



Refinements to DMN 1.1 Suggested by Real-World Experience

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Presenters



- ▶ We work with clients to improve their business by applying business rules and analytic technology to automate and improve decisions.
 - ▶ Vendor-neutral
 - ▶ Original DMN submitter
 - ▶ Using decision modeling since 2011
- ▶ I have spent 14 years focused on analytic applications and Decision Management



- ▶ We enable investment banks to automate demanding financial compliance regulations, against challenging deadlines, through the application of business rules, business decision modeling and business decision management systems.
- ▶ 13 years' experience applying Decision Modeling and Business Rules in finance



Agenda

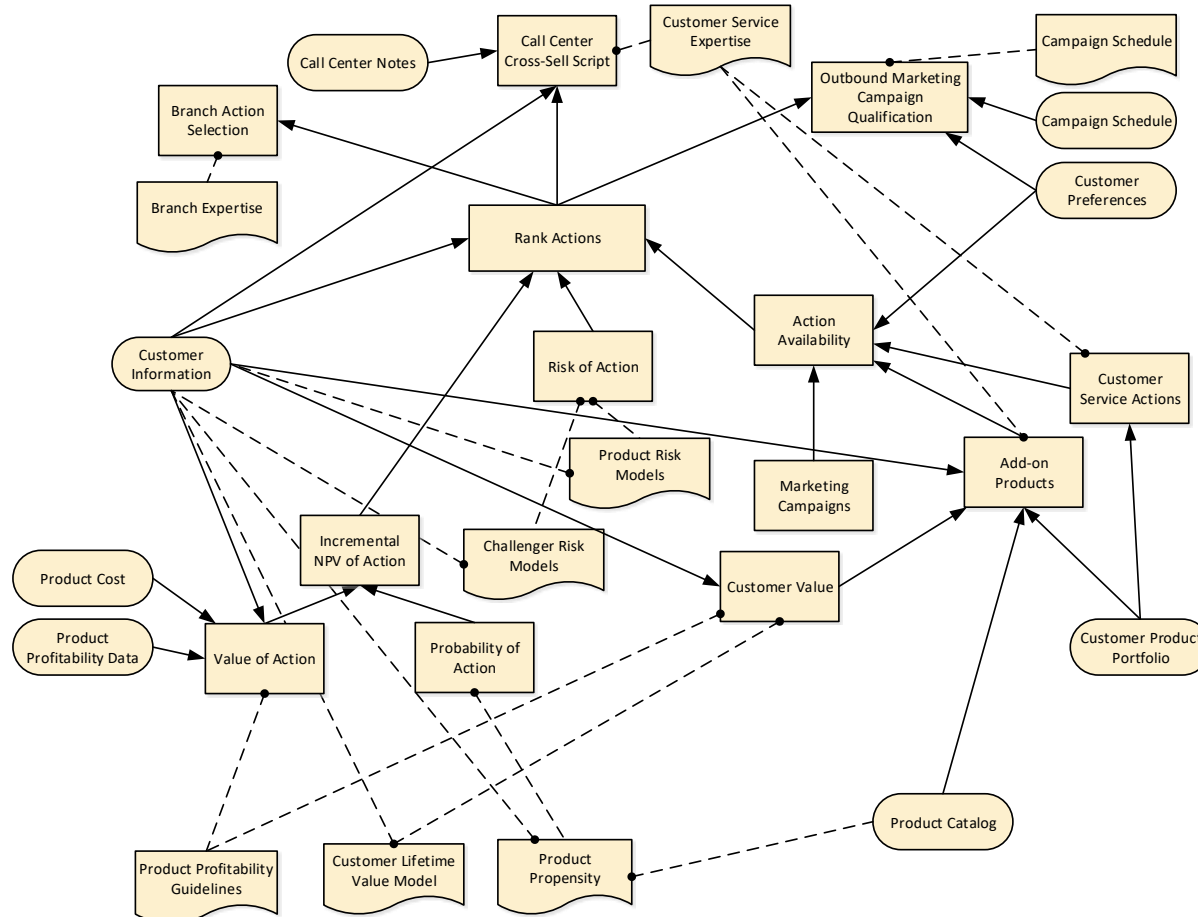
- ▶ **Motivation**
 - ▶ Decision Modelling business case is compelling
 - ▶ DMN 1.1 has been very effective
 - ▶ Benefits from ‘in the field’ feedback and refinements
- ▶ **We Discuss ‘Gaps’ Revealed by Demanding Projects**
 - ▶ Large, volatile models or model complexes
 - ▶ Complex business logic requiring transparency
 - ▶ Representing varied interests of different stakeholders
 - ▶ Navigating complex, managed data

