <DataElementRef DataElementId="ancillaryFavoringMalignancy"/>
        <DataElementRef DataElementId="ancillaryFavoringBenignity"/>
        <DataElementRef DataElementId="adjustcategorybasedonAncillary"/>
      </NotRelevantDataElements>
      <EqualCondition DataElementId="observationCharacter"
        ComparisonValue="treatedObservation"/>
      <EndPointRef EndPointId="hcctreatedEp"/>
    </Branch>
    <Branch>
      <Label>Definitely Benign</Label>
      <NotRelevantDataElements>
        <DataElementRef DataElementId="diameter"/>
        <DataElementRef DataElementId="arterialEnhancement"/>
        <DataElementRef DataElementId="washout"/>
        <DataElementRef DataElementId="capsule"/>
        <DataElementRef DataElementId="thresholdgrowth"/>
        <DataElementRef DataElementId="ancillaryFavoringMalignancy"/>
        <DataElementRef DataElementId="ancillaryFavoringBenignity"/>
        <DataElementRef DataElementId="adjustcategorybasedonAncillary"/>
      </NotRelevantDataElements>
      <EqualCondition DataElementId="observationCharacter" ComparisonValue="definitelyBenign"/>
      <EndPointRef EndPointId="hcc1Ep"/>
    </Branch>
    <Branch>
      <Label>Probably Benign</Label>
      <NotRelevantDataElements>
        <DataElementRef DataElementId="diameter"/>
        <DataElementRef DataElementId="arterialEnhancement"/>
        <DataElementRef DataElementId="washout"/>
        <DataElementRef DataElementId="capsule"/>
        <DataElementRef DataElementId="thresholdgrowth"/>
        <DataElementRef DataElementId="ancillaryFavoringMalignancy"/>
        <DataElementRef DataElementId="ancillaryFavoringBenignity"/>
        <DataElementRef DataElementId="adjustcategorybasedonAncillary"/>
      </NotRelevantDataElements>
      <EqualCondition DataElementId="observationCharacter" ComparisonValue="probablyBenign"/>
      <EndPointRef EndPointId="hcc2Ep"/>
    </Branch>
    <Branch>
      <Label>Probable malignancy, not specific for HCC</Label>
      <NotRelevantDataElements>
        <DataElementRef DataElementId="diameter"/>
        <DataElementRef DataElementId="arterialEnhancement"/>
        <DataElementRef DataElementId="washout"/>
        <DataElementRef DataElementId="capsule"/>
        <DataElementRef DataElementId="thresholdgrowth"/>
```

```
        <DataElementRef DataElementId="ancillaryFavoringMalignancy"/>
        <DataElementRef DataElementId="ancillaryFavoringBenignity"/>
        <DataElementRef DataElementId="adjustcategorybasedonAncillary"/>
      </NotRelevantDataElements>
      <EqualCondition DataElementId="observationCharacter" ComparisonValue="notspecificforhcc"/>
      <EndPointRef EndPointId="hccmEp"/>
    </Branch>
    <Branch>
      <Label>Tumor in vein</Label>
      <NotRelevantDataElements>
        <DataElementRef DataElementId="diameter"/>
        <DataElementRef DataElementId="arterialEnhancement"/>
        <DataElementRef DataElementId="washout"/>
        <DataElementRef DataElementId="capsule"/>
        <DataElementRef DataElementId="thresholdgrowth"/>
        <DataElementRef DataElementId="ancillaryFavoringMalignancy"/>
        <DataElementRef DataElementId="ancillaryFavoringBenignity"/>
        <DataElementRef DataElementId="adjustcategorybasedonAncillary"/>
      </NotRelevantDataElements>
      <EqualCondition DataElementId="observationCharacter" ComparisonValue="tumorInVein"/>
      <EndPointRef EndPointId="hcc5vEp"/>
    </Branch>
    <Branch>
      <Label>Neither definite nor probable benign</Label>
      <AndCondition>
        <EqualCondition DataElementId="observationCharacter"
          ComparisonValue="notDefProbBenign"/>
        <EqualCondition DataElementId="adjustcategorybasedonAncillary" ComparisonValue="No"
        />
      </AndCondition>
      <DecisionPoint>
        <Label>Arterial phase enhancement</Label>
        <Branch>
          <Label>Hyper-enhancement</Label>
          <!-- Hyper-enhancement -->
          <EqualCondition DataElementId="arterialEnhancement"
            ComparisonValue="hyperEnhancing"/>
          <DecisionPoint>
            <Label>Diameter</Label>
            <Branch>
              <Label>&lt; 10</Label>
              <!-- Diameter < 10 -->
              <LessThanCondition DataElementId="diameter"
                ComparisonValue="diameterSmall"/>
              <DecisionPoint>
                <Label>Washout/Capsule/Thresholdgrowth</Label>
                <Branch>
                  <Label>None</Label>
                  <!-- None / Zero Y's -->
                  <AndCondition>
                    <EqualCondition DataElementId="washout" ComparisonValue="no"/>
```

