SIMposium 2010

The Charm of IT:
Bringing People, Process & Technology Together

October 3-5, 2010 | The Omni Hotel at CNN Center | Atlanta, GA

"USING ENTERPRISE ARCHITECTURE TO DELIVER STRATEGIC INNOVATION AND PRESERVE KNOWLEDGE"

- *Leon A. Kappelman, Professor of IS, College of Business, University of North Texas*

- *Rolando Hernandez, Knowledge Engineer & Business Rules Architect, BizRules.com*

- *John A. Zachman, Author, thought leader, and originator of the "Zachman Framework for Enterprise Architecture"*

SIM
Delivering Business Value Through IT Leadership

SIM
Atlanta

PEM
Premier Event Management

You live in a knowledge-based world.

Knowledge capital is your most valuable asset

You are facing a knowledge deficit

Like it or not,
You are in the
Knowledge Wars™.
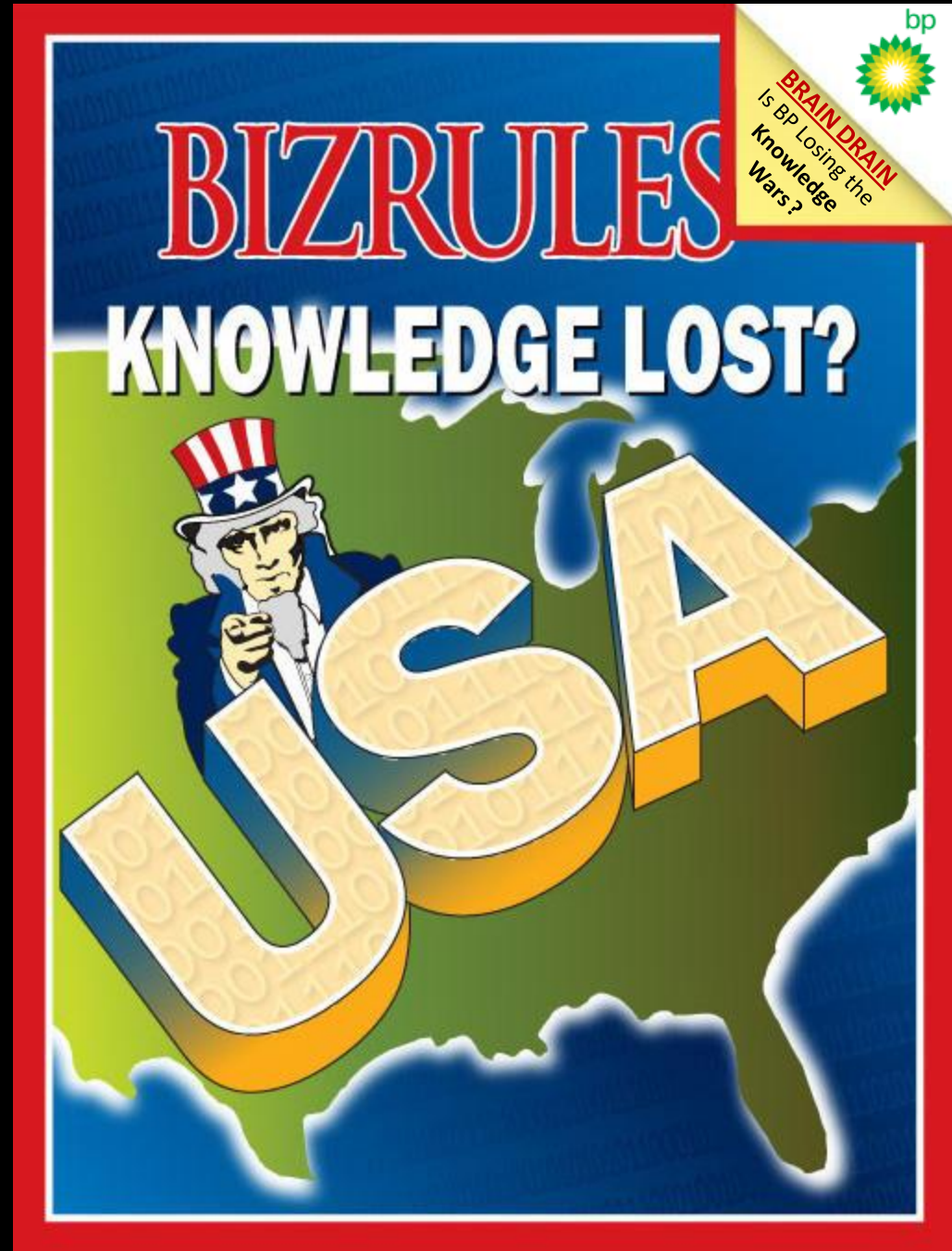
Do you believe that knowledge is as important as data?

