Using DHIS2 as a
Business Intelligence Platform for a
Health Insurance Provider

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Contents

Background Information of NHIF - Kenya

History:

- National Hospital Insurance Fund (NHIF) is a State corporation that was established in 1966 as a department under the Ministry of Health.

Our Mandate:

- The Fund's core mandate is to provide medical insurance cover to all its members and their declared dependents (spouse and children).

- The NHIF membership is open to all Kenyans who have attained the age of 18 years (there is no age ceiling)

Background Information of NHIF - Kenya

Service points:

- 125 offices in all of the 47 counties of the nation

NHIF Roles:

- registration of new members

- revenue collection

- claim reimbursements

Background Information of NHIF - Kenya

Services covered:

- Inpatient services

- Outpatient services

Statistics:

Item	Counts
Total members (spouse and children)	Over 15 million
Hospital accredited with NHIF	Over 1,800
No of Employees	1,700

Current Areas of Reporting at the NHIF

- **membership registration and management**

- **claims processing and analysis**

- **financial reporting (income and expenditure)**

- **revenue collection and debt management**

- **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.

Typical Business Intelligence Architecture (Example)
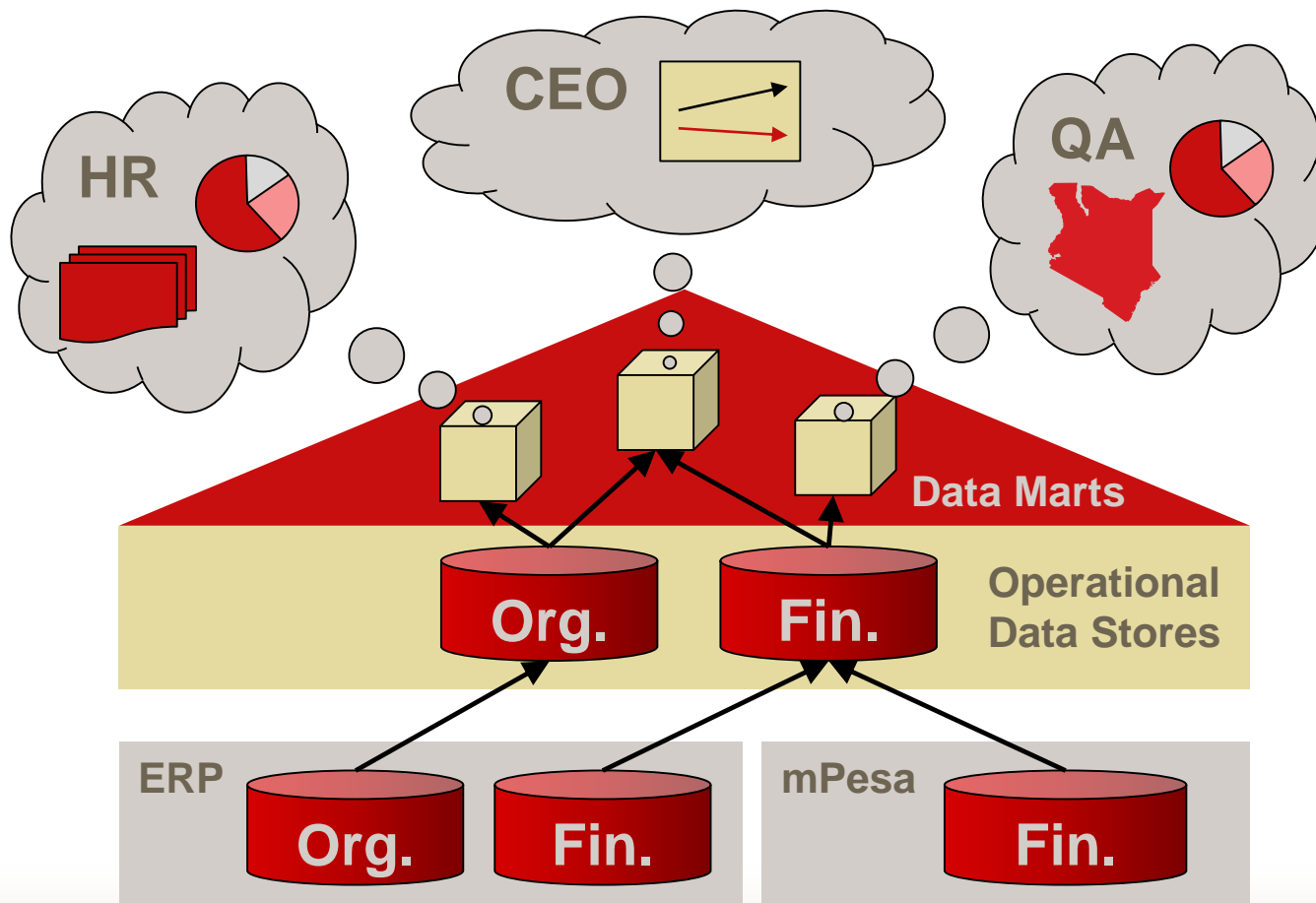
Analytical Applications

