

Embracing Change

Financial Informatics and Risk Analytics

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The views expressed are those of the author and do not necessarily reflect official positions of the Federal Housing Finance Board or the U.S. Department of the Treasury.

Federal Home Loan Banking System

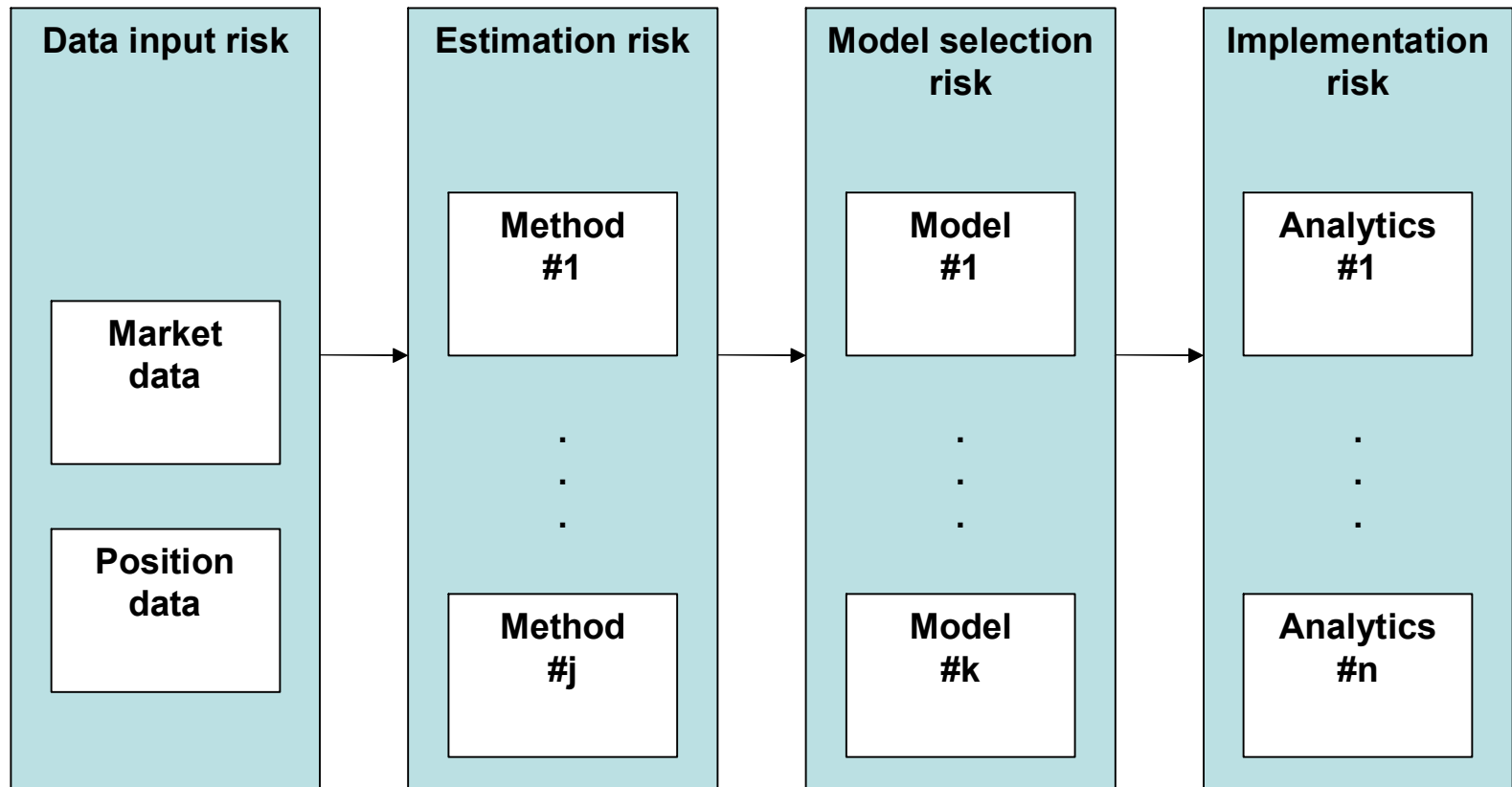


- 12 regional Federal Home Loan Banks (FHLBs)
 - Owned by members (8000 banks and thrifts)
 - ca. \$1,000,000,000,000 in aggregate assets
 - ca. 100,000 complex financial contracts
 - ca. 4.50% capital

Managing Risk

- Analysis requires data and models
- Unstable metadata, due to:
 - financial innovation
 - model risk
 - strategic policy evolution
- Flexibility is the central requirement

