SAPIENS DECISION

DecisionCAMP 2016: Solving the last mile in model based development

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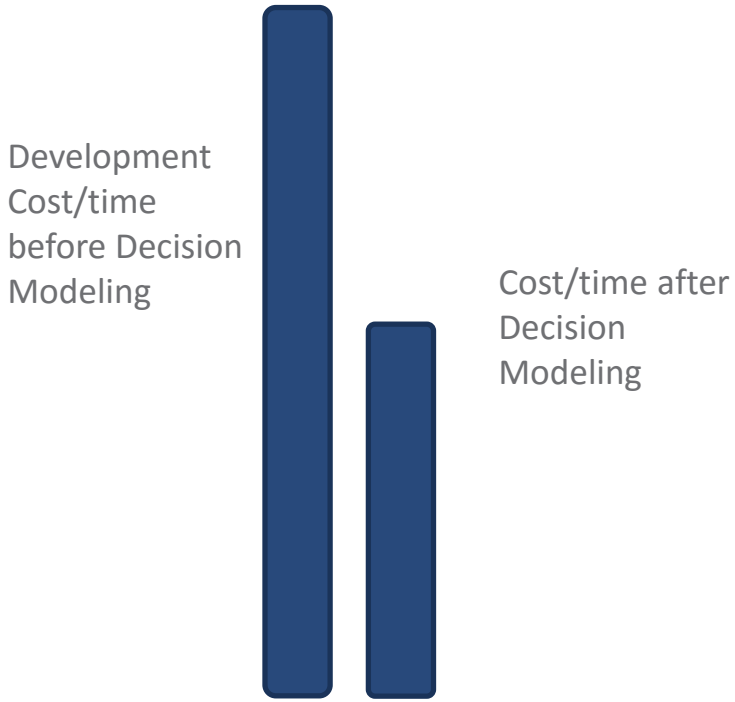
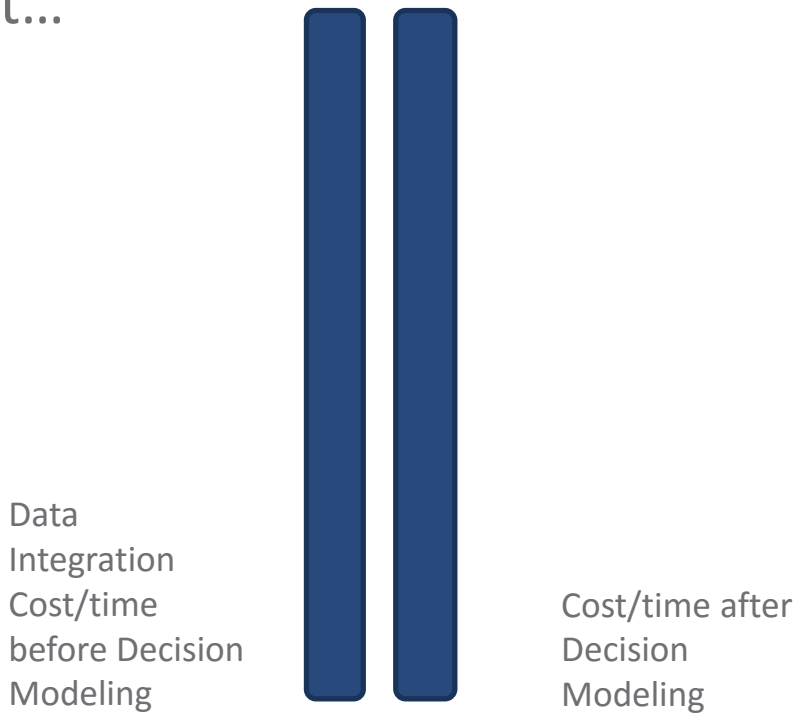
The Problem

We are seeing very significant improvement in development Cost/Time/Quality….



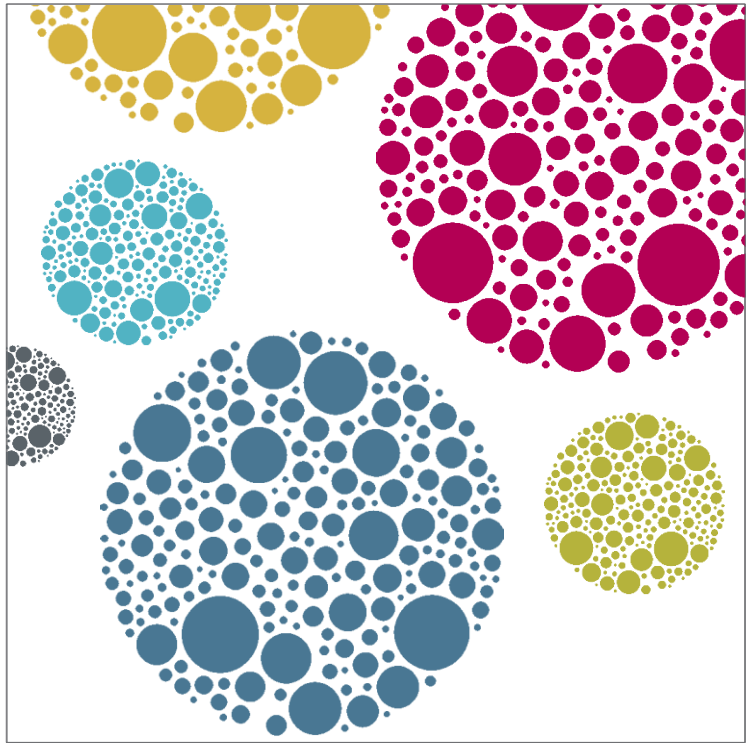
But the last mile in implementing decisions remains data integration: the Cost of this step remains high and the time unimproved by model based development…



