

## Exchange of Analytics Data Using FHIR Resources

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## Who am I?

- Chetan Kumar Jain
- Senior Architect, Optum
- 17 Years of architectural experience in IT industry solutioning in areas of Data Analytics, Big Data, Cloud and Interoperability implementation



# Agenda

1

- Why we need to exchange analytics data?

2

- FHIR solution

3

- Structure definition and mapping

4

- Solution approach

5

- Q&A

## Exchanging raw/transactional data



- Submit a claim



- Issue medication



- Create a diagnostic report



- Check appeal status



- Update patient detail



- Show my claims

# Analytics Use Cases

### Sample Use Cases

- Last 12 months' claims count
- Claim processing rate and trends
- Proportion of claims in each status
- Trends in claim submissions by providers

### Lenses to view the data

- Granularity
- Slices
- Dimensions
- Filter
- Timeline
- Units

### Granularity

- Claims/Claim details
- Yearly/Monthly/Daily

### Timeline

- Date Range
- Year To Date
- Last 365 days

### Units

- Volume
- \$ Value

### Filter

- Practitioner
- Tax ID Number(s)

### Slices/Dimensions

- Line of Business
- Types of Claims
- Processing Status
- Approval Status

# Quality reporting and testing

| Category           | Alphabetical   | R2 Layout          | By Maturity  | Security Category  | By Standards Status   | By Committee          |  |                                     |   |                               |   |                                |   |  |  |                              |  |
|--------------------|--|--------------------|--|--------------------|---|-----------------------|--|-------------------------------------|---|-------------------------------|---|--------------------------------|---|--|--|------------------------------|--|
| <b>Conformance</b> | <ul style="list-style-type: none"> <li>CapabilityDefinition</li> <li>StructureDefinition</li> <li>ImplementationGuide</li> <li>SearchParameter</li> <li>MessageDefinition</li> <li>OperationDefinition</li> <li>ComponentDefinition</li> <li>StructureMap</li> <li>GroupDefinition</li> <li>ExampleScenario</li> </ul> | <b>Terminology</b> | <ul style="list-style-type: none"> <li>CodeSystem</li> <li>ValueSet</li> <li>ConceptMap</li> <li>NamingSystem</li> <li>TerminologyCapabilities</li> </ul>  | <b>Security</b>    | <ul style="list-style-type: none"> <li>Provenance</li> <li>AuditEvent</li> <li>Consent</li> </ul>   | <b>Documents</b>      | <ul style="list-style-type: none"> <li>Composition</li> <li>DocumentManifest</li> <li>DocumentReference</li> <li>Linkage</li> <li>Category</li> </ul>  | <b>Other</b>                        | <ul style="list-style-type: none"> <li>Basic</li> <li>Binary</li> <li>Bundle</li> <li>Linkage</li> <li>MessageHeader</li> <li>OperationOutcome</li> <li>Parameter</li> <li>Subscription</li> </ul>                                  |                               |   |                                |   |  |  |                              |  |
| <b>Individuals</b> | <ul style="list-style-type: none"> <li>Person</li> <li>Practitioner</li> <li>PractitionerRole</li> <li>RelatedPerson</li> <li>Person</li> <li>Group</li> </ul>   | <b>Entities #1</b> | <ul style="list-style-type: none"> <li>Organization</li> <li>OrganizationAffiliation</li> <li>HealthcareService</li> <li>Endpoint</li> <li>Location</li> </ul>   | <b>Entities #2</b> | <ul style="list-style-type: none"> <li>Substance</li> <li>SubstanceDerivation</li> <li>Device</li> <li>DeviceMetric</li> </ul>  | <b>Workflow</b>       | <ul style="list-style-type: none"> <li>Task</li> <li>Appointment</li> <li>AppointmentResponse</li> <li>Schedule</li> <li>Slot</li> <li>WorkflowBased</li> </ul>  | <b>Management</b>                   | <ul style="list-style-type: none"> <li>Encounter</li> <li>EpisodeOfCare</li> <li>Flag</li> <li>List</li> <li>Library</li> </ul>   |                               |   |                                |   |  |  |                              |  |