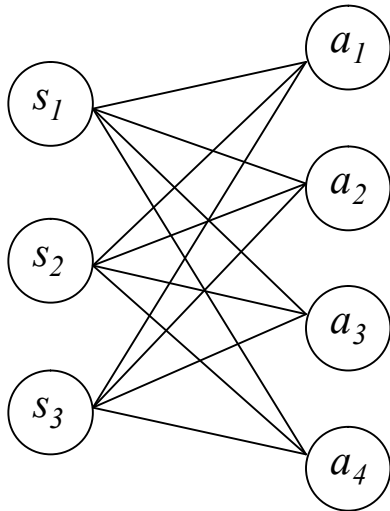
Model Risk



Scalability of Metadata

Stovepipe topology

Source systems **Analytics systems**

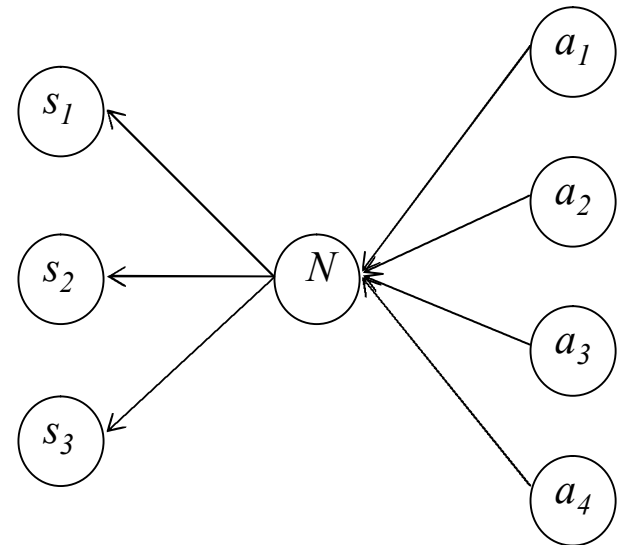


$$\text{Cost} = (m + n)k_{spec} + (mn)k_{map}$$

Numeraire topology

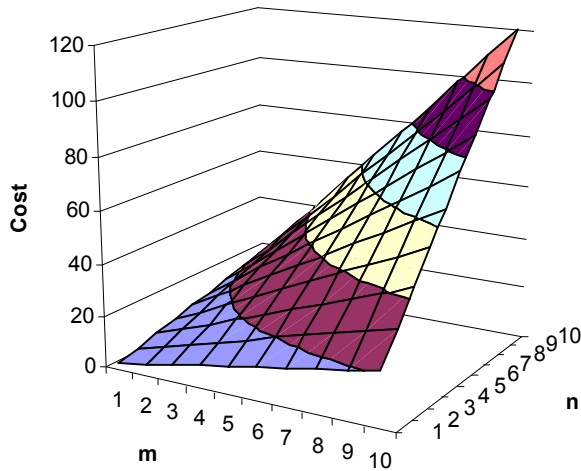
Source systems

Analytics systems

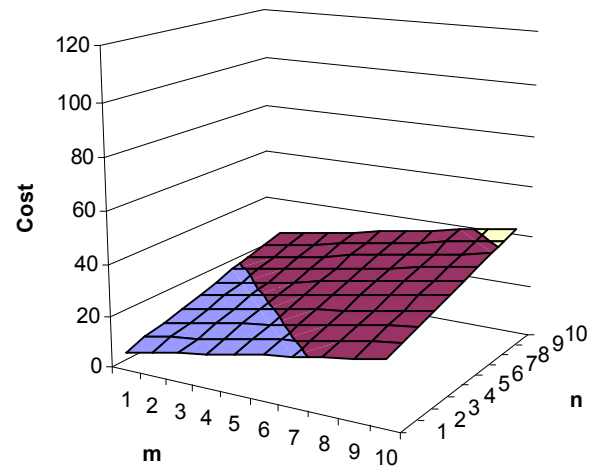


$$\text{Cost} = k_N + (m + n)k_{spec} + (m + n)k_{map}$$

Scalability of Metadata



Stovepipe topology



Numeraire topology

Implementing a Solution

- **Requirements:**
 - **Flexible**

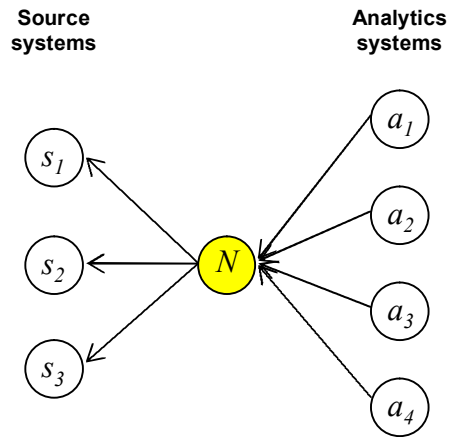
Auto-generate all significant outputs from metadata
 - **Scalable**