You spend billions protecting data.

How much do you spend protecting knowledge?

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What's Your Knowledge Deficit?

Nuclear Regulatory Commission losing 3,900 years of experience every year.

"By Mother's Day, we forgot all our lessons learned from Valentine's Day."

CIO, One of the world's largest flower producers and marketers

Is it your Duty, Obligation, or Policy to know

Your knowledge deficit rate (KDR)?

Your knowledge preservation plan (KPP)?

Who your key experts (SMEs) are?

When are they expected to retire?

Your Key Suppliers' KDR, KPP, SMEs, etc.?

What is your plan to

Identify Knowledge Sources of Record

Identify key experts?

Prioritize what knowledge to retain?

Elicit and preserve their knowledge?

Automate knowledge?

Are you ready to preserve knowledge?

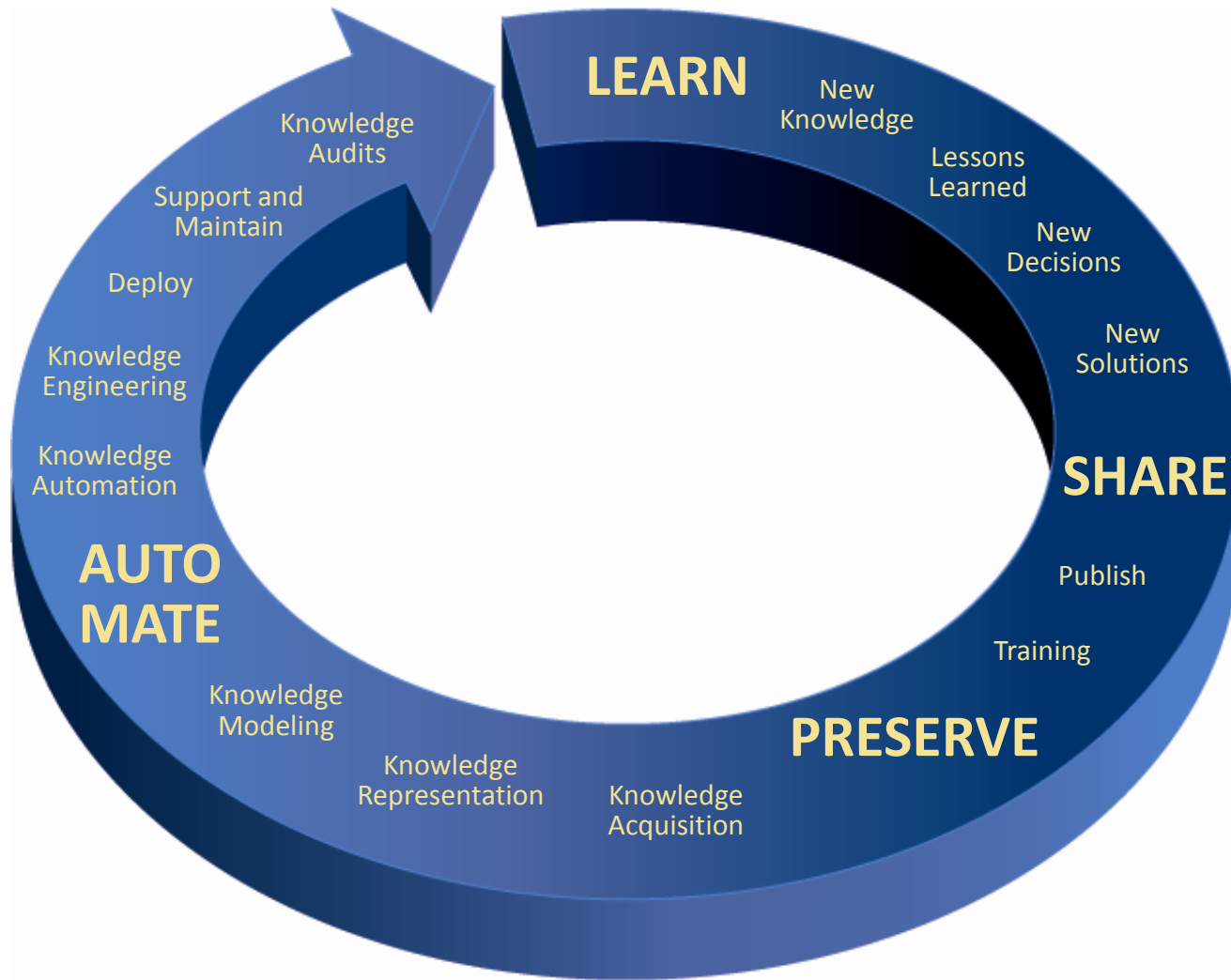## You need a knowledge supply chain.

