



# Computable Care Guidelines

Creating value, and capturing value, from broadly-scaled digital health investments

June-30 2022

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## Agenda

- Introductions
- What is a CCG... and why should we care?
- How is a CCG defined... and when does it matter?
- Where do emerging new tools add value?
- Who will this impact?
- Q&A

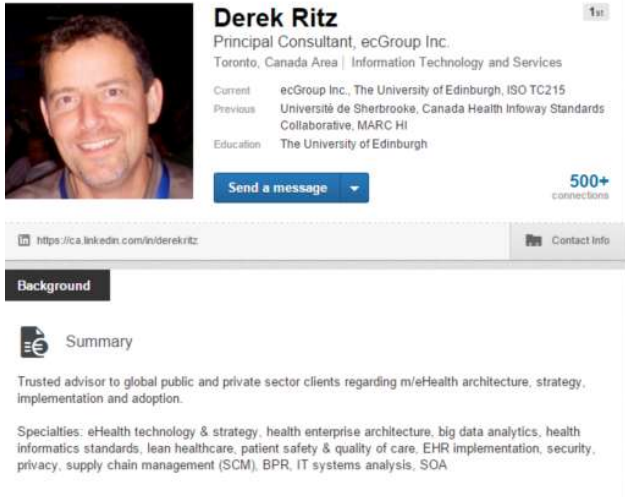
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# Introduction...

LinkedIn



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Principal Consultant, ecGroup Inc.  
Toronto, Canada Area | Information Technology and Services

Current ecGroup Inc., The University of Edinburgh, ISO TC215  
Previous Université de Sherbrooke, Canada Health Infoway Standards Collaborative, MARC HI  
Education The University of Edinburgh

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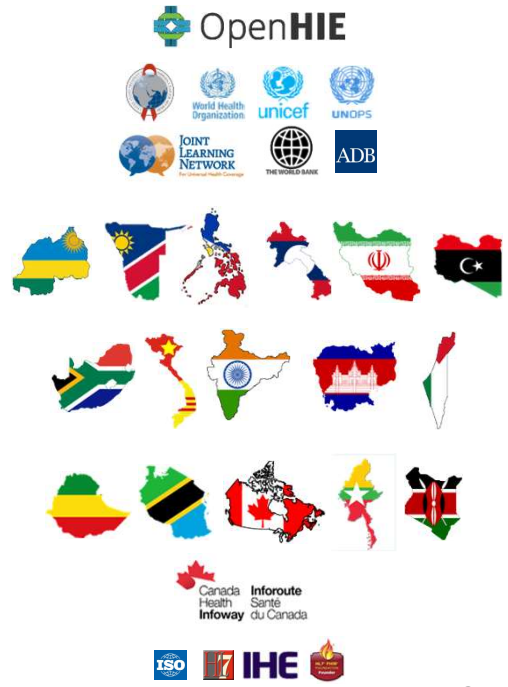
<https://ca.linkedin.com/in/derekritz> Contact Info

**Background**

**Summary**

Trusted advisor to global public and private sector clients regarding m/eHealth architecture, strategy, implementation and adoption.

Specialties: eHealth technology & strategy, health enterprise architecture, big data analytics, health informatics standards, lean healthcare, patient safety & quality of care, EHR implementation, security, privacy, supply chain management (SCM), BPR, IT systems analysis, SOA



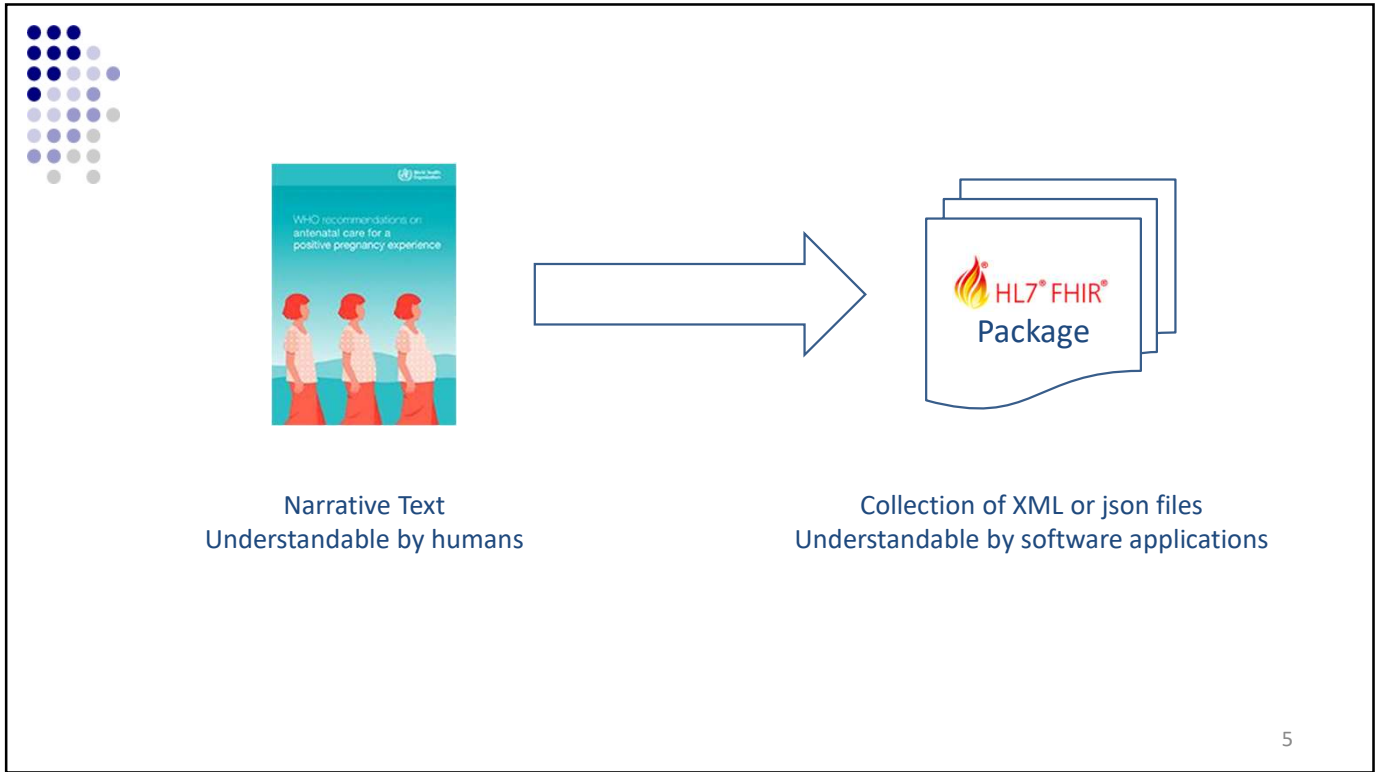
OpenHIE

World Health Organization, UNICEF, UNOPS, ADB, JOINT LEARNING NETWORK, THE WORLD BANK

Canada Health Infoway, Inforoute Santé du Canada

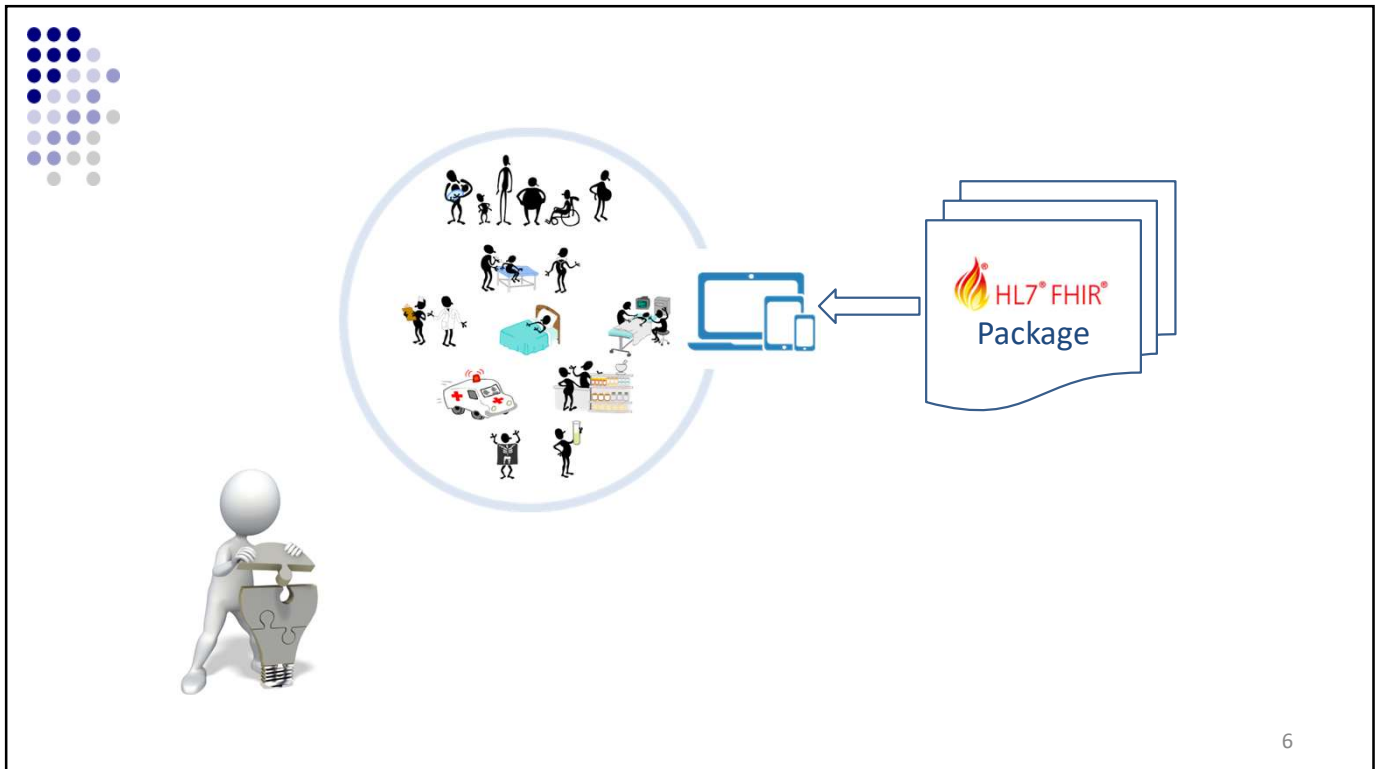
ISO, IHE





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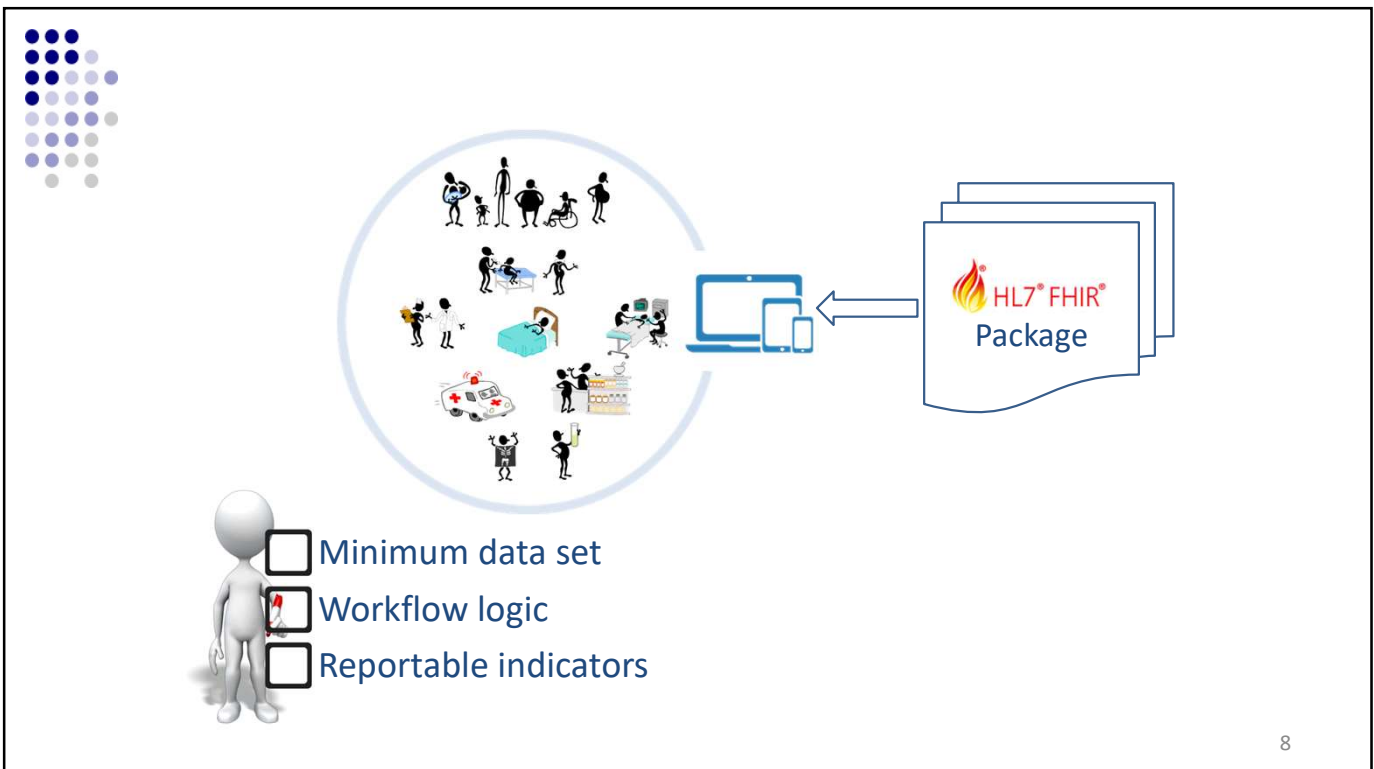