| <b>Summary</b>     | <ul style="list-style-type: none"> <li>AllergyIntolerance</li> <li>AdverseEvent</li> <li>Condition</li> <li>Procedure</li> <li>FamilyMemberHistory</li> <li>ChargeExpression</li> <li>DetectableEntity</li> </ul>  | <b>Diagnostics</b> | <ul style="list-style-type: none"> <li>Observation</li> <li>Media</li> <li>DiagnosticReport</li> <li>Specimen</li> <li>StudyStructure</li> <li>ImagingStudy</li> <li>QuestionnaireResponse</li> <li>MolecularSequence</li> </ul> | <b>Medications</b> | <ul style="list-style-type: none"> <li>MedicationRequest</li> <li>MedicationAdministration</li> <li>MedicationDispense</li> <li>MedicationStatement</li> <li>Medication</li> <li>MedicationKnowledge</li> <li>Immunization</li> <li>ImmunizationEvaluation</li> <li>TechniqueInformation</li> </ul> | <b>Care Provision</b> | <ul style="list-style-type: none"> <li>Condition</li> <li>CareTeam</li> <li>Goal</li> <li>ServiceRequest</li> <li>SubstanceOrder</li> <li>Vaccination</li> <li>RiskAssessment</li> <li>RequestGroup</li> </ul> | <b>Request &amp; Response</b>       | <ul style="list-style-type: none"> <li>CommunicationRequest</li> <li>CommunicationRequestResponse</li> <li>DeviceRequest</li> <li>DeviceStatus</li> <li>GuidelineResponse</li> <li>SupplyRequest</li> <li>SupplyDelivery</li> </ul> |                               |   |                                |   |  |  |                              |  |
| <b>Support</b>     | <ul style="list-style-type: none"> <li>Coverage</li> <li>CoverageEligibilityRequest</li> <li>CoverageEligibilityResponse</li> <li>EnrollmentRequest</li> <li>EnrollmentResponse</li> </ul>   | <b>Billing</b>     | <ul style="list-style-type: none"> <li>Claim</li> <li>ClaimResponse</li> <li>Invoice</li> </ul>  | <b>Payment</b>     | <ul style="list-style-type: none"> <li>PaymentNotice</li> <li>PaymentReconciliation</li> </ul>  | <b>General</b>        | <ul style="list-style-type: none"> <li>Account</li> <li>ChargeItem</li> <li>ChargeItemDefinition</li> <li>Contract</li> <li>ContractDocument</li> <li>ContractNegotiation</li> <li>ContractRequest</li> </ul>  | <b>Public Health &amp; Research</b> | <ul style="list-style-type: none"> <li>ResearchStudy</li> <li>ResearchSubject</li> </ul>  | <b>Definitional Artifacts</b> | <ul style="list-style-type: none"> <li>ActivityDefinition</li> <li>DeviceDefinition</li> <li>EventDefinition</li> <li>ObservationDefinition</li> <li>PlanDefinition</li> <li>Questionnaire</li> <li>SpecimenDefinition</li> </ul> | <b>Evidence-Based Medicine</b> | <ul style="list-style-type: none"> <li>ResearchDefinition</li> <li>ResearchConceptDefinition</li> <li>Evidence</li> <li>EvidenceVariable</li> <li>EvidenceSynthesis</li> <li>RiskEvidenceSynthesis</li> </ul> | <b>Quality Reporting &amp; Testing</b> | <ul style="list-style-type: none"> <li>Measure</li> <li>MeasureDefinition</li> <li>TestScript</li> <li>TestReport</li> </ul> | <b>Medication Definition</b> | <ul style="list-style-type: none"> <li>MedicationProduct</li> <li>MedicationProductAdministration</li> <li>MedicationProductContraindication</li> <li>MedicationProductIndication</li> <li>MedicationProductIngredient</li> <li>MedicationProductSubstance</li> <li>MedicationProductManufactured</li> <li>MedicationProductPackaged</li> <li>MedicationProductPharmaceutical</li> <li>MedicationProductPharmaceuticalBatch</li> <li>SubstanceMolecule</li> <li>SubstanceMoleculeActive</li> <li>SubstanceMoleculeInert</li> <li>SubstanceMoleculeRelated</li> <li>SubstanceMoleculeRelatedBatch</li> <li>SubstanceMoleculeRelatedFormulation</li> <li>SubstanceMoleculeRelatedFormulationBatch</li> <li>SubstanceMoleculeRelatedFormulationPackaged</li> <li>SubstanceMoleculeRelatedFormulationPackagedBatch</li> <li>SubstanceMoleculeRelatedFormulationPackagedBatchFormulation</li> <li>SubstanceMoleculeRelatedFormulationPackagedBatchFormulationBatch</li> <li>SubstanceMoleculeRelatedFormulationPackagedBatchFormulationBatchFormulation</li> <li>SubstanceMoleculeRelatedFormulationPackagedBatchFormulationBatchFormulationBatchFormulation</li> </ul> |

