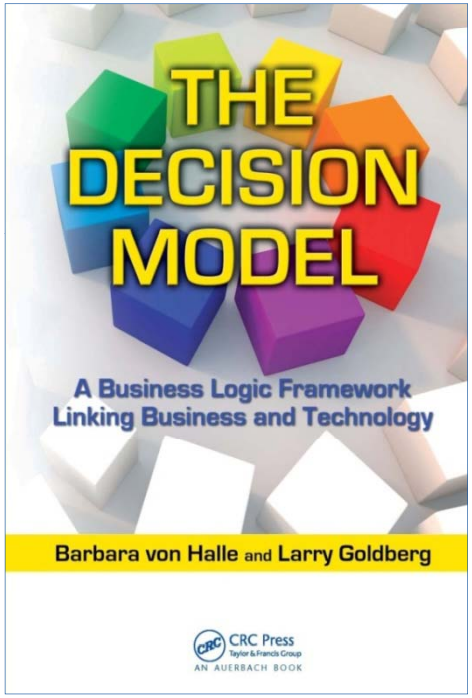
Linking Business and Technology (MIT Information Quality Industry Symposium)

Larry Goldberg & Barbara von Halle

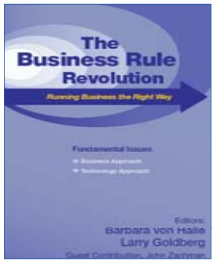
Managing Partners, Knowledge Partners International, LLC

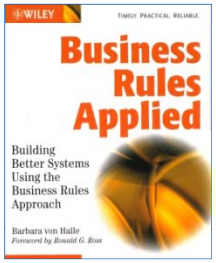
lgoldberg@kpiusa.com BvonHalle@kpiusa.com

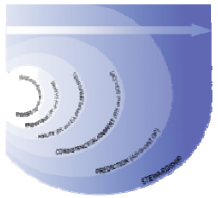
About KPI: Thought Leader



"..one of the classic books of a new era in computing that will have much traction in the next few years" Dr. Opher Etzion, Master Inventor, IBM





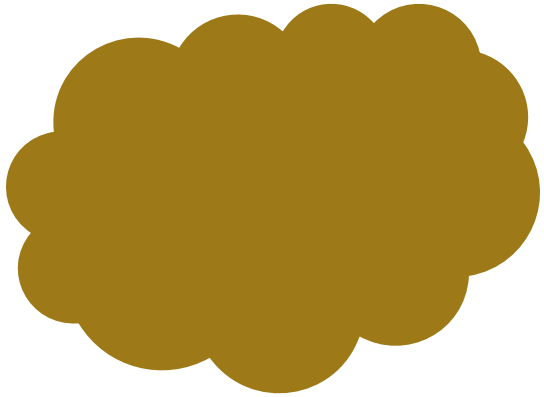


- The Decision Model
- STEP Methodology and Training for
  - Business Decision Management
  - Business Process Management
  - Business Requirements
  - Business Logic Testing
- Leading provider of methodology and consulting to Global 1000 companies since 1997

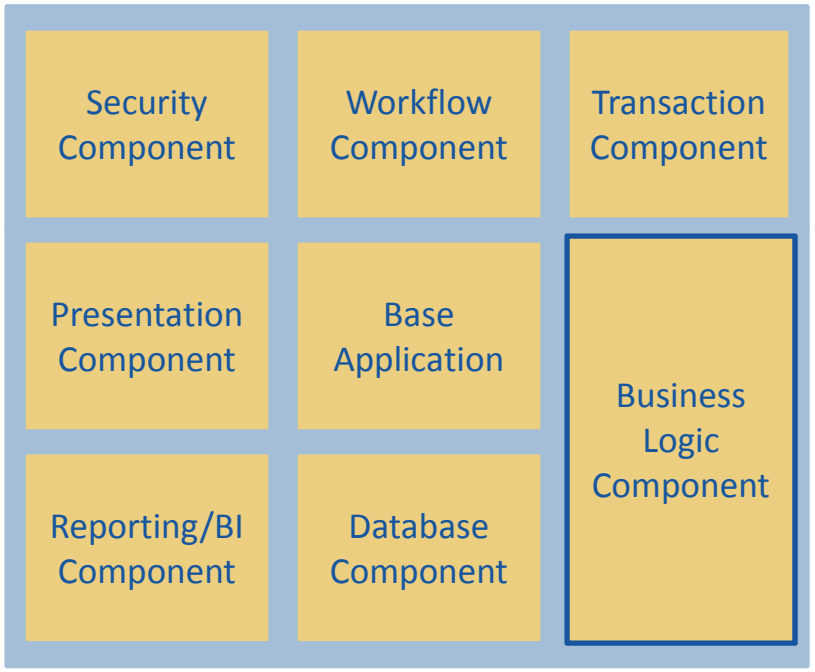
Agenda

- **The Problem of Logic in our Business Systems**
- Introduction To The Decision Model
- The Profound Impact on Business
- The Decision Model and Information Quality
- Summary

Separation of Concerns: The One Dimension Left Behind



Traditional Application Architecture – A "Big Ball of Mud" (Foote & Yoder)



Component Based Application Architecture

Source: Ken Orr

The Impediment

- Business Problem:
  - No standard way to *organize* business rules/business logic into a technology-independent, universal model
  - High value but low management visibility
- Technology Problem:
  - No standard way to translate business rules/business logic into code
- Best Practice Today:
  - Express business logic as business rules, separate from process flow or as part of requirements. Organize business rules into (arbitrary) sets.
- Better Solution:
  - A universal model for business rules/business logic (like the relational model was for data)

Why This Workshop Is Important

The Relational Model

- Changes the way we manage, leverage, store data
- Recognizes that data has its own existence
- Elevates data as an organizational asset
- Introduces rigor through normalization principles
- Impacts the direction of technology, methodology, and best practices

The Decision Model

- Changes the way we manage, leverage, store business logic
- Recognizes that business logic has its own existence
- Elevates business logic as an organizational asset
- Introduces rigor through normalization principles
- Impacts technology, methodology, and best practices

Agenda

- The Problem of Logic in our Business Systems
- **Introduction To The Decision Model**
- The Profound Impact on Business
- The Decision Model and Information Quality
- Summary

A Simple Statement of Business Logic

The simplest case is the evaluation of single fact, leading to a conclusion about one new fact:

When | The Fact in this Condition is True | Then | The Fact in this Conclusion is True

Which can also be represented as follows:

Condition Assertion → Conclusion Assertion

Or simply, a basic assertion:

Condition → Conclusion

One example of such an assertion:

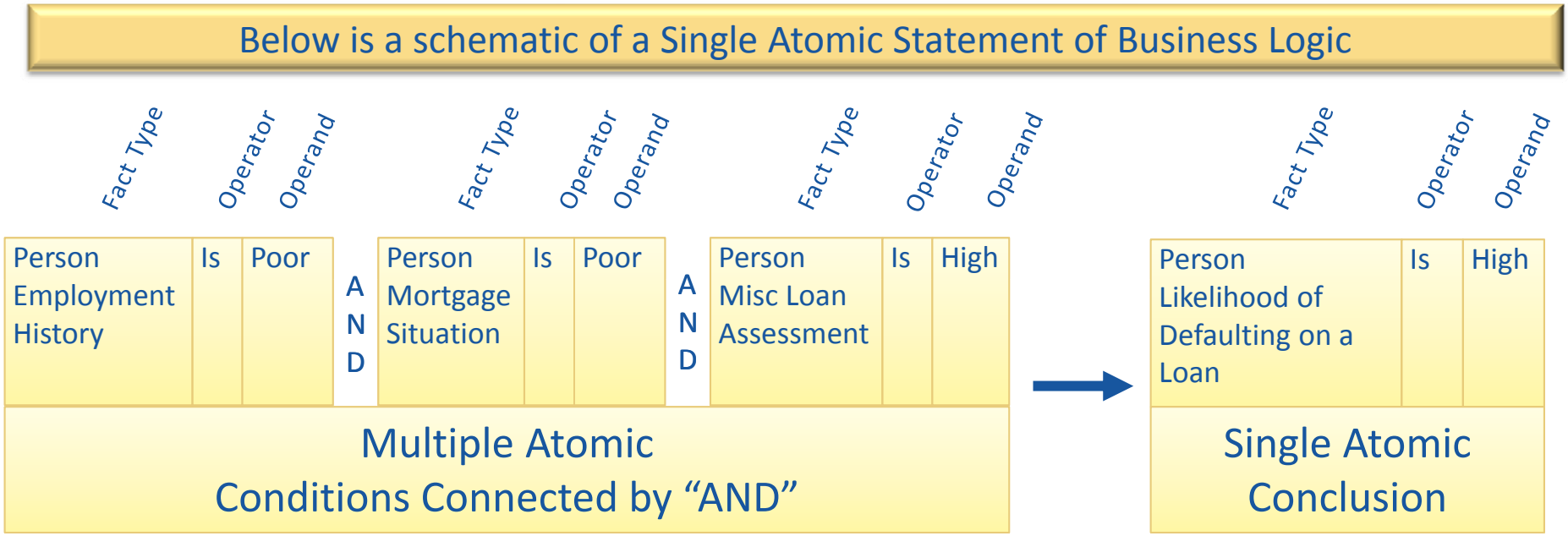
A person has a poor employment history → A person is highly likely to default on a loan

What is an Atomic Piece of Business Logic?

- The concept of “atomic”
  - cannot be decomposed into smaller elements of that object without losing its meaning
- Atomic Business Logic Statement
  - A business logic statement that cannot be decomposed (into smaller business logic statements) without loss of meaning
- An atomic statement of business logic consists of zero to many conditions leading to a conclusion about a single fact type
  - Each condition is an atomic logical expression about an atomic fact type
  - Conditions are ANDed together, never ORed

What Does Atomic Mean?

- Atomic Statement of Business Logic: One conclusion, conditions connected by AND
- Atomic Fact Type: un-divisible



Grouping Multiple Statements

Multiple Atomic Logic Statements may be made about a Single Conclusion Fact Type

Person Employment History	Is	Poor	AND	Person Mortgage Situation	Is	Poor	AND	Person Misc Loan Assessment	Is	High	→	Person Likelihood of Defaulting on a Loan	Is	High
								Person Employment History	Is	Good	→	Person Likelihood of Defaulting on a Loan	Is	Low
Person Employment History	Is	Poor	AND	Person Mortgage Situation	Is	Good	AND	Person Misc Loan Assessment	Is	Low	→	Person Likelihood of Defaulting on a Loan	Is	Medium

Here are Three Examples of all the Possible Logic Statements that have a Conclusion about the Fact Type "Person Likelihood of Defaulting on a Loan". Can you suggest a few more? Could the first statement be broken into smaller statements without losing meaning?

The Rule Family – A Way to Represent Multiple Logic Statements

Instead of Multiple Logic Statements that Look Like This:

Person Employment History	Is	Poor	AND	Person Mortgage Situation	Is	Poor	AND	Person Misc Loan Assessment	Is	High	→	Person Likelihood of Defaulting on a Loan	Is	High

They May be Represented in Two Dimensional Tables:

Conditions						Conclusion	
Person Employment History		Person Mortgage Situation		Person Miscellaneous Loans Assessment		Person Likelihood of Defaulting on a Loan	
Is	Poor	Is	Poor	Is	High	Is	High
Is	Good					Is	Low
Is	Poor	Is	Poor	Is	Low	Is	Medium

Rule Families are Tables that Conform to Rigorous Principles

What is the organizing principal behind the Rule Family?

Building Further: Where Do We Get Our Input?

	Conditions								Conclusion	
Rule Pattern	Person Employment History		Person Mortgage Situation		Person Miscellaneous Loans Assessment		Person Outside Credit Score		Person Likelihood of Defaulting on a Loan	
1	is	Poor	Is	Poor	Is	High	<	650	is	High

- Starting with the first condition, we ask where this fact value comes from. Input from a web page or a file? Is it persistent data? Is it the result of execution logic?
- In this case we discover that it comes from executing logic that evaluates other business criteria: the business experts want to judge a Person's Employment History based on criteria such as Person's Years at Current Employer and Person's Number of Jobs in the Past Five Years.
- We have to build an additional Rule Family where the conclusion will be "Person Employment History", a different conclusion to that of our current Rule Family (Rule Family: Business logic grouped by Conclusion Fact Type.)

Building Up to Two Rule Families

- Note the Interim Conclusion "Person Employment History"
- We discover the need for yet another Rule Family. This one comes to a conclusion about a Person's Employment History which is based on two conditions: Person Years at Current Employer and Person Number of Jobs in Past Five Years.

	Conditions		Conclusion
Rule Pattern	Person Years at Current Employer	Person Number of Jobs in Past Five Years	**Person Employment History**

	Conditions								Conclusion	
Rule Pattern	**Person Employment History**		Person Mortgage Situation		Person Miscellaneous Loans Assessment		Person Outside Credit Score		Person Likelihood of Defaulting on a Loan	
1	is	Poor	Is	Poor	is	High	<	650	is	High

Three Rule Families (How do we connect them?)

