

# The Semantic Interoperability Problem Business Impact and Technical Solutions

A Pragmatic Approach to  
Improving Data Integration

David Frankel Consulting  
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# Agenda

- The Need for Smarter Systems
- A technique for Mitigating the Problem
- Application of the Techniques

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# The Semantic Interoperability Barrier

## A Business View

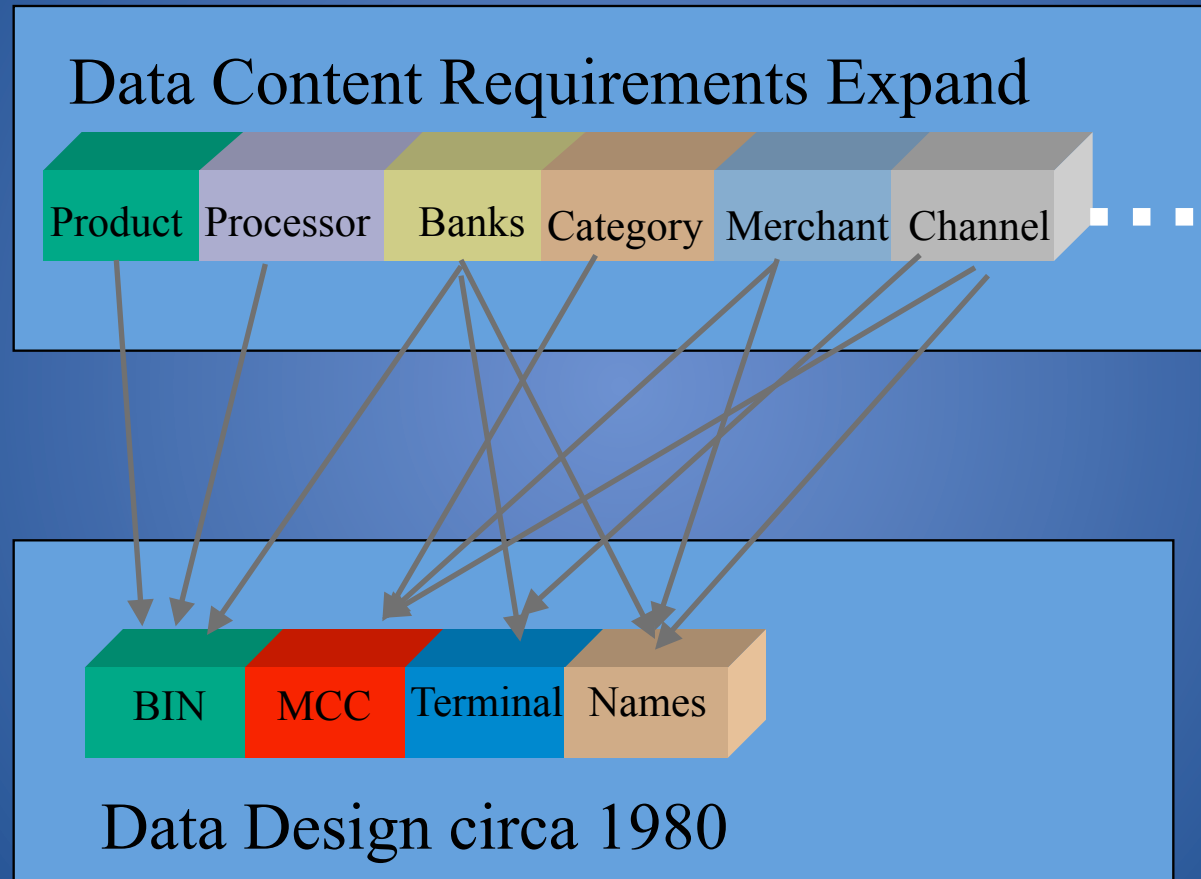
- Semantic interoperability of data: *The ability of multiple parties to coordinate their function based on a shared understanding of the data that flows among them*
- Business Drivers
  - Value chains, outsourcing, M&A, industrial convergence, need for transparency e.g. for regulation and risk management
- Data integration bottlenecks measurably impact global GDP
  - Modest improvements have large economic ramifications