Our Approach

- ▶ **Transparency and Collaboration**
 - ▶ Business, Operations, Analytics and IT
- ▶ **To Each Stakeholder one or more Views**
 - ▶ Manage complexity with multiple views
- ▶ **Model Decision-Making not just Automation**
 - ▶ All decision-making can be modelled
 - ▶ Automation is not necessary for value
- ▶ **Decisions as First Class Objects**
 - ▶ Not just something to support a process

Multiple Views

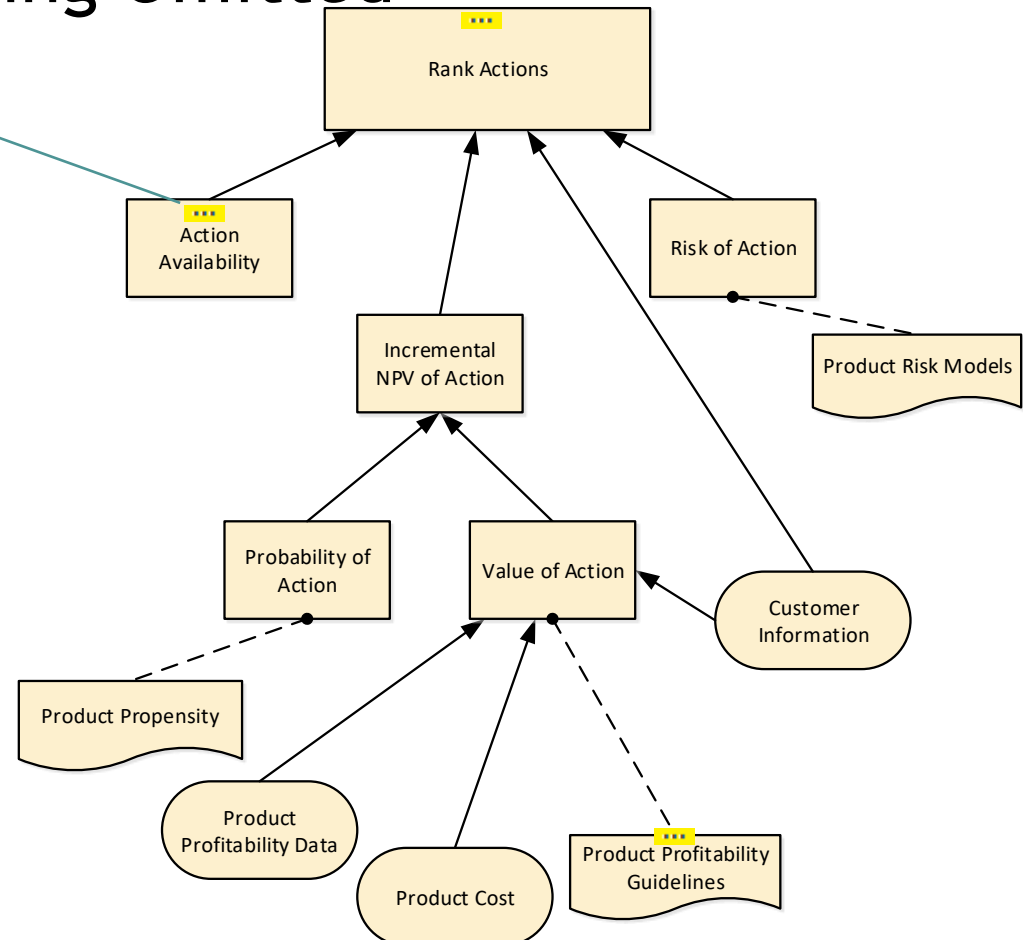
- ▶ Even Moderately Complex Real-World Models Create Messy Diagrams if a Single View is Used



Multiple Views What's Omitted?

