FHIR® Shorthand™

Wicked Shorthand

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Post-STU 1 Planned Features

Disclaimer: Everything in this presentation is subject to change

Topics:

- **Soft Array Indexing**
- **Parameterized Rule Sets**
- **Context Paths**
- **Logical Models**

Soft Array Indexing

- **The problem is with long lists of array items that are explicitly numbered**
  - Removing or adding elements means renumbering

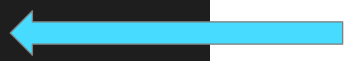
```
* item[0].linkId = "sp-101"
* item[0].text = "What is your date of birth?"
* item[0].type = #date

* item[1].linkId = "sp-102"
* item[1].text = "What is your country of birth?"
* item[1].type = #code

* item[2].linkId = "sp-103"
* item[2].text = "What country do you currently reside in?"
* item[2].type = #code

* item[3].linkId = "sp-104"
* item[3].text = "What country did you travel to"
* item[3].type = #code

* item[4].linkId = "sp-105"
* item[4].text = "When did the travel start?"
* item[4].type = #date

* item[5].linkId = "sp-106"
* item[5].text = "When did the travel end?"
* item[5].type = #date
```

```
* item[ ].linkId = "sp-108"
* item[ ].text = "What state do you current reside in?"
* item[ ].type = #code
```

Soft Array Indexing

- **Approach:**
  - [+] represents the next element in an array
  - If the array is empty, [+] represents the first element, [0]
  - [=] represents the same element of the array as the last time the array was referenced

```
* item[+].linkId = "sp-101"
* item[=].text = "What is your date of birth?"
* item[=].type = #date

* item[+].linkId = "sp-102"
* item[=].text = "What is your country of birth?"
* item[=].type = #code

* item[+].linkId = "sp-103"
* item[=].text = "What country do you currently reside in?"
* item[=].type = #code

* item[+].linkId = "sp-104"
* item[=].text = "What country did you travel to"
* item[=].type = #code

* item[+].linkId = "sp-105"
* item[=].text = "When did the travel start?"
* item[=].type = #date

* item[+].linkId = "sp-106"
* item[=].text = "When did the travel end?"
* item[=].type = #date
```



```
* item[+].linkId = "sp-108"
* item[=].text = "What state do you current reside in?"
* item[=].type = #code
```

Rule Sets (Review)

- **Rule Sets provide the ability to define free-floating rules**
  - The same rule set can be used in multiple places

```
RuleSet: {RuleSetName}
* {rule1}
* {rule2}
// More rules
```

- **Applied with an "insert" rule (formerly the Mixin keyword)**

```
* insert {RuleSetName}
```

Parameterized Rule Set Proposal (aka "Macros")

```
RuleSet: XYZ(foo, bar)
* code = {foo}
* description = {bar}
```

```
* insert XYZ (LNC#1234-5, "Hello, world")
```

preprocessor

```
* code = LNC#1234-5
* description = "Hello, world"
```

Works by simple text substitution during a pre-processing step

- Not like procedural function calls
- No conditional logic
- No actions
- Parameters are treated as text strings

CapabilityStatement: Original FSH

```
// MeasureReport requirements
* rest.resource[0].type = #MeasureReport
* rest.resource[0].supportedProfile = "http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasureReport"
// SHALL support MeasureReport with the PublicHealthMeasureReport Profile
* rest.resource[0].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[0].extension[0].valueCode = #SHALL
// SHALL support create on MeasureReport
* rest.resource[0].interaction[0].code = #create
* rest.resource[0].interaction[0].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[0].interaction[0].extension[0].valueCode = #SHALL
// SHALL support update on MeasureReport
* rest.resource[0].interaction[1].code = #update
* rest.resource[0].interaction[1].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[0].interaction[1].extension[0].valueCode = #SHALL

// Measure requirements
* rest.resource[1].type = #Measure
* rest.resource[1].supportedProfile[0] = "http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasure"
* rest.resource[1].supportedProfile[1] = "http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasureStratifier"
// SHOULD support Measure with the PublicHealthMeasure and PublicHealthMeasureStratifier Profile
* rest.resource[1].supportedProfile[0].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[1].supportedProfile[0].extension[0].valueCode = #SHOULD
* rest.resource[1].supportedProfile[1].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[1].supportedProfile[1].extension[0].valueCode = #SHOULD
// SHOULD support create on Measure
* rest.resource[1].interaction[0].code = #create
* rest.resource[1].interaction[0].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[1].interaction[0].extension[0].valueCode = #SHOULD
// SHOULD support update on Measure
* rest.resource[1].interaction[1].code = #update
* rest.resource[1].interaction[1].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[1].interaction[1].extension[0].valueCode = #SHOULD
```