# Semantic Interoperability

## Technical Factors

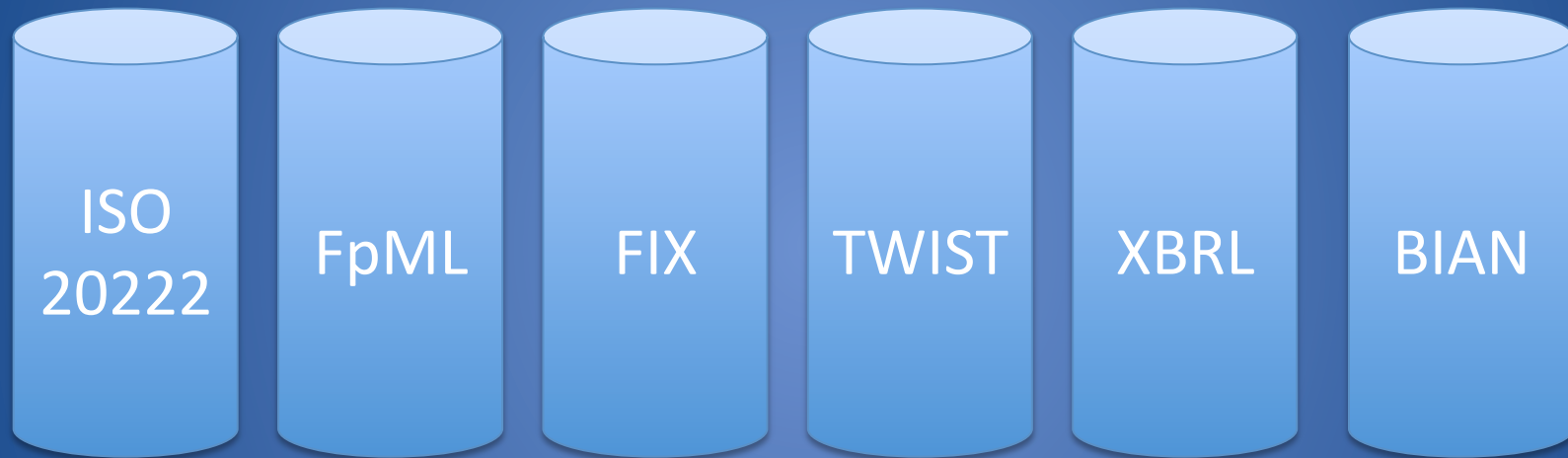
- Legacy data used for unintended purposes
- Standards silos
  - E.g. different standards with different architectures for trading front office and back office, electronic submission of financial statements, payment initiation, etc.
  - All of which have to integrate with traditional relational databases
- New data sources : mobile devices, sensors

# Legacy Gets Stretched



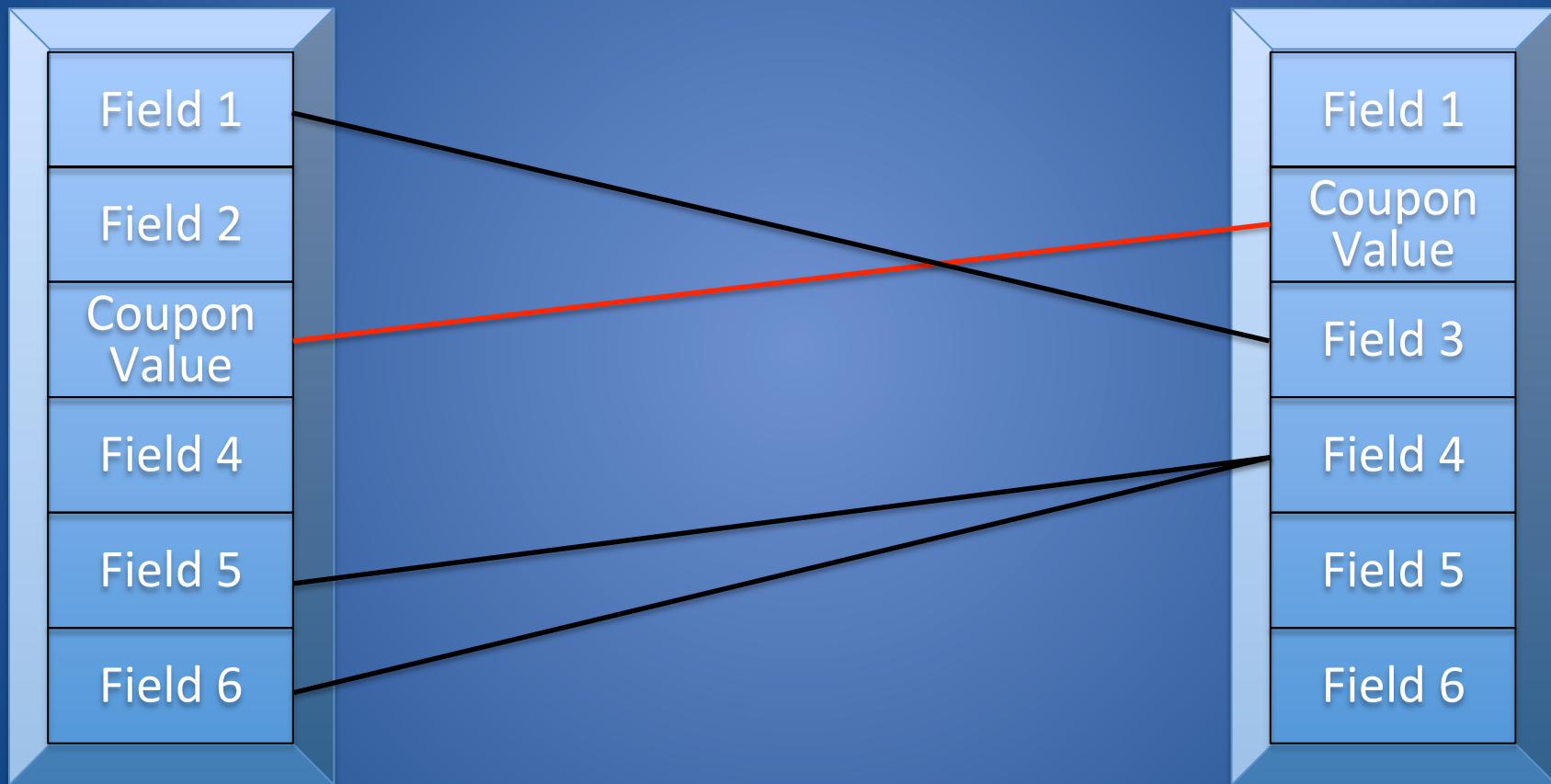
This graphic courtesy of Visa Inc.