The Solution: The Business Logical Unit

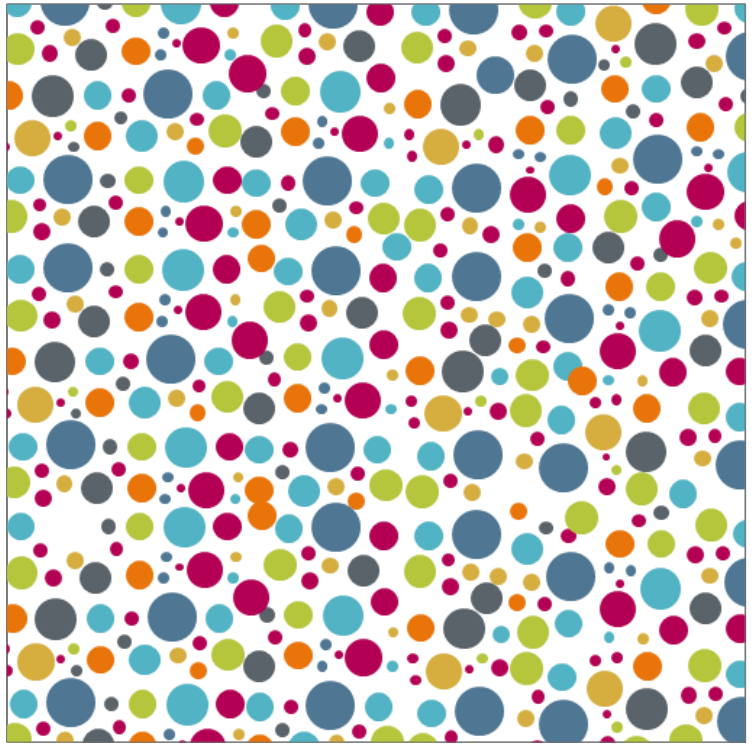
- The Business Logical Unit is the name given to a model of the information inputs and outputs of a given decision model
- Thus we are able to extend the model based paradigm into the data integration implementation for decision models.
- The Business Logical model is implemented in a tool we call Sapiens Decision InfoHub (DI)
- Our experience of this tool in the field shows:
  - Reduction in time and cost of data integration in the development and change cycles
  - Improved data governance
  - Significantly enhanced decision execution performance
  - Strengthened security of the data in the execution environment

The Business Logical Unit vs Classic Data Approaches



TRADITIONAL RDBMS

- Data is scattered across multiple systems (e.g. CRM, Billing, etc.)
- Each system is independent
- Very hard to access all data corresponding to one entity (e.g. customer)



UNSTRUCTURED BIG DATA

- Data is stored and distributed in big data system (e.g. Hadoop)
- No business logic in storage
- Data access for one entity requires lookup through massive amount of data

BUSINESS LOGICAL UNIT

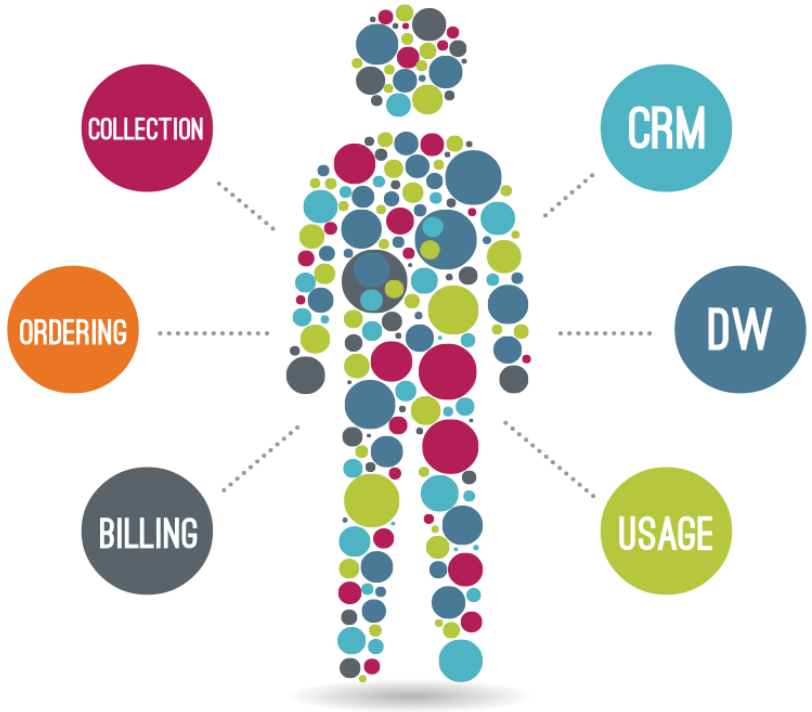
- Data is represented by BLU
- Distributed storage on demand
- Data access for one instance is a core feature
- Aligns with DM Glossary giving a business view of the data required for a given decision

The Business Logical Unit*

Data is organized

by the logical unit of the business

Each logical instance is treated as a **micro-database,** containing all data about the entity



**Patent Pending*

Business Logical Unit – Definitions

BUSINESS LOGICAL UNIT (BLU)