- ▶ Multiple Views Help a Lot But it's not Always Clear That Information is Being Omitted

Show objects with requirements that are not displayed



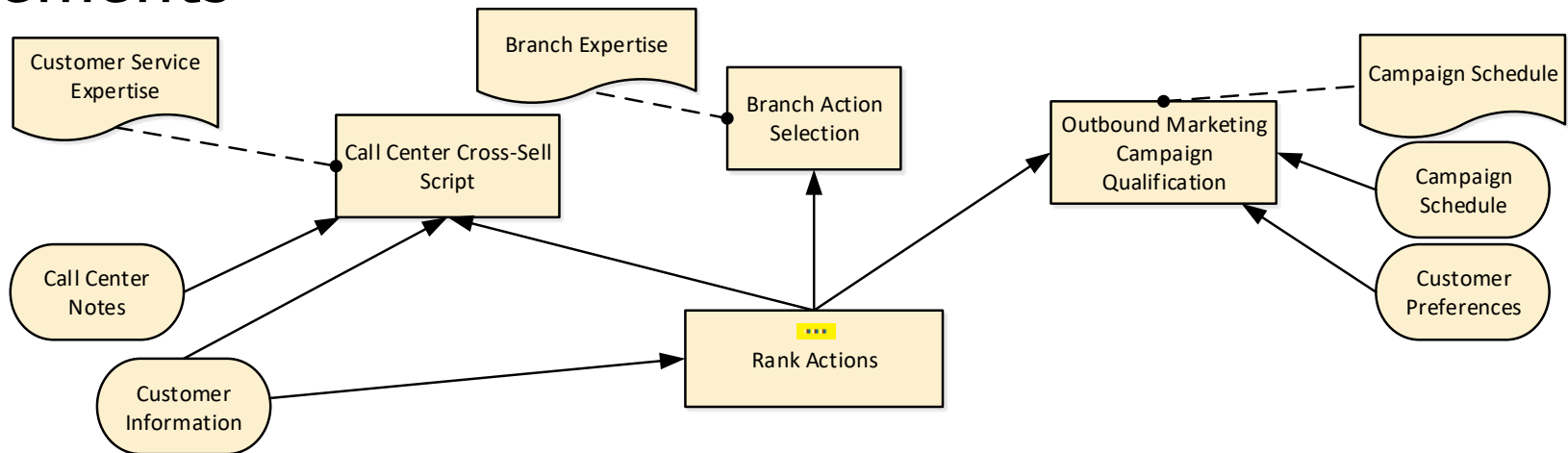
Questions:

- ▶ Treat all requirements equally or only show missing Information Requirements?
- ▶ Show missing “requires” differently from missing “required by”?
- ▶ ... or +?

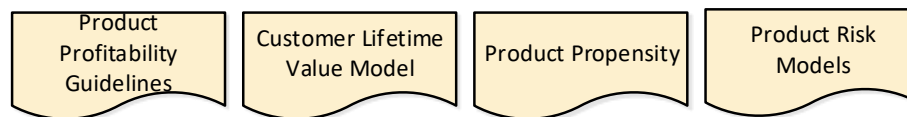
Multiple Views

Implicit Links Often Matter

- ▶ Sometimes Helpful to See Links Implied by Omitted Elements



It might be really important to show the SME that the Rank Actions decision is impacted by these analytic knowledge sources