```
                    <EqualCondition DataElementId="capsule" ComparisonValue="no"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="no"/>
                  </AndCondition>
                  <EndPointRef EndPointId="hcc3Ep"/>
                </Branch>
                <Branch>
                  <Label>One</Label>
                  <!-- One / One Y -->
                  <OrCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="yes"/>
                      <!-- Washout = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="no"/>
                      <EqualCondition DataElementId="thresholdgrowth"
                        ComparisonValue="no"/>
                    </AndCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="no"/>
                      <!-- Capsule = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="yes"/>
                      <EqualCondition DataElementId="thresholdgrowth"
                        ComparisonValue="no"/>
                    </AndCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="no"/>
                      <!-- Thresholdgrowth = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="no"/>
                      <EqualCondition DataElementId="thresholdgrowth"
                        ComparisonValue="yes"/>
                    </AndCondition>
                  </OrCondition>
                  <EndPointRef EndPointId="hcc4Ep"/>
                </Branch>
                <Branch>
                  <Label>Two or More</Label>
                  <!-- Two / Two or more Y's -->
                  <OrCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="yes"/>
                      <!-- Washout = Yes, Capsule = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="yes"/>
                      <EqualCondition DataElementId="thresholdgrowth"
```

```
                    ComparisonValue="no"/>
                </AndCondition>
                <AndCondition>
                  <EqualCondition DataElementId="washout"
                    ComparisonValue="yes"/>
                  <!-- Washout = Yes, Thresholdgrowth = Yes -->
                  <EqualCondition DataElementId="capsule"
                    ComparisonValue="no"/>
                  <EqualCondition DataElementId="thresholdgrowth"
                    ComparisonValue="yes"/>
                </AndCondition>
                <AndCondition>
                  <EqualCondition DataElementId="washout"
                    ComparisonValue="no"/>
                  <!-- Capsule = Yes, Thresholdgrowth = Yes -->
                  <EqualCondition DataElementId="capsule"
                    ComparisonValue="yes"/>
                  <EqualCondition DataElementId="thresholdgrowth"
                    ComparisonValue="yes"/>
                </AndCondition>
                <AndCondition>
                  <EqualCondition DataElementId="washout"
                    ComparisonValue="yes"/>
                  <!-- Washout = Yes, Capsule = Yes, Thresholdgrowth = Yes -->
                  <EqualCondition DataElementId="capsule"
                    ComparisonValue="yes"/>
                  <EqualCondition DataElementId="thresholdgrowth"
                    ComparisonValue="yes"/>
                </AndCondition>
              </OrCondition>
              <EndPointRef EndPointId="hcc4Ep"/>
            </Branch>
          </DecisionPoint>
        </Branch>
        <Branch>
          <Label>10-19</Label>
          <!-- 10 <= Diameter <= 19 -->
          <AndCondition>
            <GreaterThanOrEqualsCondition DataElementId="diameter"
              ComparisonValue="diameterSmall"/>
            <LessThanOrEqualsCondition DataElementId="diameter"
              ComparisonValue="19"/>
          </AndCondition>
          <DecisionPoint>
            <Label>Washout/Capsule/Thresholdgrowth</Label>
            <Branch>
              <Label>None</Label>
              <!-- None / Zero Y's -->
              <AndCondition>
                <EqualCondition DataElementId="washout" ComparisonValue="no"/>
                <EqualCondition DataElementId="capsule" ComparisonValue="no"/>
```

```
            <EqualCondition DataElementId="thresholdgrowth"
              ComparisonValue="no"/>
          </AndCondition>
          <EndPointRef EndPointId="hcc3Ep"/>
        </Branch>
        <Branch>
          <Label>One</Label>
          <!-- One / One Y -->
          <OrCondition>
            <AndCondition>
              <EqualCondition DataElementId="washout"
                ComparisonValue="yes"/>
              <!-- Washout = Yes -->
              <EqualCondition DataElementId="capsule"
                ComparisonValue="no"/>
              <EqualCondition DataElementId="thresholdgrowth"
                ComparisonValue="no"/>
            </AndCondition>
            <AndCondition>
              <EqualCondition DataElementId="washout"
                ComparisonValue="no"/>
              <!-- Capsule = Yes -->
              <EqualCondition DataElementId="capsule"
                ComparisonValue="yes"/>
              <EqualCondition DataElementId="thresholdgrowth"
                ComparisonValue="no"/>
            </AndCondition>
            <AndCondition>
              <EqualCondition DataElementId="washout"
                ComparisonValue="no"/>
              <!-- Thresholdgrowth = Yes -->
              <EqualCondition DataElementId="capsule"
                ComparisonValue="no"/>
              <EqualCondition DataElementId="thresholdgrowth"
                ComparisonValue="yes"/>
            </AndCondition>
          </OrCondition>
          <EndPointRef EndPointId="hcc4_5"/>
        </Branch>
        <Branch>
          <Label>Two or More</Label>
          <!-- Two / Two or more Y's -->
          <OrCondition>
            <AndCondition>
              <EqualCondition DataElementId="washout"
                ComparisonValue="yes"/>
              <!-- Washout = Yes, Capsule = Yes -->
              <EqualCondition DataElementId="capsule"
                ComparisonValue="yes"/>
              <EqualCondition DataElementId="thresholdgrowth"
                ComparisonValue="no"/>
```