	Conditions		Conclusion
Rule Pattern	Person Student Loans	Person Business Loans	**Person Miscellaneous Loans Assessment**

	Conditions		Conclusion
Rule Pattern	Person Years at Current Employer	Person Number of Jobs in Past Five Years	**Person Employment History**

	Conditions								Conclusion	
Rule Pattern	**Person Employment History**		Person Mortgage Situation		**Person Miscellaneous Loans Assessment**		Person Outside Credit Score		Person Likelihood of Defaulting on a Loan	
1	is	Poor	Is	Poor	is	High	<	650	is	High

We can see how they can be connected, but a large set of dependencies would soon become unwieldy

Organizing Logic

- Logic statements group and relate themselves naturally:
  - By their Conclusion Fact Types into Rule Families
  - Rule Families relate themselves naturally by their dependencies (Supporting Rule Families for Condition Fact Types)
  - We determine scope by the group of Rule Families that relate themselves to a natural business anchor point, the ***Business Decision***
- The Decision Model begins with the Business Decision and ends naturally when there are no further dependent Rule Families

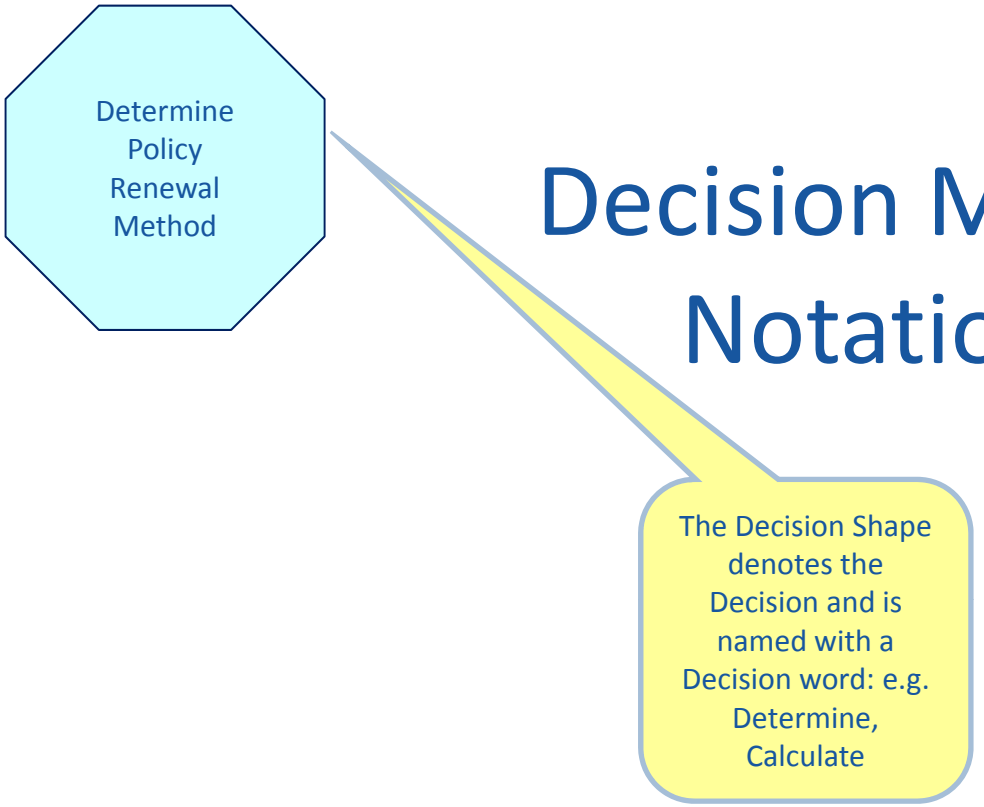
Defining a Business Decision

"**Business decision**: a conclusion that a business arrives at through **business logic** and which the business is interested in **managing**."

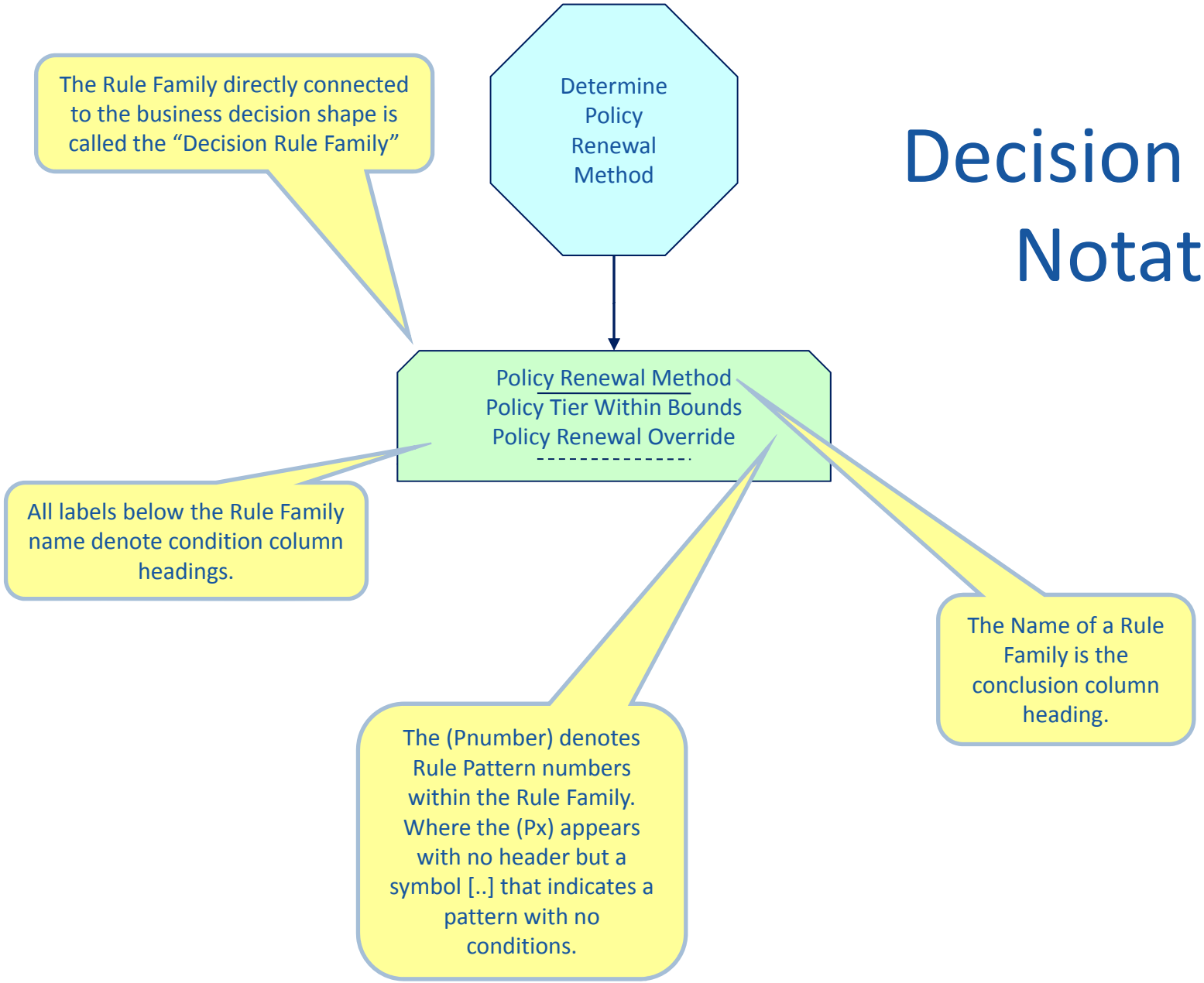
Fact Type	Business Decision
Claim Payment Amount	Estimate the claim payment amount
Claim Payment Eligibility	Determine Claim Payment Eligibility
Customer Likelihood of Loan Default	Determine Customer Likelihood of Loan Default
Insurance Policy Renewal Method	Determine insurance policy renewal method
Inventory Item Minimum Stock Level	Assess the Inventory Item minimum stock level
Loan Prequalification Requirements	Determine loan prequalification requirements for a customer
Person BMI (Body Mass Index)	Calculate Person BMI
Vendor Performance Index	Calculate the Vendor Performance Index