- Generic word used to encapsulate the concept behind the business-oriented representation of data in the Decision

BUSINESS LOGICAL UNIT TYPE (BLUT)

- Specific type of Business Logical Unit representing business-oriented data (e.g. Policy Renewal, Product Pricing, Patient Claim Eligibility, etc.)
- LUTs are configured in DI Studio

BUSINESS LOGICAL UNIT INSTANCE (BLUI)

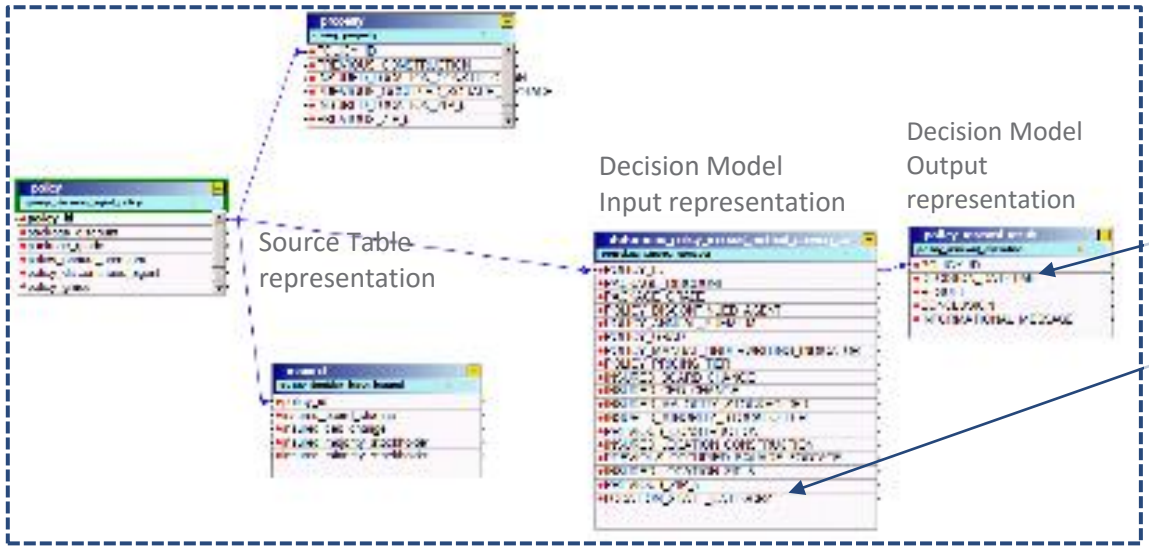
- Instance of a Logical Unit Type (e.g. Policy 123, Product N23RX, Patient 2344433456)
- Instances are the micro-databases stored in the DI servers

Relationship of Business Logical Unit, Type and Instance to The Decision Model

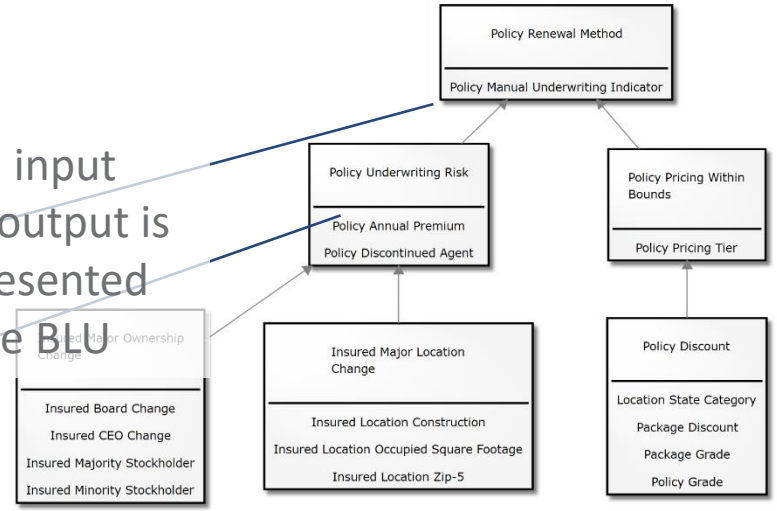
Business Logical Unit Type (BLUT)

Policy Renewal

Business Logical Unit (BLU)



Each input and output is represented in the BLU



Business Logical Unit Instance (BLUI)

The Decision Model

Relationship of Business Logical Unit, Type and Instance to The Decision Model

Business Logical Unit Type (BLUT)

Policy Renewal

Business Logical Unit (BLU)