Use the numeraire architecture
 - **Practical**

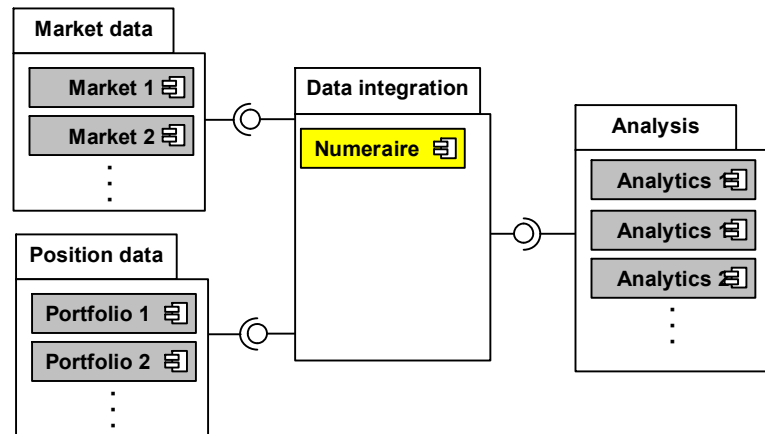
Use production-quality tools available today
 - **Portable**

Design is self contained and independent of platform

Implementing the Numeraire

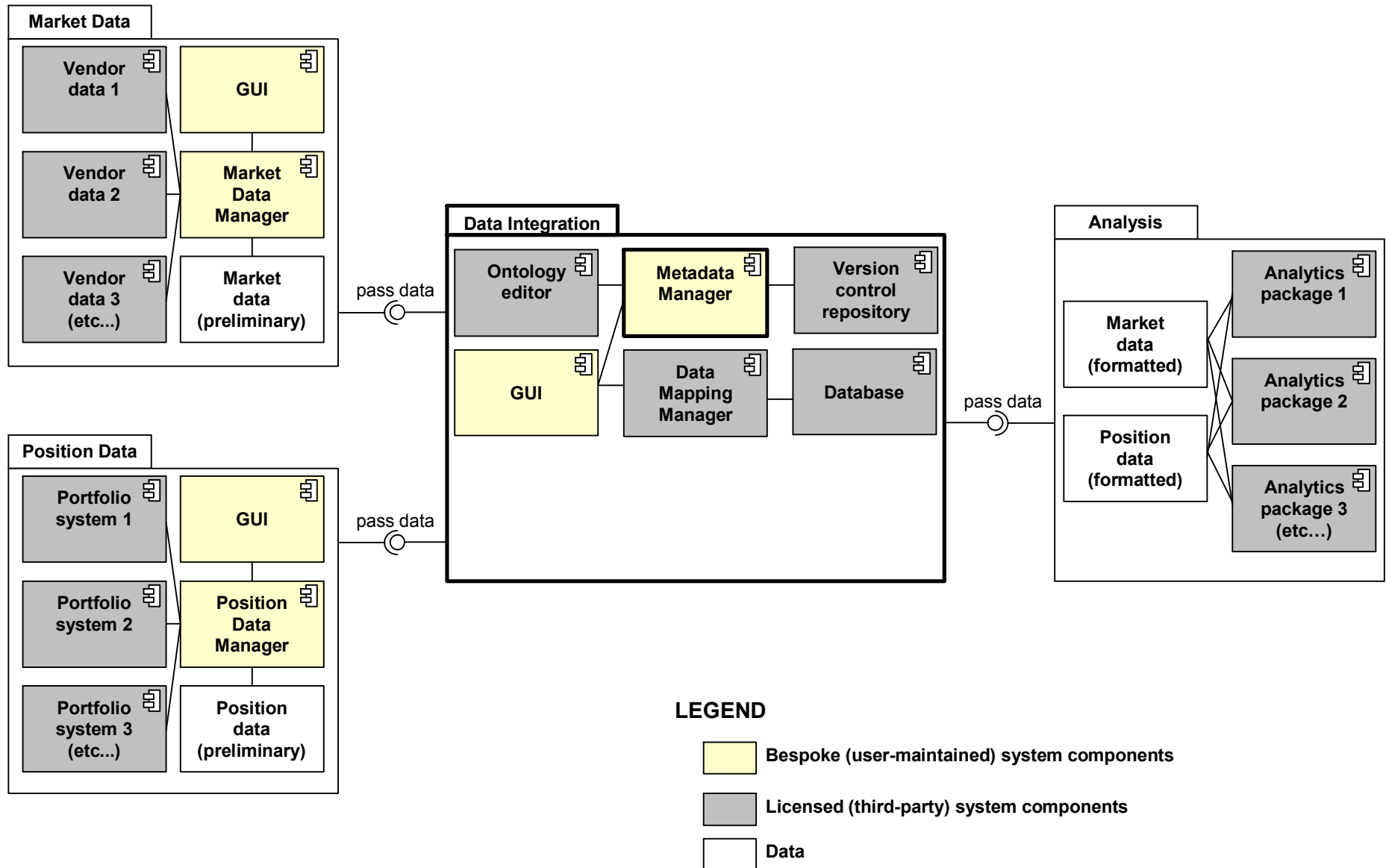


Numeraire topology

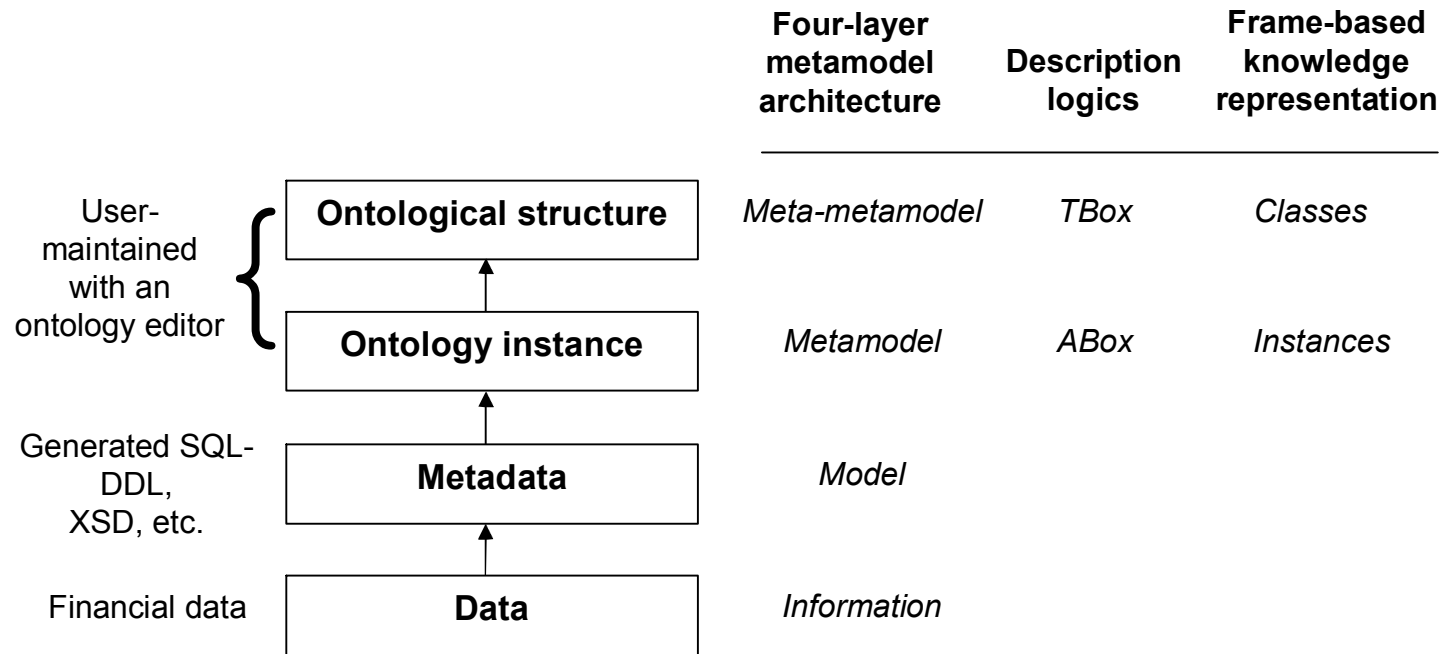


Numeraire component design

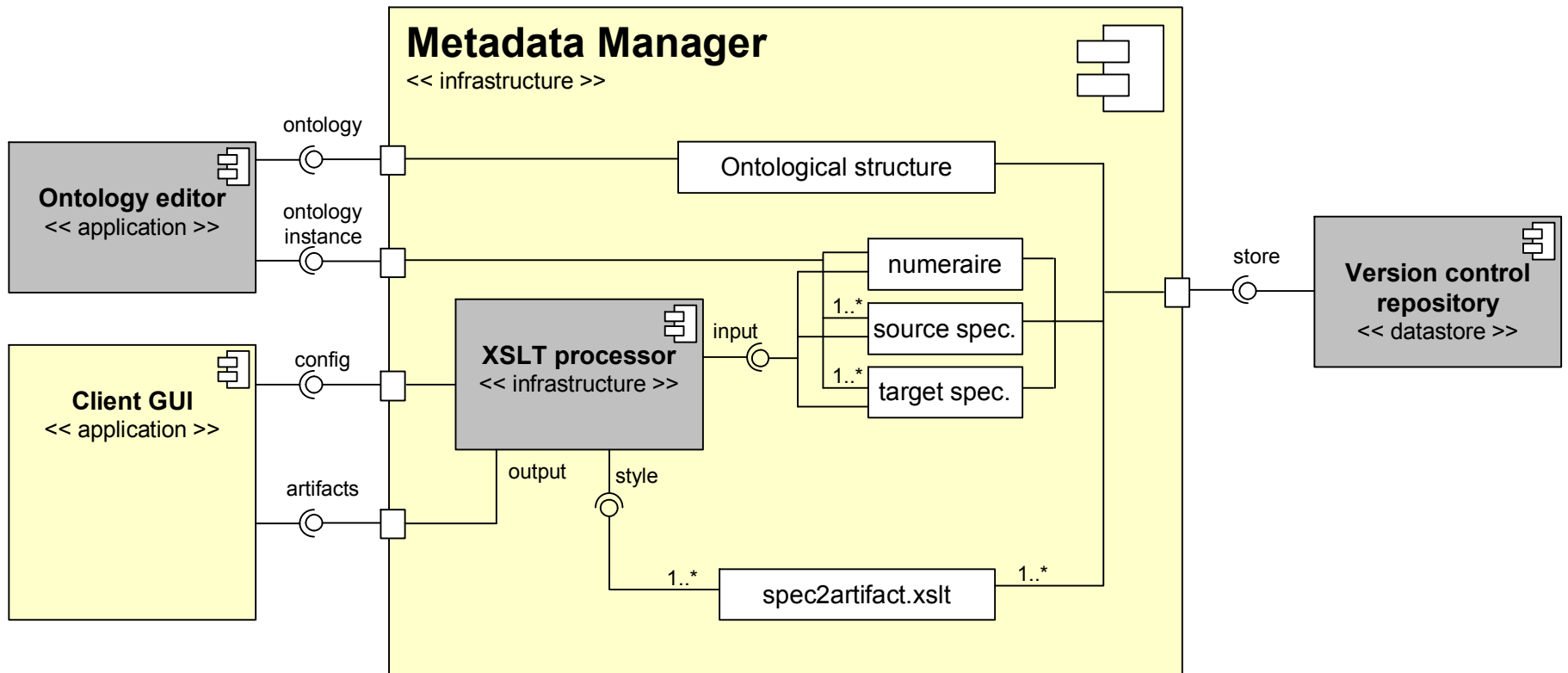
Implementing the Numeraire



Ontology for Flexible Metadata



Implementing Flexible Metadata



Really implementing it

