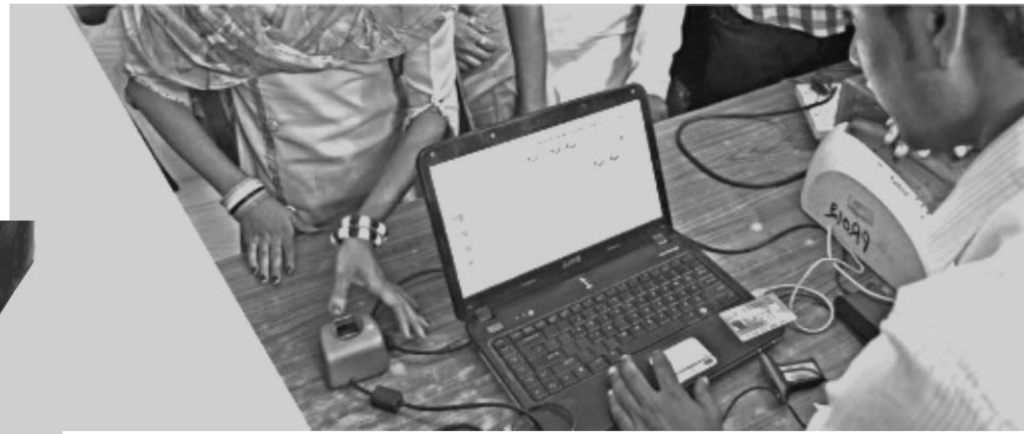
DHIS2 as Health Insurance MIS
OpenHIMIS Initiative



Patrick Ernst (GIZ OpenHIMIS)
Uwe Wahser (GIZ-HSP Kenya)

Oslo, August 2017

Part 1: From MS IMIS to OpenHIMIS

Part 2: NHIF Kenya DHIS2 DWH

Current status of IMIS

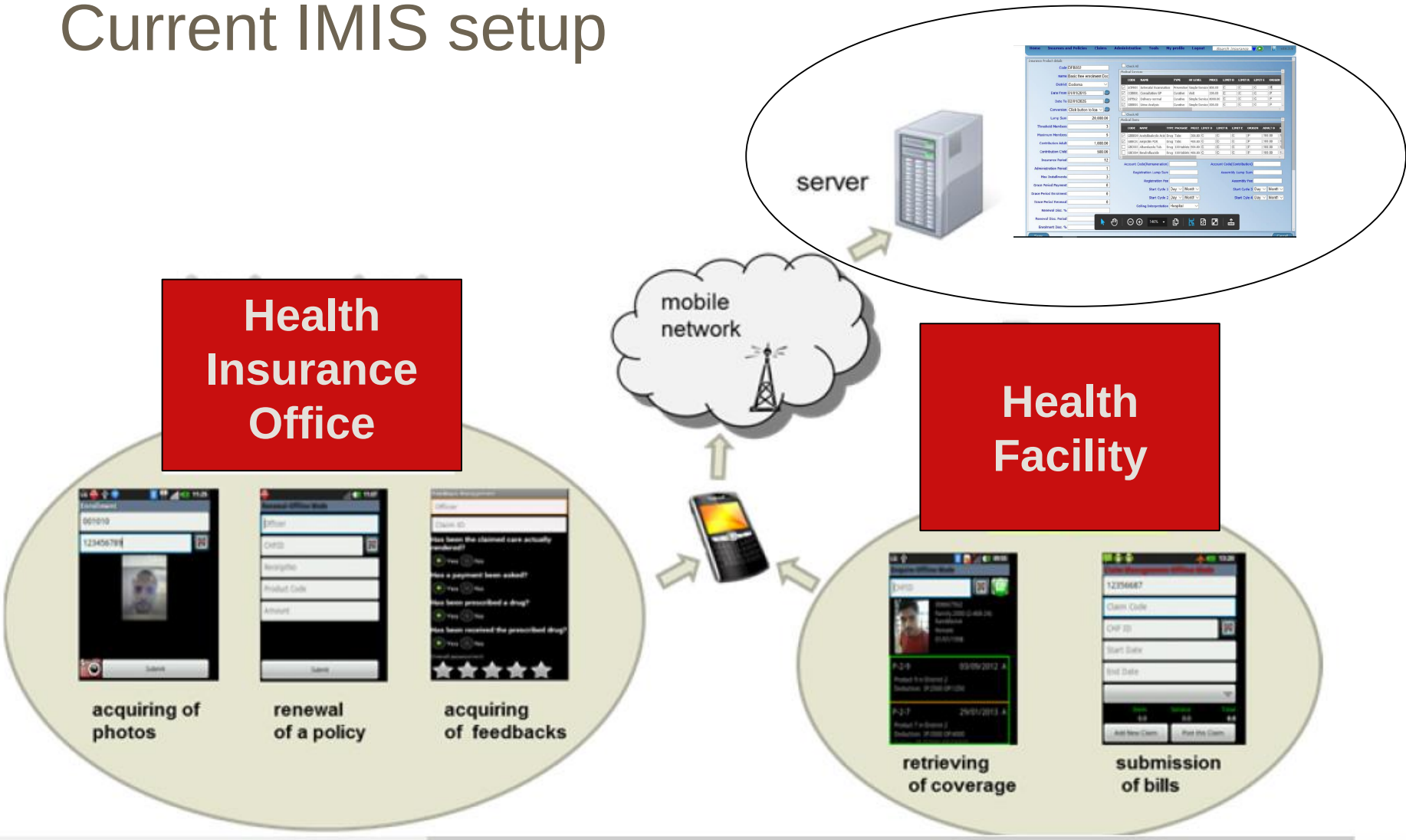
Collaborative effort of

- Swiss Agency for Development and Cooperation (SDC)
- German Development Cooperation (GIZ)