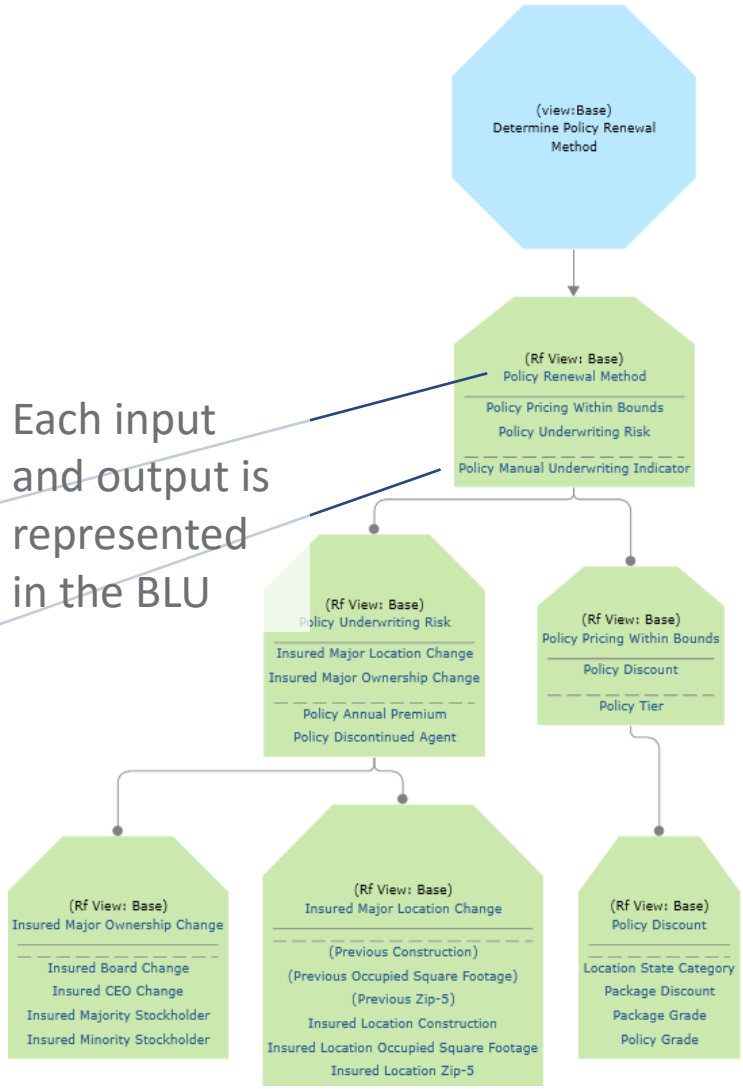
Source Table representation

Decision Model Input representation

Decision Model Output representation

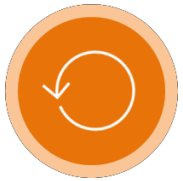
Each input and output is represented in the BLU

Business Logical Unit Instance (BLUI)



The Decision Model

Flexible Synchronization



ON-DEMAND SYNC

On-demand calls triggered by web services, batch scripts or directly querying InfoHub (administrative mode).

EVENT-BASED SYNC

InfoHub synchronization can be triggered using the principles of Change Data Capture (CDC).

ALWAYSYNC

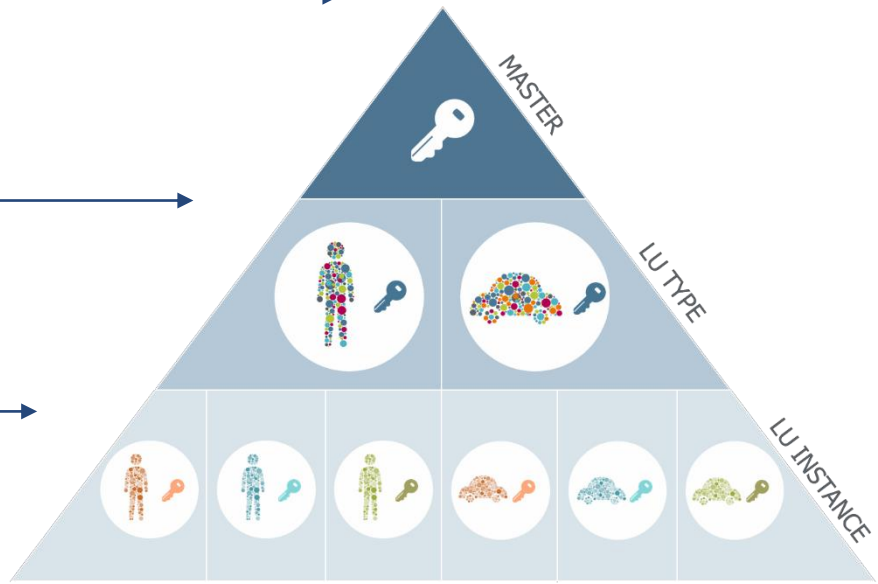
Timer based synchronizations

Using and combining these synchronization strategies ensures that the data is available as needed by the execution environment

Row Level Security

Hierarchical Encryption-Key Schema (HEKS)
implemented for two BLU types

- 1 Master Key allowing full access
- 2 Type Keys restricting access to 2 different BLU Types
- 6 Instance Keys, 3 for each BLU Type restricting access at the BLU Instance level



Architecture

KEY TO THE LAYERS IN THE DIAGRAM

CONFIGURATION: The versioned configuration of every Logical Unit Type, accessed through administration tools (Admin Manager, Studio and Web Admin interfaces).

WEB/DATABASE SERVICES: Communicates with user applications: either via direct queries (database services) or via web services.

A**UTHENTICATION ENGINE:** Manages user access control and restrictions.

MASKING LAYER: Optional, allows real time masking of sensitive data.