```
                    </AndCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="yes"/>
                      <!-- Washout = Yes, Thresholdgrowth = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="no"/>
                      <EqualCondition DataElementId="thresholdgrowth"
                        ComparisonValue="yes"/>
                    </AndCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="no"/>
                      <!-- Capsule = Yes, Thresholdgrowth = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="yes"/>
                      <EqualCondition DataElementId="thresholdgrowth"
                        ComparisonValue="yes"/>
                    </AndCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="yes"/>
                      <!-- Washout = Yes, Capsule = Yes, Thresholdgrowth = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="yes"/>
                      <EqualCondition DataElementId="thresholdgrowth"
                        ComparisonValue="yes"/>
                    </AndCondition>
                  </OrCondition>
                  <EndPointRef EndPointId="hcc5Ep"/>
                </Branch>
              </DecisionPoint>
            </Branch>
            <Branch>
              <Label>&amp;gt;= 20</Label>
              <!-- Diameter >= 20 -->
              <GreaterThanOrEqualsCondition DataElementId="diameter"
                ComparisonValue="diameterLarge"/>
              <DecisionPoint>
                <Label>Washout/Capsule/Thresholdgrowth</Label>
                <Branch>
                  <Label>None</Label>
                  <!-- None / Zero Y's -->
                  <AndCondition>
                    <EqualCondition DataElementId="washout" ComparisonValue="no"/>
                    <EqualCondition DataElementId="capsule" ComparisonValue="no"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="no"/>
                  </AndCondition>
                  <EndPointRef EndPointId="hcc4Ep"/>
                </Branch>
```

```
                <Branch>
                  <Label>One</Label>
                  <!-- One / One Y -->
                  <OrCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="yes"/>
                      <!-- Washout = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="no"/>
                      <EqualCondition DataElementId="thresholdgrowth"
                        ComparisonValue="no"/>
                    </AndCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="no"/>
                      <!-- Capsule = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="yes"/>
                      <EqualCondition DataElementId="thresholdgrowth"
                        ComparisonValue="no"/>
                    </AndCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="no"/>
                      <!-- Thresholdgrowth = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="no"/>
                      <EqualCondition DataElementId="thresholdgrowth"
                        ComparisonValue="yes"/>
                    </AndCondition>
                  </OrCondition>
                  <EndPointRef EndPointId="hcc5Ep"/>
                </Branch>
                <Branch>
                  <Label>Two or More</Label>
                  <!-- Two / Two or more Y's -->
                  <OrCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="yes"/>
                      <!-- Washout = Yes, Capsule = Yes -->
                      <EqualCondition DataElementId="capsule"
                        ComparisonValue="yes"/>
                      <EqualCondition DataElementId="thresholdgrowth"
                        ComparisonValue="no"/>
                    </AndCondition>
                    <AndCondition>
                      <EqualCondition DataElementId="washout"
                        ComparisonValue="yes"/>
                      <!-- Washout = Yes, Thresholdgrowth = Yes -->
```