Enterprise Data Warehouse (EDW)

Operational Systems

- CEO
- HR
- QA
- Data Marts
- Operational Data Stores
- Org.
- Fin.
- ERP
- mPesa
- Org.
- Fin.
- Fin.

Alternative Business Intelligence Architectures

current   independent   bus   EDW

dimensional, aggregated

transformed, granular

relational, granular
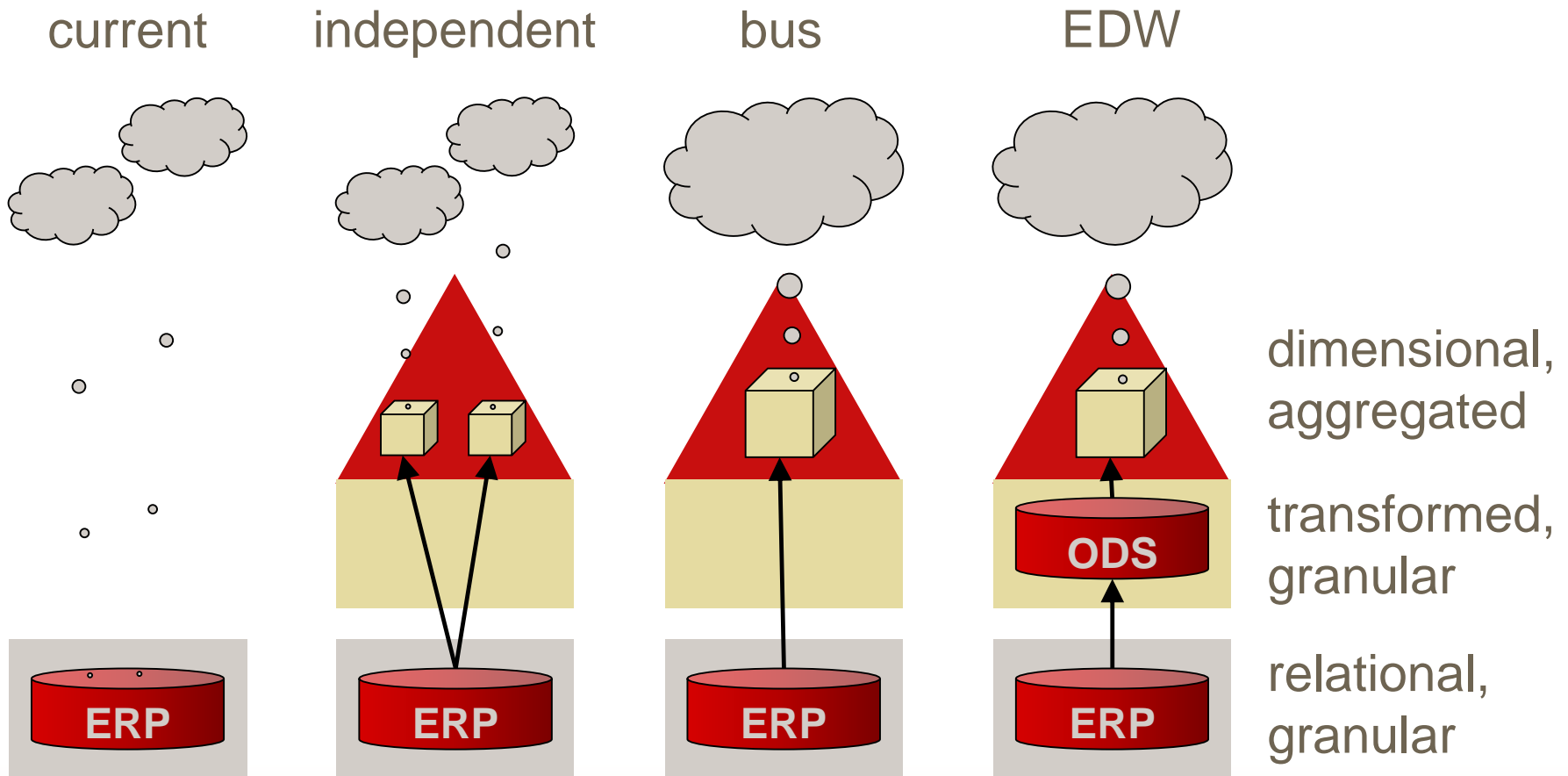
Dimensional data
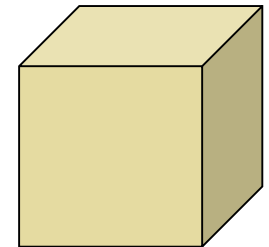
Fact / Keyfigure:
Revenue collected