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CapabilityStatement Example: Apply Soft Indexing

```
// MeasureReport requirements
* rest.resource[+].type = #MeasureReport
* rest.resource[=].supportedProfile = "http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasureReport"
// SHALL support MeasureReport with the PublicHealthMeasureReport Profile
* rest.resource[=].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[=].extension[0].valueCode = #SHALL
// SHALL support create on MeasureReport
* rest.resource[=].interaction[+].code = #create
* rest.resource[=].interaction[=].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[=].interaction[=].extension[0].valueCode = #SHALL
// SHALL support update on MeasureReport
* rest.resource[=].interaction[+].code = #update
* rest.resource[=].interaction[=].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[=].interaction[=].extension[0].valueCode = #SHALL

// Measure requirements
* rest.resource[+].type = #Measure
* rest.resource[=].supportedProfile[+] = "http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasure"
* rest.resource[=].supportedProfile[=].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[=].supportedProfile[=].extension[0].valueCode = #SHOULD
* rest.resource[=].supportedProfile[+] = "http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasureStratifier"
* rest.resource[=].supportedProfile[=].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[=].supportedProfile[=].extension[0].valueCode = #SHOULD
// SHOULD support create on Measure
* rest.resource[=].interaction[+].code = #create
* rest.resource[=].interaction[=].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[=].interaction[=].extension[0].valueCode = #SHOULD
// SHOULD support update on Measure
* rest.resource[=].interaction[+].code = #update
* rest.resource[=].interaction[=].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[=].interaction[=].extension[0].valueCode = #SHOULD
```

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Convert Repeated Pattern to Parameterized Rule Set

```
* rest.resource[=].supportedProfile[+] = "http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasure"
* rest.resource[=].supportedProfile[=].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[=].supportedProfile[=].extension[0].valueCode = #SHOULD
```

structurally similar

```
* rest.resource[=].supportedProfile[+] = "http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasureStratifier"
* rest.resource[=].supportedProfile[=].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
* rest.resource[=].supportedProfile[=].extension[0].valueCode = #SHOULD
```

generalize

```
RuleSet SupportProfile(profile, expectation)
  * rest.resource[=].supportedProfile[+] = {profile}
  * rest.resource[=].supportedProfile[=].extension[0].url = "http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation"
  * rest.resource[=].supportedProfile[=].extension[0].valueCode = {expectation}
```

Capability Statement Rule Sets

```
Alias:  $ExpExt = http://hl7.org/fhir/StructureDefinition/capabilitystatement-expectation

RuleSet SupportResource(resource, expectation)
  * rest.resource[+].type = {resource}
  * rest.resource[=].extension[0].url = $ExpExt
  * rest.resource[=].extension[0].valueCode = {expectation}

RuleSet SupportProfile(profile, expectation)
  * rest.resource[=].supportedProfile[+] = {profile}
  * rest.resource[=].supportedProfile[=].extension[0].url = $ExpExt
  * rest.resource[=].supportedProfile[=].extension[0].valueCode = {expectation}

RuleSet SupportInteraction(interaction, expectation)
  * rest.resource[=].interaction[+].code = {interaction}
  * rest.resource[=].interaction[=].extension[0].url = $ExpExt
  * rest.resource[=].interaction[=].extension[0].valueCode = {expectation}
```

Capability Statement Example with Macros

```
// MeasureReport requirements
* insert SupportResource(#MeasureReport, #SHALL)
* insert SupportProfile("http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasureReport", #SHALL)
* insert SupportInteraction(#create, #SHALL)
* insert SupportInteraction(#update, #SHALL)

// Measure requirements
* insert SupportResource(#Measure, #SHALL)
* insert SupportProfile("http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasure", #SHOULD)
* insert SupportProfile("http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasureStratifier", #SHOULD)
* insert SupportInteraction(#create, #SHOULD)
* insert SupportInteraction(#update, #SHOULD)

// Location requirements
* insert SupportResource(#Location, #SHALL)
* insert SupportProfile("http://hl7.org/fhir/us/saner/StructureDefinition/saner-resource-location", #SHOULD)
* insert SupportInteraction(#create, #SHOULD)
* insert SupportInteraction(#update, #SHOULD)

// QuestionnaireResponse requirements
* insert SupportResource(#QuestionnaireResponse, #SHALL)
* insert SupportProfile("http://hl7.org/fhir/us/saner/StructureDefinition/PublicHealthMeasureReport", #SHALL)
* insert SupportInteraction(#create, #SHALL)
* insert SupportInteraction(#update, #SHALL)
```