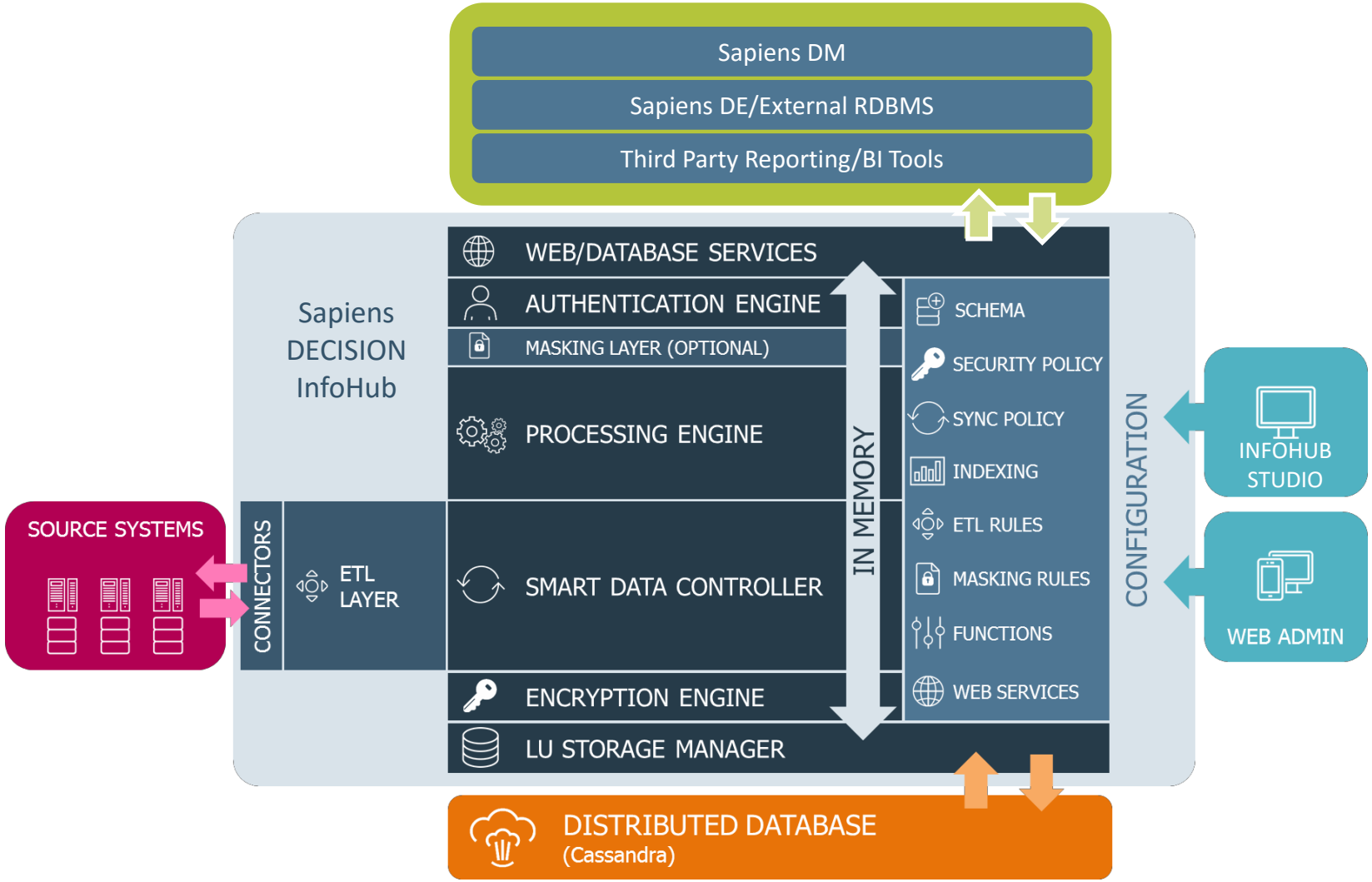
PROCESSING ENGINE: Where every data computation is managed; it uses the principles of massive parallel processing and map-reduce in order execute operations.

SMART DATA CONTROLLER: Drives the real-time synchronization of data to InfoHub.

ETL LAYER: Embedded migration layer, allowing for automated ETL on retrieval.

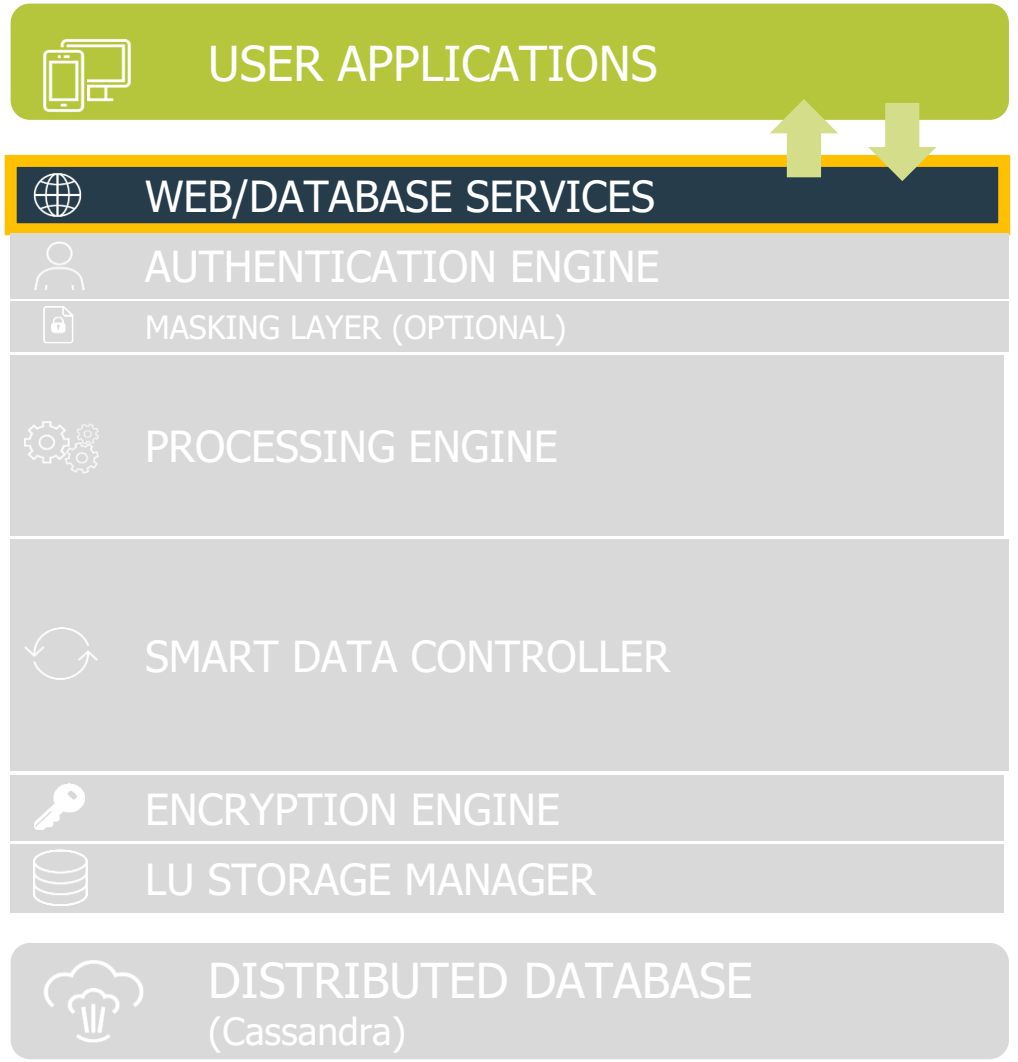
ENCRYPTION ENGINE: Manages the granular encryption of each data set.