Dimension 1: Time

Dimension 2:
Sector

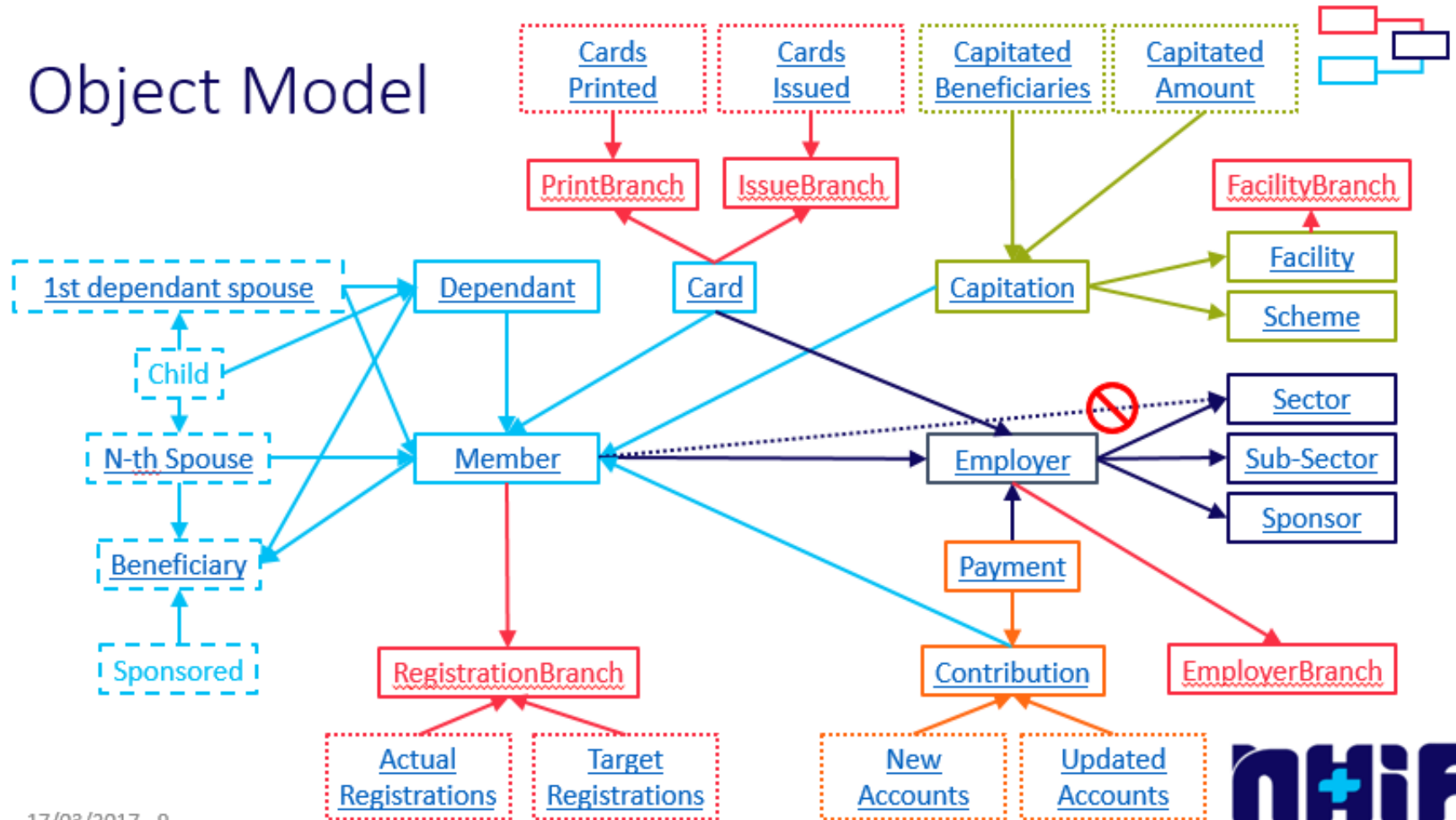| Revenue	2015	2014	2013	2012
Private Sector	45678	34567	23456	12345
Public Sector	4567	3456	2345	1234
Micro Insurance	456	345	234	123
Sponsored Prg.	45	34	23	12