# Standards Silos





# Today's Model-Driven Data Integration Tools



Expression: Format 2 Field 4 = Format 1 Field 5 \* Format 2 Field 6



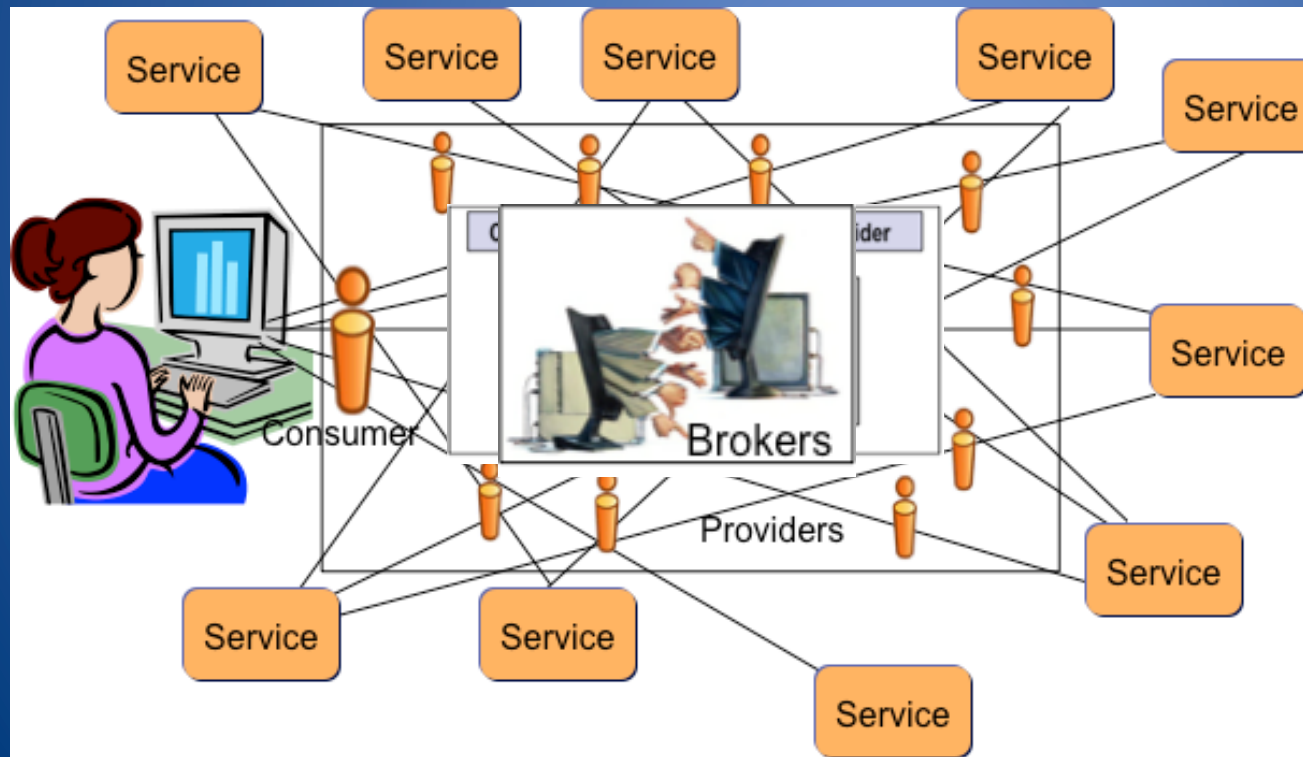
# What We Have Achieved to Date With Model-Driven Integration Tools

- More rapid route to executable transformation
  - ~20% improvement
  - Modest improvement → Big economic return
- But only after analyst figures out what maps to what
  - Figuring that out is the remaining 80% of the bottleneck

# Another Challenge

## Finding Service Agents

- Many service agents from different sources
- Example: [BIAN External Liquidity Risk Scenario](#)