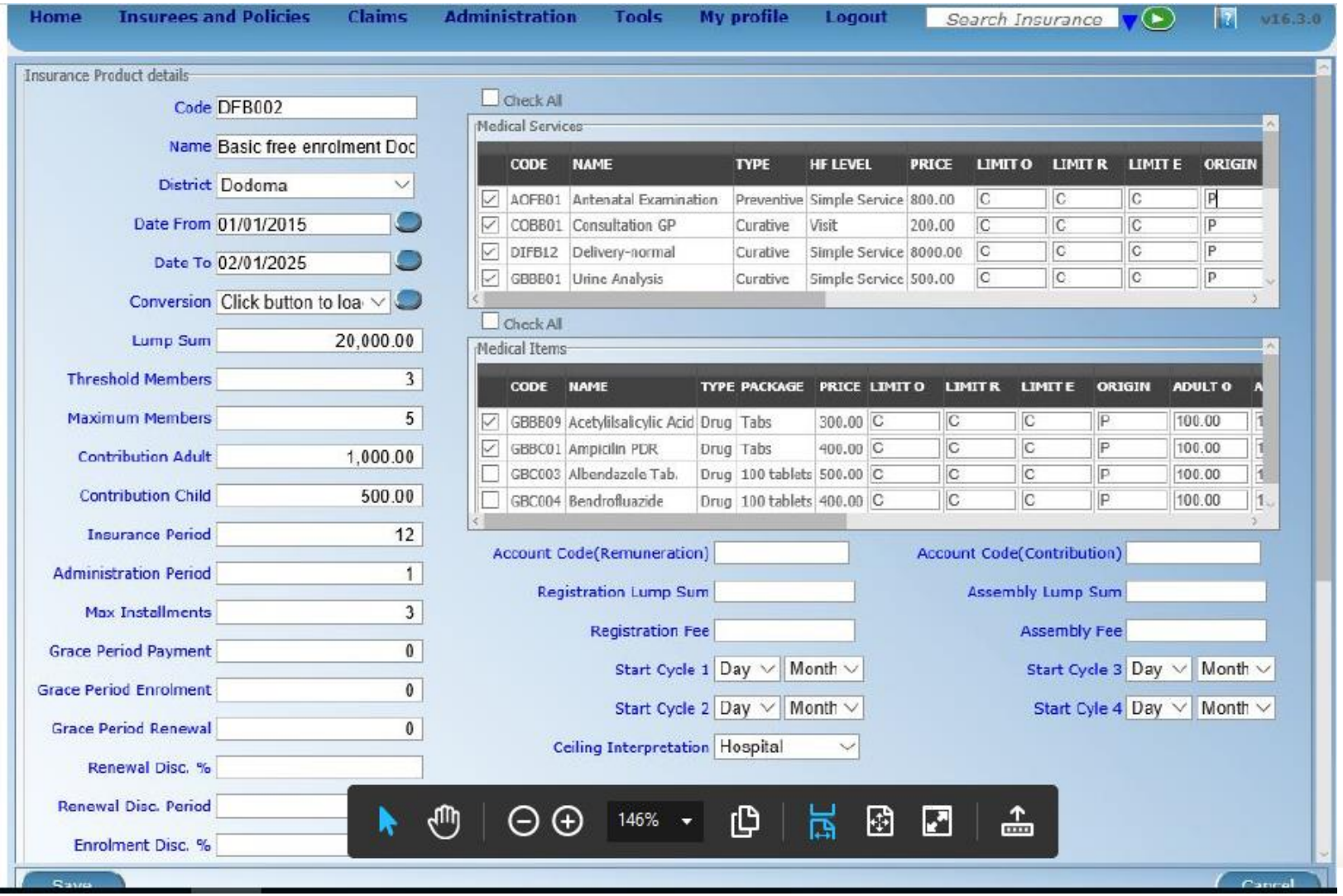
Current status

- Started in 2011, developed by SwissTPH
- Used in Nepal, Tanzania, Cameroon
- Licence owned by SDC
- Covers most important health insurance functions: Members Management, Policy Management, Claiming, Claims processing, Payments to Facilities