Approach for Systems Analysis
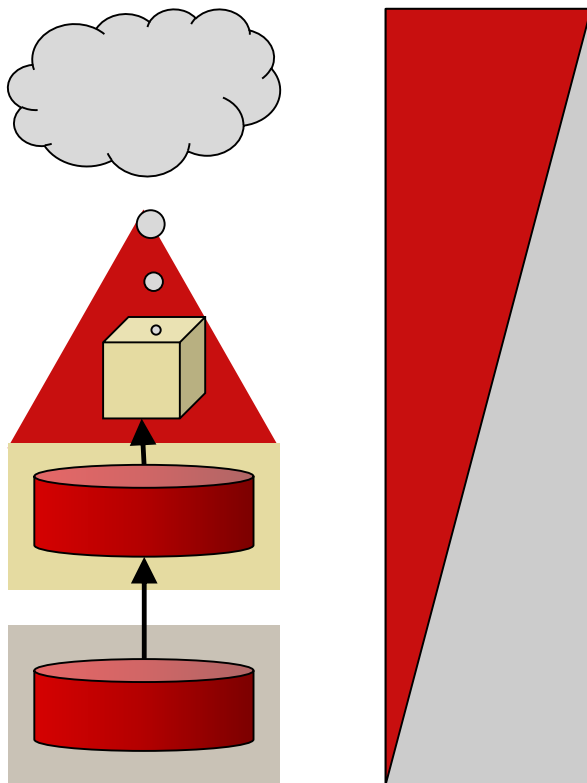
Business Perspective:
- Design of reports / dashboards
- Definition of key figures
- Definition of dimensions
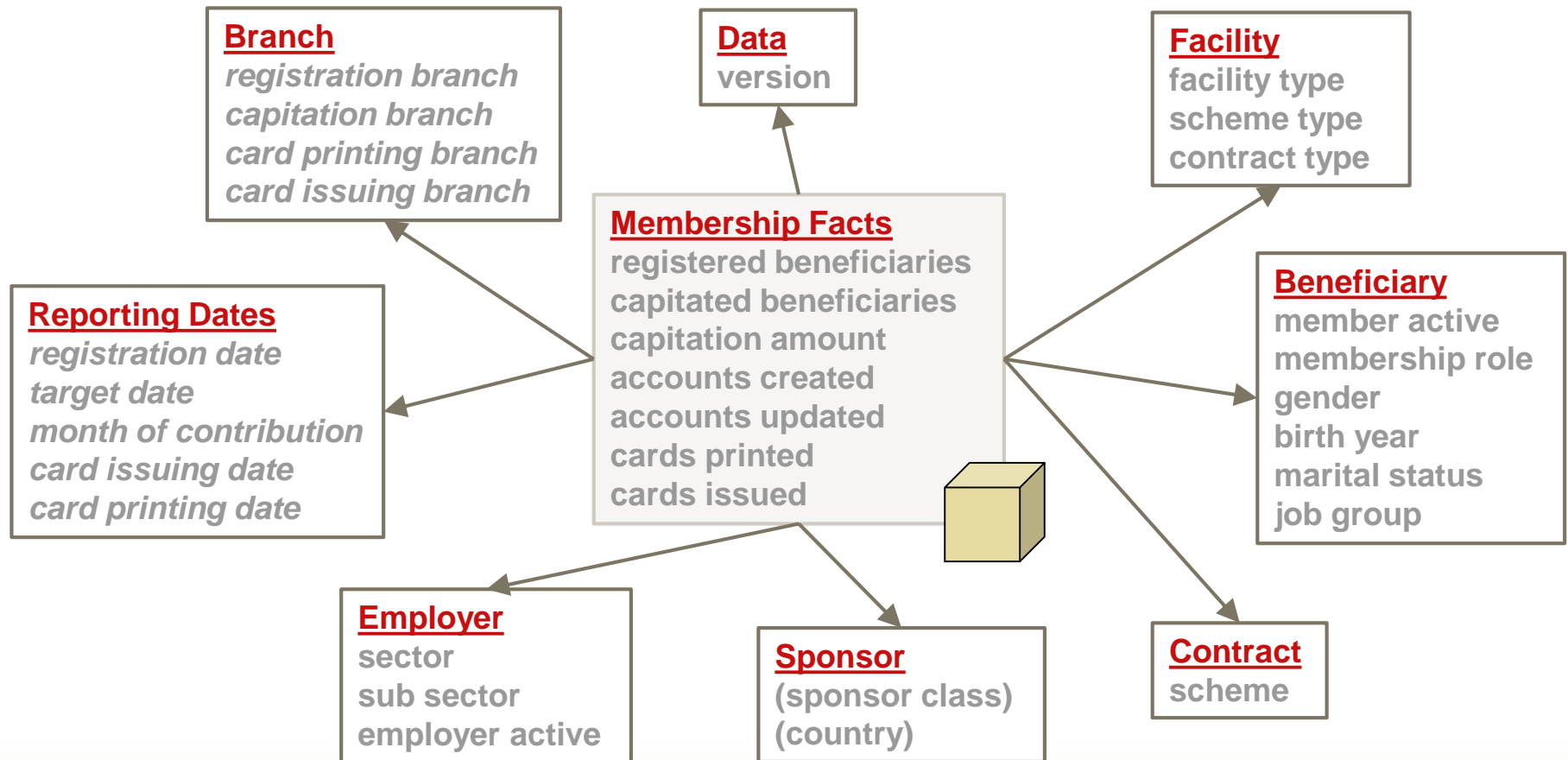- Definition of hierarchies