Graphic created by  
James Odell

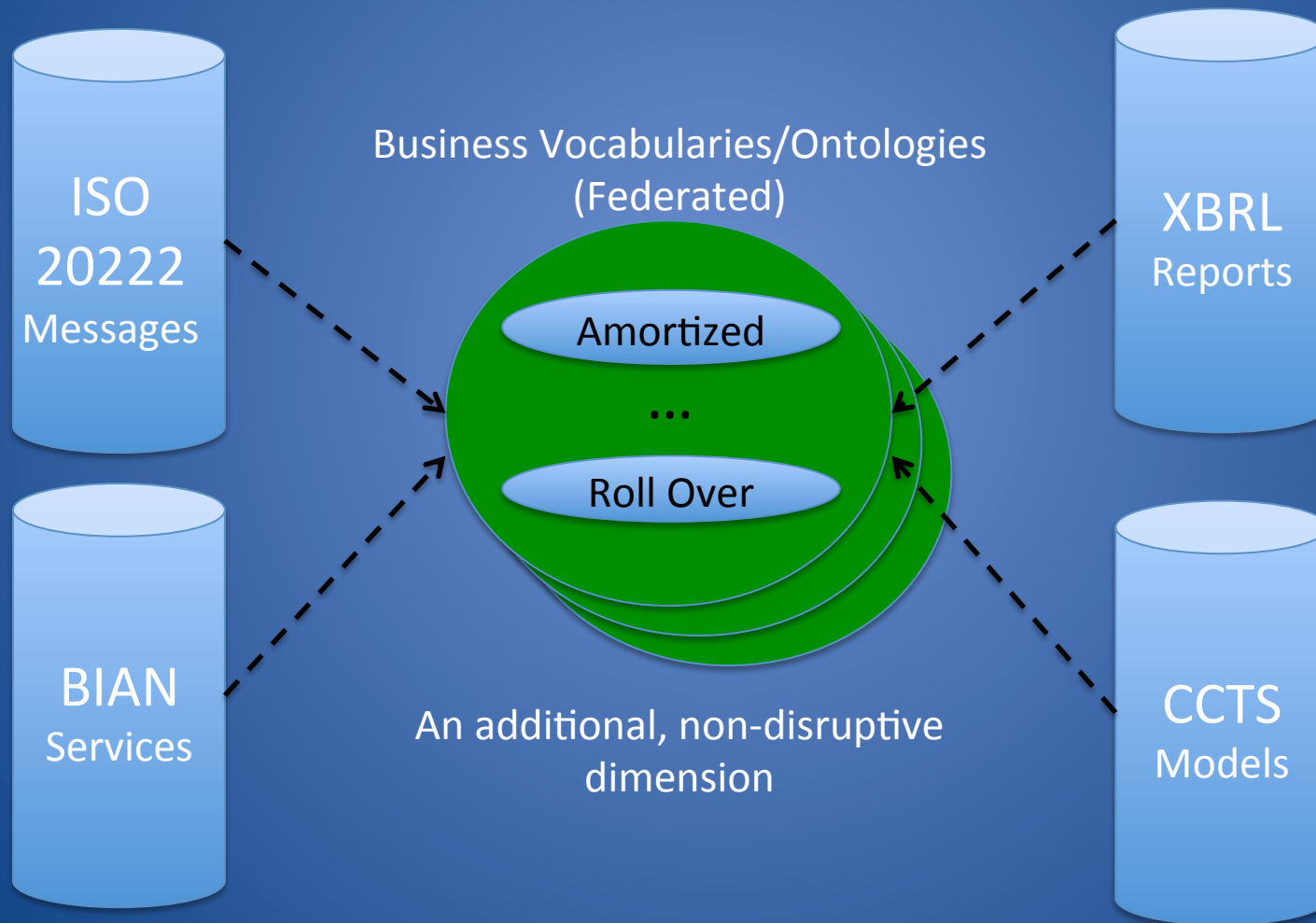
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# Improving Semantic Interoperability

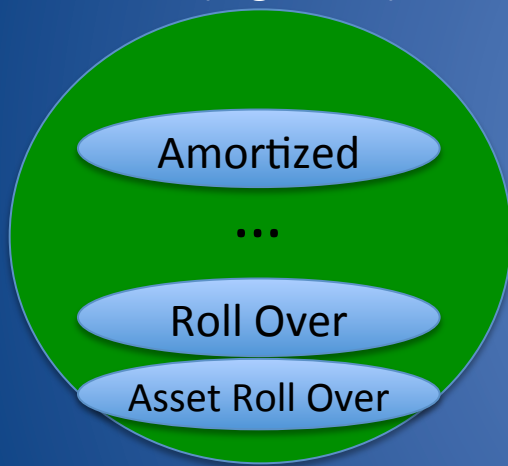
- Leveraging Semantic Technology
- Chipping Away at a Large Problem
- Remember:
  - Modest improvement → big impact
- Key challenge: Techniques must be *non-disruptive*
  - Cannot require ISO 20022, XBRL, BIAN, Relational models to change their structure