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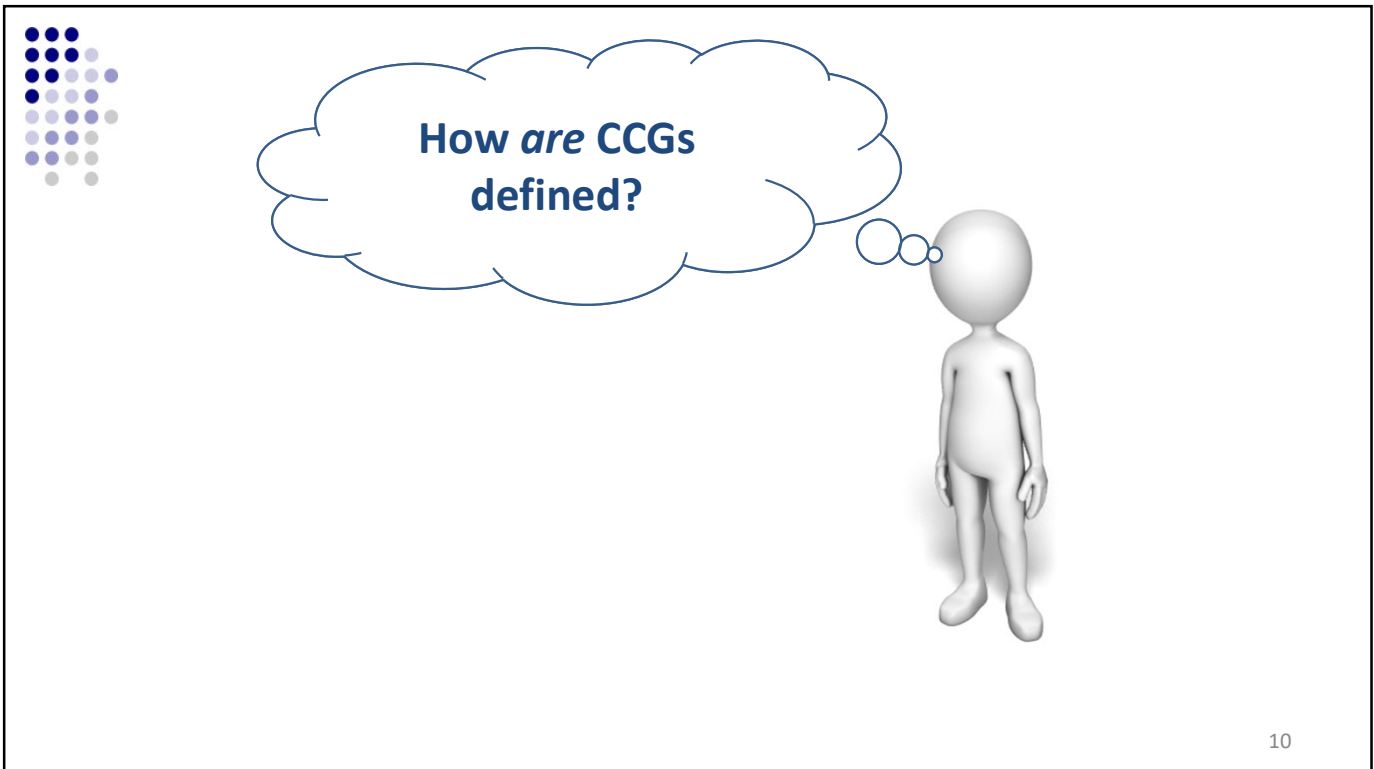
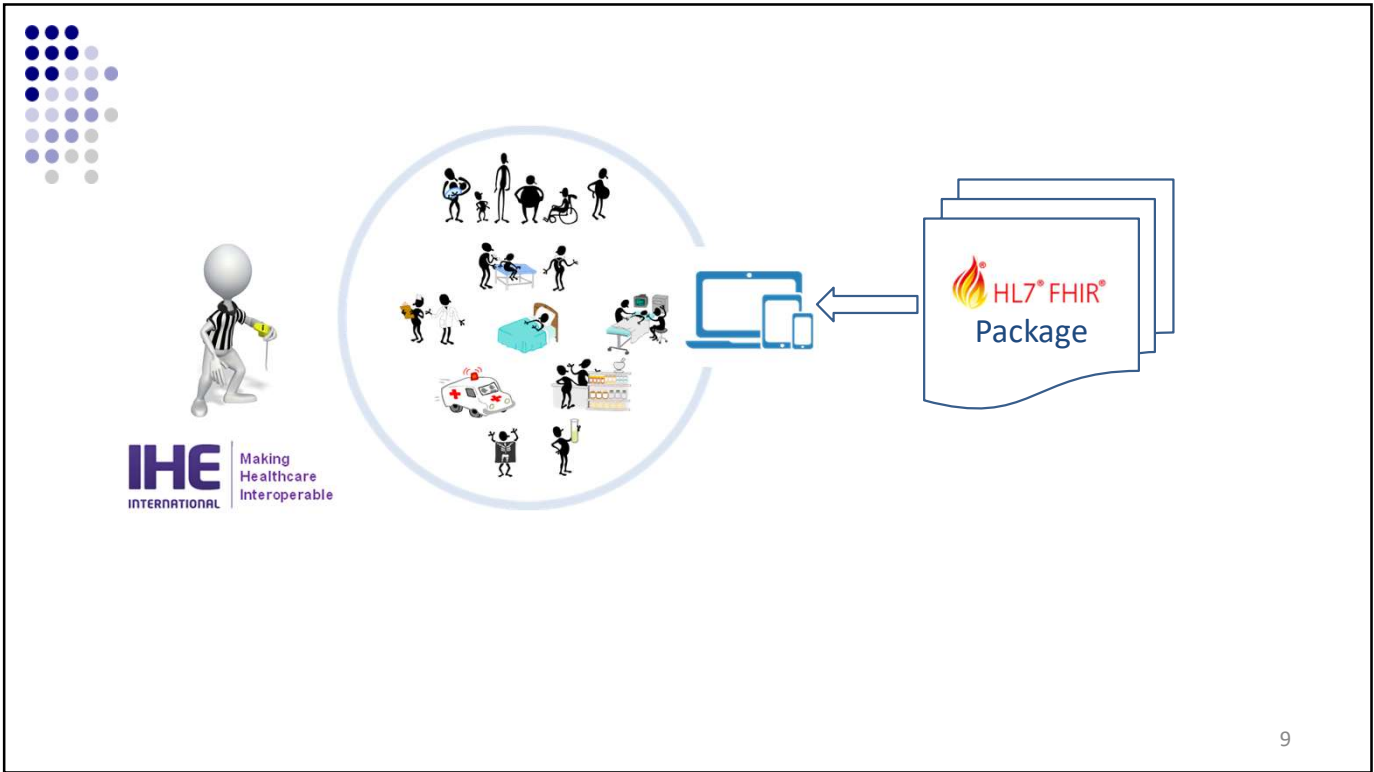
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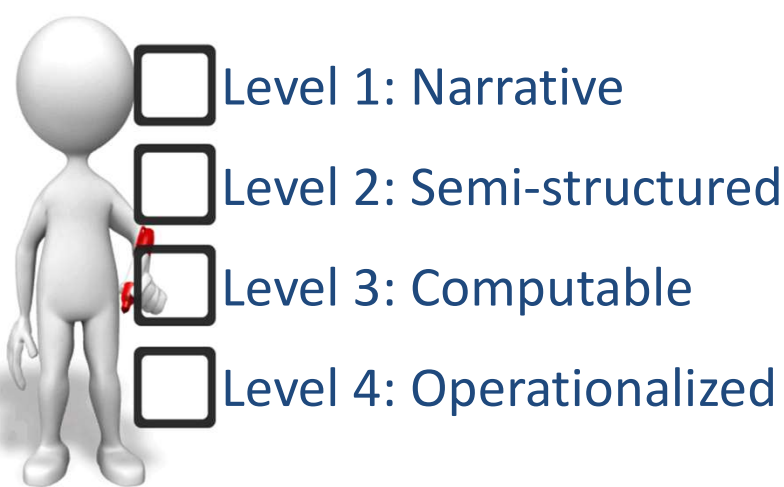


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Level 1: Narrative

Level 2: Semi-structured

Level 3: Computable

Level 4: Operationalized





**Our focus, today.**

World Health Organization

BPMN DMN

HL7 FHIR IHE

Examples: OpenMRS OPENSRP SanteSuite




Process Model


Data Model

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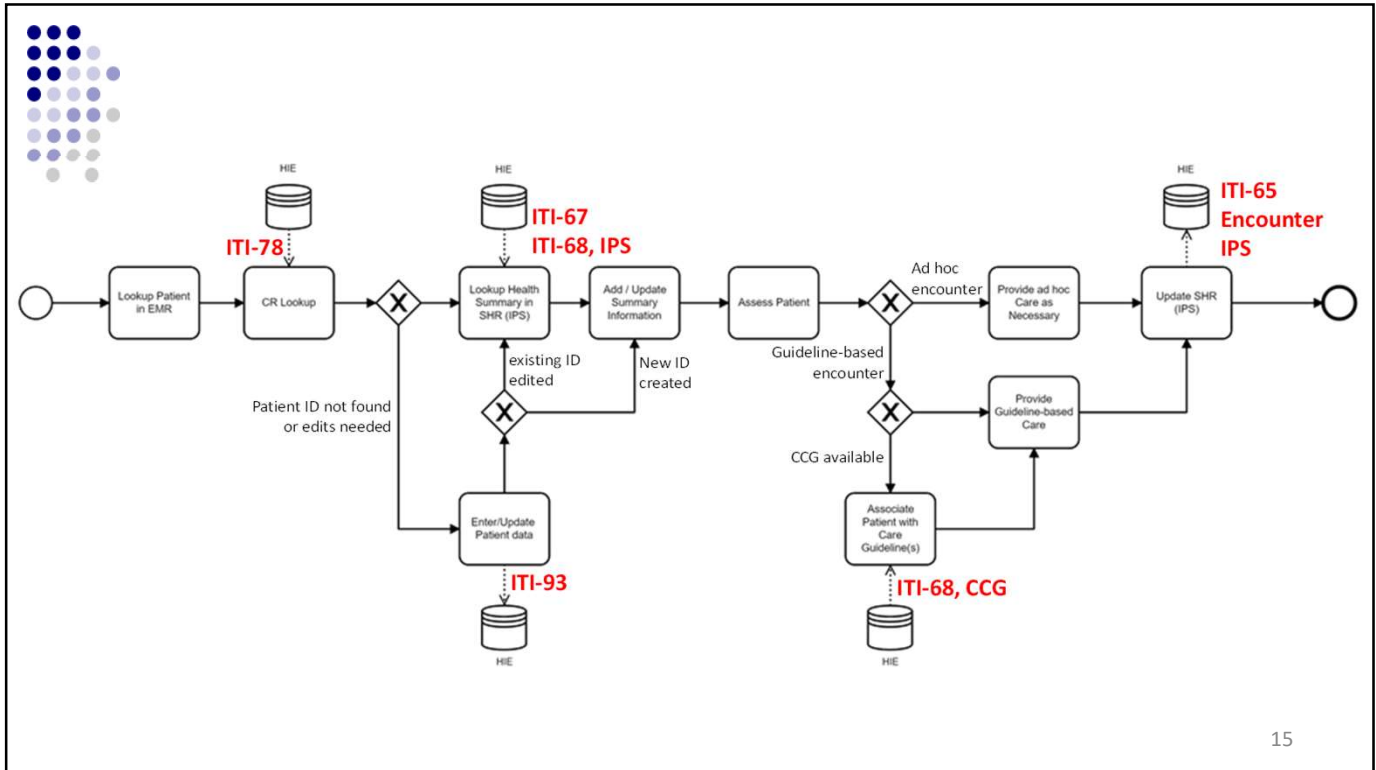
## Generic care encounter workflow



- Identify the patient
- Fetch the patient's health story
- Provide guideline-based care
- Update the patient's health story