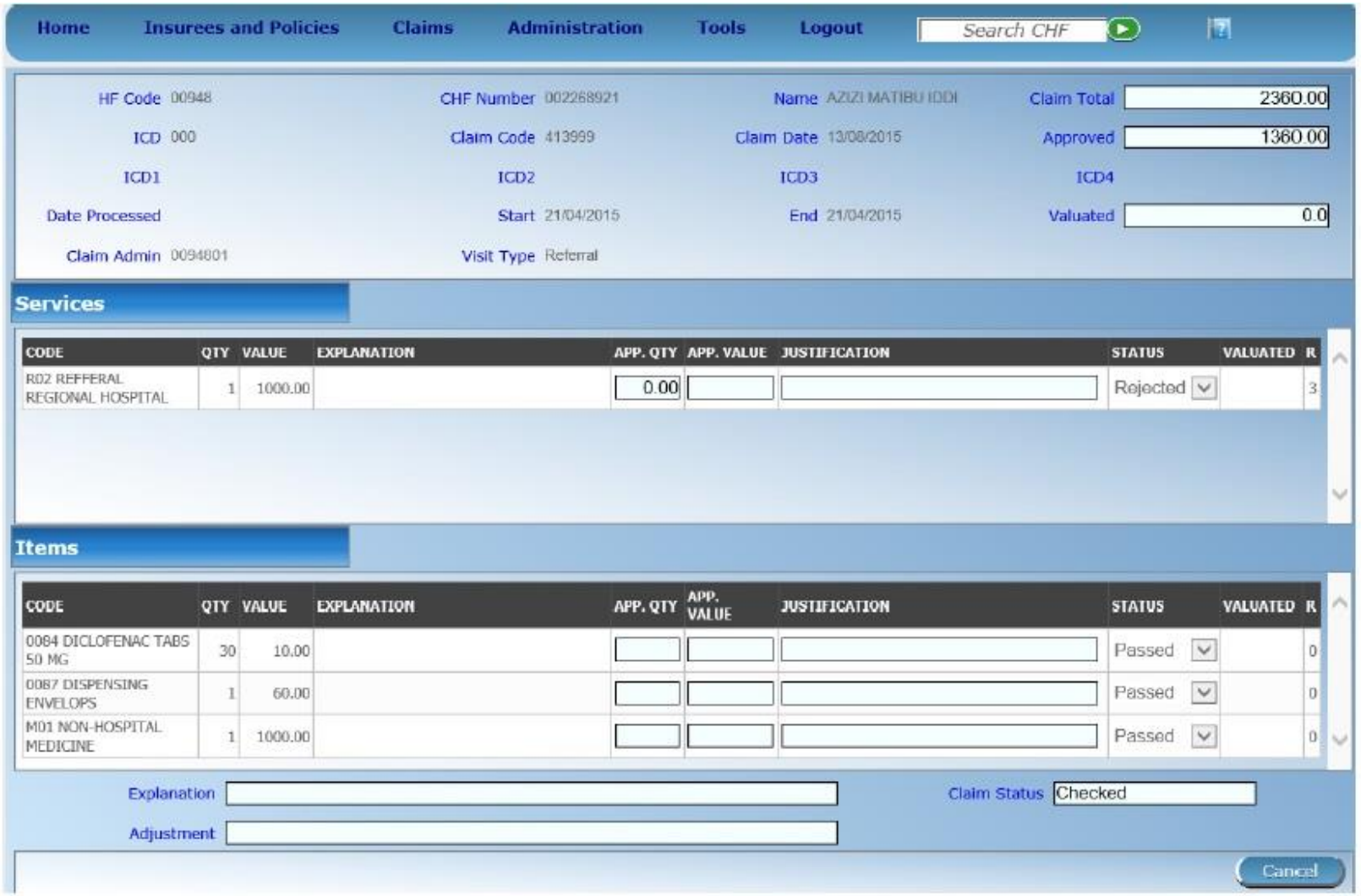
Current IMIS setup



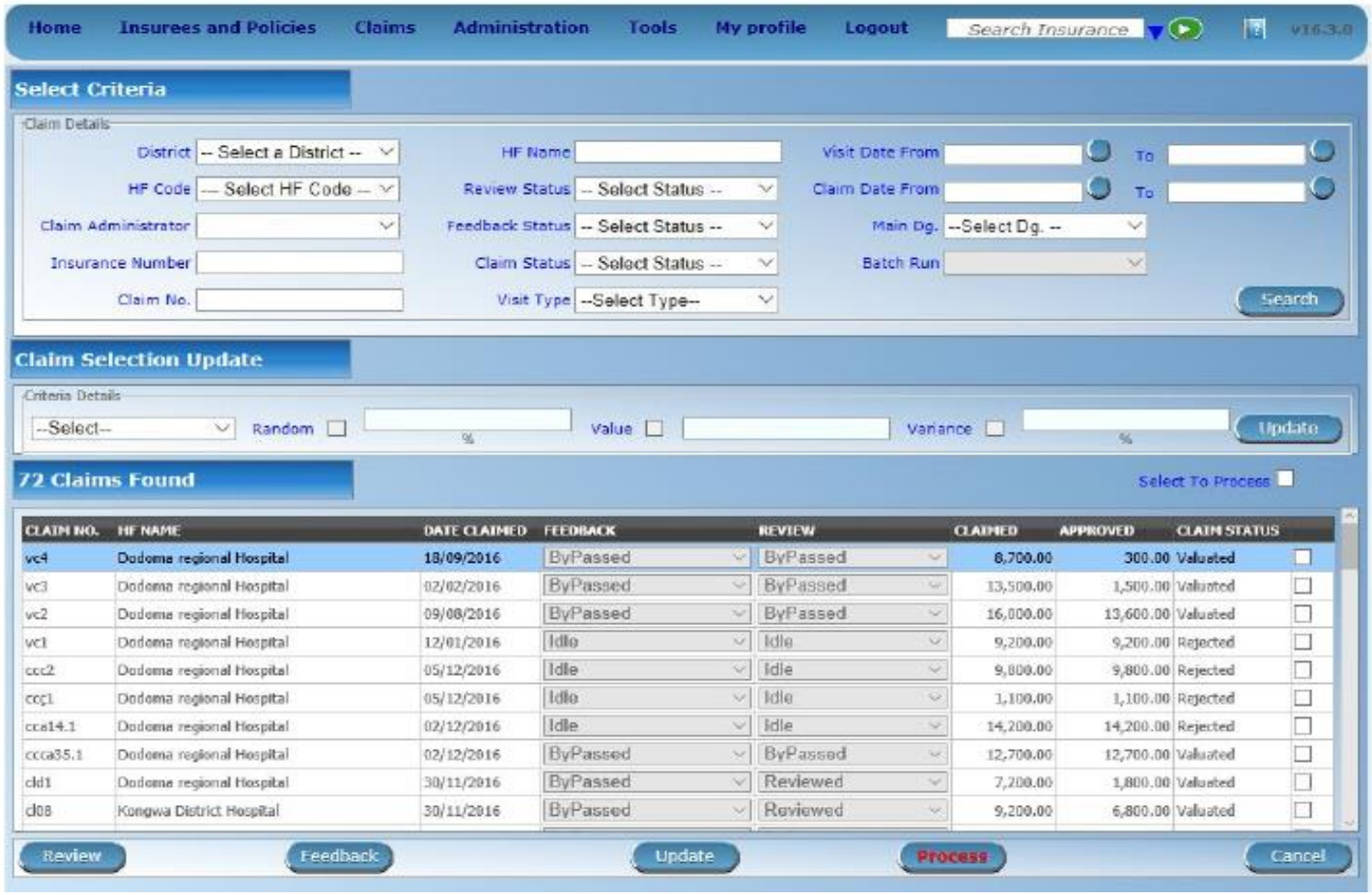
Policy definitions



Claim entry


Home
Insurees and Policies
Claims
Administration
Tools
Logout
Search CHF
HF Code 00948
CHF Number 002268921
Name AZIZI MATIBU IDDI
Claim Total 2360.00
ICD 000
Claim Code 413999
Claim Date 13/08/2015
Approved 1360.00
ICD1
ICD2
ICD3
ICD4
Date Processed
Start 21/04/2015
End 21/04/2015
Valuated 0.0
Claim Admin 0094801
Visit Type Referral
Services
CODE QTY VALUE EXPLANATION APP. QTY APP. VALUE JUSTIFICATION STATUS VALUATED R
R02 REFFERAL REGIONAL HOSPITAL 1 1000.00 0.00 Rejected 3
Items
CODE QTY VALUE EXPLANATION APP. QTY APP. VALUE JUSTIFICATION STATUS VALUATED R
0084 DICLOFENAC TABS 50 MG 30 10.00 Passed 0
0087 DISPENSING ENVELOPS 1 60.00 Passed 0
M01 NON-HOSPITAL MEDICINE 1 1000.00 Passed 0
Explanation
Claim Status Checked
Adjustment
Cancel

Claims selection and processing



From "IMIS" => "OpenHIMIS"

1. It should be built using **open source** technology in a community driven process
2. It should be **scalable** to support also larger countries
3. **Modularity and interoperability:** Be able to communicate with other systems through clearly defined APIs (OpenHIE)
4. **Data standards**: Adhering to data standards prepares also for future interoperability scenarios (HL7 FHIR), incl. **data security**
5. It should re-use components of **existing standard software**/platform solutions, to benefit from technical, functional and community synergies. Embed solution into national health system architectures
6. Support to existing **users** and implementations (Tanzania, Nepal, Cameroun)
7. Reduce cost, time and complexity of software **implementation**

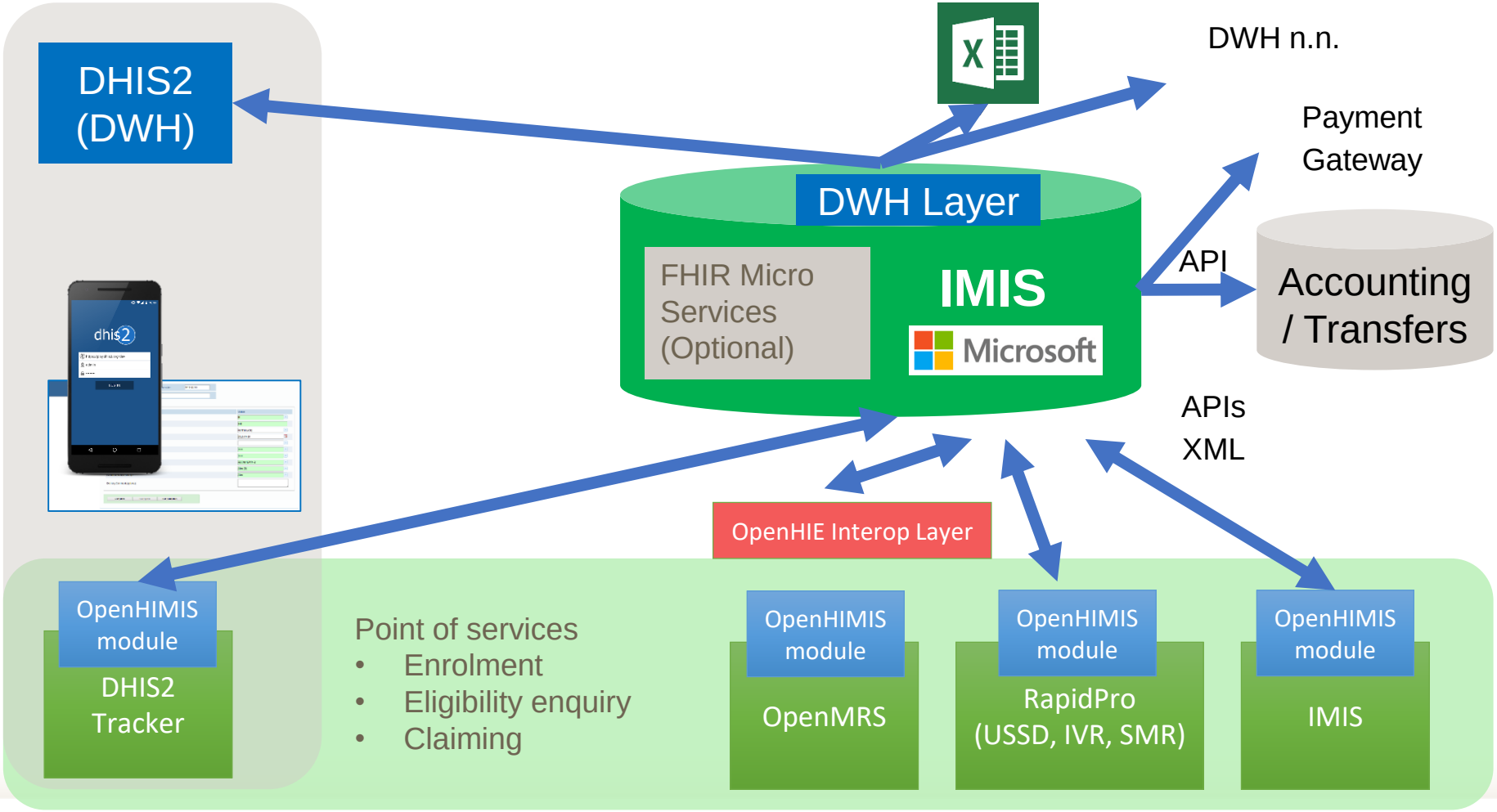
Opportunities for DHIS2

- MS IMIS: No other international standard solution (commercial or open source) directed at health insurance in low income countries
- No UHC icon in the OpenHIE map (!)
- Health Insurance schemes often have best health demographics data
- Health Insurance often **disconnected** from MoH
  - Often different ministry
  - Reluctant to share finance related data
- **Opportunities**
  - Joint reporting, joint indicators
  - Client registry / health demographics