# Integration via Common Semantic Anchoring Mechanism



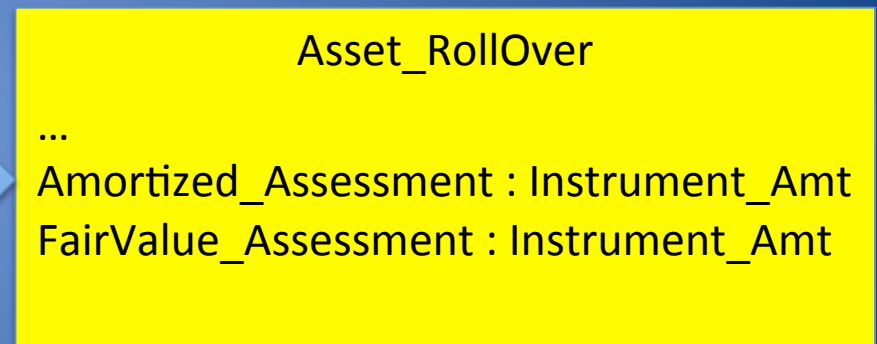
# Making Semantic Vocabularies and Ontologies *Actionable*

Business Vocabulary/Ontology  
(e.g. FIBO)



What is the  
connection?

IT Data Structure  
(Relational, ISO 20022, XBRL, etc.)

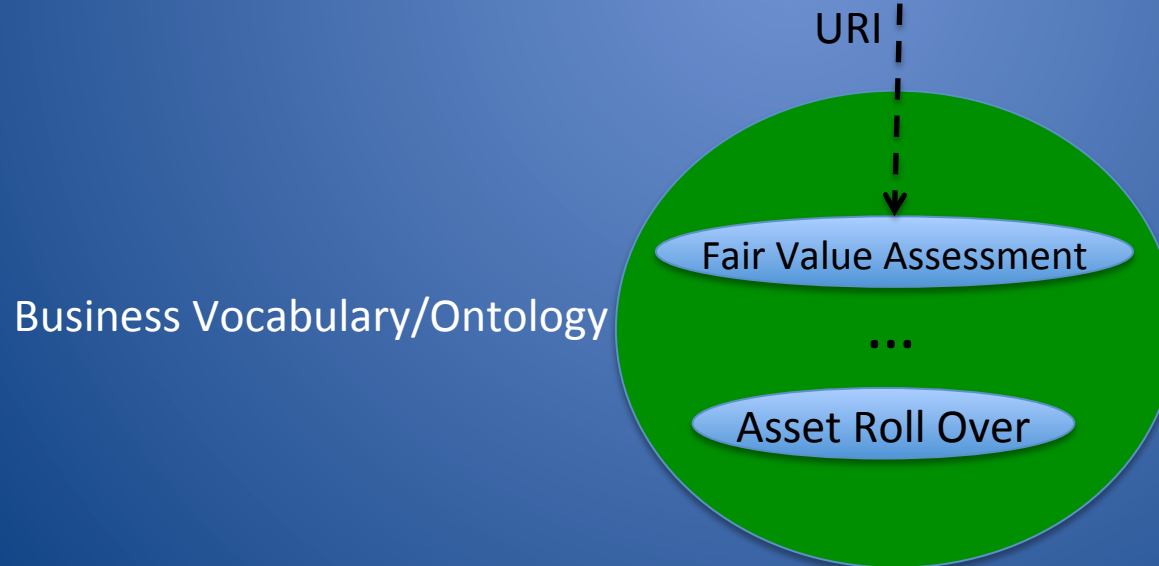




# Semantic Structure

## Based on ISO 11179 and UN/CEFACT

Field	Object	Property	Data Type
<b>Amortized_Assessment</b>	Asset Roll Over	Amortized Assessment	Instrument Amount
<b>FairValue_Assessment</b>	Asset Roll Over	Fair Value Assessment	Instrument Amount
...			

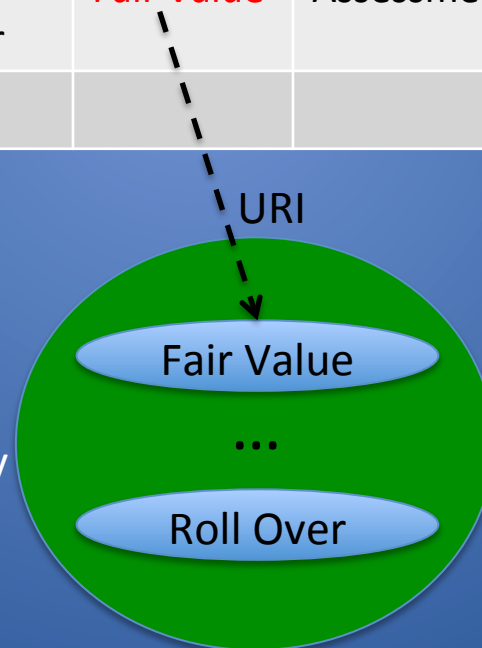




# Refined Semantic Structure

Field	Object Qualifier Term	Object Term	Property Qualifier Term	Property Term	DataType Qualifier Term	CoreDataType Term
Amortized_Assessment	Asset	Roll Over	Amortized	Assessment	Instrument	(Money) Amount
FairValue_Assessment	Asset	Roll Over	Fair Value	Assessment	Instrument	(Money) Amount
...						