## Quality Reporting & Testing

- Measure 2
- MeasureReport 2
- TestScript 2
- TestReport 0

## Operation

**\$evaluate-measure**  
 URL: [base]/Measure/\$evaluate-measure

# FHIR resources, operation and parameters

## Resources

**Measure** – Represents a clinical quality measure and provide evaluation through the \$evaluate-measure operation.

**MeasureReport** – Represents the response to a specific measure evaluation request returned by the \$evaluate-measure operation

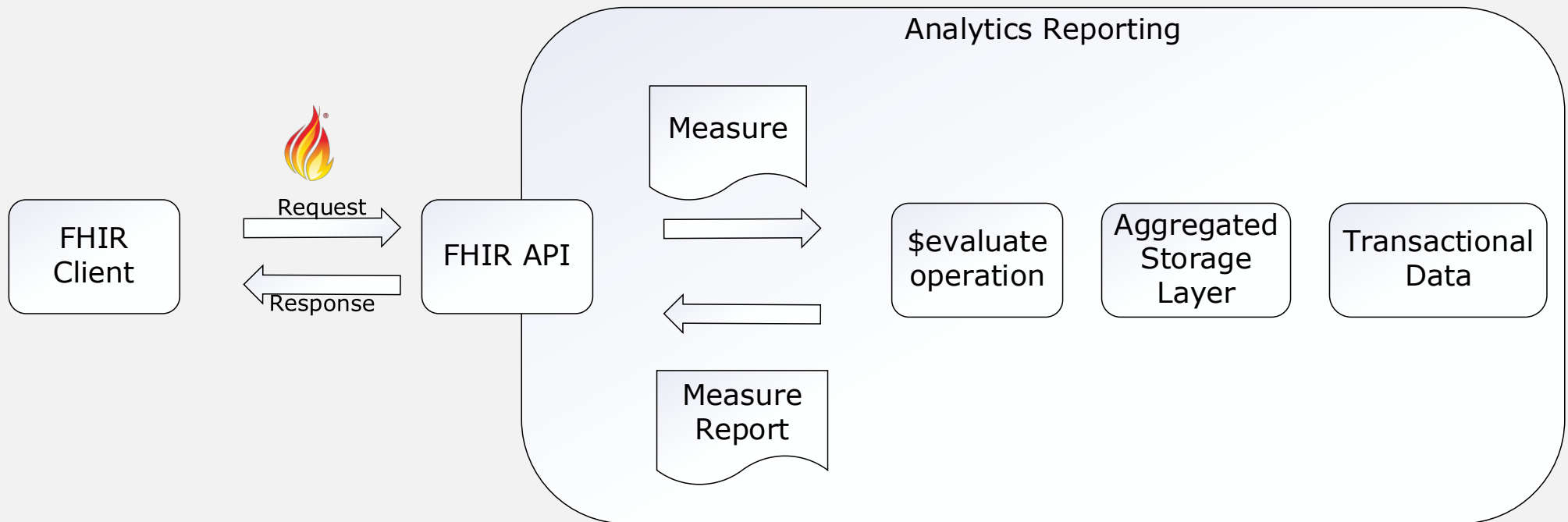
## Operation

**\$evaluate-measure** – The evaluate-measure operation is used to calculate an eMeasure and obtain the results.

## Parameters

- **measure**
- **practitioner**
- **subject**
- **reportType**
- **periodStart**
- **periodEnd**
- **lastReceivedOn**

# Analytics Solution Architecture





# Resource Structure - Measure

Group

|             |             |
|-------------|-------------|
| Code        | claimCount  |
| Description | Claim Count |
| Population  |             |

|             |  |
|-------------|--|
| Code        |  |
| Description |  |
| Criteria    |  |