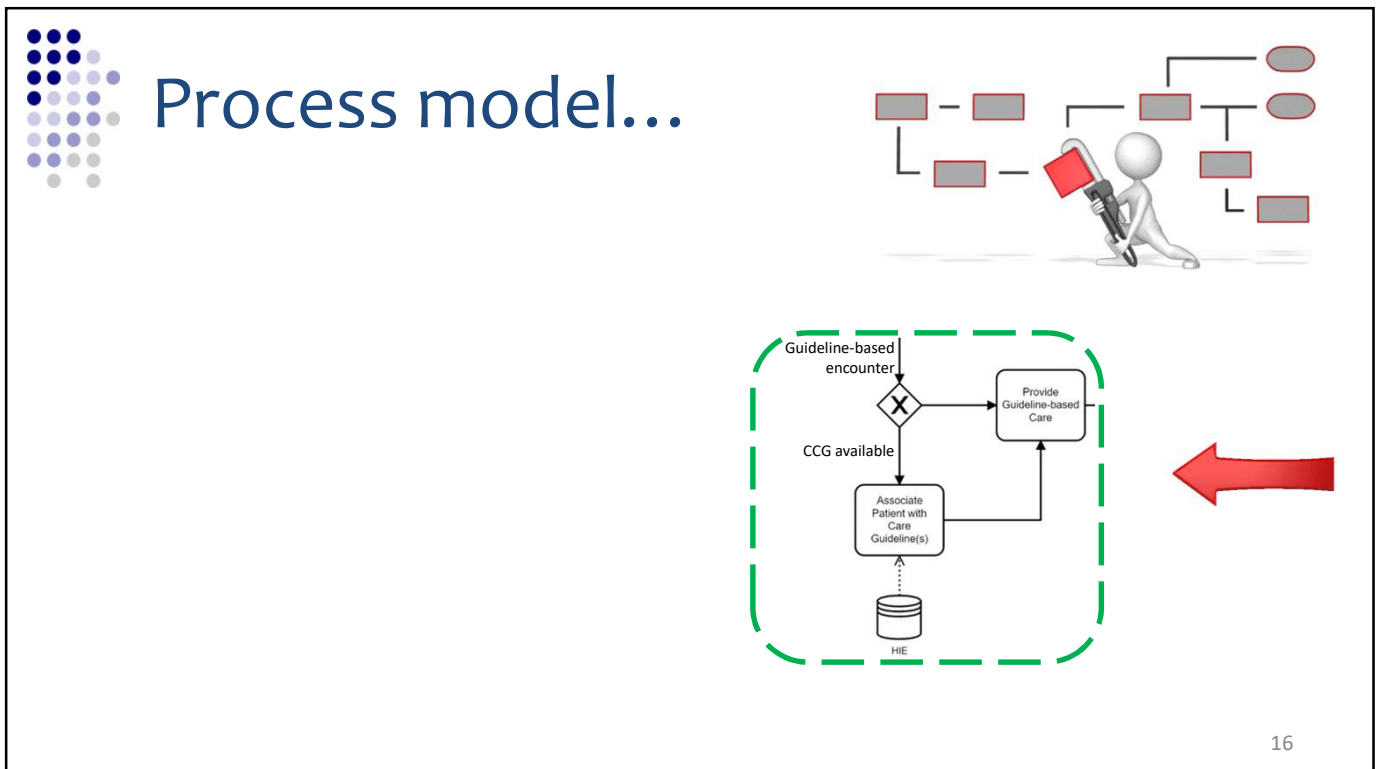
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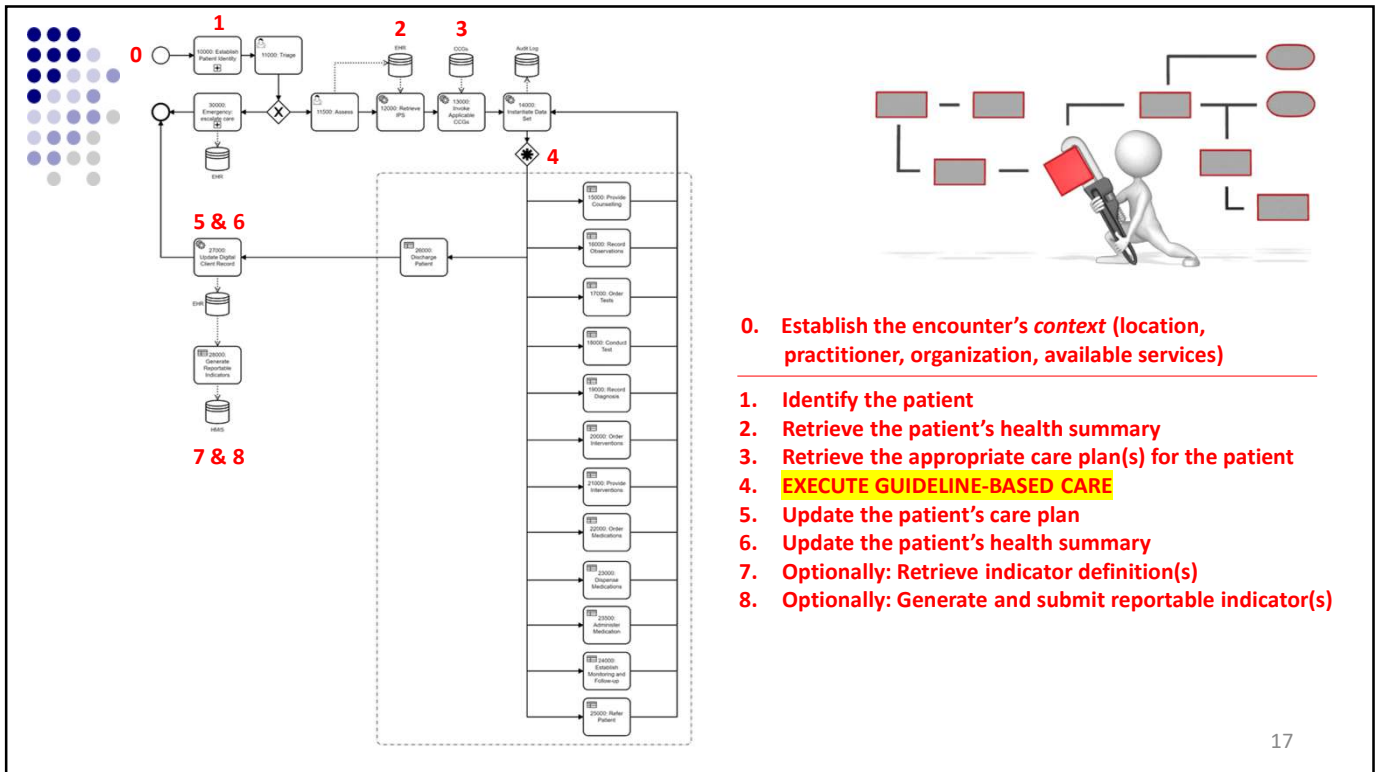
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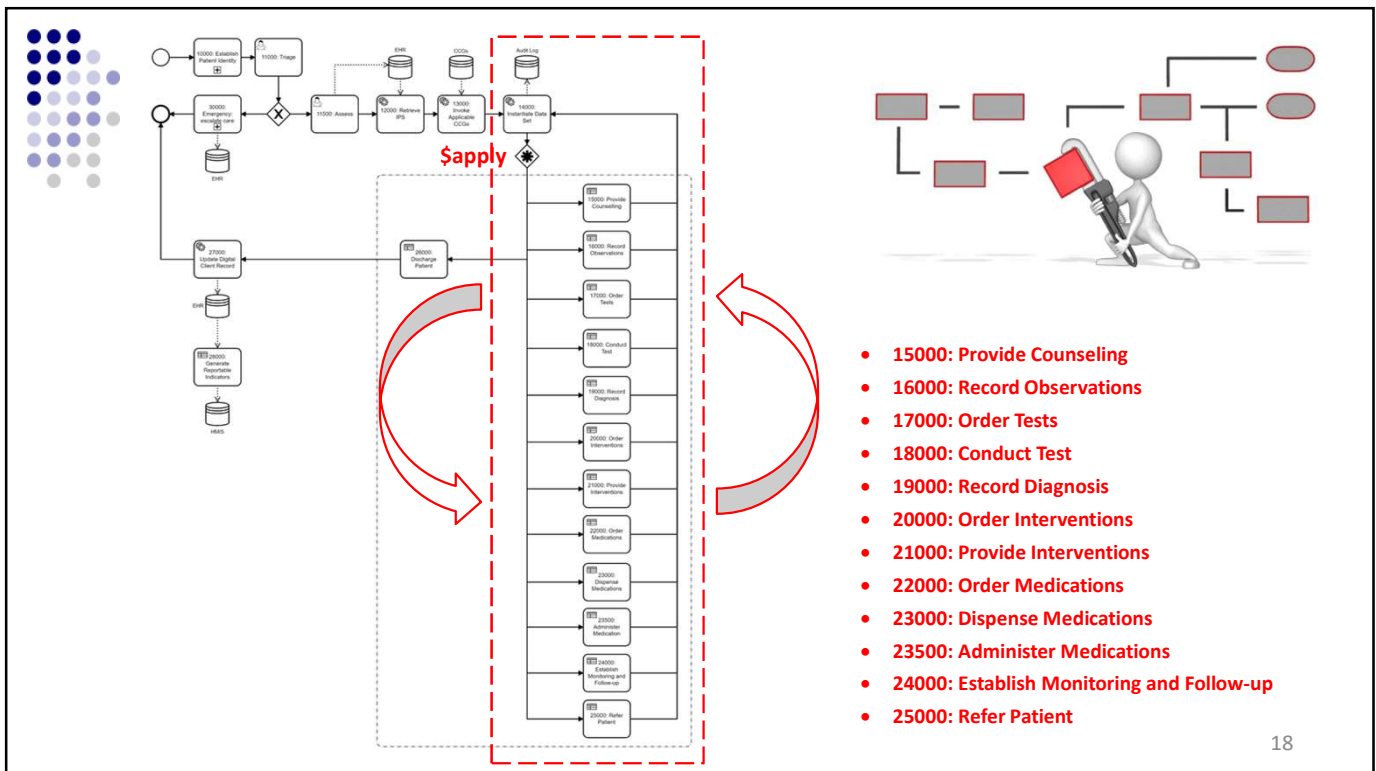
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**0. Establish the encounter's context (location, practitioner, organization, available services)**

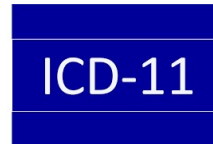
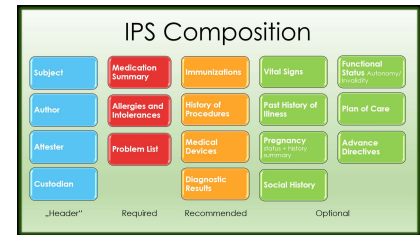
1. Identify the patient
2. Retrieve the patient's health summary
3. Retrieve the appropriate care plan(s) for the patient
4. EXECUTE GUIDELINE-BASED CARE
5. Update the patient's care plan
6. Update the patient's health summary
7. Optionally: Retrieve indicator definition(s)
8. Optionally: Generate and submit reportable indicator(s)





## Data model...

- Medication Summary (R) [ [Medication Statement \(IPS\)](#) | [Medication \(IPS\)](#) ]
- Allergies and Intolerances (R) [ [Allergy Intolerance \(IPS\)](#) ]
- Problem List (R) [ [Condition \(IPS\)](#) ]
- Immunizations (S) [ [Immunization \(IPS\)](#) ]
- History of Procedures (S) [ [Procedure \(IPS\)](#) | [Organization \(IPS\)](#) | [Device \(performer, observer\)](#) ]
- Medical Devices (S) [ [Device Use Statement \(IPS\)](#) | [Device \(IPS\)](#) ]
- Diagnostic Results (S) [ [Observation \(Results\)](#) | [DiagnosticReport \(IPS\)](#) | [Organization \(IPS\)](#) ]
  - Laboratory results [ [Observation \(Results: laboratory\)](#) | [Specimen \(IPS\)](#) | [Media observation \(Results: laboratory, media\)](#) ]
  - Radiology results [ [Observation \(Results: radiology\)](#) | [Device \(performer, observer\)](#) | [Imaging Study \(IPS\)](#) | [Practitioner \(IPS\)](#) ]
  - Pathology results [ [Observation \(Results: pathology\)](#) | [Specimen \(IPS\)](#) | [Media observation \(Results: laboratory, media\)](#) ]
- Vital Signs [ [Vital Signs](#) ]
- Past history of illnesses [ [Condition \(IPS\)](#) ]
- Pregnancy (status and history summary) [ [Observation \(Pregnancy: EDD\)](#) | [Observation \(Pregnancy: outcome\)](#) | [Observation \(Pregnancy: status\)](#) ]
- Social History [ [Observation \(SH: alcohol use\)](#) | [Observation \(SH: tobacco use\)](#) ]
- Functional Status (Autonomy / Invalidity) [ [Condition \(IPS\)](#) | [Clinical Impression](#) ]
- Plan of care [ [Care Plan](#) ]
- Advance Directives [ [Consent](#) ]



WHO ATC

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Stand back... I have a metaphor...

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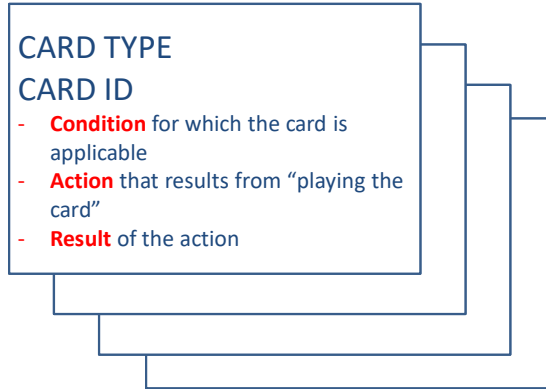
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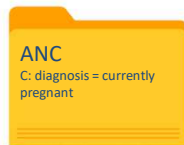
# CCG metaphor: a folder full of cards



One folder per care guideline  
(FHIR **PlanDefinition** resource)



One card per guideline-based recommendation  
(A **PlanDefinition** containing a single **ActivityDefinition** resource based on one of the 12 card "types")



Condition  
Action  
Result

15000  
GUID-1  
C: at each encounter; not yet done  
A: provide applicable pregnancy counseling  
R: Communication resource

16000  
GUID-2  
C: at each encounter; not yet done  
A: measure BP  
R: BP Observation resource


16000  
GUID-3  
C: at each encounter; not yet done  
A: measure temperature  
R: temperature Observation resource

16000  
GUID-4  
C: at each encounter; not yet done  
A: measure weight  
R: weight Observation resource

18000  
GUID-5  
C: at first ANC encounter; not yet done  
A: conduct rapid HIV test  
R: lab result Observation resource