The underlined words (Calculate, Estimate, Determine, Assess, Validate) are "Decision Words"
A Business Decision is built from Fact Types (Terms)

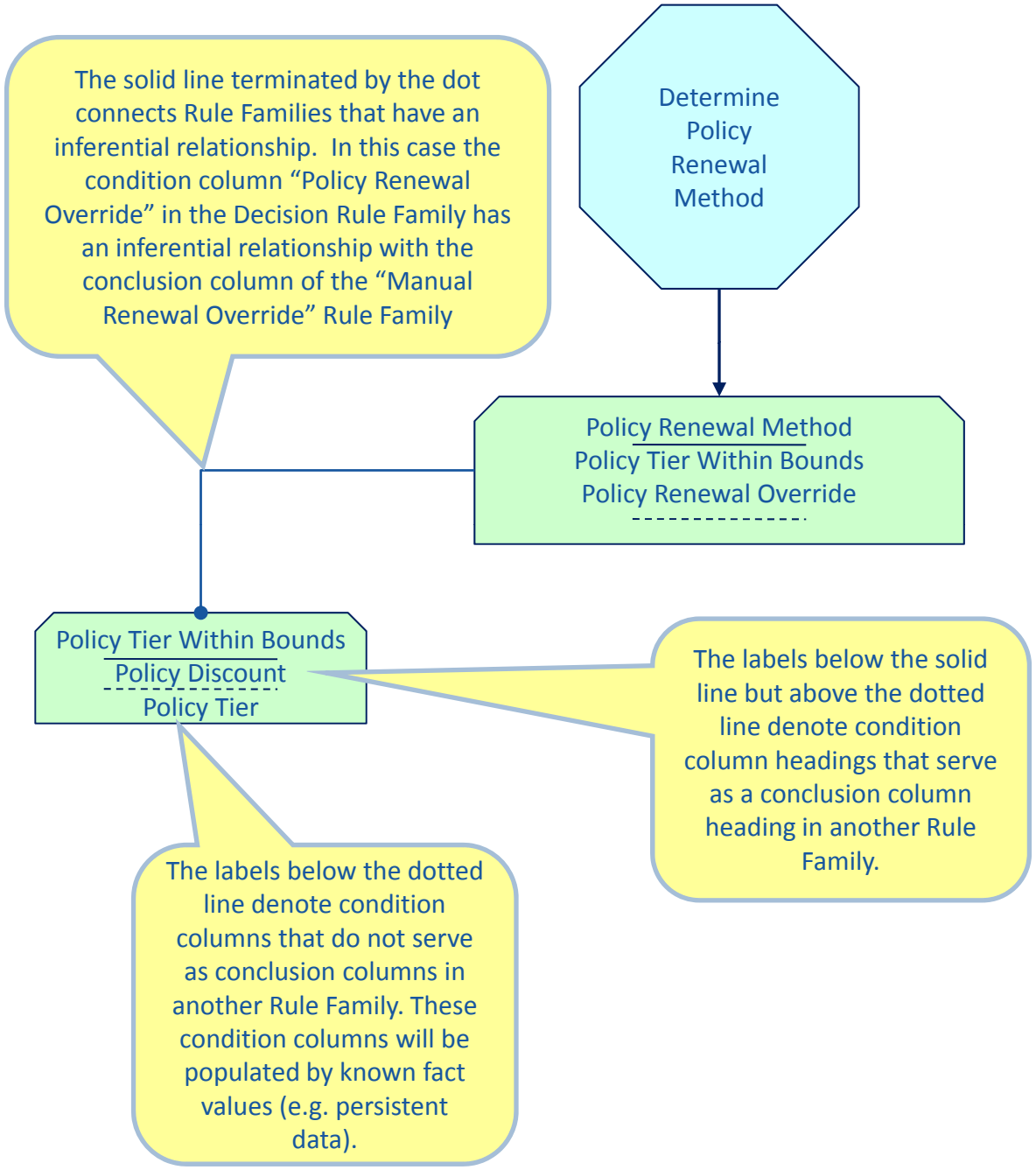
Decision Model Notation



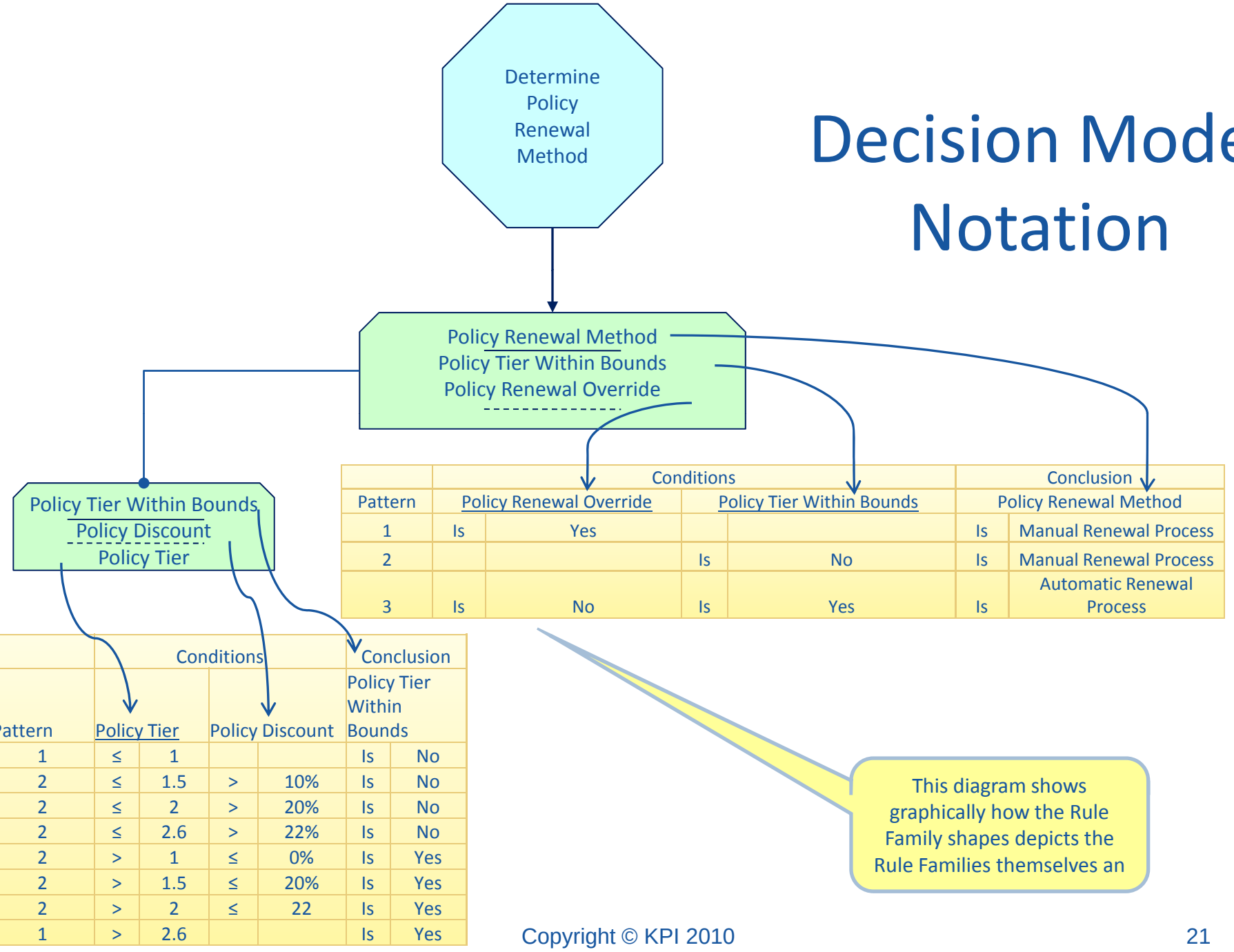
Decision Model Notation



Decision Model Notation



Decision Model Notation

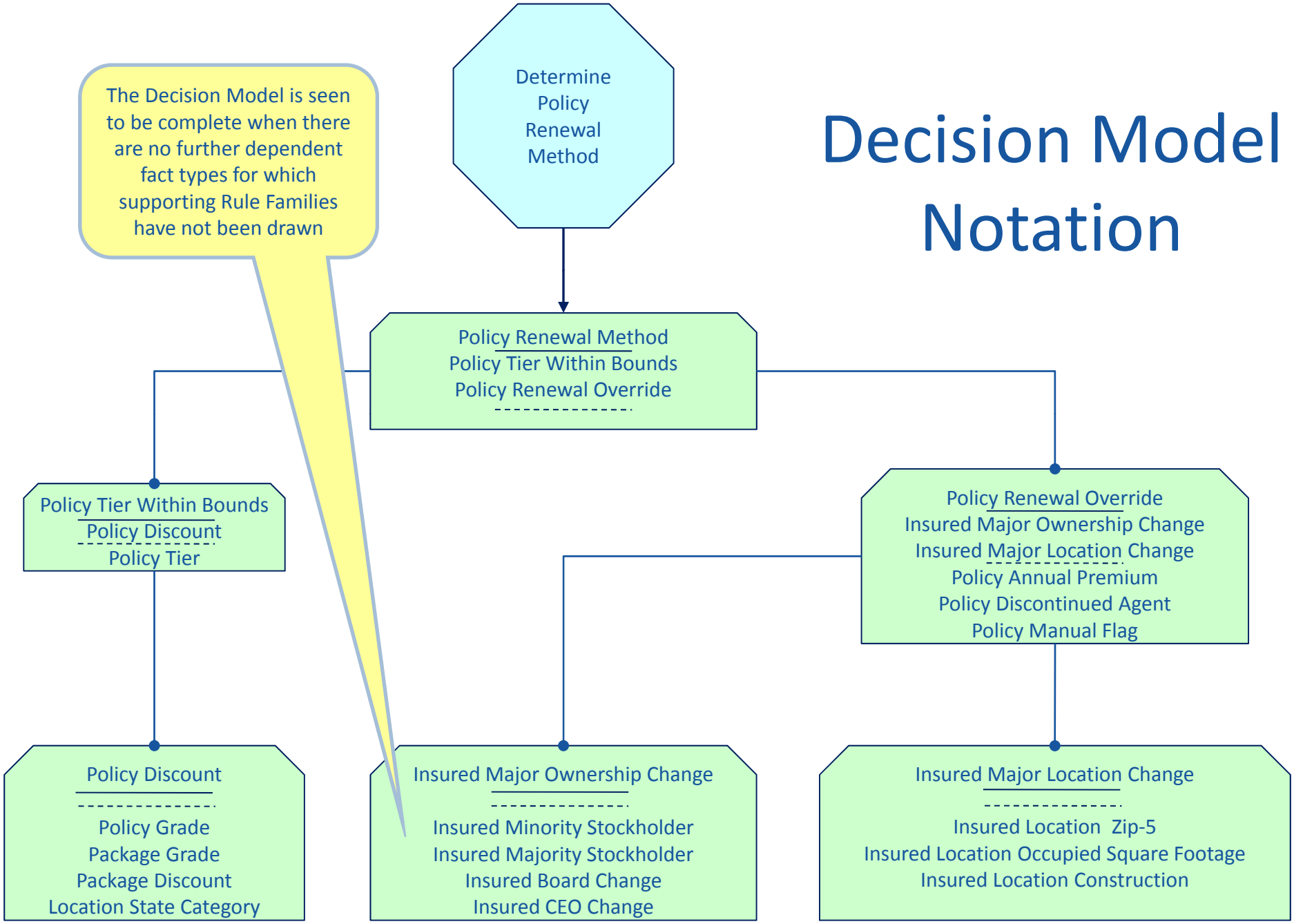


	Conditions				Conclusion	
Pattern	Policy Renewal Override		Policy Tier Within Bounds		Policy Renewal Method	
1	Is	Yes			Is	Manual Renewal Process
2			Is	No	Is	Manual Renewal Process
3	Is	No	Is	Yes	Is	Automatic Renewal Process

	Conditions				Conclusion	
Pattern	Policy Tier		Policy Discount		Policy Tier Within Bounds	
1	≤	1			Is	No
2	≤	1.5	>	10%	Is	No
2	≤	2	>	20%	Is	No
2	≤	2.6	>	22%	Is	No
2	>	1	≤	0%	Is	Yes
2	>	1.5	≤	20%	Is	Yes
2	>	2	≤	22	Is	Yes
1	>	2.6			Is	Yes

This diagram shows graphically how the Rule Family shapes depicts the Rule Families themselves an

Decision Model Notation



Agenda

- The Problem of Logic in our Business Systems
- Introduction To The Decision Model
- **The Profound Impact on Business**
- The Decision Model and Information Quality
- Summary

The Common State of Decisions*

- In recent years decision makers in both the public and private sectors have made an astounding number of poor calls
  - Teneco
  - General Motors
  - Time Warner
  - Yahoo…
- Decisions have been viewed as the prerogative of … senior executives.
- The decision process, information, and logic are like a black box