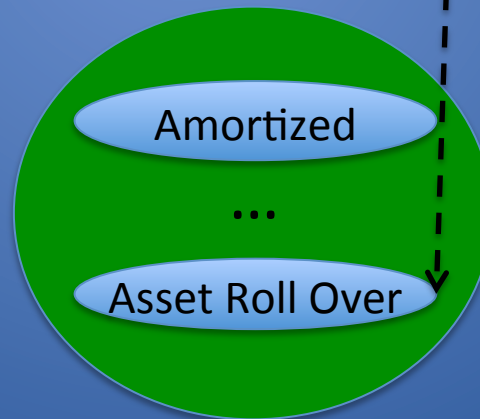
Business Vocabulary/Ontology



# Semantic Structure of a Service

Service Operation	Action	Object	Property
RollOver_Asset_Balance	Initiate	Asset Roll Over	
...			

Business Vocabulary/Ontology

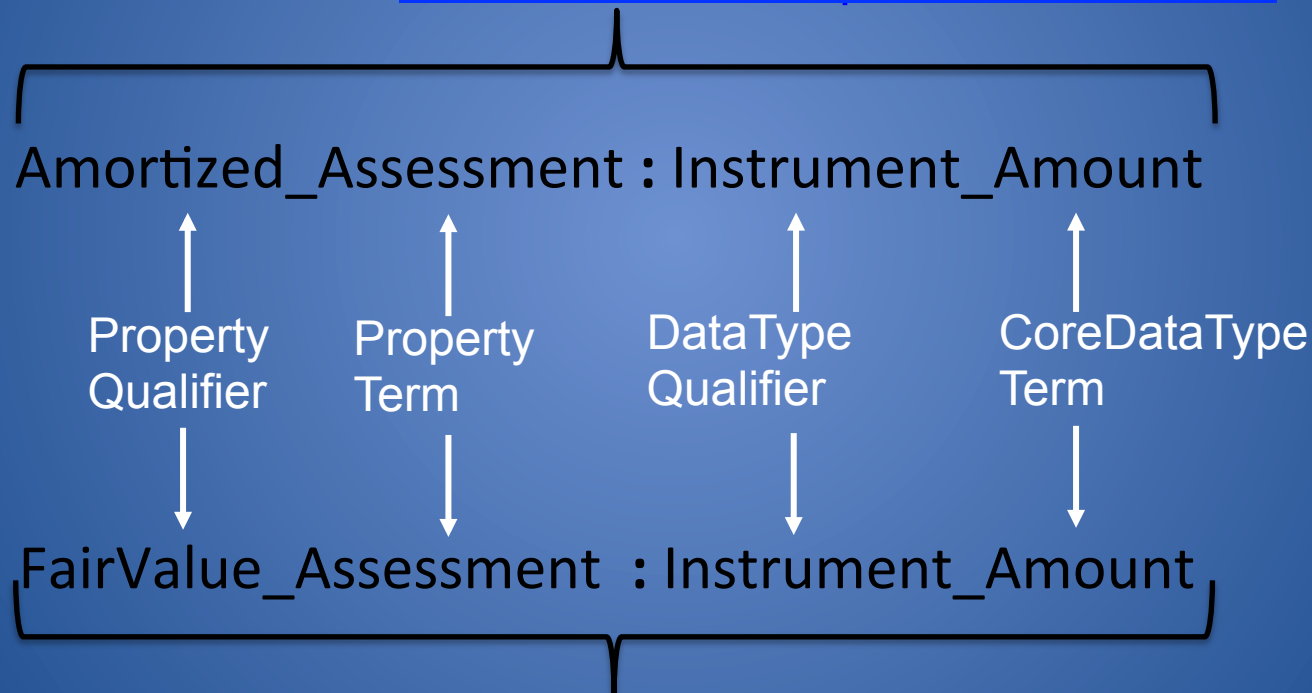


# Business Context Metadata

- Geopolitical scope: The continent, economic region, country, or region for which the element is relevant
- Industry classification: The industry or industries for which the element is relevant
- Product classification: The product class(es) for which the element is relevant
- Official constraint: A legal requirement(s) associated with the element; e.g., an element could be required by Sarbanes-Oxley
- System capability: Indicates that the element is there in order to address the limitations of a computing system(s)
- Business process: The business process(es) with which the element is associated
- Business process role: The role(s) directly involved in the business process(es) that are relevant to the element, e.g. shipper
- Supporting role: The role(s) indirectly involved in the business process; e.g., a data element in an order response from seller to buyer could be required by a third-party shipper
- ...