22000  
GUID-8  
C: if BP>target and not BP meds dispensed  
A: prescribe BP meds  
R: BP MedicationRequest resource







**HIV**  
C: diagnosis = HIV+

Condition  
Action  
Result

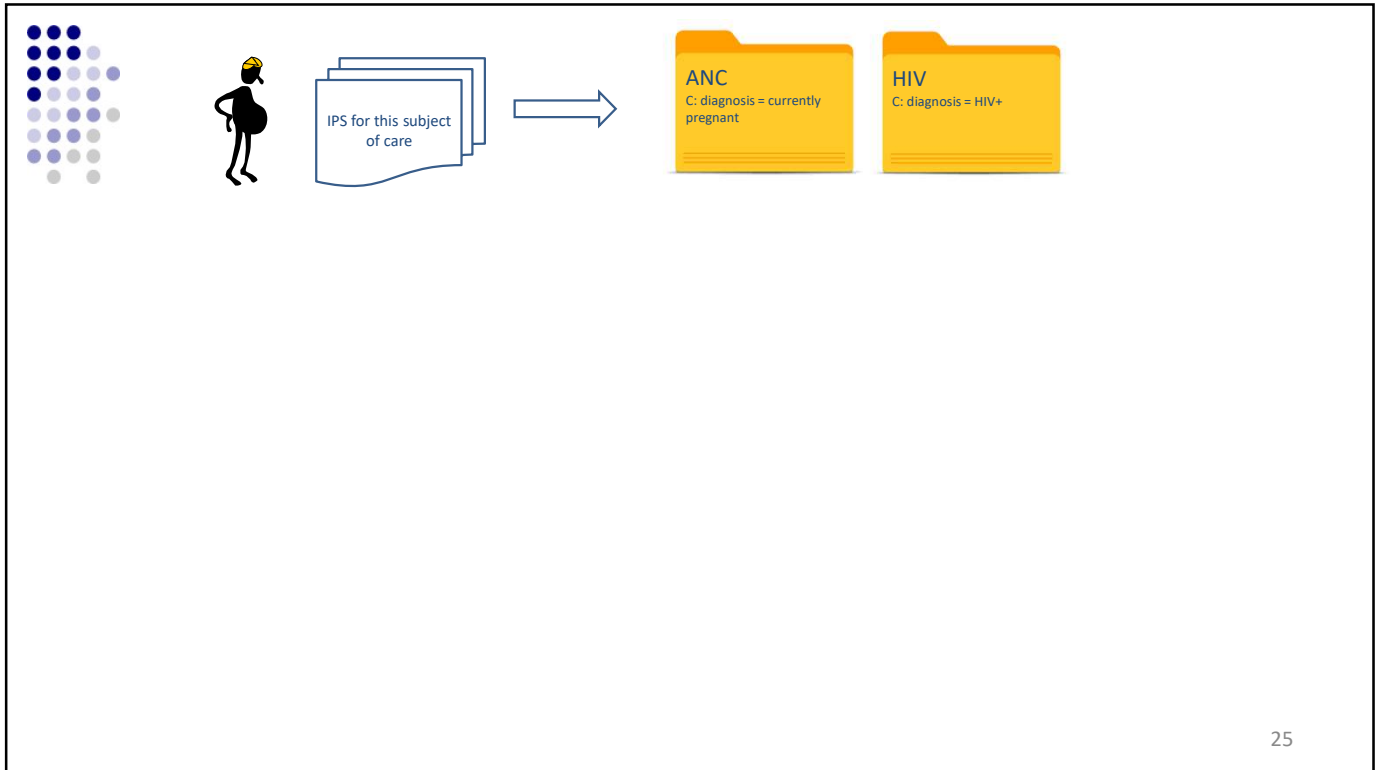
<p>15000 GUID-20 C: at each encounter; not yet done A: provide applicable HIV counseling R: Communication resource</p>	<p>16000 GUID-2 C: at each encounter; not yet done A: measure BP R: BP Observation resource</p>	<p>16000 GUID-4 C: at each encounter; not yet done A: measure weight R: weight Observation resource</p>	<p>16000 GUID-22 C: at each encounter; not yet done A: measure heart rate R: heart rate Observation resource</p>
<p>17000 GUID-24 C: if &gt;6mo since last viral load test and no active viral load test order A: order viral load test R: ServiceRequest for lab test</p>	<p>22000 GUID-26 C: if current date &gt;= last ARV dispense date + coverage period A: prescribe ARV R: ARV MedicationRequest resource</p>	<p>21000 GUID-31 C: if currently pregnant and not already PMTCT A: provide PMTCT R: PMTCT service bundle order</p>	<p>...</p>





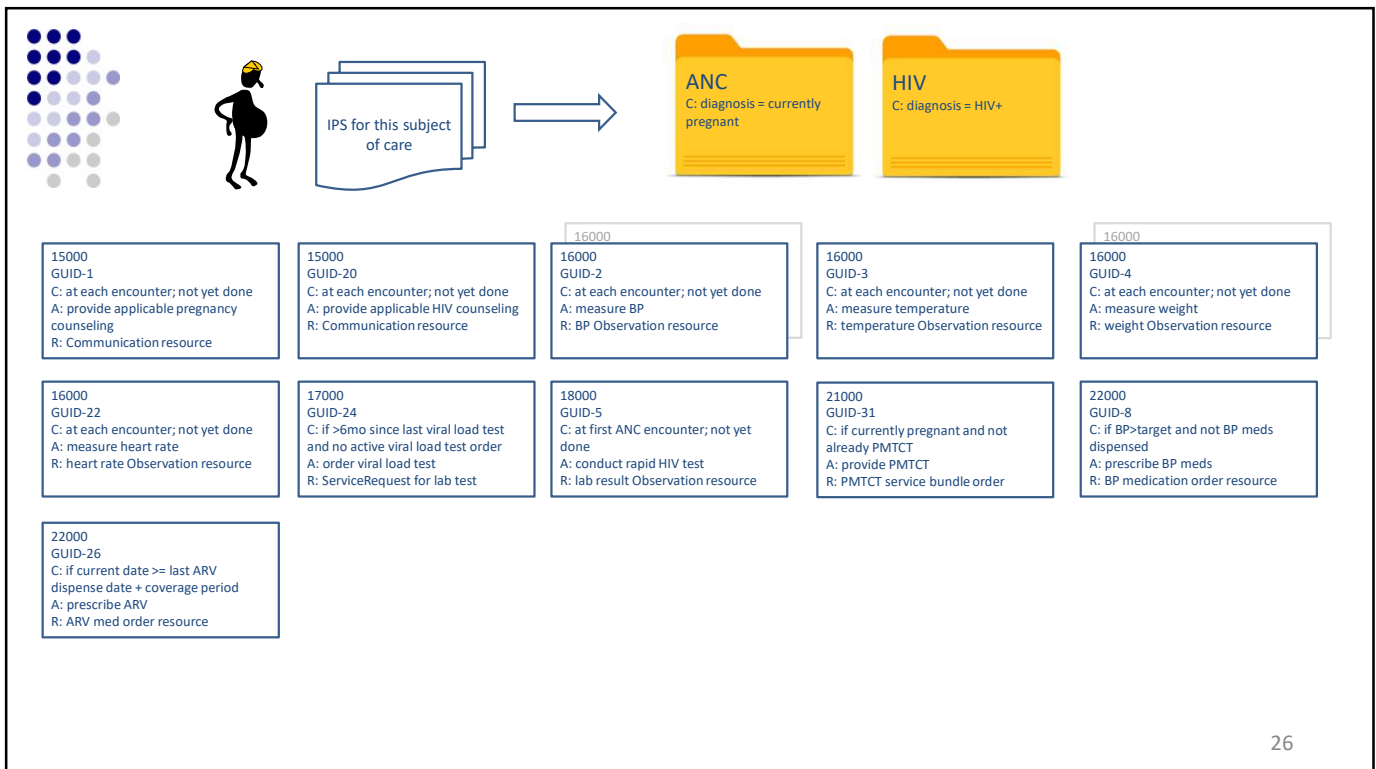
IPS for this subject of care

- **Diagnosis of currently pregnant, 2 months ago**
- **HIV test observation, 2 months ago, HIV+**
- PMTCT intervention, 2 months ago
- BP 110/70, 2 months ago
- Weight 50kg, 14 months ago
- Weight 55kg, 2 months ago
- Heart rate 60, 14 months ago
- Heart rate 61, 2 months ago
- Temperature 37C, 14 months ago
- Temperature 37C, 2 months ago
- Pregnancy counseling given, 2 months ago
- **ARV dispensed, 2 months ago, 2 month supply**
- Viral load ordered, 2 months ago
- Viral load result, 6 weeks ago, 9000 copies



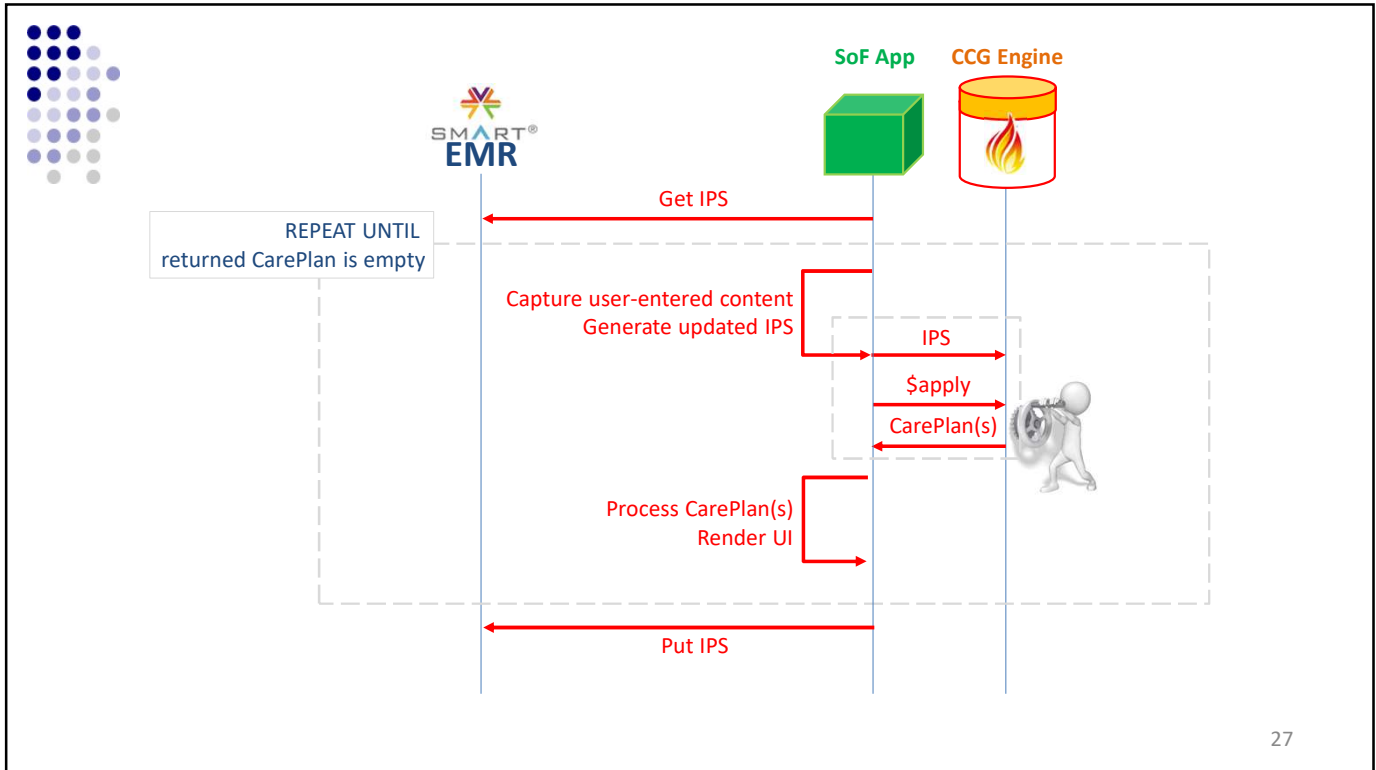
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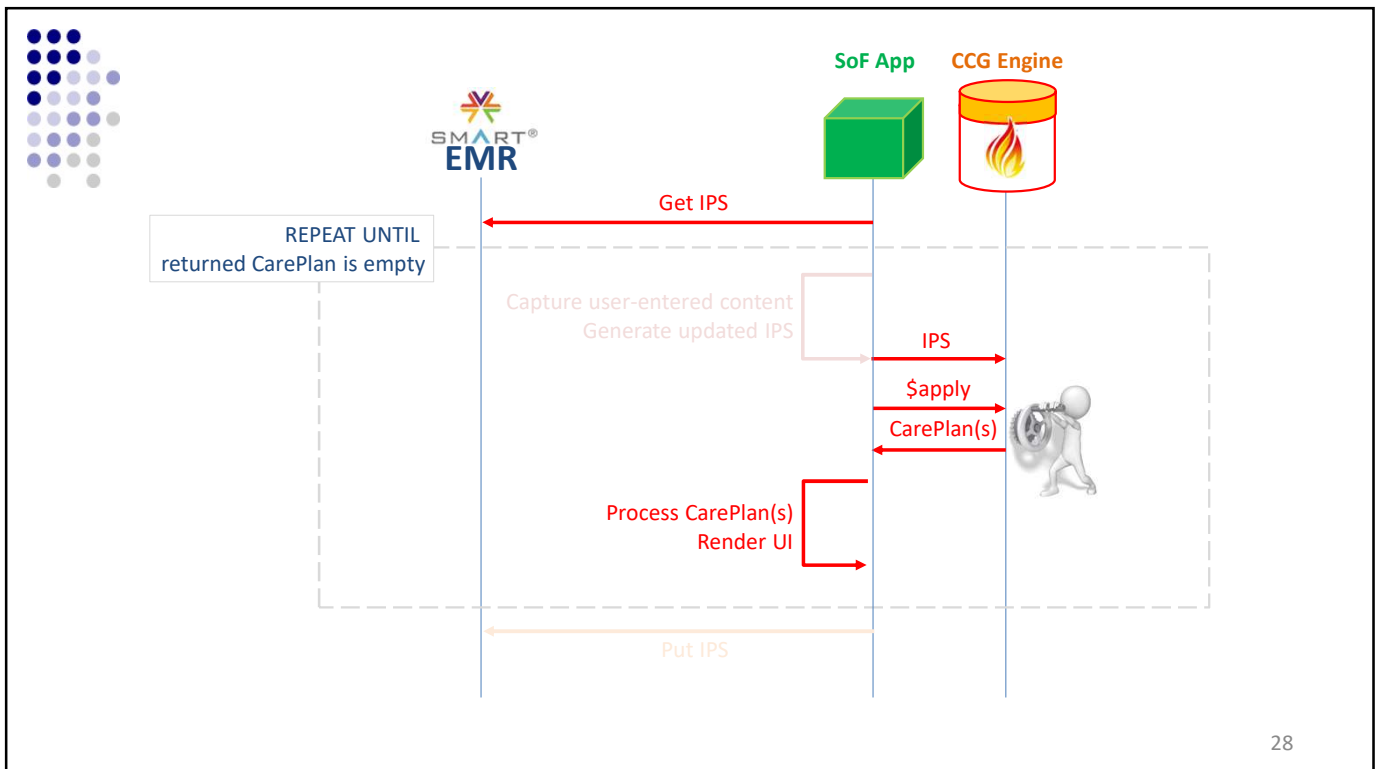