```
                    <EqualCondition DataElementId="capsule"
                      ComparisonValue="no"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="yes"/>
                  </AndCondition>
                  <AndCondition>
                    <EqualCondition DataElementId="washout"
                      ComparisonValue="no"/>
                    <!-- Capsule = Yes, Thresholdgrowth = Yes -->
                    <EqualCondition DataElementId="capsule"
                      ComparisonValue="yes"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="yes"/>
                  </AndCondition>
                  <AndCondition>
                    <EqualCondition DataElementId="washout"
                      ComparisonValue="yes"/>
                    <!-- Washout = Yes, Capsule = Yes, Thresholdgrowth = Yes -->
                    <EqualCondition DataElementId="capsule"
                      ComparisonValue="yes"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="yes"/>
                  </AndCondition>
                </OrCondition>
                <EndPointRef EndPointId="hcc5Ep"/>
              </Branch>
            </DecisionPoint>
          </Branch>
        </DecisionPoint>
      </Branch>
      <Branch>
        <Label>Hypo/Iso-enhancing</Label>
        <!-- Hypo/Iso-enhancement -->
        <OrCondition>
          <EqualCondition DataElementId="arterialEnhancement"
            ComparisonValue="hypoEnhancing"/>
          <EqualCondition DataElementId="arterialEnhancement"
            ComparisonValue="isoEnhancing"/>
        </OrCondition>
        <DecisionPoint>
          <Label>Diameter</Label>
          <Branch>
            <Label>&amp;lt; 20</Label>
            <!-- Diameter < 20 -->
            <LessThanCondition DataElementId="diameter"
              ComparisonValue="diameterLarge"/>
            <DecisionPoint>
              <Label>Washout/Capsule/Thresholdgrowth</Label>
              <Branch>
                <Label>None</Label>
                <!-- None / Zero Y's -->
```

```
                <AndCondition>
                  <EqualCondition DataElementId="washout" ComparisonValue="no"/>
                  <EqualCondition DataElementId="capsule" ComparisonValue="no"/>
                  <EqualCondition DataElementId="thresholdgrowth"
                    ComparisonValue="no"/>
                </AndCondition>
                <EndPointRef EndPointId="hcc3Ep"/>
              </Branch>
              <Branch>
                <Label>One</Label>
                <!-- One / One Y -->
                <OrCondition>
                  <AndCondition>
                    <EqualCondition DataElementId="washout"
                      ComparisonValue="yes"/>
                    <!-- Washout = Yes -->
                    <EqualCondition DataElementId="capsule"
                      ComparisonValue="no"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="no"/>
                  </AndCondition>
                  <AndCondition>
                    <EqualCondition DataElementId="washout"
                      ComparisonValue="no"/>
                    <!-- Capsule = Yes -->
                    <EqualCondition DataElementId="capsule"
                      ComparisonValue="yes"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="no"/>
                  </AndCondition>
                  <AndCondition>
                    <EqualCondition DataElementId="washout"
                      ComparisonValue="no"/>
                    <!-- Thresholdgrowth = Yes -->
                    <EqualCondition DataElementId="capsule"
                      ComparisonValue="no"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="yes"/>
                  </AndCondition>
                </OrCondition>
                <EndPointRef EndPointId="hcc3Ep"/>
              </Branch>
              <Branch>
                <Label>Two or More</Label>
                <!-- Two / Two or more Y's -->
                <OrCondition>
                  <AndCondition>
                    <EqualCondition DataElementId="washout"
                      ComparisonValue="yes"/>
                    <!-- Washout = Yes, Capsule = Yes -->
                    <EqualCondition DataElementId="capsule"
```

```
                    ComparisonValue="yes"/>
                  <EqualCondition DataElementId="thresholdgrowth"
                    ComparisonValue="no"/>
                </AndCondition>
                <AndCondition>
                  <EqualCondition DataElementId="washout"
                    ComparisonValue="yes"/>
                  <!-- Washout = Yes, Thresholdgrowth = Yes -->
                  <EqualCondition DataElementId="capsule"
                    ComparisonValue="no"/>
                  <EqualCondition DataElementId="thresholdgrowth"
                    ComparisonValue="yes"/>
                </AndCondition>
                <AndCondition>
                  <EqualCondition DataElementId="washout"
                    ComparisonValue="no"/>
                  <!-- Capsule = Yes, Thresholdgrowth = Yes -->
                  <EqualCondition DataElementId="capsule"
                    ComparisonValue="yes"/>
                  <EqualCondition DataElementId="thresholdgrowth"
                    ComparisonValue="yes"/>
                </AndCondition>
                <AndCondition>
                  <EqualCondition DataElementId="washout"
                    ComparisonValue="yes"/>
                  <!-- Washout = Yes, Capsule = Yes, Thresholdgrowth = Yes -->
                  <EqualCondition DataElementId="capsule"
                    ComparisonValue="yes"/>
                  <EqualCondition DataElementId="thresholdgrowth"
                    ComparisonValue="yes"/>
                </AndCondition>
              </OrCondition>
              <EndPointRef EndPointId="hcc4Ep"/>
            </Branch>
          </DecisionPoint>
        </Branch>
        <Branch>
          <Label>&gt;= 20</Label>
          <!-- Diameter >= 20 -->
          <GreaterThanOrEqualsCondition DataElementId="diameter"
            ComparisonValue="diameterLarge"/>
          <DecisionPoint>
            <Label>Washout/Capsule/Thresholdgrowth</Label>
            <Branch>
              <Label>None</Label>
              <!-- None / Zero Y's -->
              <AndCondition>
                <EqualCondition DataElementId="washout" ComparisonValue="no"/>
                <EqualCondition DataElementId="capsule" ComparisonValue="no"/>
                <EqualCondition DataElementId="thresholdgrowth"
                  ComparisonValue="no"/>
```