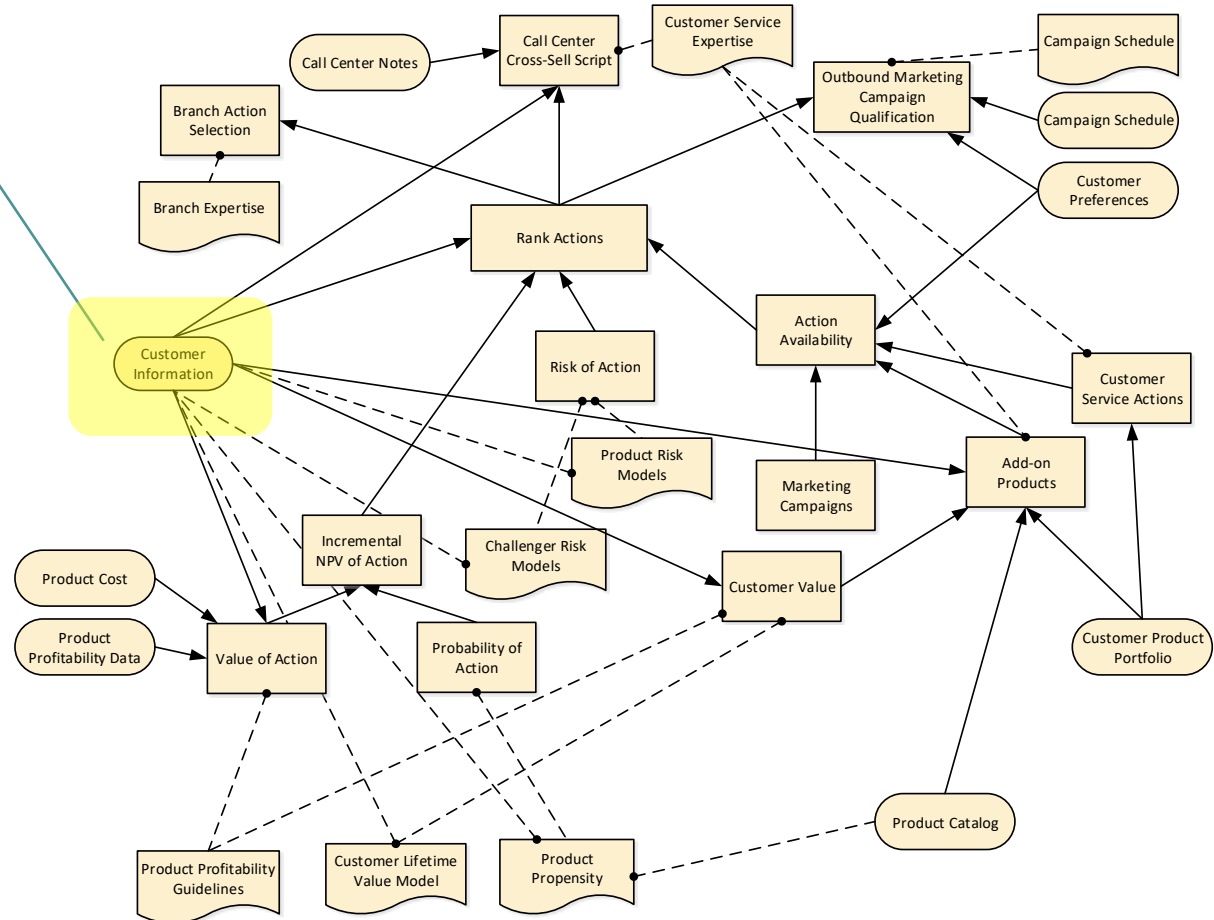
Questions:

- ▶ How to show an implicit link?
- ▶ How to interchange it?