# Semantic Structure Metadata + Business Context Metadata

Official Constraint: [US GAAP FASB Update No. 2011-04](#)



Official Constraint: [IFRS Fair Value Measurement](#)

# Modeling Semantic Structure

## Additional Benefit

*Service: Create New Current Account Inventory*

### Interpretation # 1

- Action: *Create*
- Object: *Current Account*
- Object Qualifier: *New*
- Property: *Inventory*

### Interpretation # 2

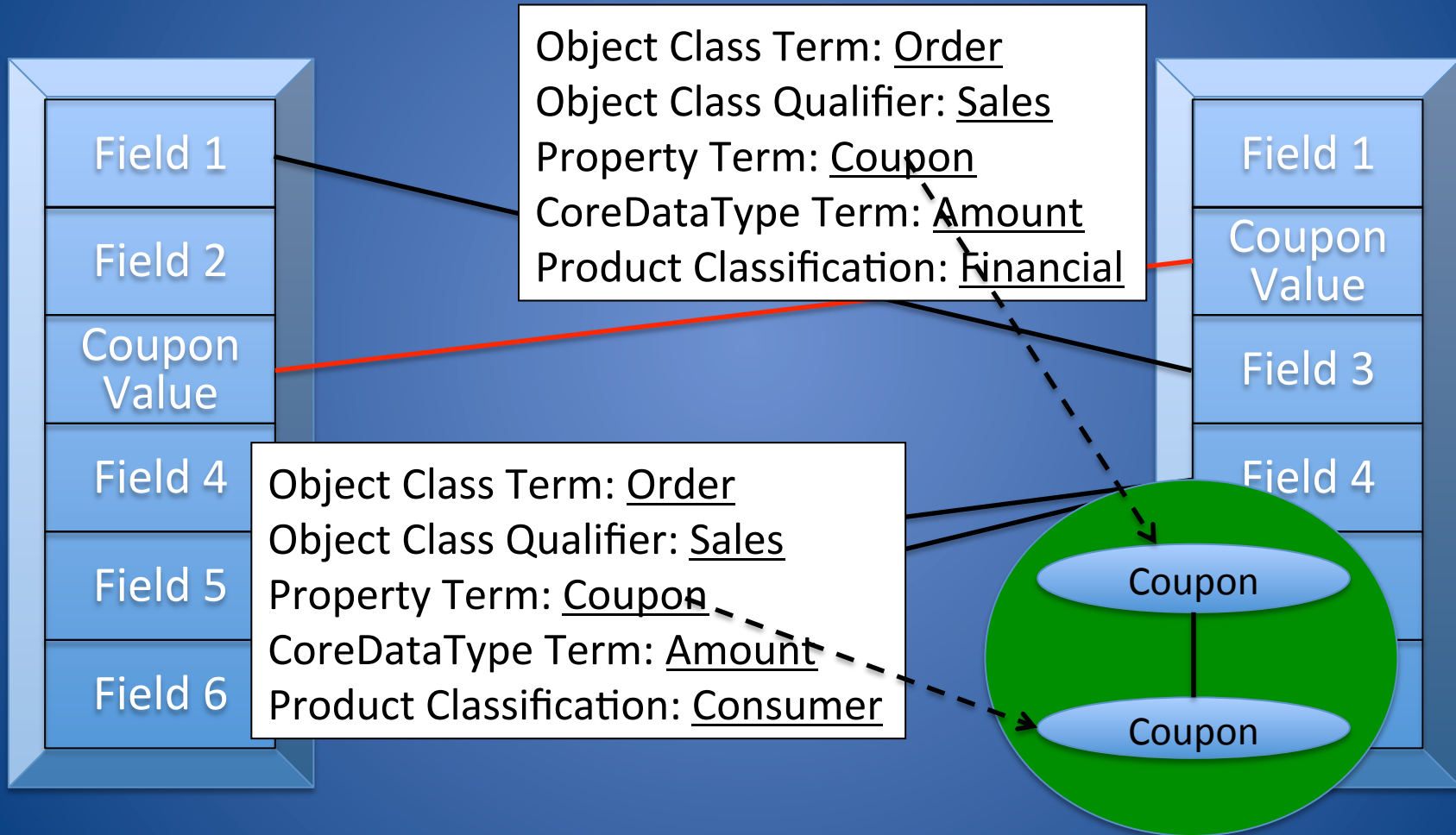
- Action: *Create*
- Object: *Current Account*
- Property: *Inventory*
- Property Qualifier: *New*