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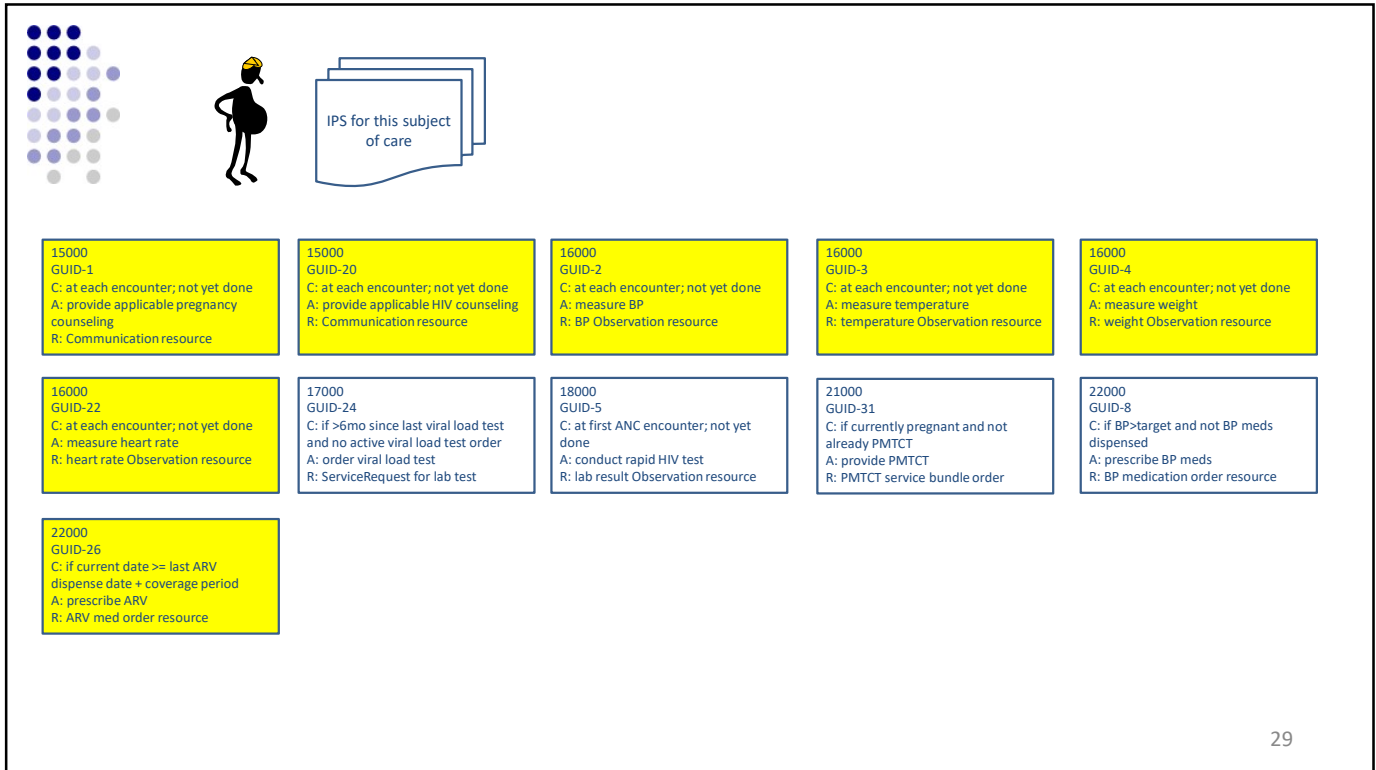
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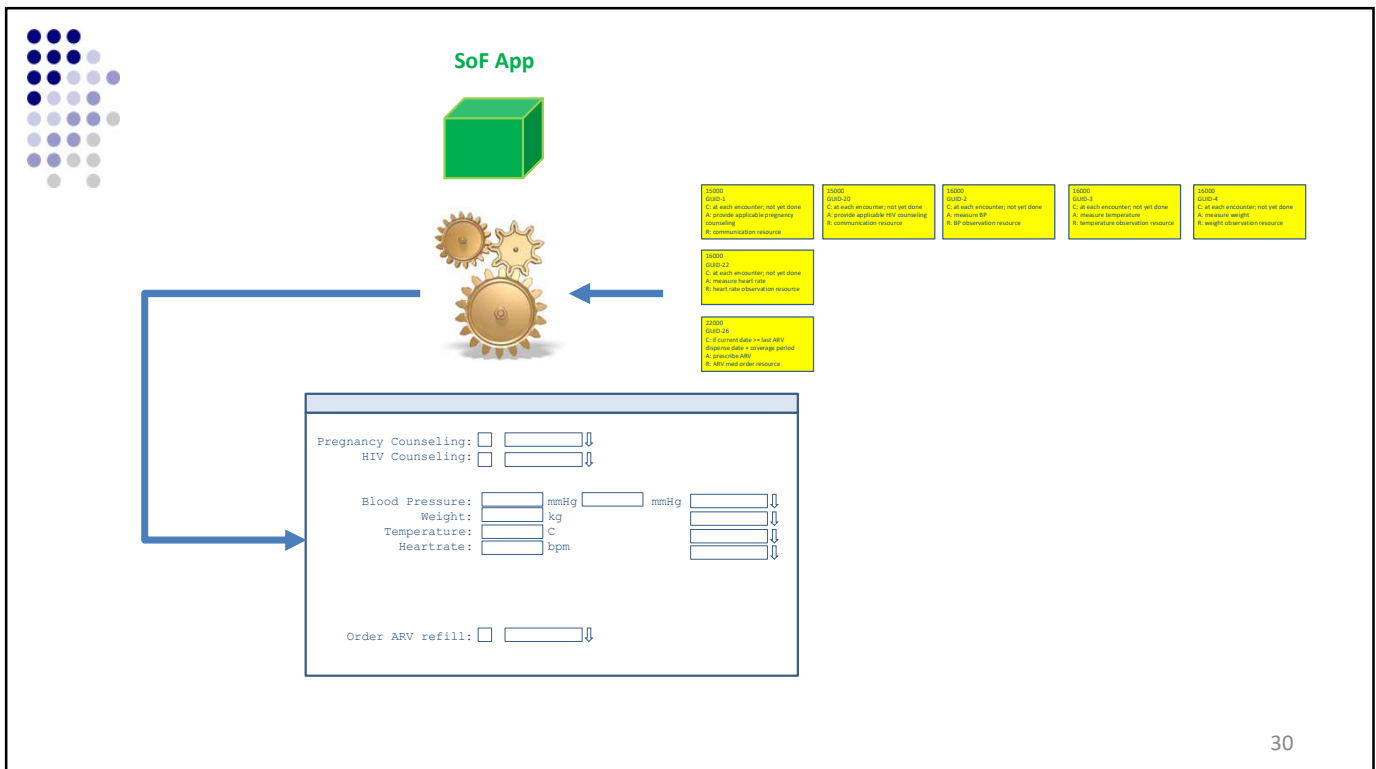


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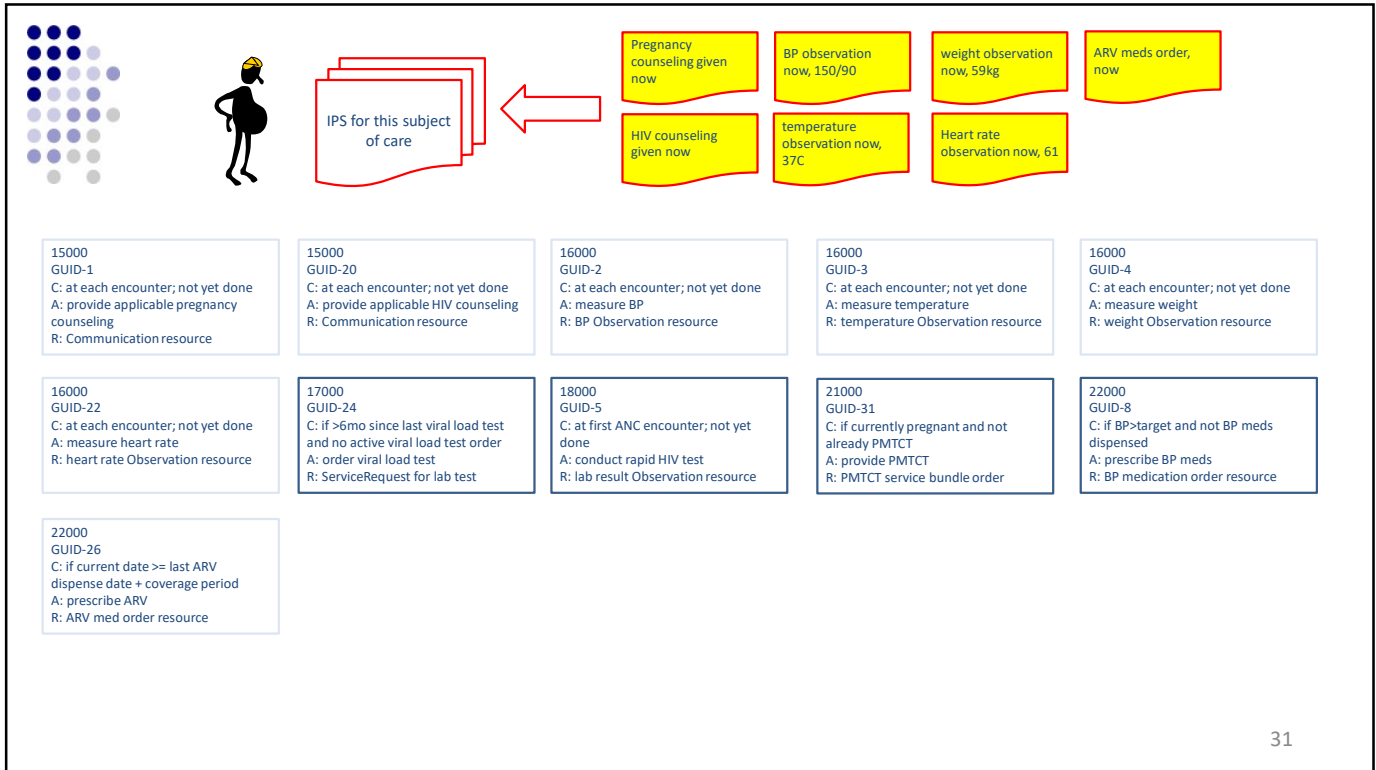
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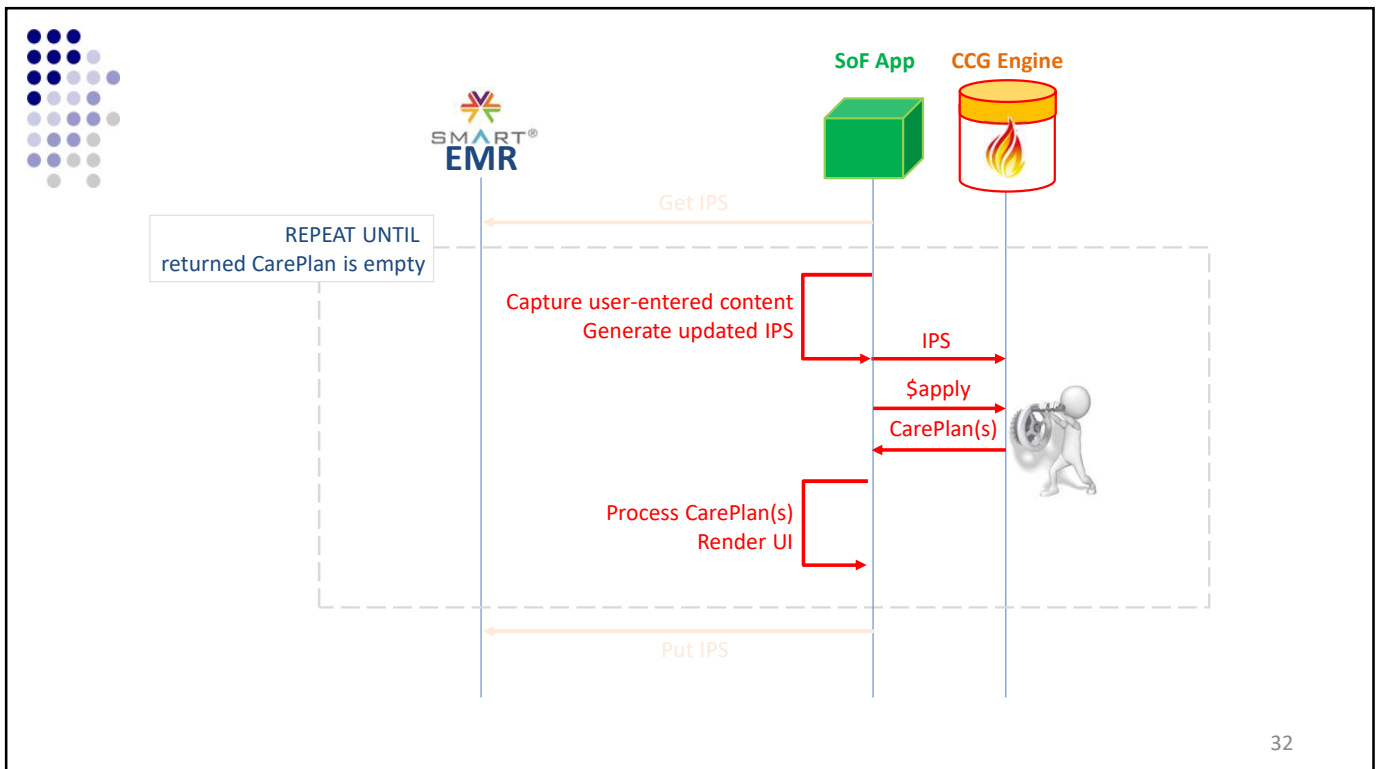