* based on Thomas Davenport, HBR, Nov 2009

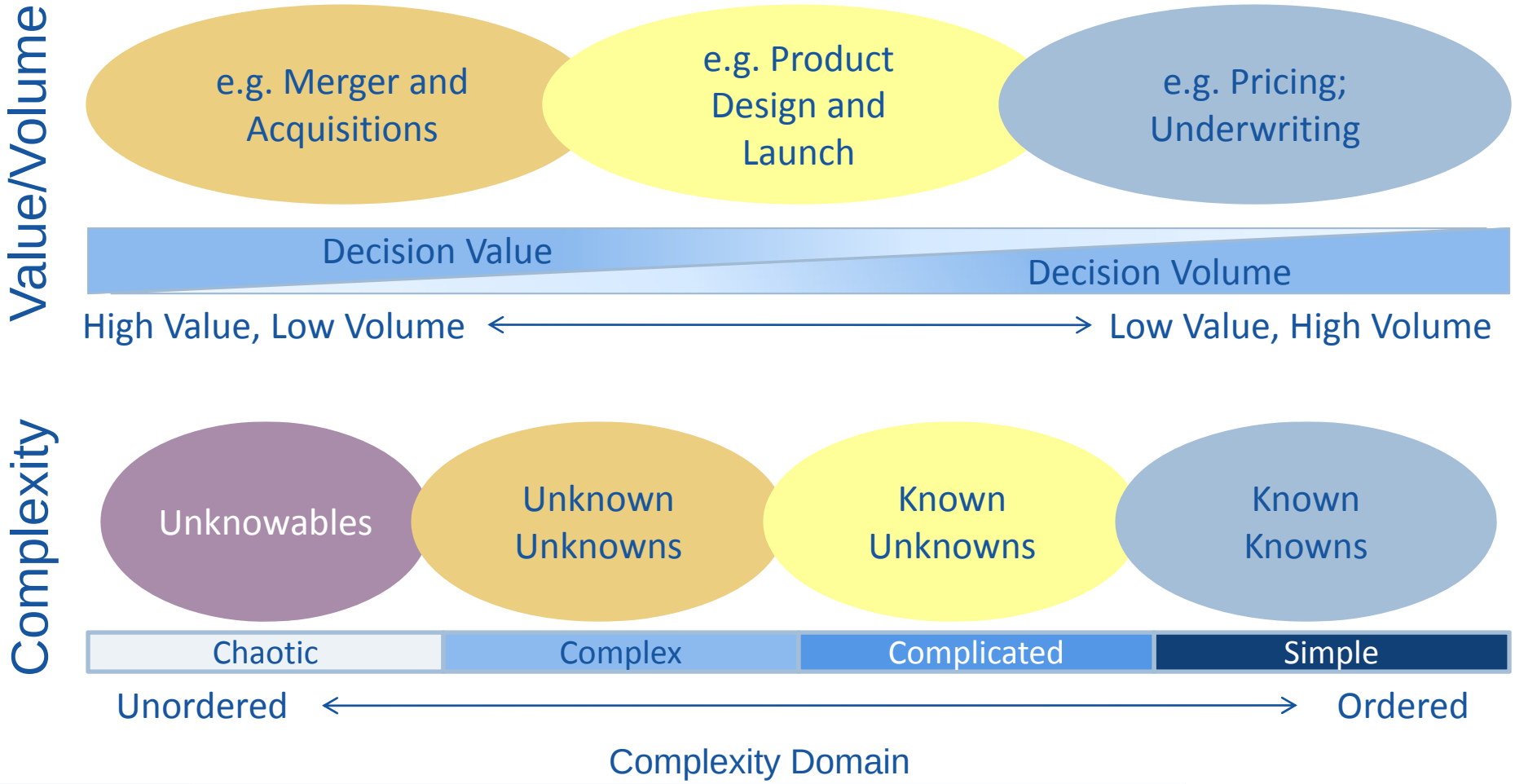
The Evolving State of Decisions

- Decision-making is becoming the focus of systematic analysis
- Sample Successes
  - Chevron*
  - Educational Testing Service*
  - The Stanley Works*
  - Healthcare Insurance companies **
  - Personal Lines Insurance Companies **
  - Mortgage Companies **

* Thomas Davenport, HBR, Nov 200

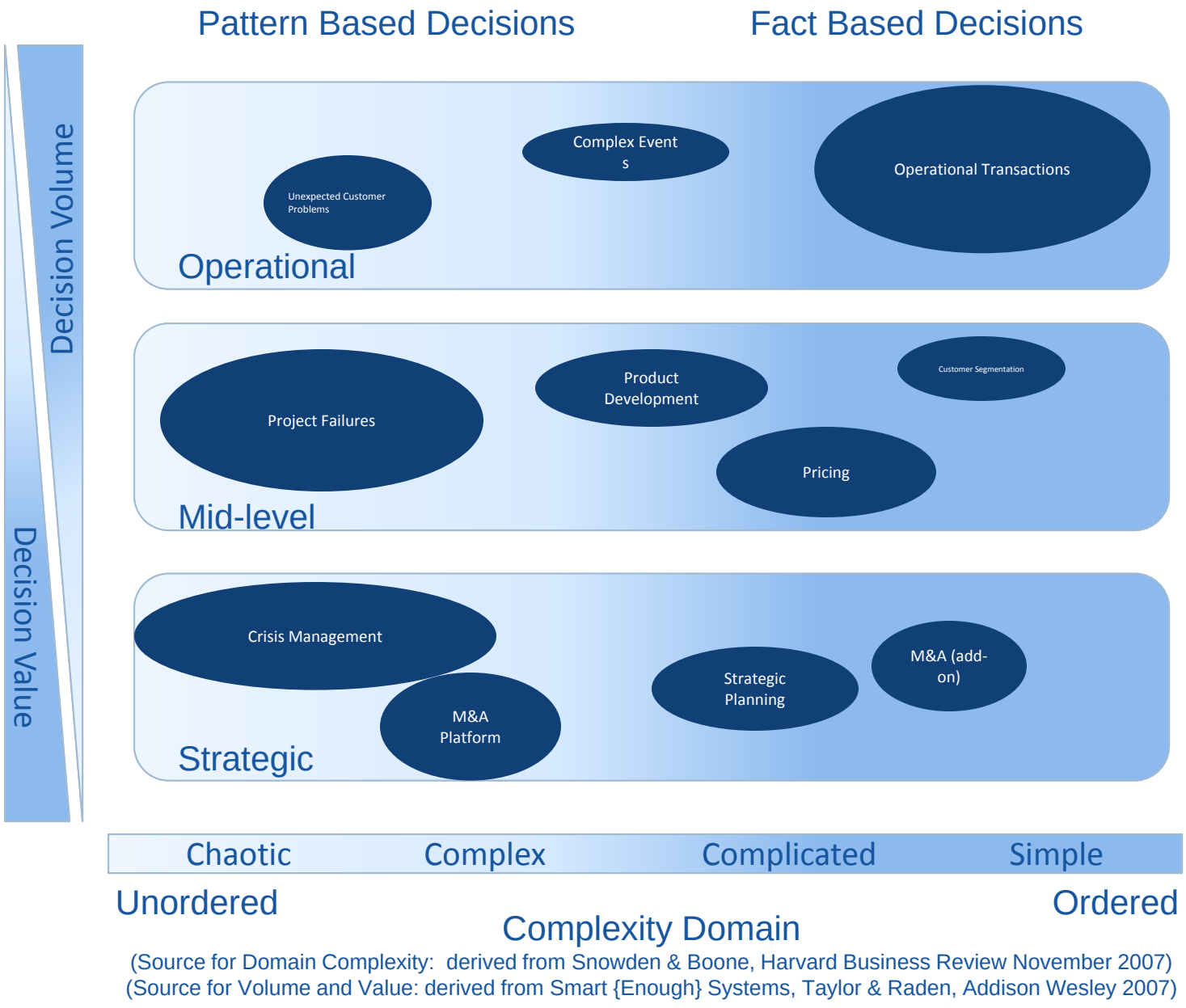
** KPI clients

Two Ways of Assessing Decisions



(Source for Domain Complexity: derived from Snowden & Boone, Harvard Business Review November 2007)
(Source for Volume and Value: derived from Smart {Enough} Systems, Taylor & Raden, Addison Wesley 2007)