```
            </AndCondition>
            <EndPointRef EndPointId="hcc3Ep"/>
          </Branch>
          <Branch>
            <Label>One</Label>
            <!-- One / One Y -->
            <OrCondition>
              <AndCondition>
                <EqualCondition DataElementId="washout"
                  ComparisonValue="yes"/>
                <!-- Washout = Yes -->
                <EqualCondition DataElementId="capsule"
                  ComparisonValue="no"/>
                <EqualCondition DataElementId="thresholdgrowth"
                  ComparisonValue="no"/>
              </AndCondition>
              <AndCondition>
                <EqualCondition DataElementId="washout"
                  ComparisonValue="no"/>
                <!-- Capsule = Yes -->
                <EqualCondition DataElementId="capsule"
                  ComparisonValue="yes"/>
                <EqualCondition DataElementId="thresholdgrowth"
                  ComparisonValue="no"/>
              </AndCondition>
              <AndCondition>
                <EqualCondition DataElementId="washout"
                  ComparisonValue="no"/>
                <!-- Thresholdgrowth = Yes -->
                <EqualCondition DataElementId="capsule"
                  ComparisonValue="no"/>
                <EqualCondition DataElementId="thresholdgrowth"
                  ComparisonValue="yes"/>
              </AndCondition>
            </OrCondition>
            <EndPointRef EndPointId="hcc4Ep"/>
          </Branch>
          <Branch>
            <Label>Two or More</Label>
            <!-- Two / Two or more Y's -->
            <OrCondition>
              <AndCondition>
                <EqualCondition DataElementId="washout"
                  ComparisonValue="yes"/>
                <!-- Washout = Yes, Capsule = Yes -->
                <EqualCondition DataElementId="capsule"
                  ComparisonValue="yes"/>
                <EqualCondition DataElementId="thresholdgrowth"
                  ComparisonValue="no"/>
              </AndCondition>
              <AndCondition>
```

```
                    <EqualCondition DataElementId="washout"
                      ComparisonValue="yes"/>
                    <!-- Washout = Yes, Thresholdgrowth = Yes -->
                    <EqualCondition DataElementId="capsule"
                      ComparisonValue="no"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="yes"/>
                  </AndCondition>
                  <AndCondition>
                    <EqualCondition DataElementId="washout"
                      ComparisonValue="no"/>
                    <!-- Capsule = Yes, Thresholdgrowth = Yes -->
                    <EqualCondition DataElementId="capsule"
                      ComparisonValue="yes"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="yes"/>
                  </AndCondition>
                  <AndCondition>
                    <EqualCondition DataElementId="washout"
                      ComparisonValue="yes"/>
                    <!-- Washout = Yes, Capsule = Yes, Thresholdgrowth = Yes -->
                    <EqualCondition DataElementId="capsule"
                      ComparisonValue="yes"/>
                    <EqualCondition DataElementId="thresholdgrowth"
                      ComparisonValue="yes"/>
                  </AndCondition>
                </OrCondition>
                <EndPointRef EndPointId="hcc4Ep"/>
              </Branch>
            </DecisionPoint>
          </Branch>
        </DecisionPoint>
      </Branch>
    </DecisionPoint>
  </Branch>
  <Branch>
    <Label>Adjust category</Label>
    <AndCondition>
      <NotCondition>
        <EqualCondition DataElementId="adjustcategorybasedonAncillary"
          ComparisonValue="No"/>
      </NotCondition>
      <EqualCondition DataElementId="observationCharacter"
        ComparisonValue="notDefProbBenign"/>
    </AndCondition>
    <DecisionPoint>
      <Label>Adjust category</Label>
      <Branch>
        <EqualCondition DataElementId="adjustcategorybasedonAncillary"
          ComparisonValue="Upgradetohcc2"/>
        <EndPointRef EndPointId="hcc2Ep"/>
```