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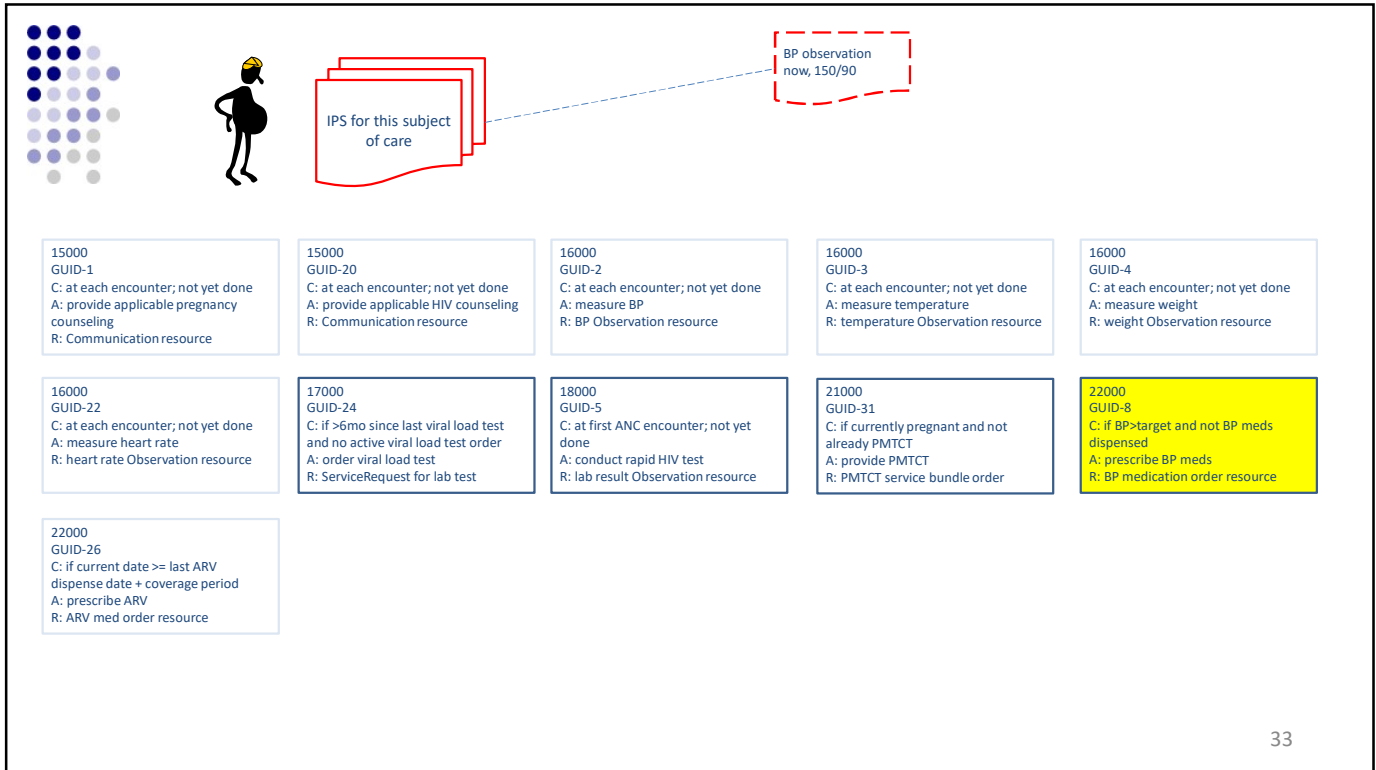


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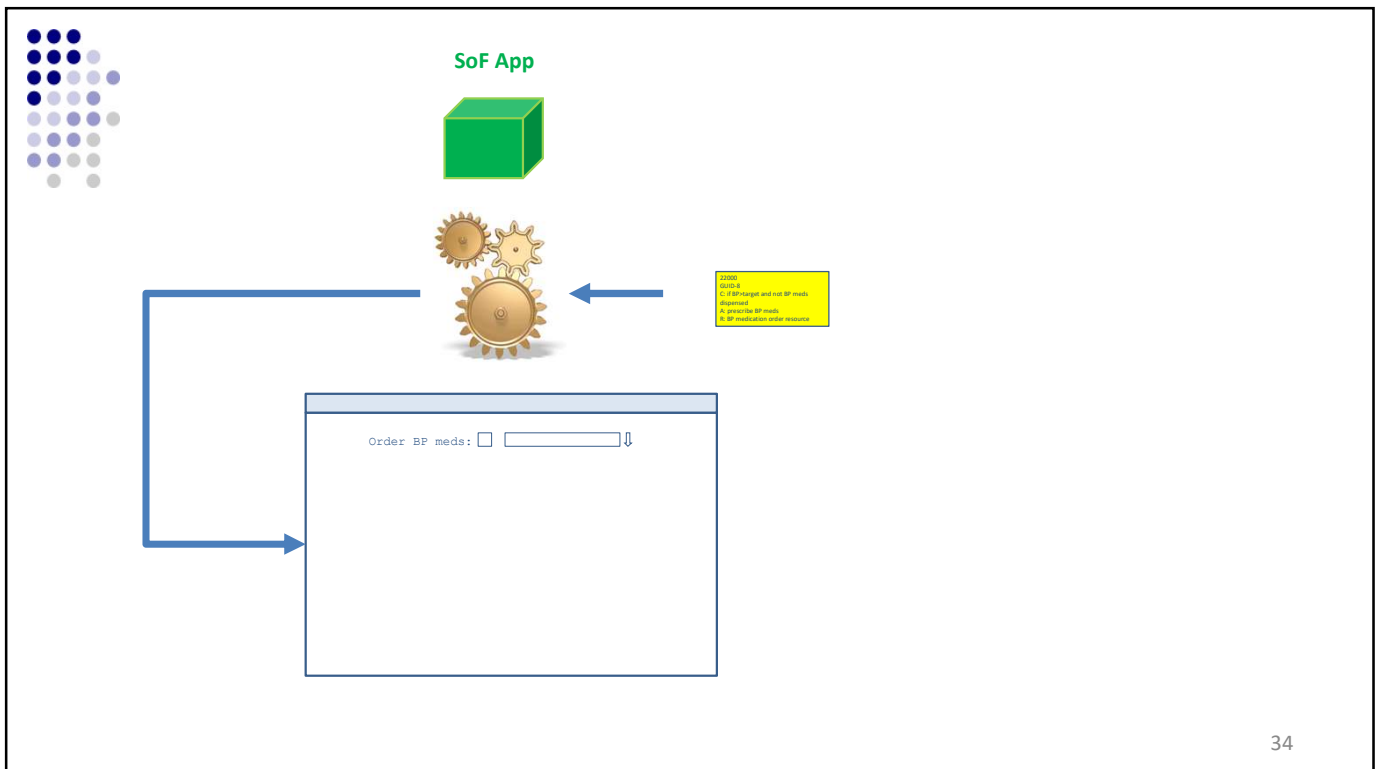


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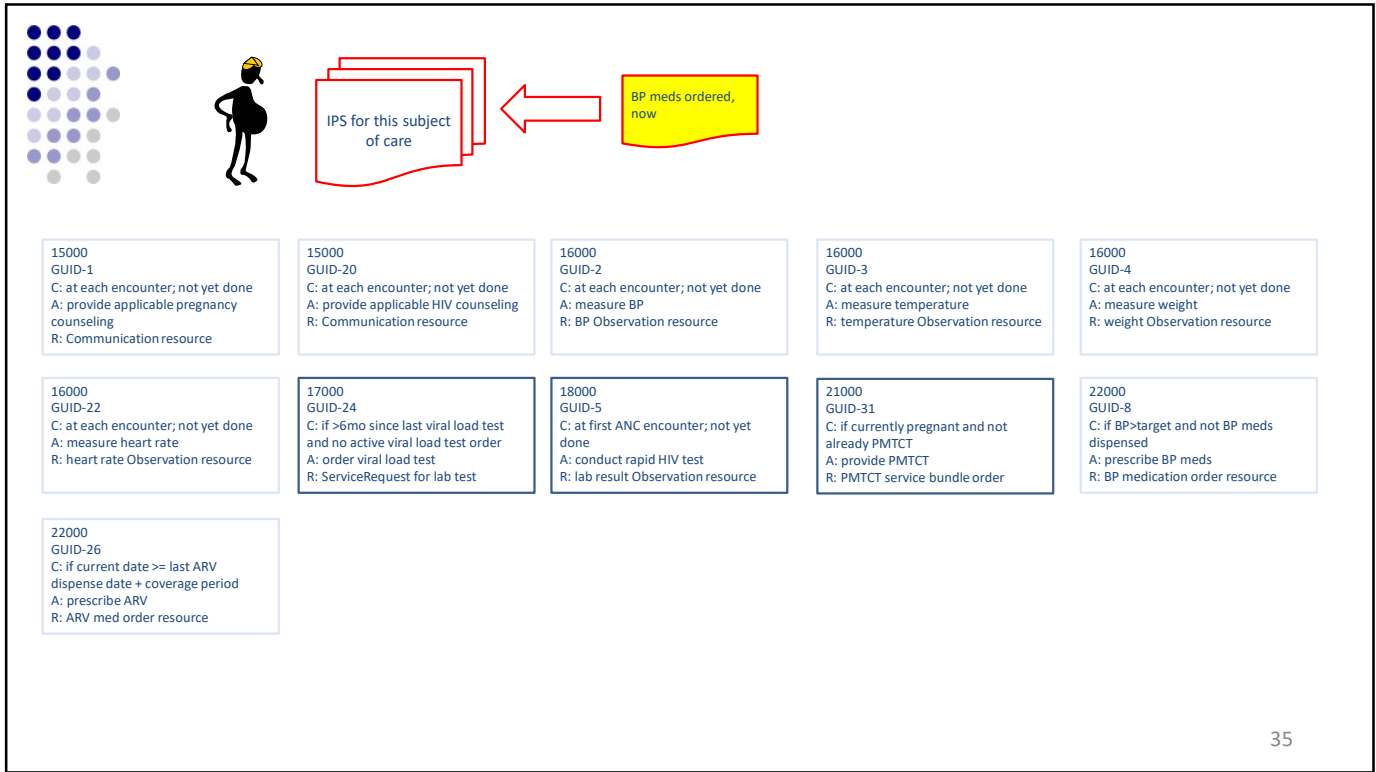




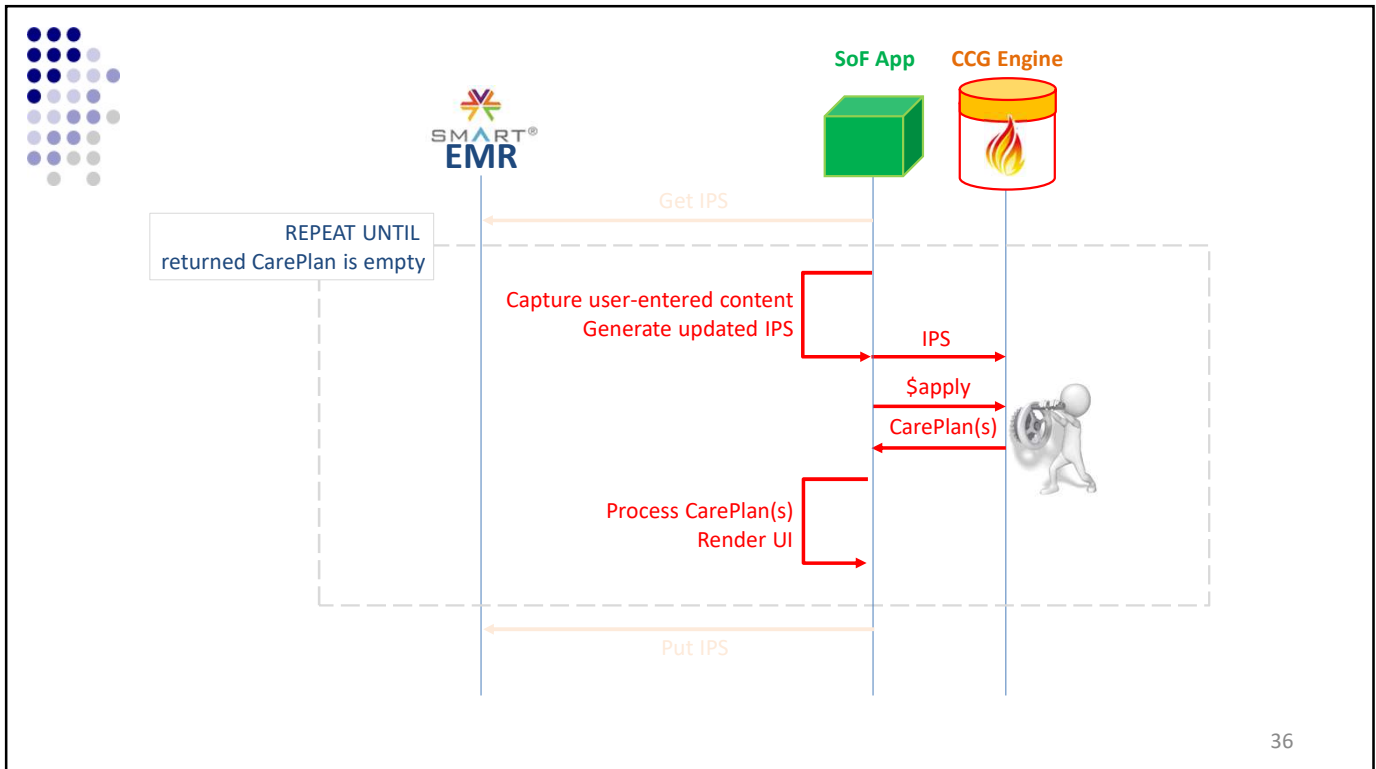
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IPS for this subject of care