Technical Perspective:
- Design of data model
- Review of operational data
- Definition of interfaces
- Design of ETL-processes

Datamodel Membership (Facts & Dimensions)

Branch
registration branch
capitation branch
card printing branch
card issuing branch

Data
version

Facility
facility type
scheme type
contract type

Reporting Dates
registration date
target date
month of contribution
card issuing date
card printing date

Membership Facts
registered beneficiaries
capitated beneficiaries
capitation amount
accounts created
accounts updated
cards printed
cards issued

Beneficiary
member active
membership role
gender
birth year
marital status
job group

Employer
sector
sub sector
employer active

Sponsor
(sponsor class)
(country)

Contract
scheme

Very Broad Architecture of DHIS2
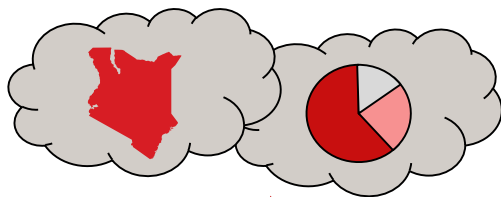
analytical level
(e.g. dashboards, GIS)

aggregate level ("data sets")

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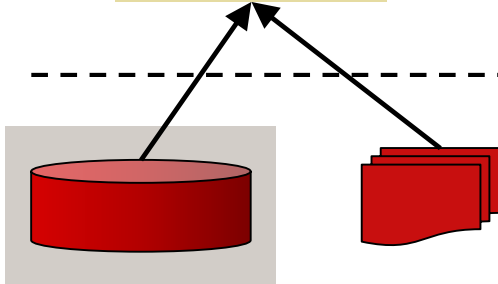
- **source systems (e.g. patient records)**
- **manual data entry (e.g. facility statistics)**

Chosen Architecture for the NHIF Prototype
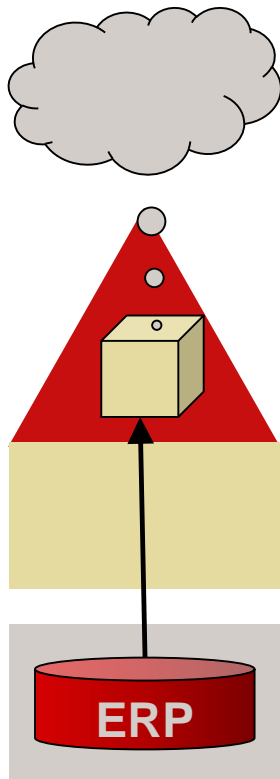
	Object	Tool
OLAP Queries	Pivot Table	
		dhis2
Cubes	Data Sets	
Keyfigures	Data Elements	
Dimensions	Categories	
ETL	Transformations	pentaho
Scheduling	Jobs	A Hitachi Group Company