Stratifier

|             |                      |
|-------------|----------------------|
| Code        | Month:ApprovalStatus |
| Description |                      |
| Criteria    | Month:ApprovalStatus |
| Component   |                      |

|             |
|-------------|
| Code        |
| Description |
| Criteria    |

# Resource Structure - MeasureReport

Group

Code  
measureScore  
Population  
Stratifier

claimCount  
<measure value with unit>

Code  
Stratum

Month:ApprovalStatus

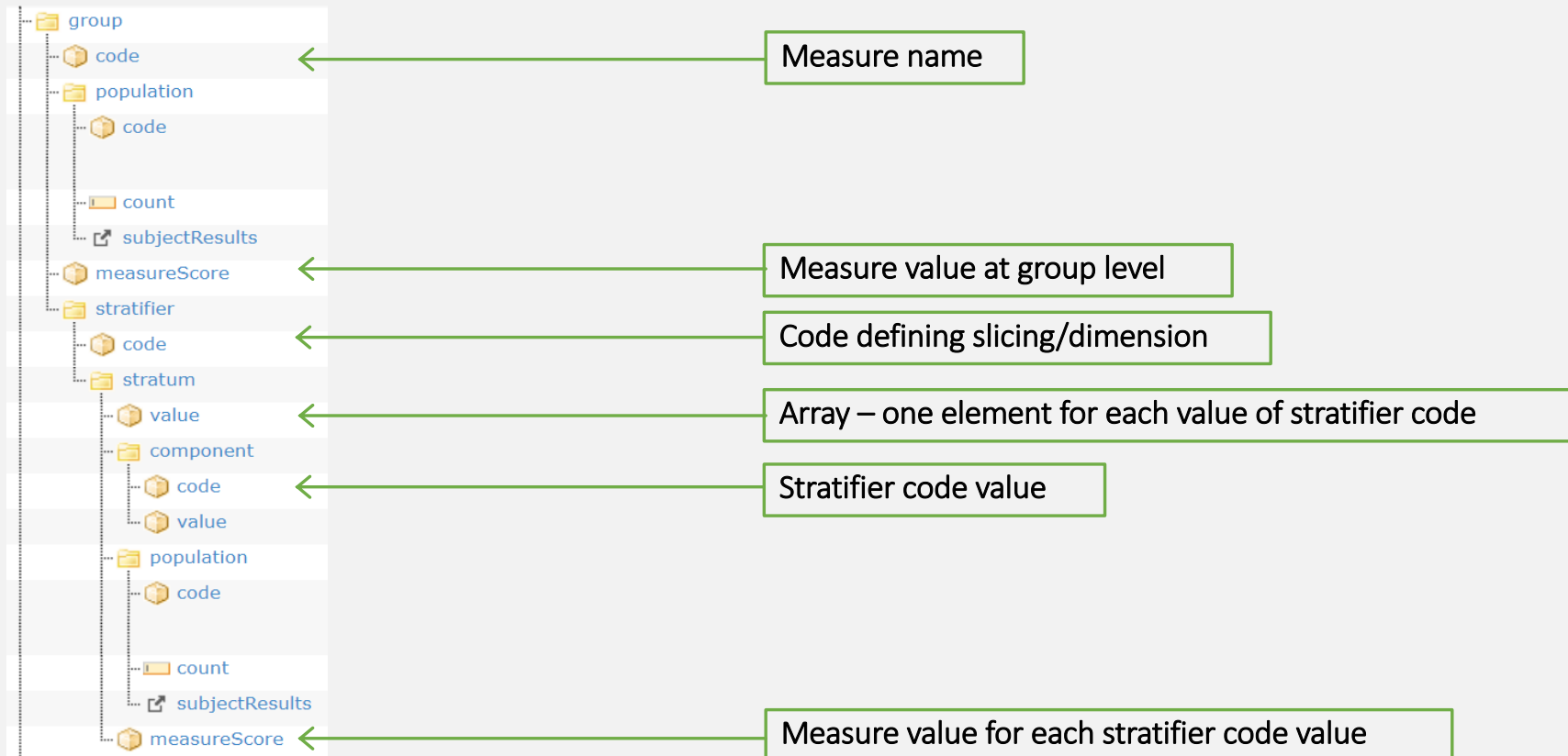
Value  
Component

Code  
Value

measureScore

<measure score for stratum code value with unit>

# Indicative Mapping





# Implementation – Step by Step

1 Identify and define the measure

2 Define the parameters needed

3 Publish measure

4 Enable \$evaluate-measure operation with FHIR end point for given measure

- Map the data element
- Define the logic to evaluate measure as per input parameters
- Generate the MeasureReport when operation invoked



# Q&A

## Contact

- During DevDays, you can find / reach me here:
  - Via Whoova App – Speaker’s Gallery
  - Email [chetan.jain@optum.com](mailto:chetan.jain@optum.com)

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