LU STORAGE MANAGER: Compresses and send data to the distributed database for storage. InfoHub leverages Cassandra as the distributed database. The communication between the distributed databases is very straight forward, making InfoHub a flexible solution that can be adapted to any other distributed database.



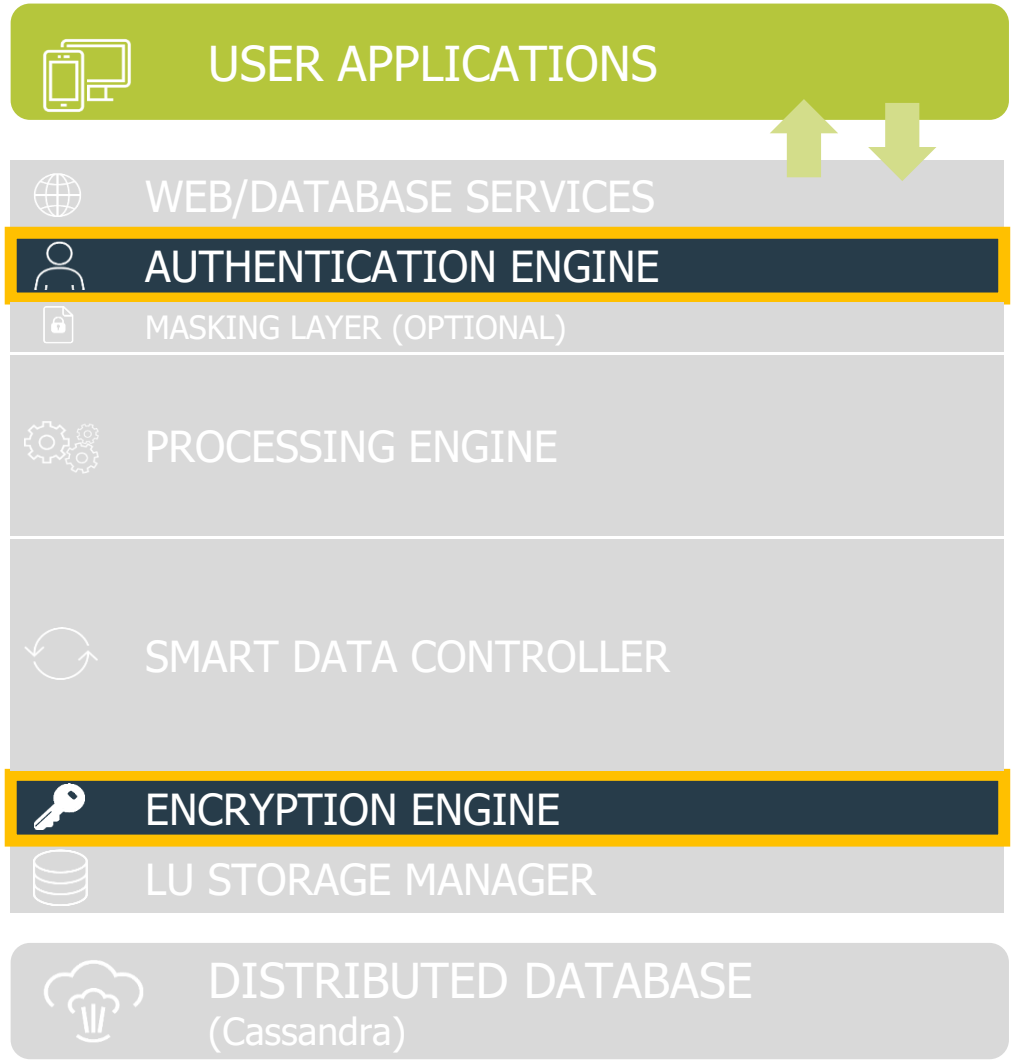
Web/Database Services

- Exposes DI's functions as APIs
- Support REST APIs
- Can output XML or JSON formats
- Access to the APIs is subject to Authentication
- Built-in function to extract the LU, or part of the LU as JSON/XML
- Provides JDBC protocol to access the distributed database directly, and interrogate it using SQL