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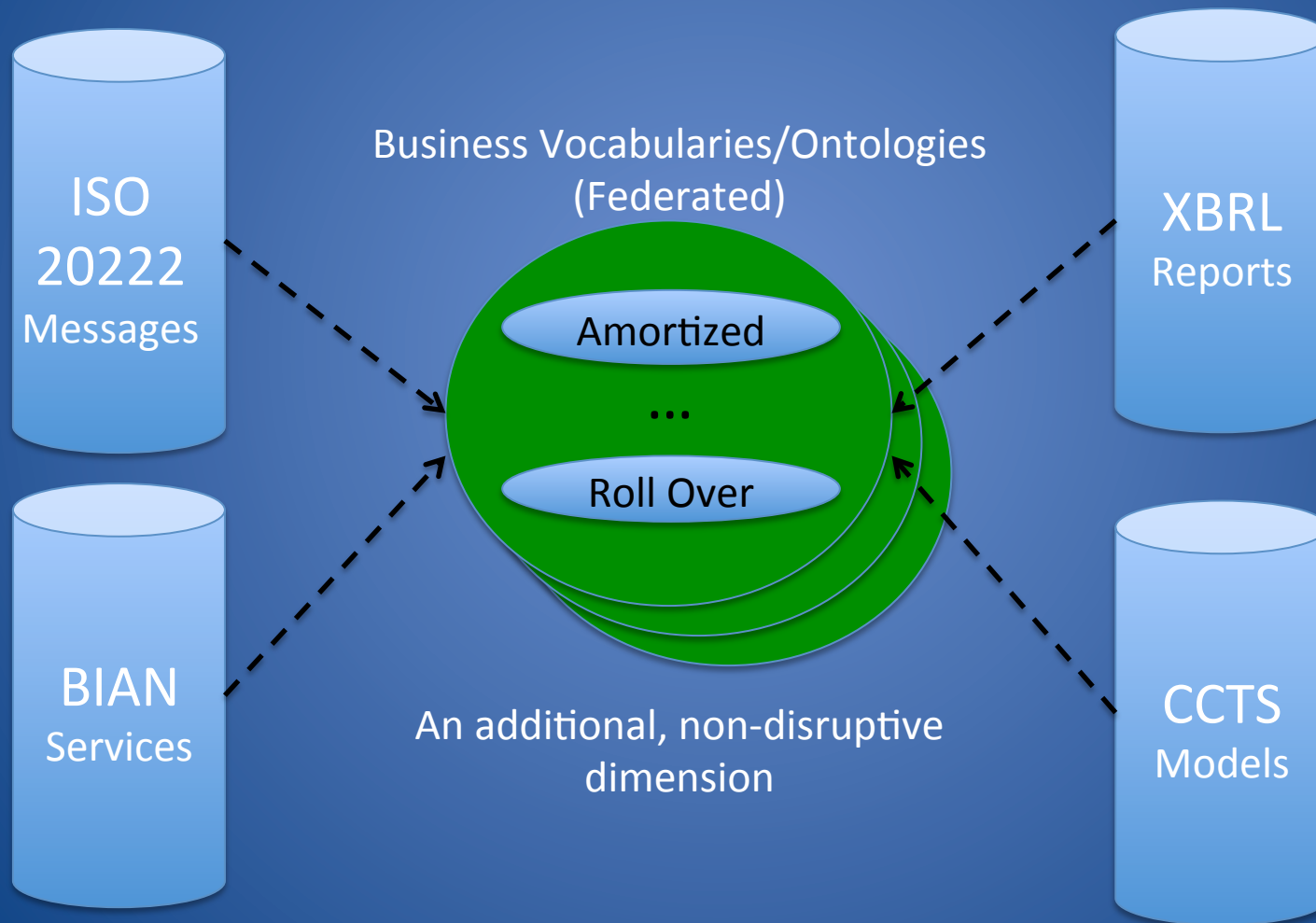


# Toward a New Generation of Data Integration Tools





# Integration via Common Semantic Anchoring Mechanism



# Conclusion

- Large problem with business and technical causes
- New techniques promise modest yet significant return
  - Not the only angle of attack
- Implementations under way
  - BIAN and CCTS most advanced
  - ISO 20022 and XBRL work in progress
- Application to LEIs and standardized instrument IDs
  - A new CoreDataType: LEI ?
  - LEIs for product classification and other business context metadata elements ?
  - Further discussion to ensue...

# For More Information

[www.DFrankelConsulting.com/articles.html](http://www.DFrankelConsulting.com/articles.html)

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# Backup

## The 22 UN/CEFACT Core Data Types

- (Money) Amount
- Binary Object
- Code
- Date
- Date Time
- Duration
- Graphic
- Identifier
- Indicator
- Measure
- Name
- Ordinal
- Percent
- Picture
- Quantity
- Rate
- Ratio
- Sound
- Text
- Time
- Value
- Video

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