Multiple Views Ubiquitous Inputs

► Some Input Data is Widely Used

Showing all the links to a single Input Data results in a cats-cradle

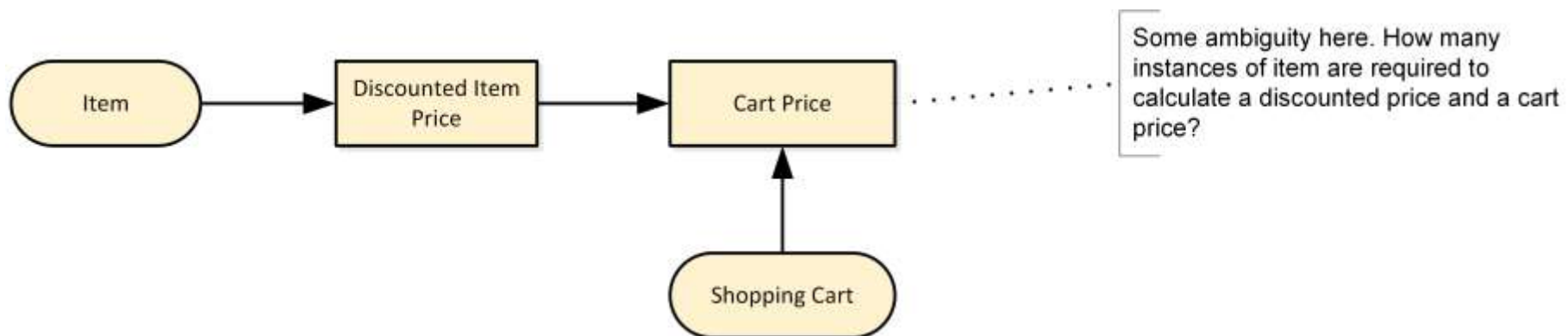


Questions:

- Allow multiple nodes representing the same object?
- How to display?
 - Faint colors?
 - Render on demand?

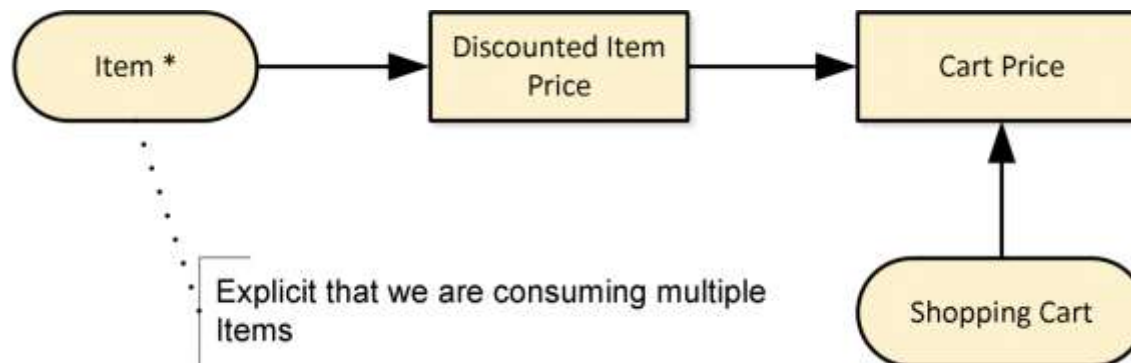
Cardinality and Multiplicity

- ▶ **Most Real-World Decision Models**
 - ▶ Require or generate collections: sequences, lists, sets
 - ▷ Iterate through collections applying the same logic to every item
 - ▷ Test the content of collections
 - ▷ Perform key based transformations: aggregation, sort, group, filter
- ▶ **But DRDs Don't Directly Support these Concepts**
- ▶ **This Leads to Confusion: 'Cardinality Blindness'**