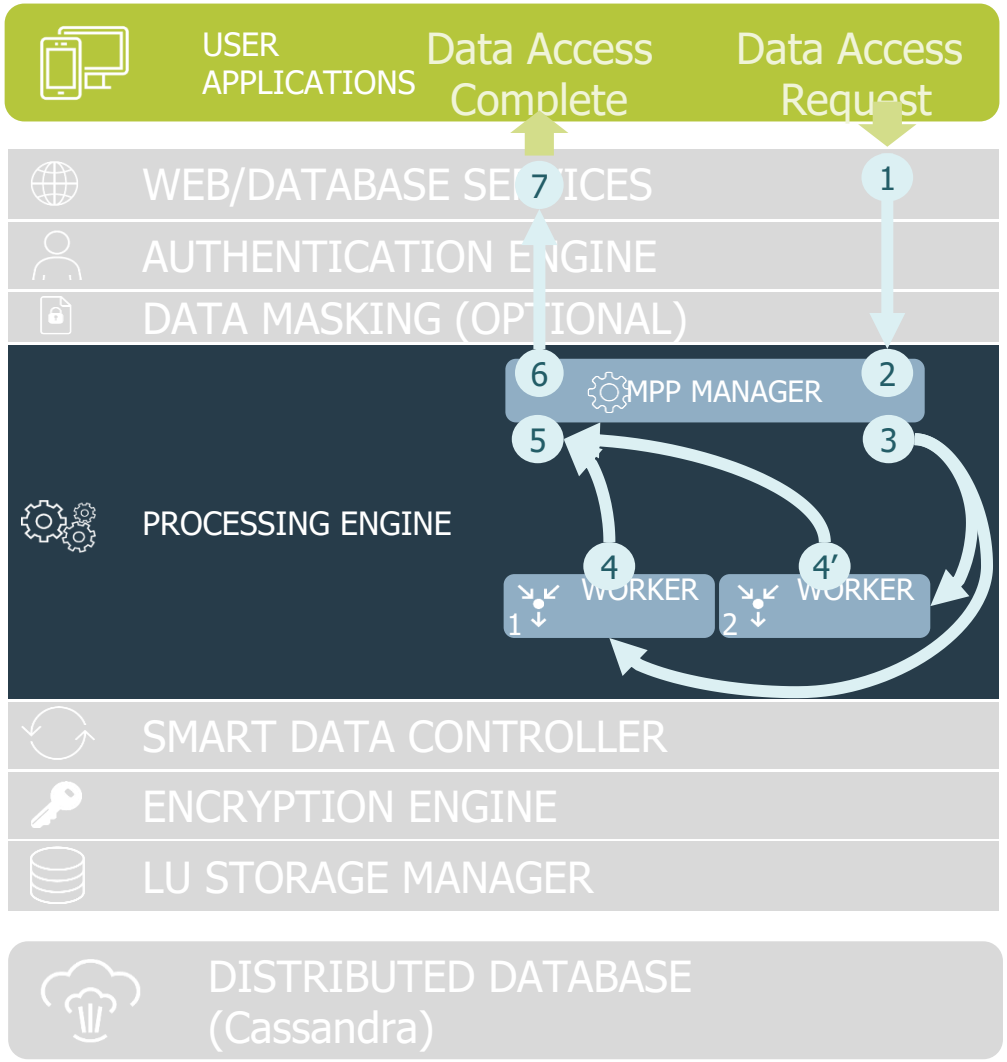
Authentication & Encryption

- Encryption
  - Each LU Type / Instance is encrypted using a specific key
    - Master Key
    - LU Type Key
    - LU Instance Key
- Authentication
  - Users are assigned roles
  - Access to LU instances can be specified at User level
  - Access to methods (that access LU instances) is specified at role level