```
          </Branch>
          <Branch>
            <EqualCondition DataElementId="adjustcategorybasedonAncillary"
              ComparisonValue="Upgradetohcc3"/>
            <EndPointRef EndPointId="hcc3Ep"/>
          </Branch>
          <Branch>
            <EqualCondition DataElementId="adjustcategorybasedonAncillary"
              ComparisonValue="Upgradetohcc4"/>
            <EndPointRef EndPointId="hcc4Ep"/>
          </Branch>
          <Branch>
            <EqualCondition DataElementId="adjustcategorybasedonAncillary"
              ComparisonValue="Downgradetohcc4"/>
            <EndPointRef EndPointId="hcc4Ep"/>
          </Branch>
          <Branch>
            <EqualCondition DataElementId="adjustcategorybasedonAncillary"
              ComparisonValue="Downgradetohcc3"/>
            <EndPointRef EndPointId="hcc3Ep"/>
          </Branch>
          <Branch>
            <EqualCondition DataElementId="adjustcategorybasedonAncillary"
              ComparisonValue="Downgradetohcc2"/>
            <EndPointRef EndPointId="hcc2Ep"/>
          </Branch>
          <Branch>
            <EqualCondition DataElementId="adjustcategorybasedonAncillary"
              ComparisonValue="Downgradetohcc1"/>
            <EndPointRef EndPointId="hcc1Ep"/>
          </Branch>
        </DecisionPoint>
      </Branch>
    </DecisionPoint>
</Rules>
```

3.4 Endpoints

This section contains all the defined endpoints together with the reusable text fragments (TemplatePartial elements). Each EndPoint element specifies the repot text to be inserted and other actions to be taken when the logic tree leads to a particular endpoint.

#	Name	Data Type	Description / Usage
1	TemplatePartial TemplatePartial elements define a reusable text fragment or macro that once defined can be repeatedly used in all endpoints.		

1.1	id	xsd:id	Template partial identifier, which can be referred in the report text
1.2	Template definition includes the text mixed with the template elements as described below.		

1.2.1	text		
1.2.2	InsertValue Insert the value of a Dataelement		

1.2.2.1.1	DataElementId	xsd:IDREF	The value of this Dataelement will be inserted
1.2.2.1.2	SignificantDigits(optional)	xsd:integer	This is applicable if the DataElement referred is a NumericDataElement. This defines the number of decimal points can be inserted into the report text.

1.2.2	InsertPartial Insert the contents of a TemplatePartial to be inserted		

1.2.2.2.1	PartialId	xsd:IDREF	The dynamic value of this TemplatePartial will be inserted.

1.2.2.3	SectionIf Insert the contained template text if the given DataElement has any value.		

1.2.2.3.1	DataElementId	xsd:IDREF	Dataelement to be tested
1.2.2.3.2	Recursive from 1.2		

1.2.2.4	SectionIfValue Insert the contained template text if the given DataElement matches with the comparison value.		

1.2.2.4.1	DataElementId	xsd:IDREF	Dataelement to be tested
1.2.2.4.2	ComparisonValue	xsd:token	Comparison value
1.2.2.4.3	Recursive from 1.2		

1.2.2.5	SectionIfNot Insert the contained template text if the given DataElement has no value.			
	1.2.2.5.1	DataElementId	xsd:IDREF	Dataelement to be tested
	1.2.2.5.2	Recursive from 1.2		
1.2.2.6	SectionIfValueNot Insert the contained template text if the given DataElement doesn't matches with the comparison value			
	1.2.2.6.1	DataElementId	xsd:IDREF	Dataelement to be tested
	1.2.2.6.2	ComparisonValue	xsd:token	Comparison value
	1.2.2.6.3	Recursive from 1.2		

2 Endpoint

2.1	Id	xsd:ID	Endpoint identifier. This will be referred to be in the logic tree.
2.2	Label (optional)	text	Brief summary of the endpoints to be used in the documentation and in diagrams
2.3	Diagnosis(optional) can contain one or more diagnosis		
2.3.1.1	CodingSystem (optional)	text	The source of coding system used. This should be a URL
2.3.1.2	Code	xsd:token	Code in coding system
2.4	ReportTexts Specifies blocks of text to be inserted in the report at various points. Can have one or more ReportText ReportText		

2.4.1	SectionId Specifies texts to be inserted at different points in the report. The supported sections are listed below		
2.4.1.1	SectionId	"findings" | "impression" | "recommendation" | "impressionRecommendation" | "citation"	**Findings**: Text to be inserted into the body of the report, typically at the point where the radiologist is currently working **Impression**: Text to be inserted into the impression section of the report, typically at the bottom of the report **Recommendation**: Text to be inserted into a recommendation section of a report, if applicable **ImpressionRecommendation**: When a recommendation section is not available, text which includes a recommendation to be inserted into the impression section of the report. **Citation**: Text to be added at the bottom of a report which provides citation information about the recommendations. See also the "Citation" tag in the Metadata section; the text in this tag should be inserted in place of that global citation when given for a particular EndPoint.
2.4.2	text		
2.4.3	InsertValue Insert the value of a Dataelement		
2.4.3.1	DataElementId	xsd:IDREF	The value of this Dataelement will be inserted
2.4.3.2	SignificantDigits(optional)	xsd:integer	This is applicable if the DataElement referred is a NumericDataElement. This defines the number of decimal points can be inserted into the report text.
2.4.4	InsertPartial Insert the contents of a TemplatePartial to be inserted		

2.4.4.1	PartialId	xsd:IDREF	The dynamic value of this TemplatePartial will be inserted.

2.4.5 SectionIf

Insert the contained template text if the given DataElement has any value.

2.4.5.1	DataElementId	xsd:IDREF	Dataelement to be tested
2.4.5.2	TextTemplateContent Recursive, can contain TextTemplateContent itself		

2.4.6 SectionIfValue

Insert the contained template text if the given DataElement matches with the comparison value.

2.4.6.1	DataElementId	xsd:IDREF	Dataelement to be tested
2.4.6.2	ComparisonValue	xsd:token	Comparison value
2.4.6.3	TextTemplateContent Recursive, can contain TextTemplateContent itself		

2.4.7 SectionIfNot

Insert the contained template text if the given DataElement has no value.

2.4.7.1	DataElementId	xsd:IDREF	Dataelement to be tested
2.4.7.2	TextTemplateContent Recursive, can contain TextTemplateContent itself		

2.4.8 SectionIfValueNot

Insert the contained template text if the given DataElement doesn't matches with the comparison value

2.4.8.1	DataElementId	xsd:IDREF	Dataelement to be tested
2.4.8.2	ComparisonValue	xsd:token	Comparison value
2.4.8.3	TextTemplateContent Recursive, can contain TextTemplateContent itself		

2.5.	ActionableFinding(optional)		
2.5.1	Category	text	
2.6	ImagingFollowup(optional) Specifies the parameters around recommended imaging follow-up		
2.6.1	ClinicalCondition	text	If the recommended follow-up has a clinical condition such as a patient has high risk for cancer
2.6.2	References(optional) Reference to the evidence base for the recommendation. Citation		
2.6.2.1	PubmedId (optional)	xsd:token	Pubmed reference Identifier https://www.ncbi.nlm.nih.gov/pubmed
2.6.2.2	URI (optional)	xsd:anyURI	Any Reference URI (for e.g.: link to abstract on journal website)
2.6.2.3	Text		citation text (for e.g. : a bibliographic reference to the citation)
2.6.3	EvidenceLevel Contains information to encode the strength of the evidence behind the recommendation		
2.6.3.1	CodingSystem	text	The source of coding system used. This should be a URL
2.6.3.2	Code	xsd:token	Code in coding system
2.6.3.3	xsd:token		
2.6.4	PreferredImagingExam For the recommended imaging follow-up, the exam that would be the first choice.		
2.6.4.1	CodingSystem (optional)	text	The source of coding system used. This should be a URL
	Code	xsd:token	Code in coding system
2.6.	AcceptableImagingExams		

5	For the recommended imaging follow-up the other exams that would satisfy the recommendation. Exam	

2.6.5.1	code	text	Code in coding system
2.6.5.2	CodeSystem	text	The source of coding system used. This should be a URL
2.6.5.3	Modality	text	modality
2.6.5.4	BodyRegion	text	Body region
2.6.5.5	text		

2.6.6	IndicationForFollowup The encoding of the indication or reason for the follow-up imaging exam.

2.6.6.1	CodingSystem (optional)	text	The source of coding system used. This should be a URL
2.6.6.2	Code	xsd:token	Code in coding system
2.6.6.3	text		

2.6.7	RecommendedTimeFrame Recommended time frame for the preferred next exam.

2.6.7.1	Earliest	Xsd:duration	Earliest time relative to the exam date time. Following is the example to mention the earliest time based on xsd:duration definition "P5Y2M10DT15H"
2.6.7.2	Latest	Xsd:duration	Latest time relative to the exam date time. Following is the example to mention the latest time based on xsd:duration definition "P5Y2M10DT15H"
2.6.7.3	empty		

3.4.1 Sample