## No cards evaluated TRUE. We're DONE!

15000  
GUID-1  
C: at each encounter; not yet done  
A: provide applicable pregnancy counseling  
R: Communication resource

15000  
GUID-20  
C: at each encounter; not yet done  
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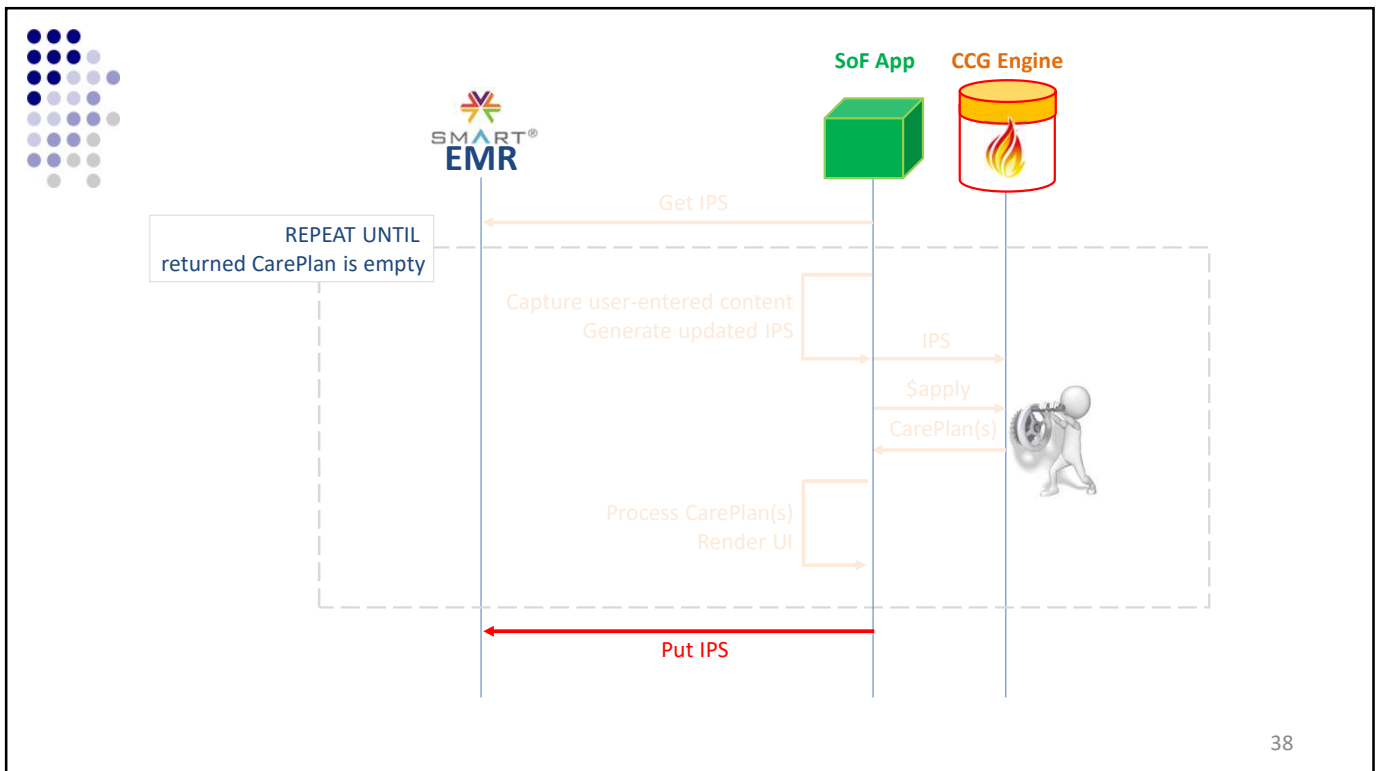
21000  
GUID-31  
C: if currently pregnant and not already PMTCT  
A: provide PMTCT  
R: PMTCT service bundle order

22000  
GUID-8  
C: if BP>target and not BP meds dispensed  
A: prescribe BP meds  
R: BP medication order resource

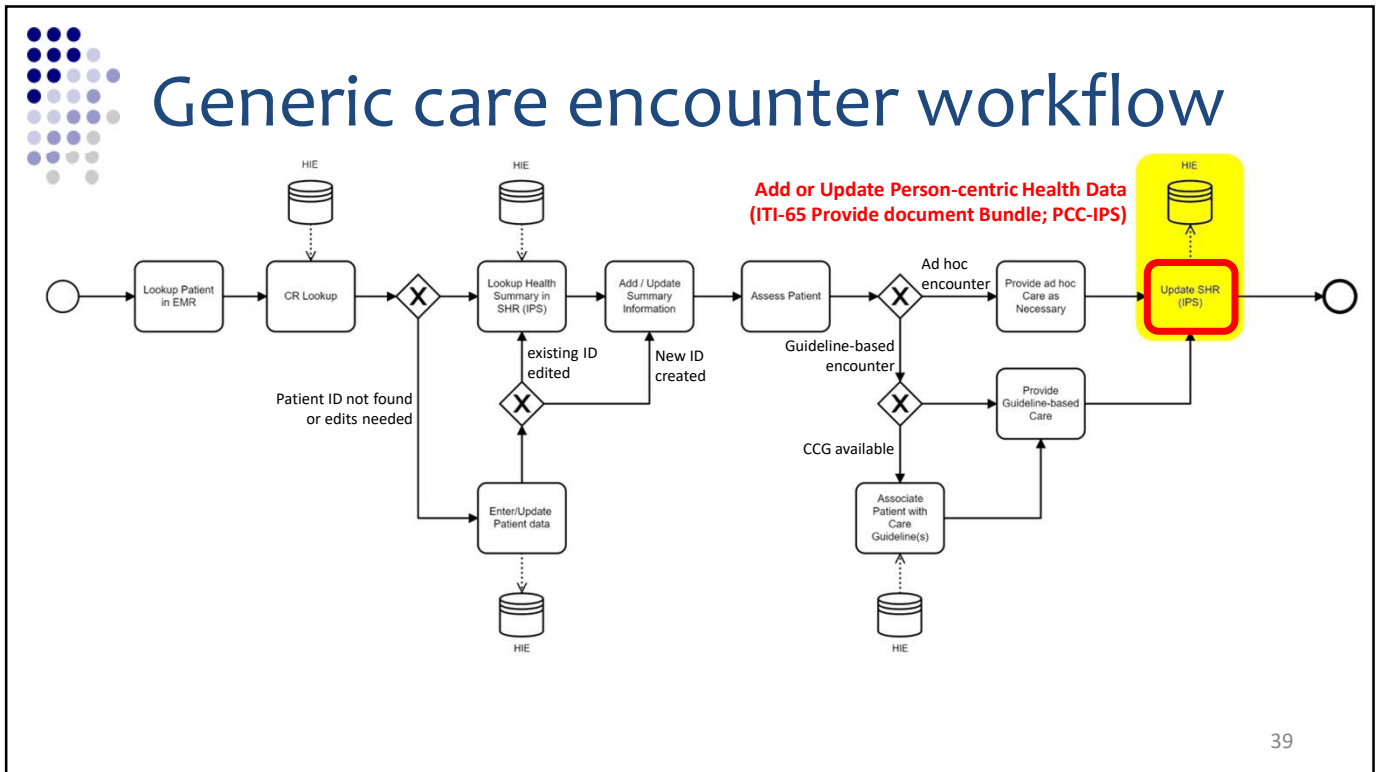
22000  
GUID-26  
C: if current date >= last ARV dispense date + coverage period  
A: prescribe ARV  
R: ARV med order resource

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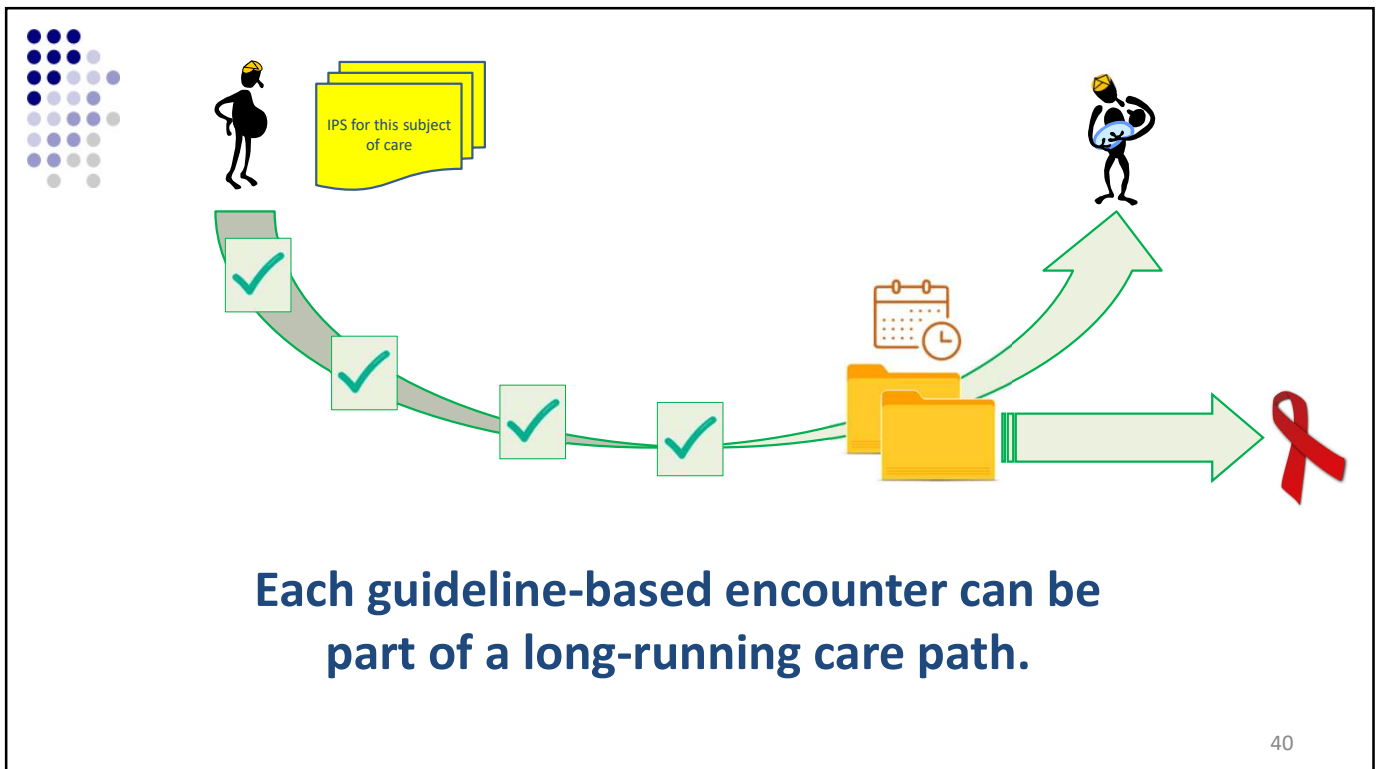
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## Important simplifications...



**The encounter *context* must be established prior to CCG execution**

**CCG *condition* statements must be defined in terms of the IHE mCSD and IHE IPS data content models**

**CCG *actions* must be defined in terms of one of the 12 pre-defined “card” types**

**Reportable indicators must be defined in terms of the 12 card type *results***

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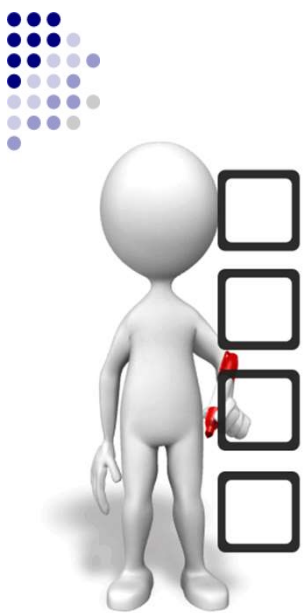


Where *are* we with CCGs and where are we *heading*?