Explicit Data Multiplicity

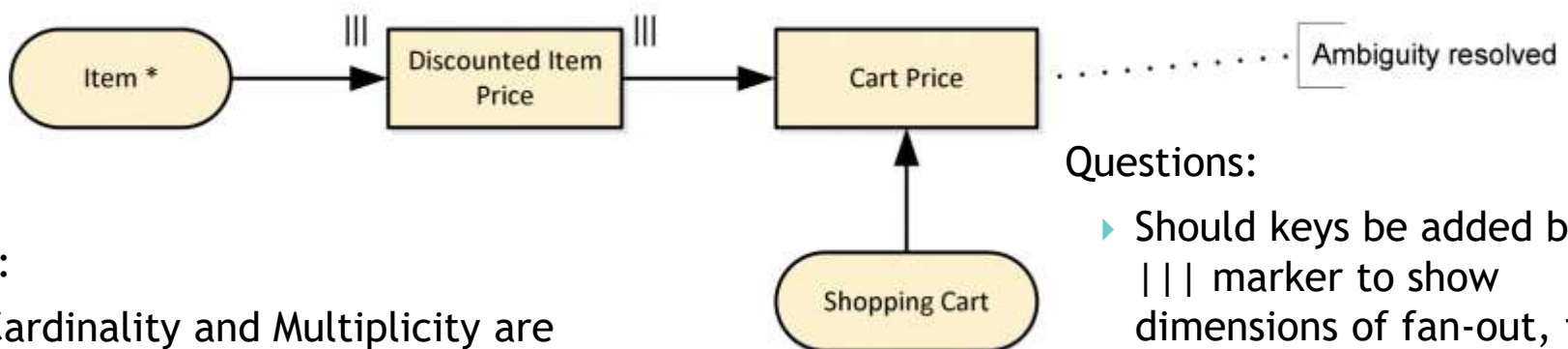
- ▶ Data Inputs, BKMs and Decisions in DRD
 - ▶ Distinguish single item vs collection output
- ▶ Representation Must
 - ▶ Require minimal change
 - ▶ Not rely exclusively on language specifics
- ▶ Suggestion: Use ‘*’ to Document a Collection
- ▶ Not New Information: It can be Derived from the DLD



Decision Cardinality

▶ Real-World Decision Models Need to Explain How Decisions Are Related - How Many Decision ‘Instances’ are Involved?

- ▶ Fan Neutral: one provider feeds one consumer
- ▶ Fan Out: single provider, multiple consumers (iteration)
- ▶ Fan In: multiple providers, single consumer (aggregation)
- ▶ Fan Complex: many-to-many relation (cross partition)



Note:

- ▶ Cardinality and Multiplicity are separate concepts
- ▶ Can be combined in several ways

Questions:

- ▶ Should keys be added by the ||| marker to show dimensions of fan-out, fan-in?
- ▶ Should boxes reinforce ‘zones of different cardinality’?

Expressive Decision Tables

- ▶ Most Real-World Decision Models Need to Test Condition Inputs
- ▶ Without Non-scalable Use of Context Entries

Determine Failsafe Rating						
	EMG Issue	list contains(Instrument Classes, <i>GOVT EMERGING</i>)				
	FE Issue	list contains(Instrument Classes, <i>FAR EAST AGENCY</i>)				
	AP Issue	list contains(Instrument Classes, <i>AP AGENCY</i>)				
	US Issue	list contains(Instrument Classes, <i>US AGENCY</i>) or list contains(Instrument Classes, <i>US TBILL</i>)				
P	Issuer Type	EMG Issue	FE Issue	AP Issue	US Issue	Failsafe Rating
	<Issuer Type>	true, false	true, false	true, false	true, false	AA-, A, AA, AAA, UNKNOWN
1	<i>US MORTGAGE SECURITIES</i>	-	-	-	-	AAA
2	not (<i>US MORTGAGE SECURITIES</i>)	true	-	-	-	AA-
3		false	true	-	-	A
4			false	true	-	AA
5			false	false	true	AAA
6			false	false	false	false

Expressive Decision Tables

- ▶ Most Real-World Decision Models require input entries more powerful than Unary Tests
 - ▶ Use of expressions '`>Start Date + Expiry Period`'
 - ▶ Use of functions '`>=max(Expiry Date, Month End)`'
 - ▶ Direct handling of collections '`list contains(GOLD, SILVER)`'
- ▶ Need 'lower ceremony' iteration, aggregation, filters
- ▶ Without these:
 - ▶ Decision tables become larger, less readable, less scalable
 - ▶ Forced to resort to boilerplate FEEL more often
- ▶ Does this lose the advantage of static analysis?