```
<EndPoint Id="ID000">
  <Label>Label0</Label>
  <Diagnosis CodingSystem="CodingSystem0" Code="Code0">
  </Diagnosis>
  <ReportTexts>
    <ReportText SectionId="findings">
      <SectionIf DataElementId="ID000">
      </SectionIf>
      <SectionIfValueNot DataElementId="ID000" ComparisonValue="ComparisonValue0">
      </SectionIfValueNot>
    </ReportText>
    <ReportText SectionId="findings">
      <SectionIfValue DataElementId="ID000" ComparisonValue="ComparisonValue1">
      </SectionIfValue>
      <InsertValue DataElementId="ID000" SignificantDigits="0"/>
    </ReportText>
    <ReportText SectionId="findings">
      <InsertValue DataElementId="ID000" SignificantDigits="0"/>
      <InsertValue DataElementId="ID000" SignificantDigits="0"/>
    </ReportText>
    <ReportText SectionId="findings">
      <SectionIfNot DataElementId="ID000">
      </SectionIfNot>
      <InsertValue DataElementId="ID000" SignificantDigits="0"/>
    </ReportText>
  </ReportTexts>
  <ActionableFinding Category="Category0"/>
  <ImagingFollowup>
    <Exam Code="Code1" CodeSystem="CodeSystem0" Modality="Modality0" BodyRegion="BodyRegion0">
    </Exam>
    <Exam Code="Code2" CodeSystem="CodeSystem1" Modality="Modality1" BodyRegion="BodyRegion1">
    </Exam>
  </ImagingFollowup>
</EndPoint>
```

3.4.2 Real-world Sample