Resource sharing opportunities

DHIS2 community activities	Opportunities for OpenHIMIS
Training	
Academies: >1000 Participants / year	Special Training Module, Special Academies
Online Training Course	Use existing Learning Management System
Certification	OpenHIMIS Implementer Certificate
User Support	
Community	Joint support for DHIS2 Health Insurance modules
4th level support	
Implementers	
Guides	Integration guides
Conferences: > 300 participants/ year	Participate, Pre-Conference, DHIS2-OpenHIMIS

First ideas on system architecture



Part 1: From MS IMIS to OpenHIMIS

Part 2: NHIF Kenya DHIS2 DWH

Contents

1. The National Hospital Insurance Fund
2. Business Intelligence in a Nutshell
3. Modelling Business Intelligence Needs at the NHIF
4. Technical Implementation of the BI Prototype with DHIS2
5. Discussion

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Background Information of NHIF - Kenya

- founded1966 as department of Ministry of Health
- over 15 Mio beneficiaries
  - formal sector
  - informal sector
- over 1800 hospitals accredited
  - inpatient and outpatient
- 125 offices / 47 counties
- app. 1700 employees

Current Areas of Reporting at the NHIF

- **membership registration and management**
- **claims processing and analysis**
- **revenue collection and debt management**
- **financial reporting (income and expenditure)**
- **budget and utilization of funds**

Reporting Challenges Faced

- Existing reporting infrastructure feeds directly from the ERP
- New reporting needs have to be implemented by IT developers.
- Several issues are compromising the performance, usability and quality of existing reports.
- It is difficult to produce timely and consistent reports for managerial processes and external communications.

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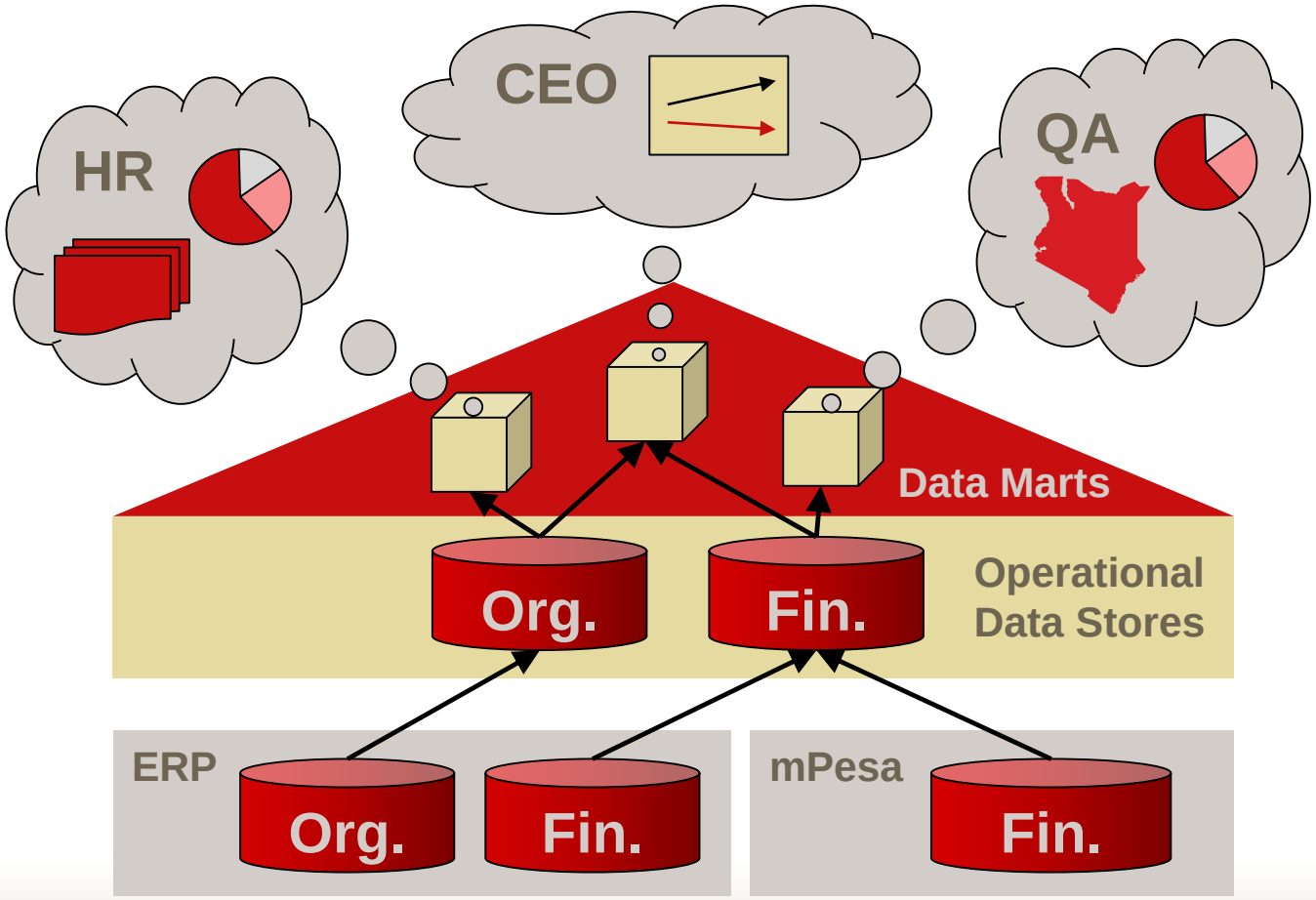
Typical Business Intelligence Architecture (Example)