Expressive Decision Tables

Determine Failsafe Rating						
EMG Issue	list contains(Instrument Classes, GOVT EMERGING)					
FE Issue	list contains(Instrument Classes, FAR EAST AGENCY)					
AP Issue	list contains(Instrument Classes, AP AGENCY)					
US Issue	list contains(Instrument Classes, US AGENCY) or list contains(Instrument Classes, US TBILL)					
P	Issuer Type	EMG Issue	FE Issue	AP Issue	US Issue	Failsafe Rating
	<Issuer Type>	true, false	true, false	true, false	true, false	AA-, A, AA, AAA, UNKNOWN
1	US MORTGAGE SECURITIES	-	-	-	-	AAA
2	not (US MORTGAGE SECURITIES)	true	-	-	-	AA-
3		false	true	-	-	A
4			false	true	-	AA
5				false	true	AAA
6					false	UNKNOWN

Questions:

- ▶ What best practices are needed to stop decision tables becoming too opaque as a result of this additional expressive power?

Determine Failsafe Rating		
P	Issuer Type	Failsafe Rating
	<Issuer Type>	AA-, A, AA, AAA, UNKNOWN
1	US MORTGAGE SECURITIES	AAA
2	not(US MORTGAGE SECURITIES)	list contains(US AGENCY)
3		list contains(US TBILL)
4		list contains(AP AGENCY)
5		list contains(FAR EAST AGENCY)
6		list contains(GOVT EMERGING)

Expressive Decision Tables

- ▶ Most Real-World Decision Models Benefit from Rule Level Annotations
 - ▶ With Knowledge Source traceability
 - ▶ Able to evaluate expressions like TDM ‘Messages’
 - ▶ Can be merged to depict shared purpose
- ▶ Need Explicit Default Consistent with Other Outputs

Asset Class					
U	Asset Category	Instrument is Convertible	Issuer Class	Asset Class	Annotation
1	<i>OTHER</i>	-	-	<i>OTHER</i>	"IAS 3.3.1 misc; undeterminable"
2	<i>INDEX</i>	-	-	<i>INDEX</i>	"IAS 5.10.4 and 5.10.6; index derivatives (" + Instrument.Index+)"
3	<i>EQUITY</i>	-	-	<i>EQUITY</i>	"IAS 5.10.4; equity derivatives"
4	<i>PREFERRED</i>	true	-	<i>CVTPFD</i>	"IAS 3.3.1, 3.5.5 preferred vs non-convertible preferreds"
5		false	-	<i>OTHER</i>	
6	<i>DEBT</i>	false	<i>SUPRA</i>	<i>SUPRA</i>	"IAS 3.2.1 supernational debt"
7			not(<i>SUPRA</i>)	<i>OTHER</i>	"IAS 3.3.6 misc; non-convertible debt"
8		true	-	<i>CONVERTIBLE</i>	"IAS 3.1.10 convertible stock"
DEFAULT				<i>EXCEPTIONAL</i>	"IAS 7.1 exceptional circumstances"

Glossary, Data Management

- ▶ Real-World Decision Models Need Glossaries
- ▶ DMN keeps its Glossary Approach Open
- ▶ But We Need:
 - ▶ Multiple references to value lists across models
 - ▶ Enumerations to be symbolic constants, not strings
 - ▶ Enumerations to have sort orders
 - ▶ Ways to manage enumerations - functions to:
 - ▷ Return a list of allowed values
 - ▷ Check if a value is an allowed value
 - ▷ Compare values in the context of the list

‘And Another Thing...’

- ▶ Real-World Experience Suggests a Need for
 - ▶ Better integration with analytics, optimization, cognitive
 - ▶ Decision tree notation
 - ▶ ‘-’ conclusion
 - ▶ Additional FEEL functions
 - ▶ Need the ability to aggregate with any function
- ▶ Some Features Cause Trouble in the Real World
 - ▶ Null handling
 - ▶ Use of italics, bold, underline for ‘special meanings’
 - ▶ Hit Policies output order, rule order
 - ▶ Ranges using ‘(‘, ‘)’

Next Steps / Q&A

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▶ More Information

- ▷ www.decisionmanagementsolutions.com
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▶ Book

- ▶ Free chapter: <http://bit.ly/RWDMFree>
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▶ Any Questions?