What knowledge must be **shared**?

What knowledge must be **preserved**?

What knowledge to **automate**?

How do you elicit, model, and automate knowledge?

You need a Knowledge Supply Chain

LEARN
- New Knowledge
- Lessons Learned
- New Decisions
- New Solutions

SHARE
- Publish
- Training

PRESERVE
- Knowledge Acquisition
- Knowledge Representation
- Knowledge Modeling

AUTO MATE
- Knowledge Automation
- Knowledge Engineering
- Deploy
- Support and Maintain
- Knowledge Audits

October 2010 Rev 1
BIZRULES® Knowledge Supply Chain™

Do you need to automate knowledge?

Knowledge-based workers need knowledge-based systems

Decision-makers need rule-based systems

9

What's your plan for going as fast as you can, without crossing the line & going over the edge?

Hope & pray your People <u>follow</u> the rules?

Rule-based systems to <u>automate</u> the rules?

Knowledge-based systems to <u>enforce</u> the rules?

If you don't do this

One day the SEC, IRS, FBI may come knocking

- *Who knew?*
- *What did they know?*
- *When did they know it?*
- *Who did they tell?*
- *What are the laws and regulations?*
- *What are your policies and procedures?*

- *What are the rules?*
- *Where's the rulebook?*
- *When was it last updated?*
- *Why did you decide that?*
- *Who really knows how it all works?*
- *Who do you call when this happens?*
- *Who's the expert?*

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Preserve knowledge… or allow brain drain?

BP corrosion expert leaves… corrosion leads to oil spill

BP's senior corrosion engineer for Alaska operations left in 2005

15 months later, in March 2006, the position was still vacant when the BP-owned Prudhoe Bay pipeline ruptured due to internal corrosion

BP was fined $20 million.

Use models & rules to make key decisions... or guess?

Expert models recommended 21 centralizers... BP used 6

Halliburton technical advisor Jesse Gagliano told BP on April 15 that computer models predicted the well would have a "severe gas flow problem" unless BP used 21 centralizers.

BP decided to use just six centralizers

Centralizers hold steel pipe in the middle of the hole to ensure a good quality cementing job.

Cement is meant to block gas and oil from flowing into a well, the first step toward a blowout.

Cement failure is a possible cause of the April 20 disaster, which killed 11 people and set off the worst offshore oil spill in U.S. history.

Update your Models *before* you make changes... or hope and pray?

Transocean drawings did not reflect BOP modifications.

The control panel switch that would have activated a bore ram to close and seal the pipe for good had been connected to a test ram instead.

The blueprints were not updated.

So when BP tried to activate the bore ram, they failed. They activated the useless test ram instead.