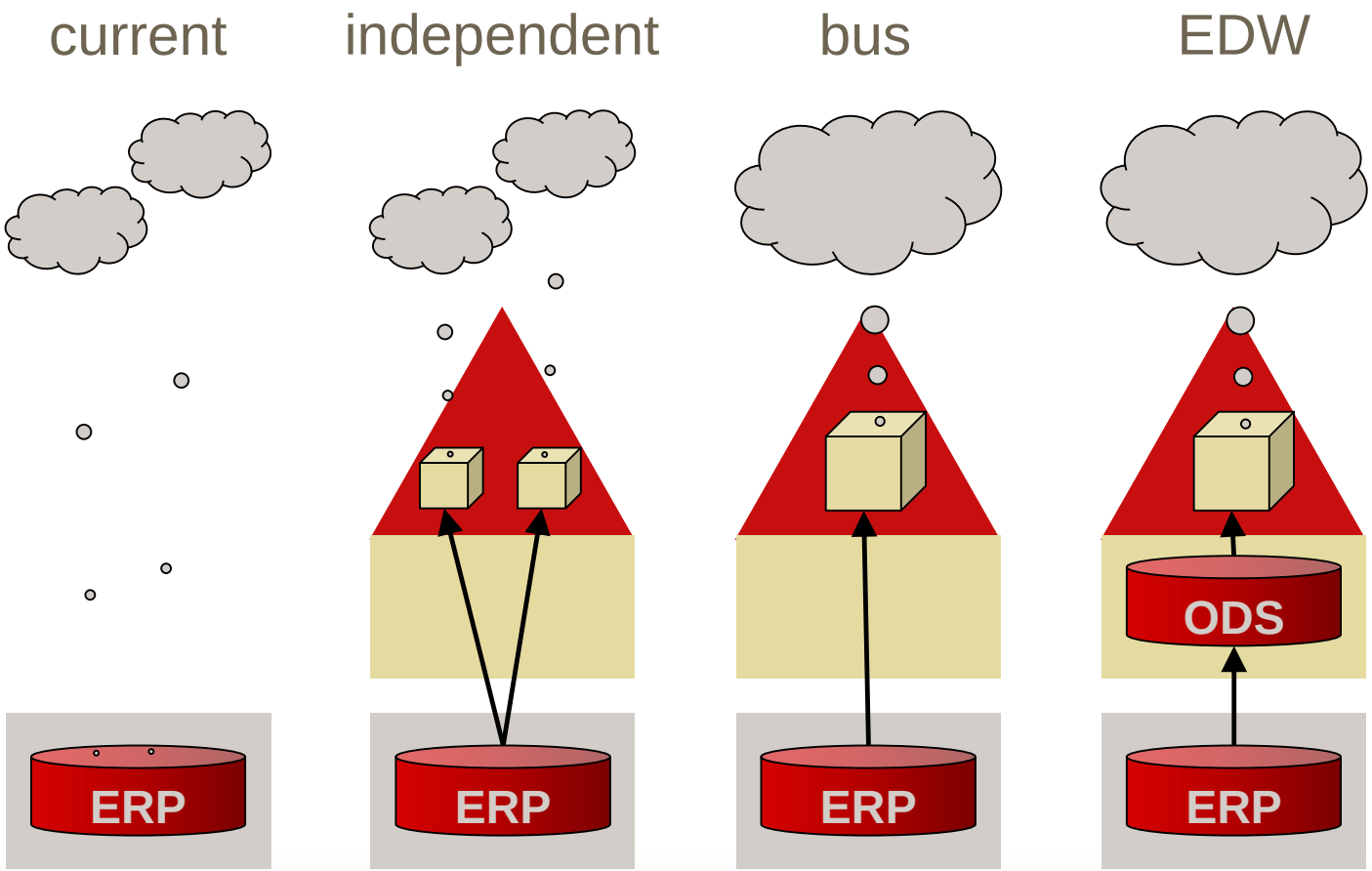


Analytical Applications

Enterprise Data Warehouse (EDW)

Operational Systems

Alternative Business Intelligence Architectures

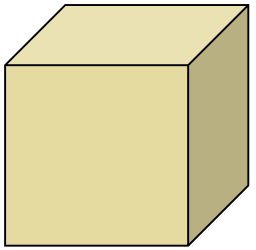


dimensional, aggregated

transformed, granular

relational, granular

Dimensional data



Fact / Keyfigure:
Revenue collected

Dimension 1: Time

Dimension 2:
Sector

Revenue	2015	2014	2013	2012
Private Sector	45678	34567	23456	12345
Public Sector	4567	3456	2345	1234
Micro Insurance	456	345	234	123
Sponsored Prg.	45	34	23	12

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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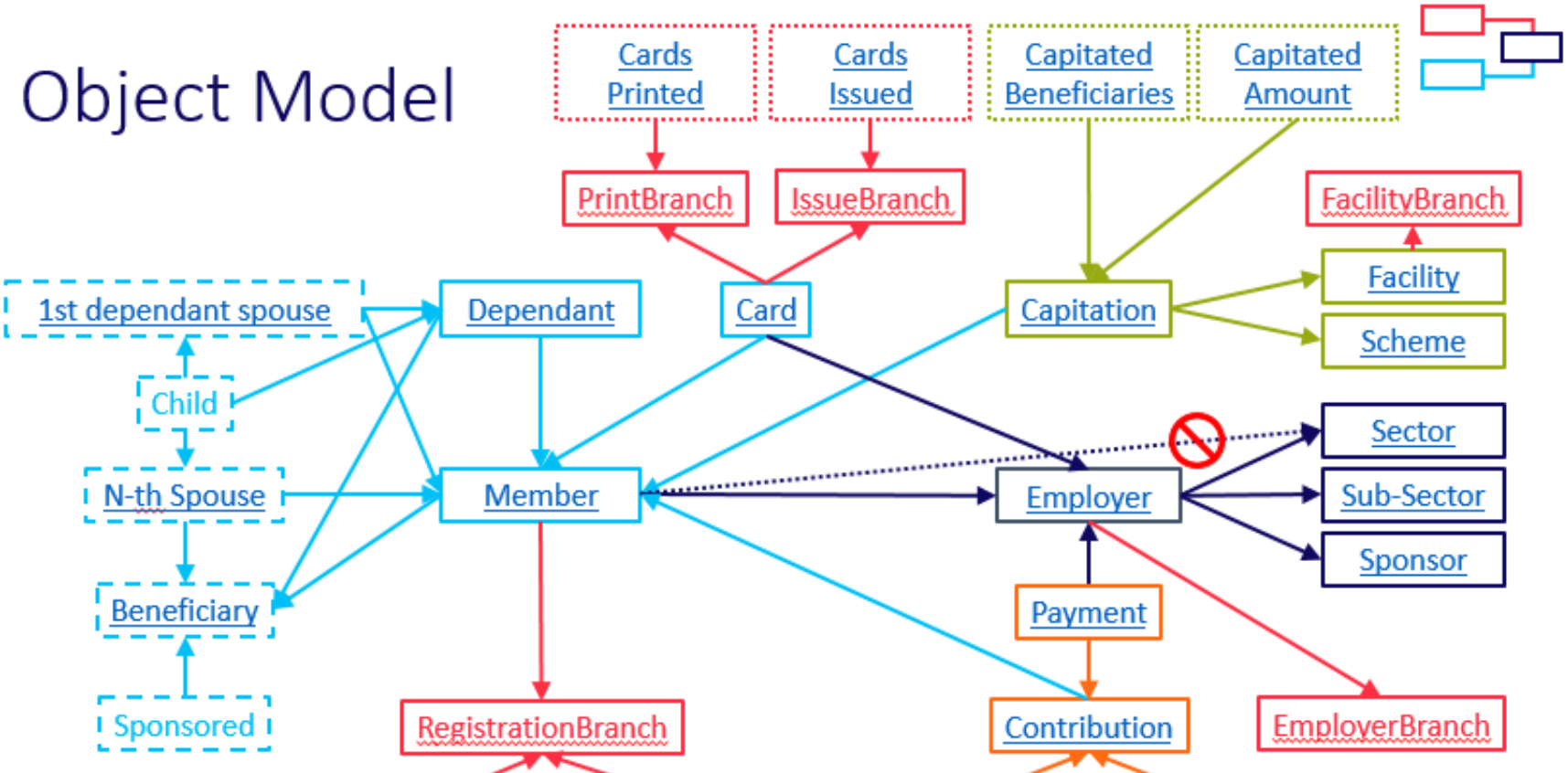
Object Model