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**We have an approachable, standards-based way to author CCGs.**

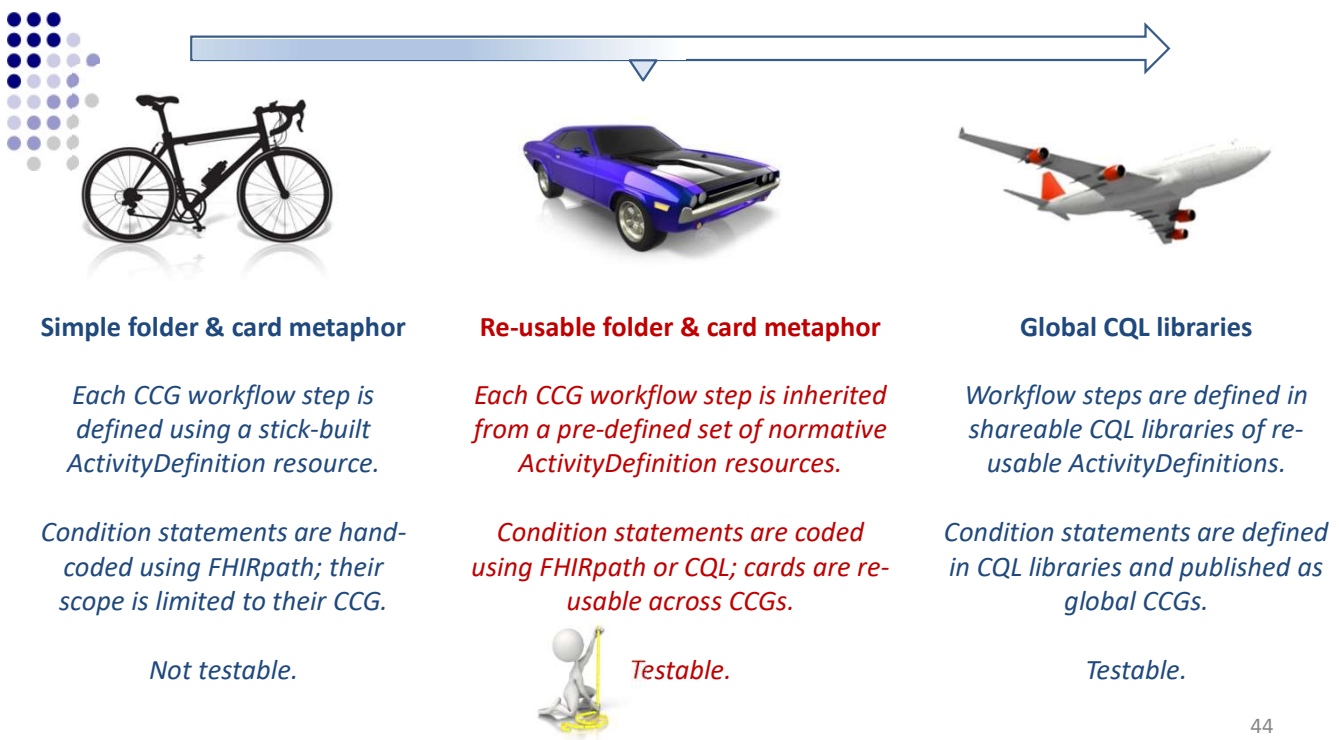
**Care recommendation “cards” can be re-used across CCGs.**





**Multiple CCGs can reliably and safely execute simultaneously.**

**We can add CCG processing to any SMART-on-FHIR capable app.**

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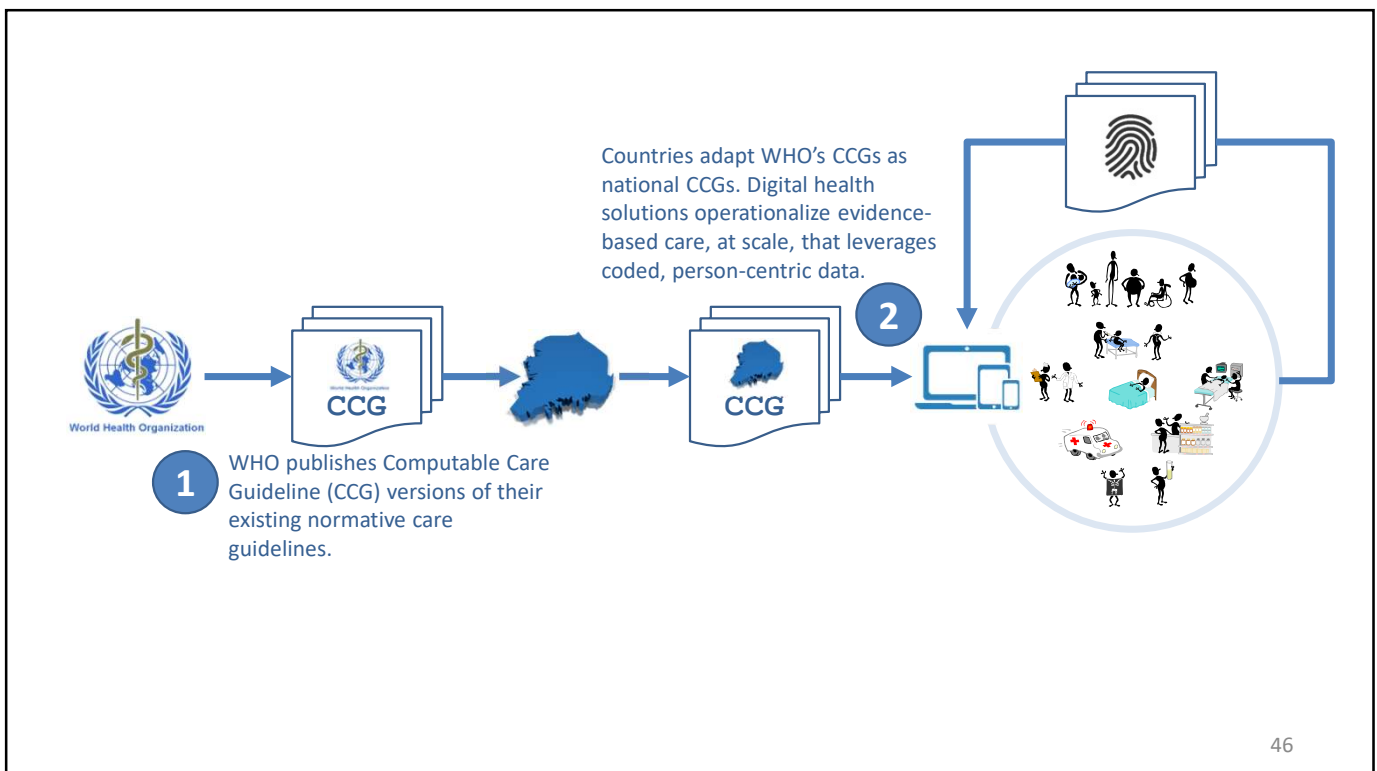
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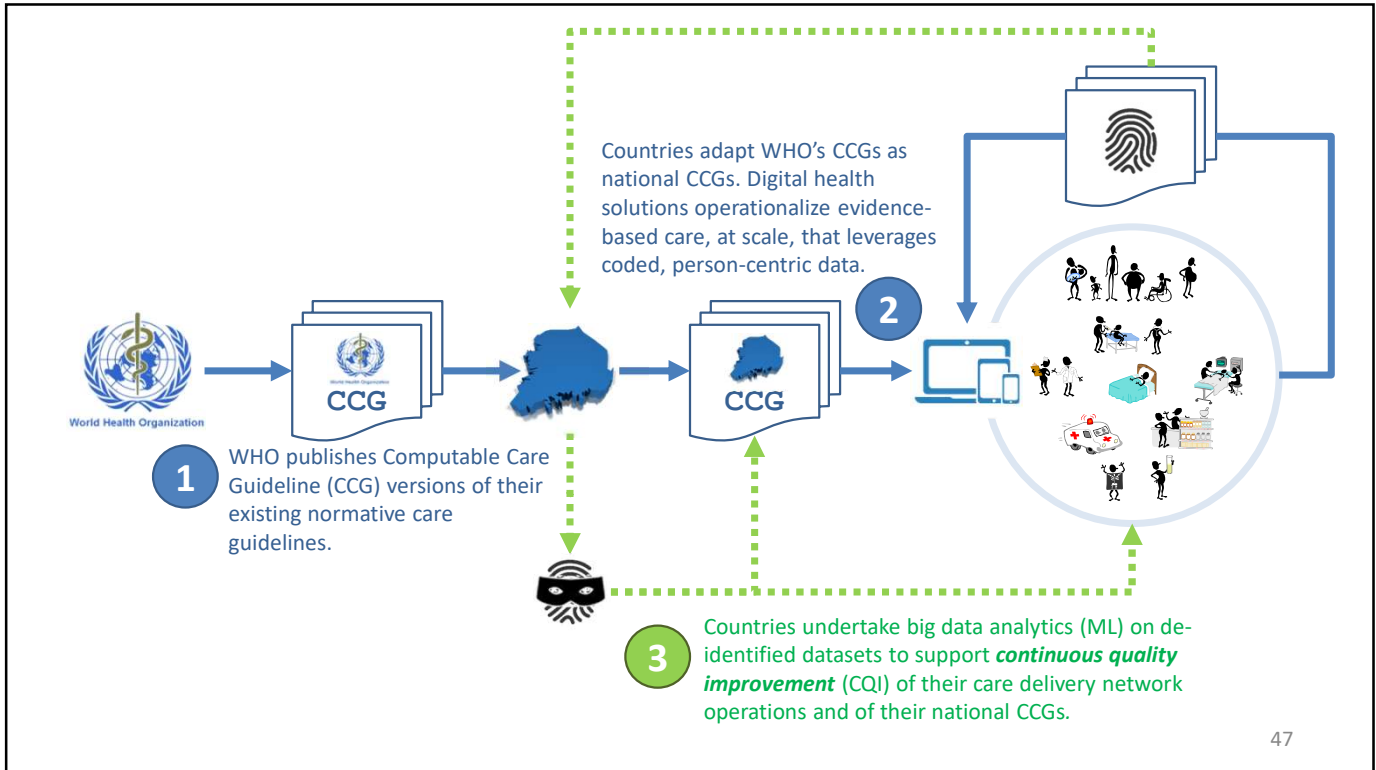


		
<p><b>Simple folder &amp; card metaphor</b></p>	<p><b>Re-usable folder &amp; card metaphor</b></p>	<p><b>Global CQL libraries</b></p>
<p><i>Each CCG workflow step is defined using a stick-built ActivityDefinition resource.</i></p>	<p><i>Each CCG workflow step is inherited from a pre-defined set of normative ActivityDefinition resources.</i></p>	<p><i>Workflow steps are defined in shareable CQL libraries of re-usable ActivityDefinitions.</i></p>
<p><i>Condition statements are hand-coded using FHIRpath; their scope is limited to their CCG.</i></p>	<p><i>Condition statements are coded using FHIRpath or CQL; cards are re-usable across CCGs.</i></p>	<p><i>Condition statements are defined in CQL libraries and published as global CCGs.</i></p>
<p><i>Not testable.</i></p>	 <p><i>Testable.</i></p>	<p><i>Testable.</i></p>

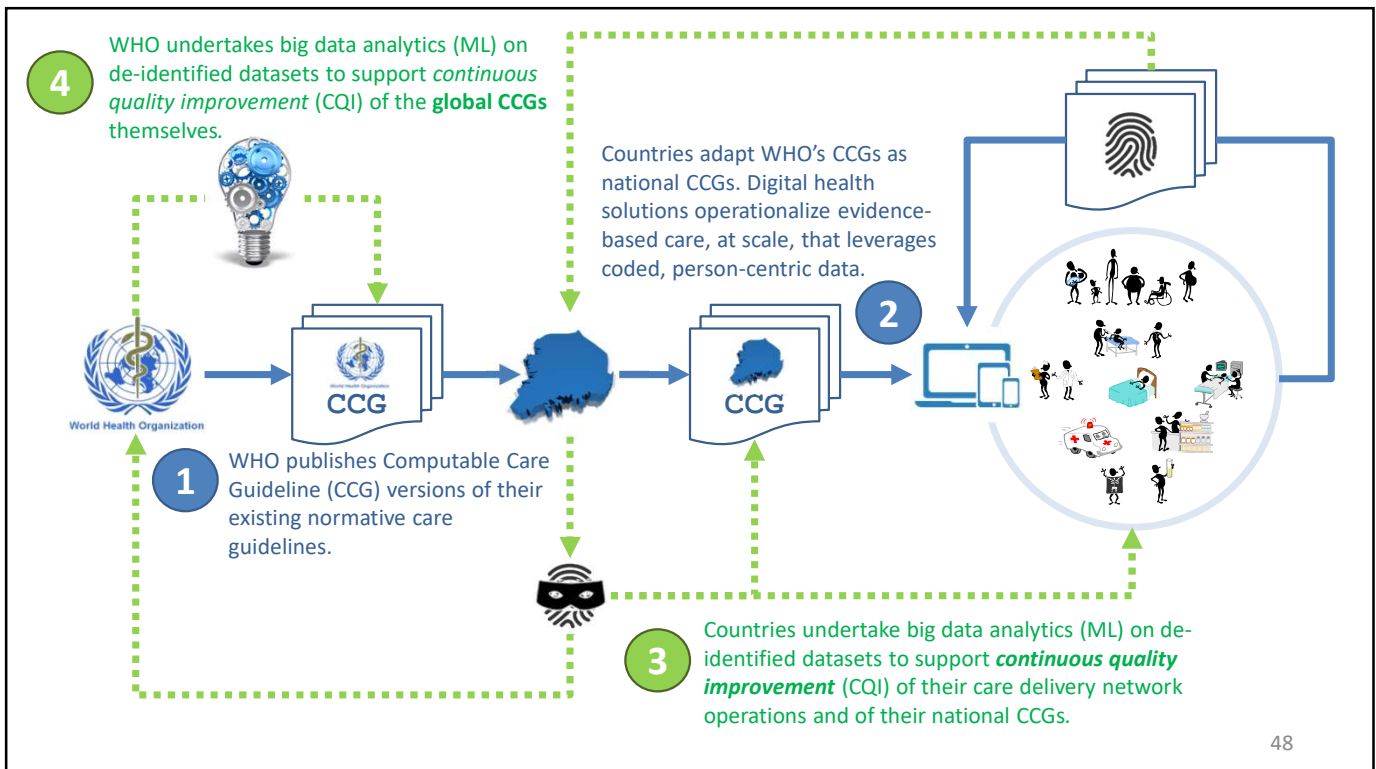
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<https://confluence.hl7.org/display/CDS/CPGonFHIR>

[https://wiki.ihe.net/index.php/Computable\\_Care\\_Guidelines](https://wiki.ihe.net/index.php/Computable_Care_Guidelines)