Putting it Together



(Source for Domain Complexity: derived from Snowden & Boone, Harvard Business Review November 2007)
(Source for Volume and Value: derived from Smart {Enough} Systems, Taylor & Raden, Addison Wesley 2007)

The Business Decision Maturity Model (BDMM)

Knowledge Partners International

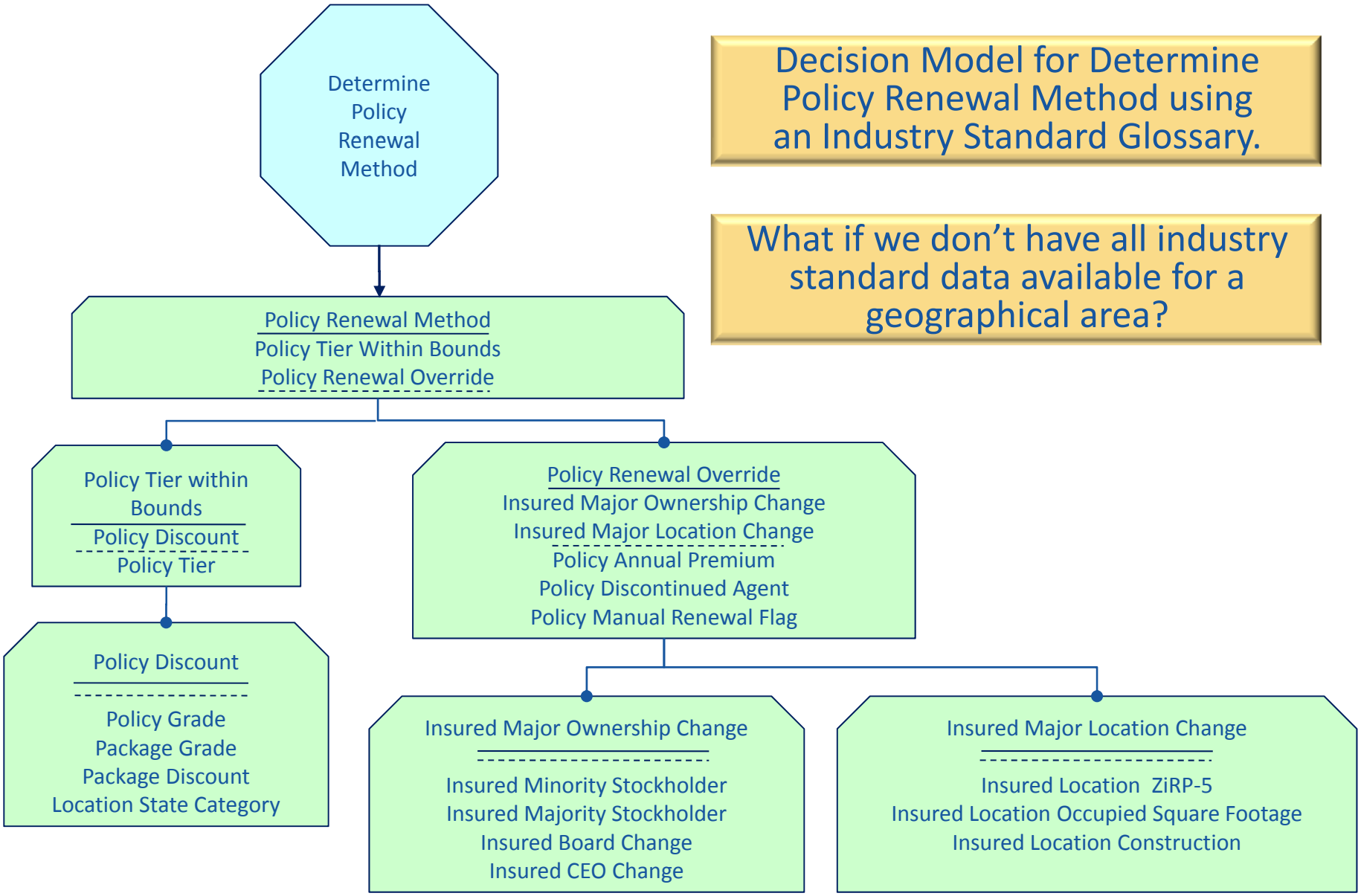
Level 0 Unmanaged	Level 1 Visible	Level 2 Agile	Level 3 Aligned	Level 4 Predictive	Level 5 Autonomic
MINIMUM	**BUSINESS VALUE**				**MAXIMUM**
Risk of loss of business control is high. Risk of business change is high. Ability to predict business impact of change is low. Cost of change is high.	Risk of loss of business control and business change is lower. Cost of change is lowered. Ability to predict business impact of change is still low. Analysis of business decisions is possible, but is manual.	Risk of loss of business control greatly reduced at the project level; business change becomes possible through automated analysis. Ability to predict business impact of change is still low.	Risk of loss of business control greatly reduced across projects. Ability to predict business impact of change is improved. Consistency between business units improved. Cost of change and testing reduced further.	Firm control of business policy established. Ability to predict short-term futures, ability to assess the impact of change on the future is possible.	Optimize business policy to changing conditions in real time and against predicted changes in business models and metrics Management focus on evolving business ojectives and policy with a firm business control; birth of the Agile Enterprise.
IMMATURE	**BUSINESS ARCHITECTURE**				**MATURE**
No business architecture; no business architecture to speak of.	Informal Business Decision Management architecture.	Project level process and business decision standards established within broarder architectural standards.	Cross project level process and business decision standards defined with broarder architechtural standards.	Detailed standards for process and Business Decision Architecture established and managed.	Continuous improvement of process and Business Decision architecture with the broarder architectural process.
NOT PRESENT	**BUSINESS STEWARDSHIP**				**ENTERPRISE**
No stewardship.	Business Analysts lead business decision discovery for local locigal development.	Inegration of Business Decisions with use cases and process flows with business metrics.	Stewardship of business process and Business Decisions across project boundaries.	Stewardship of business process and Business Decisions at enterprise levels.	Full integration of process and Business Decision Management into business planning.
DECISIONS SHARED ACROSS: <-- PROJECT LEVEL ONLY --> <---- PROJECTS ----> <---------- ENTERPRISE ---------->					

Agenda

- The Problem of Logic in our Business Systems
- Introduction To The Decision Model
- The Profound Impact on Business
- **The Decision Model and Information Quality**
- Summary