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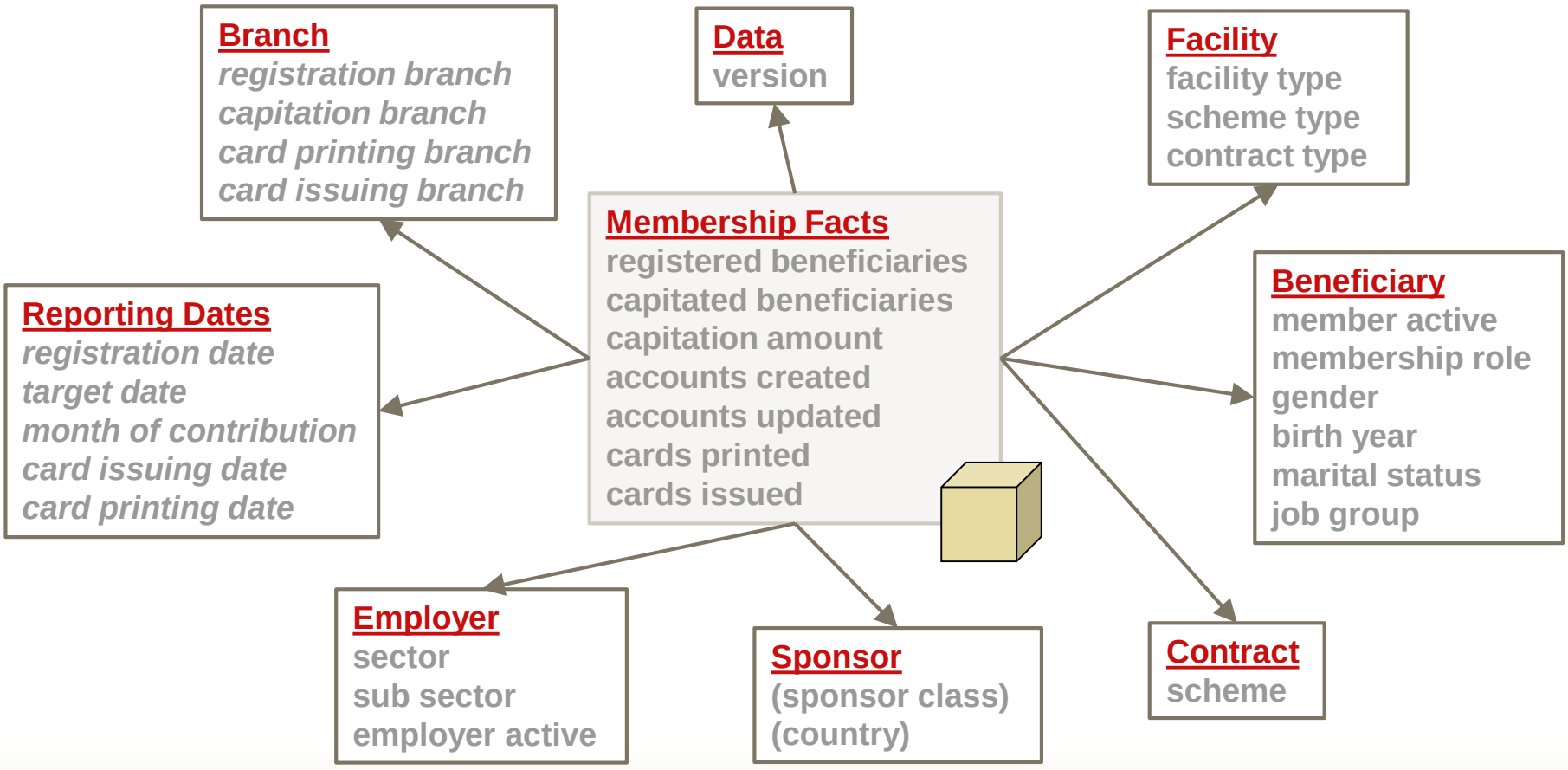
NHIF Afya Yetu. Bima Yetu

Datamodel Membership (Facts & Dimensions)



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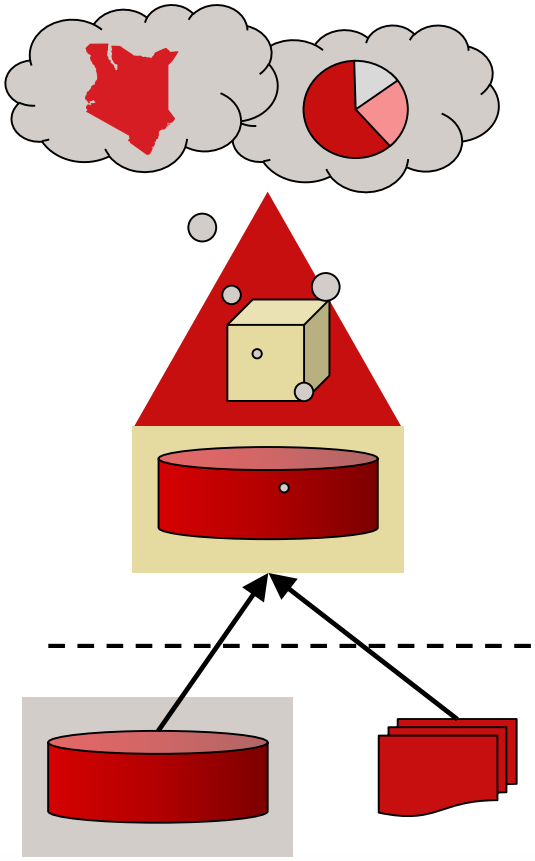
Very Broad Architecture of DHIS2



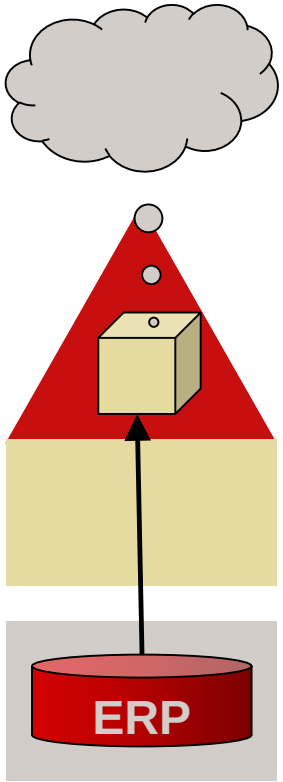
analytical level
(e.g. dashboards, GIS, pivot tables)

aggregate level ("data sets")

detailed level ("tracker")

- **source systems (e.g. patient records)**
- **manual data entry (e.g. facility statistics)**