The screenshot displays the Protégé 3.2 beta interface for a project named 'TCDS'. The main window is divided into several panes:

- CLASS BROWSER:** Shows a class hierarchy for the project. The hierarchy is as follows:
 - :THING
 - :SYSTEM-CLASS
 - RED
 - DOCUMENTATION
 - STRUCTURAL
 - red_element
 - red_spec (1)
 - red_manifest (1)
 - red_instrument (17)
 - red_attribute
 - red_field (25)
 - red_field_group (7)
 - red_field_choice (1)
 - datatype

- INSTANCE BROWSER:** Shows a list of instances for the class 'red_field'. The instances listed are:
- .CashMoneyMkt.Balance
- .CashMoneyMkt.BookValue
- .CashMoneyMkt.CRSAccount
- .CashMoneyMkt.DayCount
- .CashMoneyMkt.HedgeID
- .CashMoneyMkt.Identifier.CUSIP
- .CashMoneyMkt.Identifier.NonCUSIP
- .CashMoneyMkt.IntRate.SchedFloatRate.CapS
- .CashMoneyMkt.IntRate.SchedFloatRate.FloorS
- INSTANCE EDITOR:** Shows the details for the instance '.CashMoneyMkt.Balance'. The 'Name' field is set to 'Balance'. The 'InstructionSlot' section indicates 'This slot currently has 1 value.' Below this, the 'Title' field is also set to 'Balance'. There are checkboxes for 'Attribute Node' and 'DatatypeSlot', and a 'Contains' field.

Thank you.