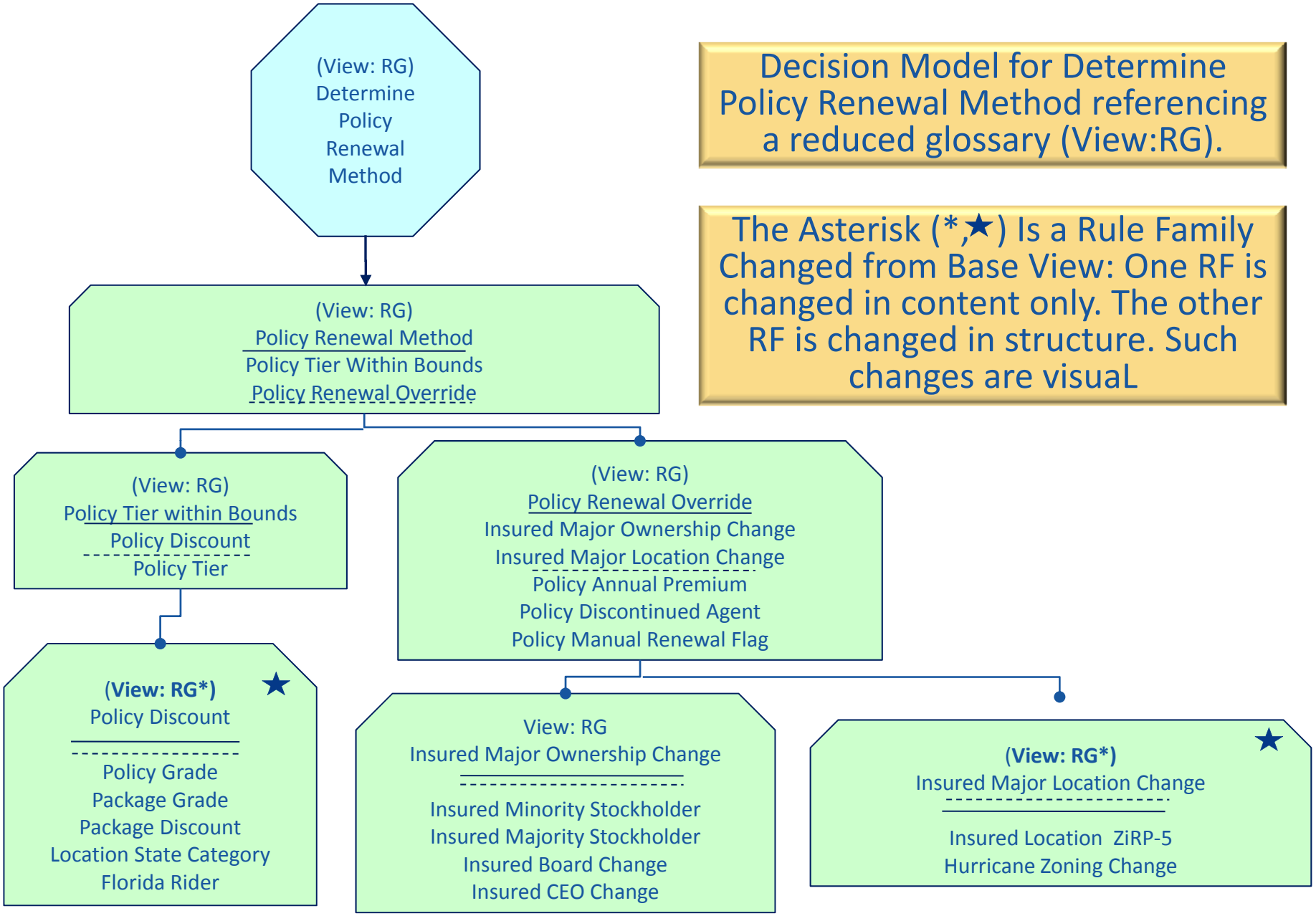
Decision Model Information Quality Framework

Information Quality Dimension	Definition	Repository of Information Quality
Completeness	All required fact types are provided	The Glossary indicates whether a fact type is always required for the general context of a business process Decision Model Views indicate the logic by which a fact type is sometimes required or irrelevant for specific context of a business process
Data Type and Domain Values	A fact value conforms to the predefined data type and within valid range of values for its fact type.	The Glossary indicates data type, valid values Decision Model Views indicate the logic by which a fact type domain is further restricted for a specific context of a business process
Consistency and Reasonableness	A fact value makes business sense in the context of related fact type/s fact values and/or conform/s to predefined reasonability limits.	Decision Model Views provide the logic to determine consistency of values for related fact types, or to determine whether a fact value is within sensible limits fact type.



Decision Model for Determine Policy Renewal Method using an Industry Standard Glossary.

What if we don't have all industry standard data available for a geographical area?

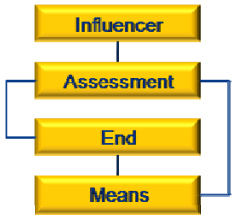


Agenda

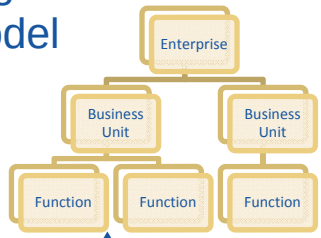
- The Problem of Logic in our Business Systems
- Introduction To The Decision Model
- The Profound Impact on Business
- The Decision Model and Information Quality
- **Summary**

The Decision Model has produced requirements faster, incrementally, and with unprecedented agility

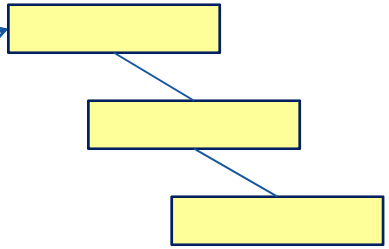
Business Motivation Model



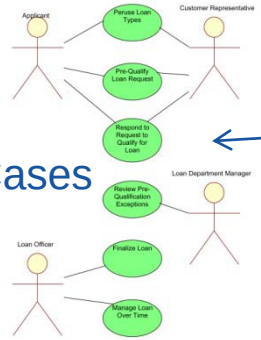
Organization Model



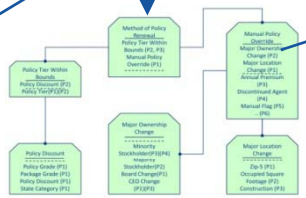
Vocabulary Models:
Glossary/Semantic Model
Logical Data Model
Object Model



Use Cases

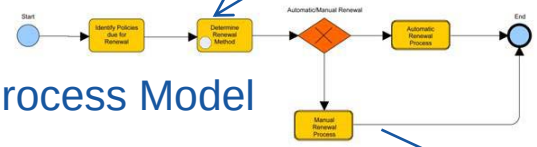


Decision

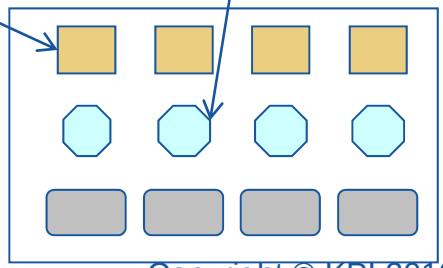


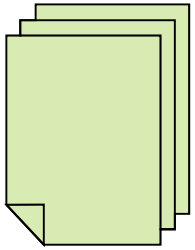
Decision Model:
business rules and
business logic

Process Model



SOA Components





Business Requirements & Test Cases

Conclusion

- The Decision Model takes the mystery (and risk) out of the decision-making black box described by Davenport in Harvard Business Review Nov 2009.
- Based on our experience with the Decision Model, we predict that it will have the same (or greater impact) on business and technology as the Relational Model did.

How to Learn More

- Log in to the KPI Website to:
  - Review The Decision Model Primer, a free download on the web site
  - Buy the book
  - Find other Decision Model information as it becomes available
  - Conduct a 2-3 week pilot (KPISTEP)

www.TheDecisionModel.com