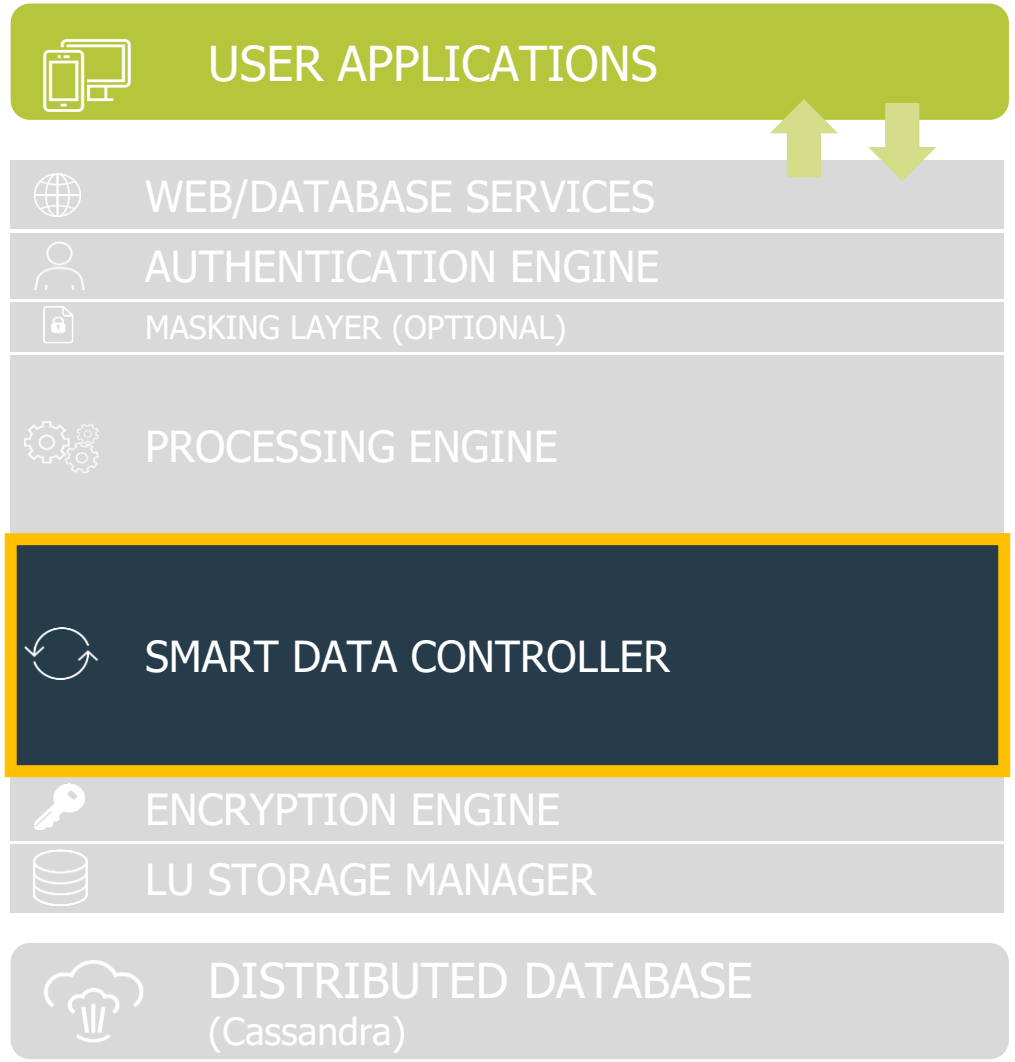
Processing Engine

- Checks Synchronization status
- Manages SQL queries
- Handles necessary operations and computations
- Initiates and Synchronizes Workers to distribute the work
- Runs Aggregations using Map-Reduce algorithm



Smart Data Controller

- Retrieves data from distributed database storage to memory (if not already there)
- Checks Schema version against last published schema version
- Checks logical unit instance data timestamp against AlwaySync timer
- If required, Triggers ETL for data synchronization
- ETL services synchronizes data with source systems and sends it to the Processing Engine



A Model Based Logic and Information Development Cycle

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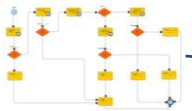
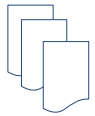
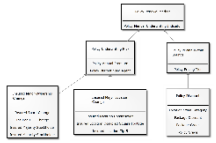




Based on Process, regulation and Policy knowledge sources, requirements for decision logic emerge

1

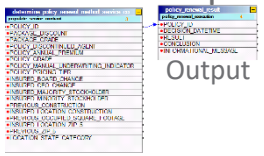
Logic and Glossary designed in the decision modeler



2

A Business Logical Unit is generated from Glossary of the Decision

Decision Model Information Requirements



Decision Input

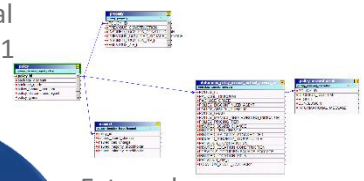
Output

Business Logical Unit Type

External source 1

External source 2

External source 3



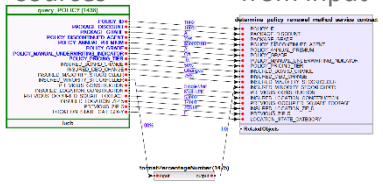
3

The data sources required by the BLU are discovered partially by auto-discovery

BLU ETL

Internal DI Query on external sources

Input table of LU with data fully transformed from input



One example of input transformation: could be regular expression, or one of many built in templates, or Java code

4

Business Logical Unit is populated through ETL and Synchronization rules

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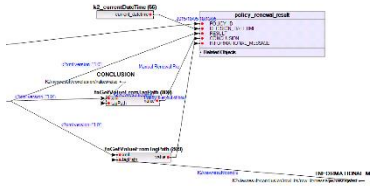
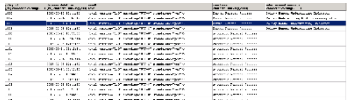
Models Deployed to Execution Environment



6

Results of execution are persisted into DI for analytics and decision optimization



Persistence of the output in the BLU (BLUI) for analytics and decision optimization

7

Analytics and Machine Learning on inputs/outputs of decisions

SAPIENS DECISION

Key Features

RISK-FREE INTEGRATION

- Fully Integrated with DECISION Suite, decision based business level model
- Embedded ETL
- Embedded Web-Services
- SQL support & REST-Like APIs
- Flexible Synchronization

HIGH-END PERFORMANCE

- Logical Unit Storage
- In-Memory Computation
- Map-Reduce Massive Parallel Processing

MODERN ARCHITECTURE

- Fully distributed
- Linearly scalable
- Highly Available
- No Single Point of Failure
- Embedded Replication

ENHANCED SECURITY

- Row-Level security using HEKS
- Complete User Access Control
- Data Masking Library

Thank You

Please visit us at www.sapiensdecision.com

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