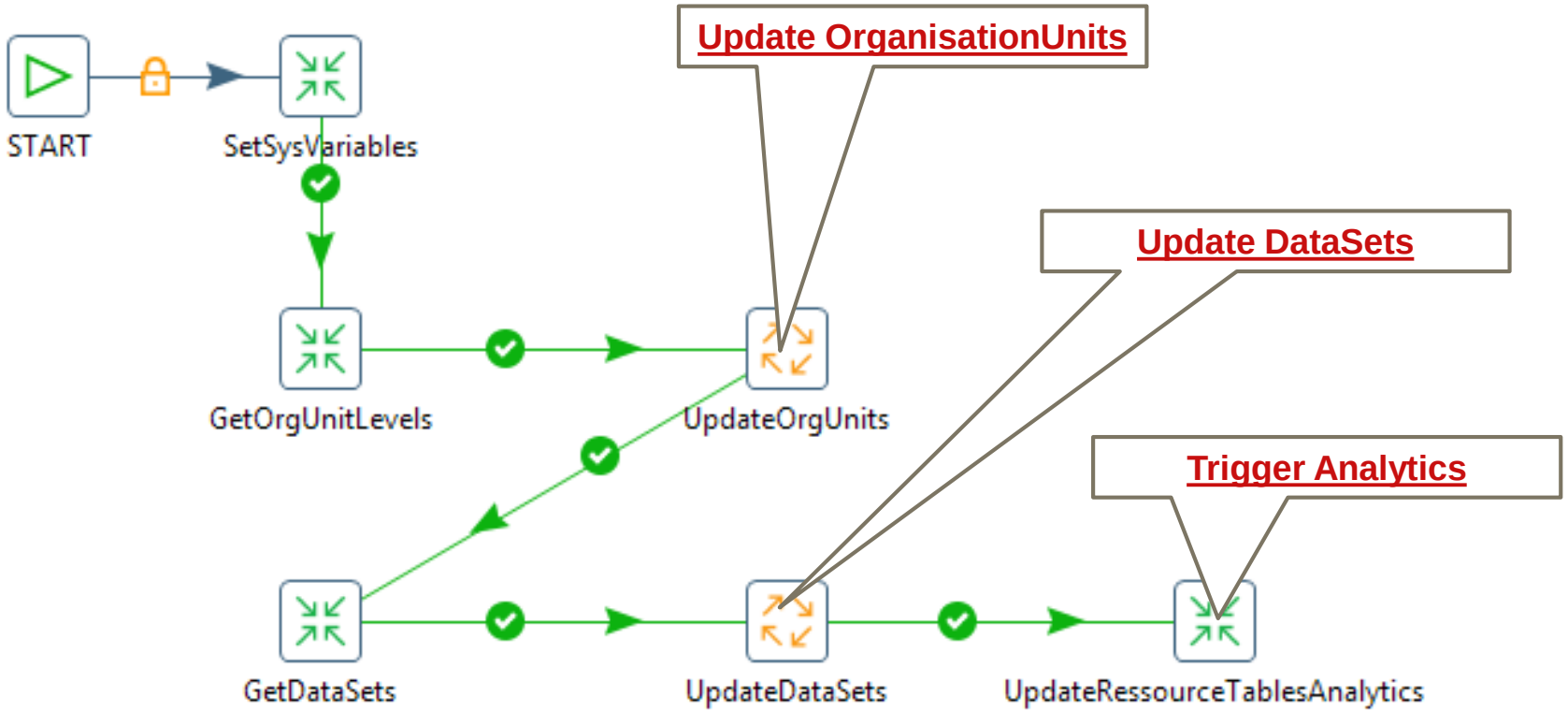
Chosen Architecture for the NHIF Prototype



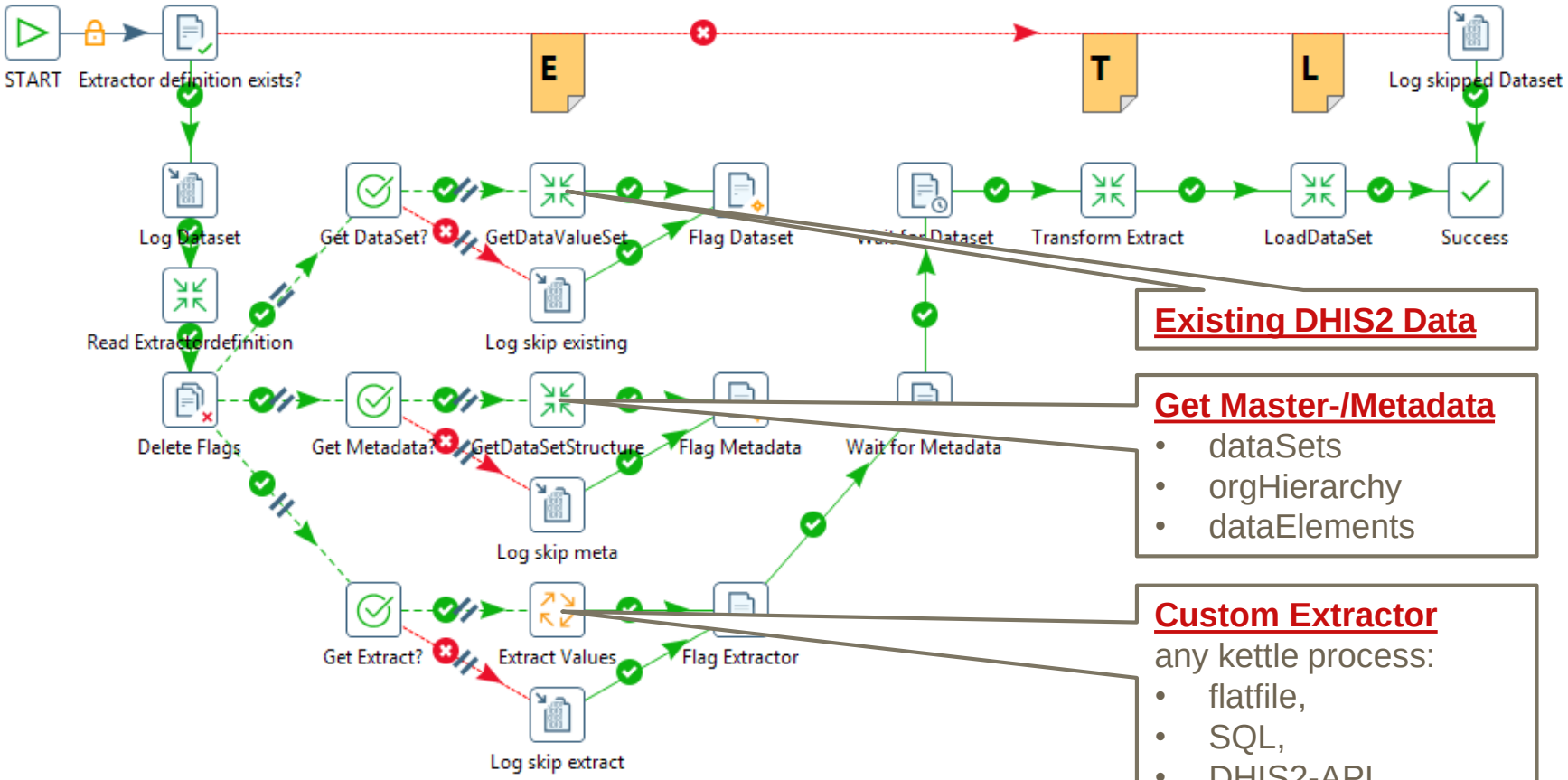
	Object	Tool
OLAP Queries	Pivot Table	dhis2
Cubes	Data Sets	
Keyfigures	Data Elements	
Dimensions	Categories	
ETL	Transformations	pentaho A Hitachi Group Company
Scheduling	Jobs	

Pentaho Data Integration ("Kettle")

Generic ETL Process for DHIS2 using Kettle



Generic Dataset-Loader for DHIS2 using Kettle



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Current Use of the DHIS2-BI-Platform

- Data on Membership implemented
  - Coming up: Claims, Employers, Targets
- Nightly updates of all data
- Data analysis mainly via pivot tables
  - Coming up: standard reports, dashboard for branches
- Further down the line: enable other ETL-targets, e.g. events, tracked level

Prototype - and then?

Results:

- estimation:
  more than 50% of the reporting needs can be covered
- BI self service possible
- single point of truth = consistent reporting possible
- timely reporting possible because of cube architecture
- architecture can be managed with local resources

<u>Question</u>: Will an additional investment of XXX.XXX KSH justify an increase of Y% covered reporting needs?