Parameterized Rule Sets Summary

- Facilitates more concise profiles
- Almost like "custom rules" -- FSH doesn't have to introduce special new grammar for CapabilityStatements, OperationDefinition, Questionnaire, and other definitional resources
- Makes it harder to figure out what's really happening
- Rule sets can be shared -- naïve users can use macro library without knowing details

Context Paths

- **New shorthand for deeply indented /nested elements**

```
* a.b.c.d = 1
* a.b.c.e = "string"
* a.b.c.f = #code
```

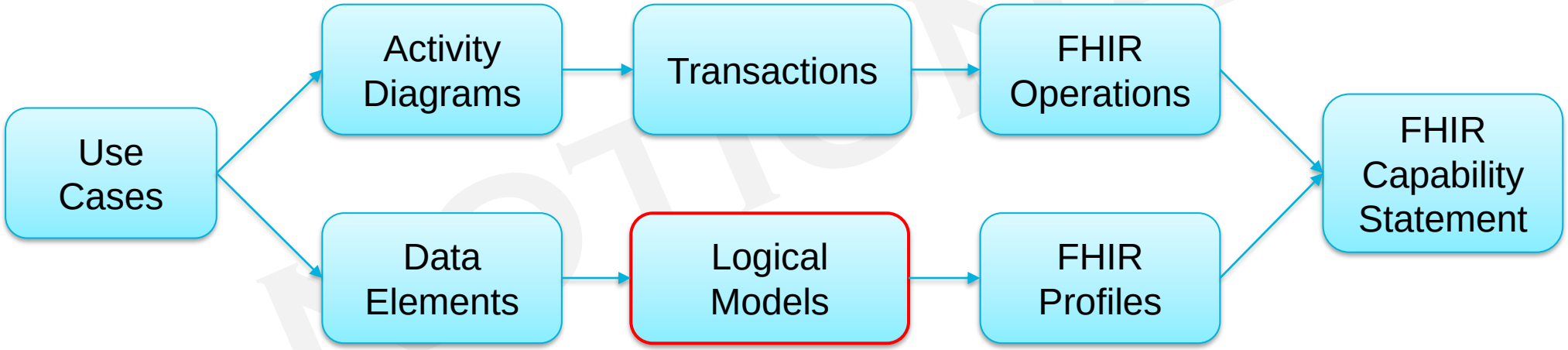
Written as:

```
* with a.b.c
** d = 1
** e = "string"
** f = #code
```

- **Thanks to Jose Costa Teixeira for this suggestion**

Logical Models

- **Logical modeling can help formalize requirements gathered from stakeholders**
- **Information is represented as a set of classes -- without the added complication of alignment with FHIR.**



FHIR Logical Models

- The only thing that makes logical models "FHIR Logical Models" is the use of the StructureDefinition as a formal representation.
- A FHIR logical model resembles a new FHIR resource, including attributes, cardinality, datatype, and terminology bindings.
- Specified in StructureDefinition.kind = #logical

- The following is speculative

Potential Logical Model Shorthand

```
LogicalModel: CancerMetastases
Id: cancer-metastases
Title: "Cancer Metastases"
Description:  "A hypothetical model of cancer spread."
* patient 1..1 MS only Reference(CancerPatient) "Reference to the cancer patient"
* hasSpread 0..1 MS only boolean
* metastasis 0..* only Element
* with metastasis
** location 1..1 only BodyLocation "The location of a metastatic tumor"
** size 0..1 only TumorSize "The size of the tumor"

LogicalModel: BodyLocation
Description: "Place in the body."
* code 1..1 only CodeableConceptElement "Code representing the body site, with or without laterality"
* code from BodySiteVS (extensible)
* laterality 0..1 only CodeableConceptElement "The laterality, if not pre-coordinated in the code"
* laterality from LateralityVS (required)

LogicalModel: TumorSize
Description: "Logical model of the size of a tumor"
* primaryDimension 1..1 only Quantity "The longest measurement"
* primaryDimension = UCUM#mm "millimeters"
* secondaryDimension 0..1 only Quantity "The next longest dimension of the tumor perpedicular to the primary axis"
* secondaryDimension = UCUM#mm "millimeters"
* tertiaryDimension 0..1 only Quantity "The measurement of the tumor perpendicular to the first two axes"
* tertiaryDimension = UCUM#mm "millimeters"
```

In Summary...

- **STU 2 -- Aiming for May 2021 ballot cycle**

← FSH STU

← FSH STU, TOO