```
<EndPoints>
  <TemplatePartial Id="adjustcategorytext">
    <SectionIfValueNot DataElementId="adjustcategorybasedonAncillary" ComparisonValue="No">
      <SectionIf DataElementId="ancillaryFavoringMalignancy"> HCC category has been adjusted
        based on the selected Ancillary features favoring Malignancy <InsertValue
          DataElementId="ancillaryFavoringMalignancy"/>
      </SectionIf>
      <SectionIf DataElementId="ancillaryFavoringBenignity"> HCC category has been adjusted
        based on the selected Ancillary features favoring Benignity <InsertValue
          DataElementId="ancillaryFavoringBenignity"/>
      </SectionIf>
    </SectionIfValueNot>
  </TemplatePartial>
  <EndPoint Id="hcc1Ep">
```

```
    <Label>HCC-1</Label>
    <ReportTexts>
      <ReportText SectionId="findings">[HCC-1] Imaging features diagnostic of a benign entity
        or definite spontaneous disappearance at follow up. <InsertPartial
          PartialId="adjustcategorytext"/>
      </ReportText>
    </ReportTexts>
  </EndPoint>
  <EndPoint Id="hcc2Ep">
    <Label>HCC-2</Label>
    <ReportTexts>
      <ReportText SectionId="findings">[HCC-2] Observation with imaging features suggestive
        but not diagnostic of a benign entity. <InsertPartial PartialId="adjustcategorytext"
        />
      </ReportText>
    </ReportTexts>
  </EndPoint>
  <EndPoint Id="hcc3Ep">
    <Label>HCC-3</Label>
    <ReportTexts>
      <ReportText SectionId="findings">[HCC-3] Observation that does not meet unequivocal
        criteria for other LI-RADS categories. <InsertPartial PartialId="adjustcategorytext"
        />
      </ReportText>
    </ReportTexts>
  </EndPoint>
  <EndPoint Id="hcc4Ep">
    <Label>HCC-4</Label>
    <ReportTexts>
      <ReportText SectionId="findings">[HCC-4] Observation with imaging features suggestive
        but not diagnostic of HCC. <InsertPartial PartialId="adjustcategorytext"/>
      </ReportText>
    </ReportTexts>
  </EndPoint>
  <EndPoint Id="hcc5Ep">
    <Label>HCC-5</Label>
    <ReportTexts>
      <ReportText SectionId="findings">[HCC-5] Observation with imaging features diagnostic of
        HCC. <InsertPartial PartialId="adjustcategorytext"/>
      </ReportText>
    </ReportTexts>
  </EndPoint>
  <EndPoint Id="hcc5vEp">
    <Label>HCC-5V</Label>
    <ReportTexts>
      <ReportText SectionId="findings">[HCC-5V] Presence of tumor in vein lumen.
          <InsertPartial PartialId="adjustcategorytext"/>
      </ReportText>
    </ReportTexts>
  </EndPoint>
  <EndPoint Id="hccmEp">
```

```
    <Label>HCC-M</Label>
    <ReportTexts>
      <ReportText SectionId="findings">[HCC-M] Observation with one or more imaging features
        that favor non-HCC malignancy <InsertPartial PartialId="adjustcategorytext"/>
      </ReportText>
    </ReportTexts>
  </EndPoint>
  <EndPoint Id="hcctreatedEp">
    <Label>HCC-Treated</Label>
    <ReportTexts>
      <ReportText SectionId="findings">[HCC-Treated] An observation that has undergone
        loco-regional treatment. </ReportText>
    </ReportTexts>
  </EndPoint>
  <EndPoint Id="hcc4_5">
    <Label>HCC-4/HCC-5</Label>
    <ReportTexts>
      <ReportText SectionId="findings">[HCC-4/HCC-5] Refers to a cell in the LI-RADS table
        where observations may be considered LR-4, LR-5us, or LR-5g <InsertPartial
          PartialId="adjustcategorytext"/>
      </ReportText>
    </ReportTexts>
  </EndPoint>
</EndPoints>
```