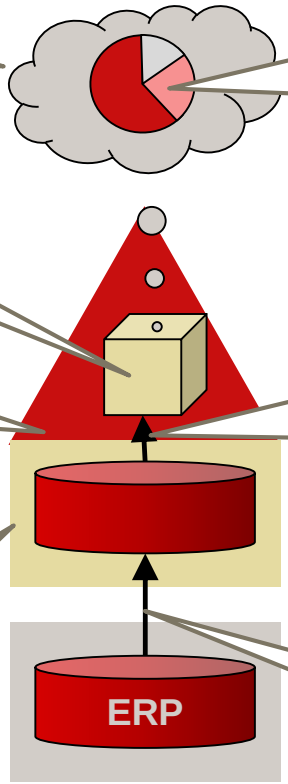
Enabling DHIS2 as a Tool for EDW

Enhance indicators:
- filter on attributes
- re-usability

Customized Data Marts:
- specific dimensions
- specific keyfigures

Enable master data:
- filter on attributes
- re-usability
- hierarchies

Enhance batch processing:
- process flows
- process status
- process statistics

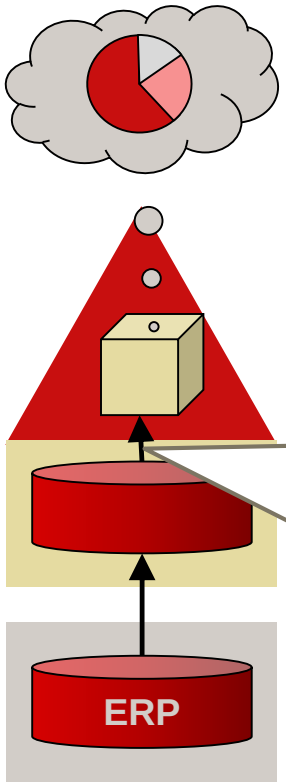


Enhance use of dimensions:
- drill-down on attributes
- separate filter and disaggregation
- harmonise use of time, organisational hierarchy and custom dimensions

Enable ETL within DHIS 2:
- tracker / aggregates / master data to tracker / aggregates / master data
- calculations, enriching
- delta loading
- overwrite, delete, aggregate into

Enhance import of data:
- enable pulling data from other systems

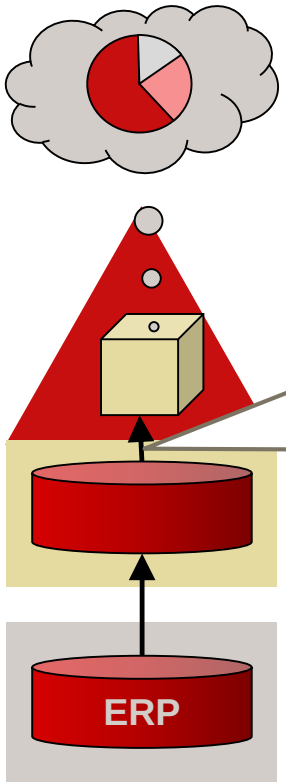
Enabling DHIS2 as a Tool for EDW



Enable ETL within DHIS 2:

- tracker / aggregates / master data to tracker / aggregates / master data
- calculations, enriching with master data
- delta loading (only what has changed since last load)
- overwrite, delete, aggregate values

Enabling DHIS2 as a Tool for EDW



Enhance batch processing:

- process flows
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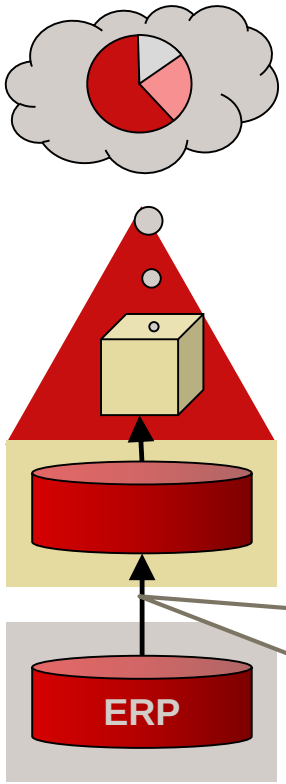
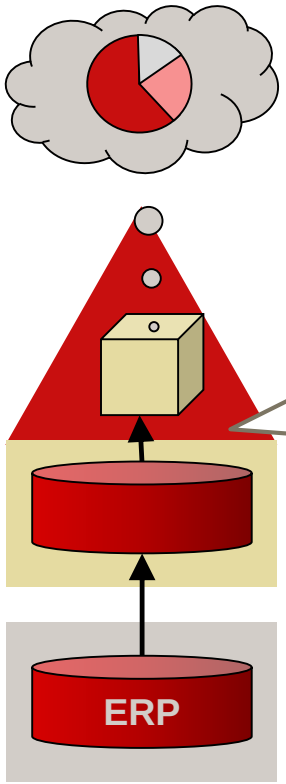


Enhance import of data:

- enable pulling data from other systems = give control to DHIS2

  currently data can only be pushed into DHIS2 from outside via API

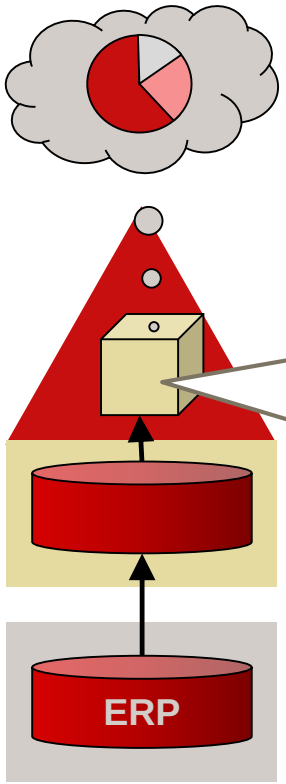
Enabling DHIS2 as a Tool for EDW



Enable master data beyond organizational hierarchy:

- filter and aggregate on attributes of master data (e.g attributes of benefit packages)
- re-usability (referring hospital vs. care giving hospital)
- other hierarchies (e.g. product hierarchies, ICD10,)

Enabling DHIS2 as a Tool for EDW



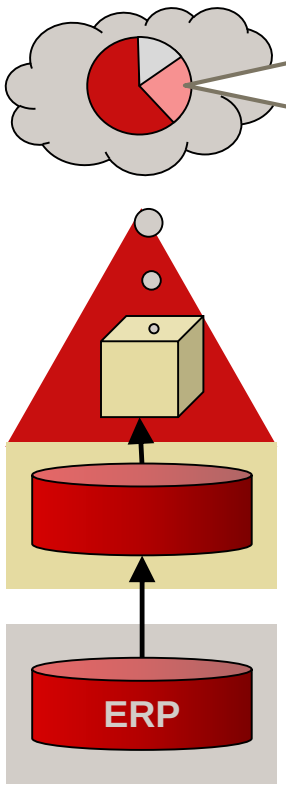
Customized Data Marts:

- specific dimensions
- specific keyfigures

Create semantical data marts according to user definitions.

Currently there is only one big data mart (analytical tables)

Enabling DHIS2 as a Tool for EDW



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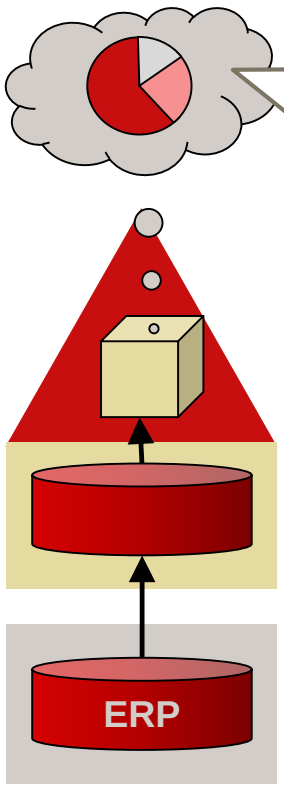

Enhance indicators:

- **filter on attributes:**

  Data Element: beneficiaries
  Attribute: gender ['M','F']

  Female Beneficiaries = beneficiaries WHERE { gender = 'F' }

- **re-usability:**

  Percentage of Female Benficiaries =
  Female Beneficiaries / Beneficiaries * 100