Pentaho Data Integration
("Kettle")

Generic ETL Process for DHIS2 using Kettle
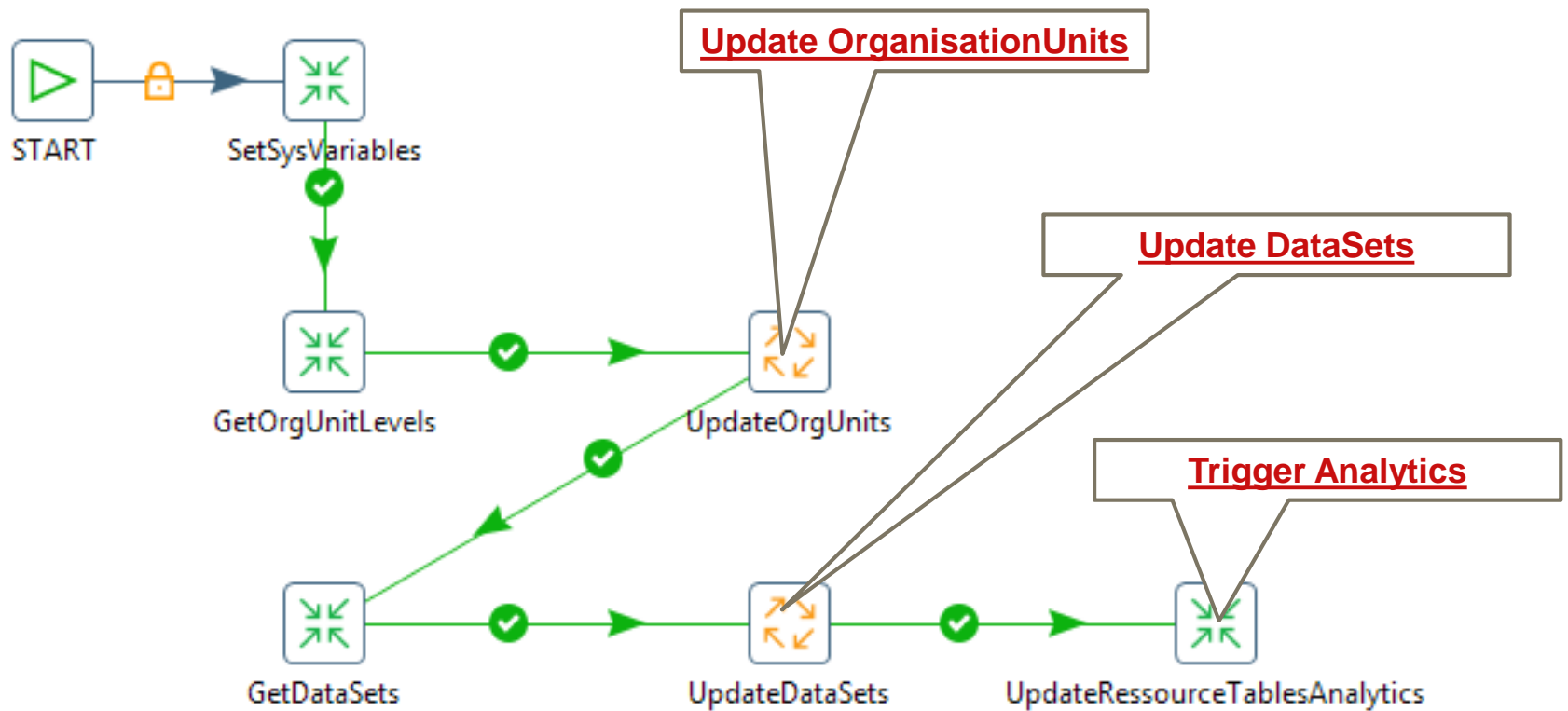
Generic Dataset-Loader for DHIS2 using Kettle

Existing DHIS2 Data

Get Master-Metadata
- dataSets
- orgHierarchy
- dataElements

Custom Extractor
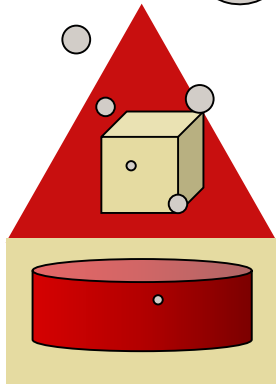any kettle process:
- flatfile,
- SQL,
- DHIS2-API ...
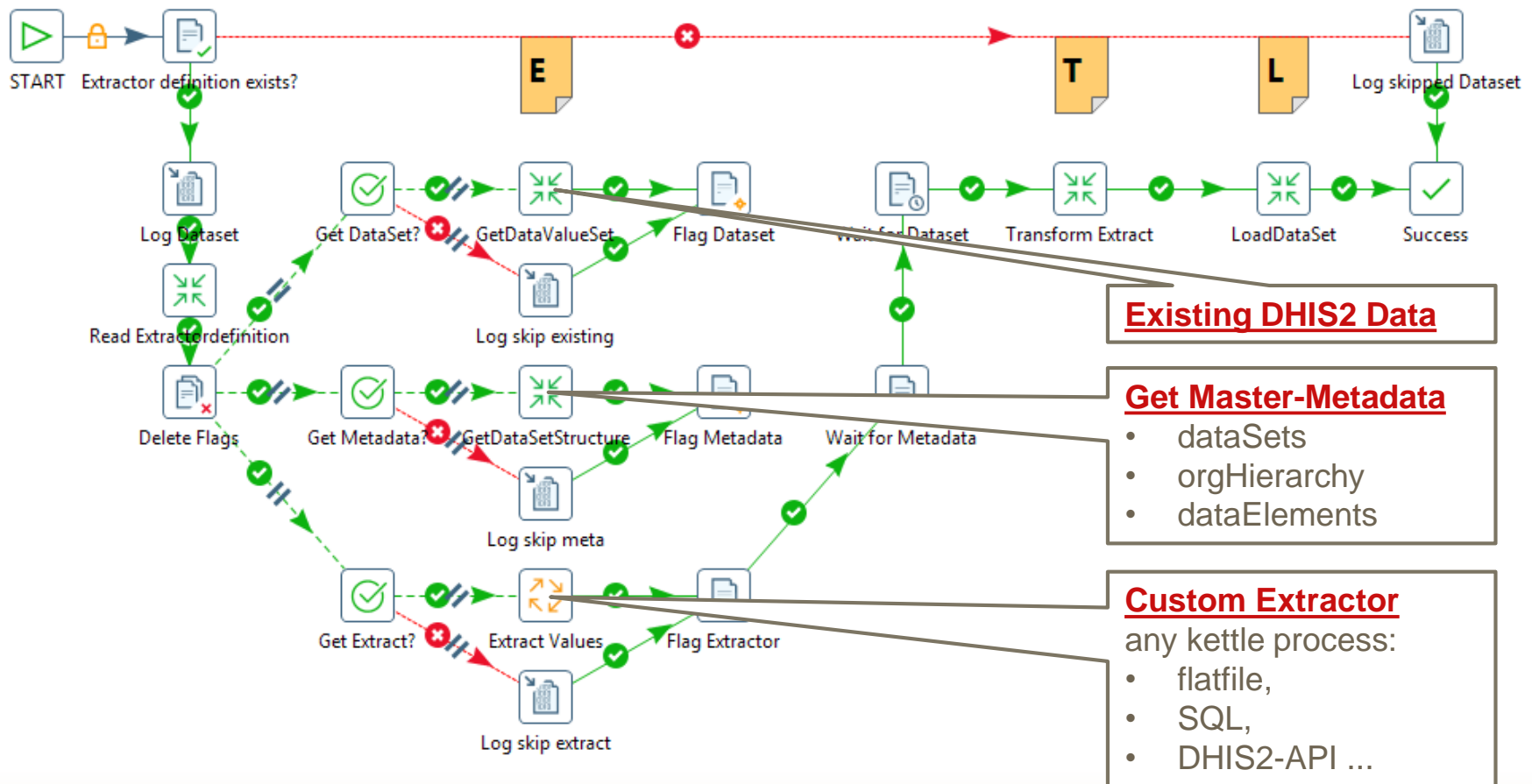
1. **The National Hospital Insurance Fund**

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**

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?

- estimation:
  more than 50% of the reporting needs will 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 ressources

- <u>Question</u>: will an additional investment of X KSH justify an increase of Y% covered reporting needs?

Enabling DHIS2 as a Tool for EDW

Enhance indicators:
- filter on attributes
- re-usability

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

ERP