Building Mobil's Knowledge Base and Knowledge Supply Chain to Preserve, Share, and Automate Knowledge

Mobil Oil Corporation 1988

- In 1988, Mobil is a $40 billion/year business
  - Exploration Division – Finds oil
  - Marketing & Refining Division – Sells Lubes & Fuels
    - US Marketing
    - Int'l Marketing

- US Marketing begins AI/Expert Systems R&D
  - Starts building small proof-of-concept applications
  - Then builds suite of global expert advisors

Mobil Oil Corporation LKB Strategy

- **Strategy**
    - Preserve and automate knowledge of top experts in the Mobil system
    - Build a Knowledge Supply Chain
- **Process**
- **Roadmap**
- **Methodology**
    - For Knowledge Acquisition (KA), Representation (KR), Modeling (KM), Automation (KA)
    - Central team building shared rules and common code
- **Suite of Expert Systems**

Mobil's Lube Knowledge Base Vision

Before

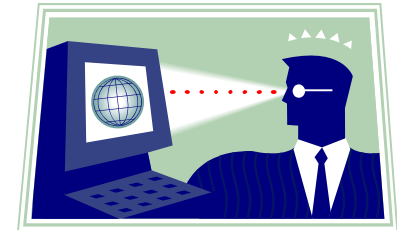## After

Product Recommendations

Expert Advice

Problem Diagnosis

The Lube Knowledge Base

Technical troubleshooting books

Product data sheets

Technical memos

Troubleshooting manuals

Lab test reports

Technical files

Customer service reports

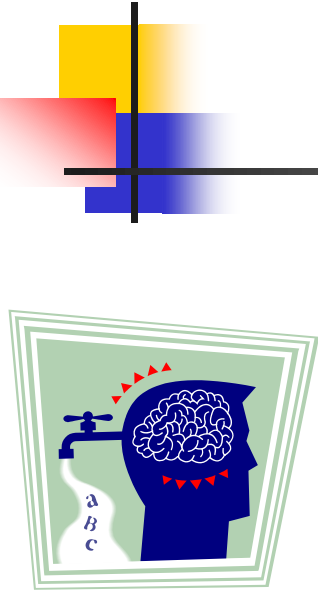Technical bulletins

Industry manuals

Product recommendation charts

Equipment builder books
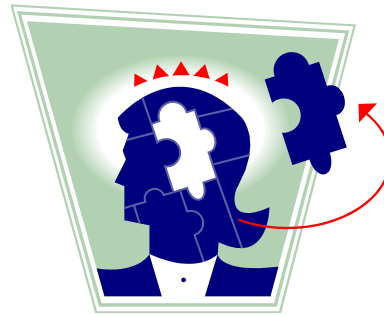
Mobil's Lube Knowledge Base

Rolling Oils Expert System
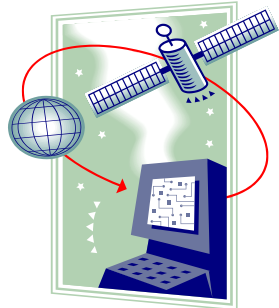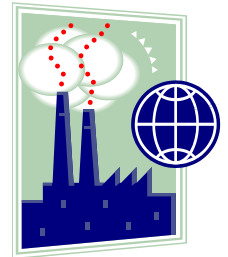
Compressor Expert System

Grease Expert System

Environmental Health & Safety Expert System

Hydraulics Expert System
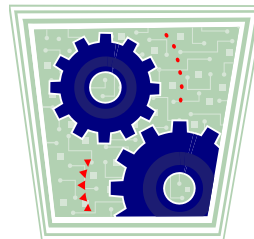
Diesel Engine Expert System

Cutting Oils Expert System

Worldwide Product Database

Shared Rules (Rules about Gears, Bearings, Cylinders, Pistons, Seals, etc.)

Equipment Builders Database

Security

Library & Reference Manuals

KAISER ALUMINUM
TRENTWOOD

HOT METAL

RE-CYCLED SCRAP

MELTING FURNACES

HOLDING FURNACES

INGOT POURING STATIONS

REMELT

SCALPING

PREHEATING

TO CUSTOMERS

SHEET & PLATE

ANNEALING FURNACES

80" CONTINUOUS HOT MILL

112" HOT MILL

132" HOT MILL

HOT LINE

SLITTERS

INSPECTION & PACKAGING

TO CUSTOMERS

COLD MILLS

PROCESSING LINES

FINISHING

KAISER ALUMINUM
TRENTWOOD

Coolant Spray Bars

Back-up Roll

Work Roll
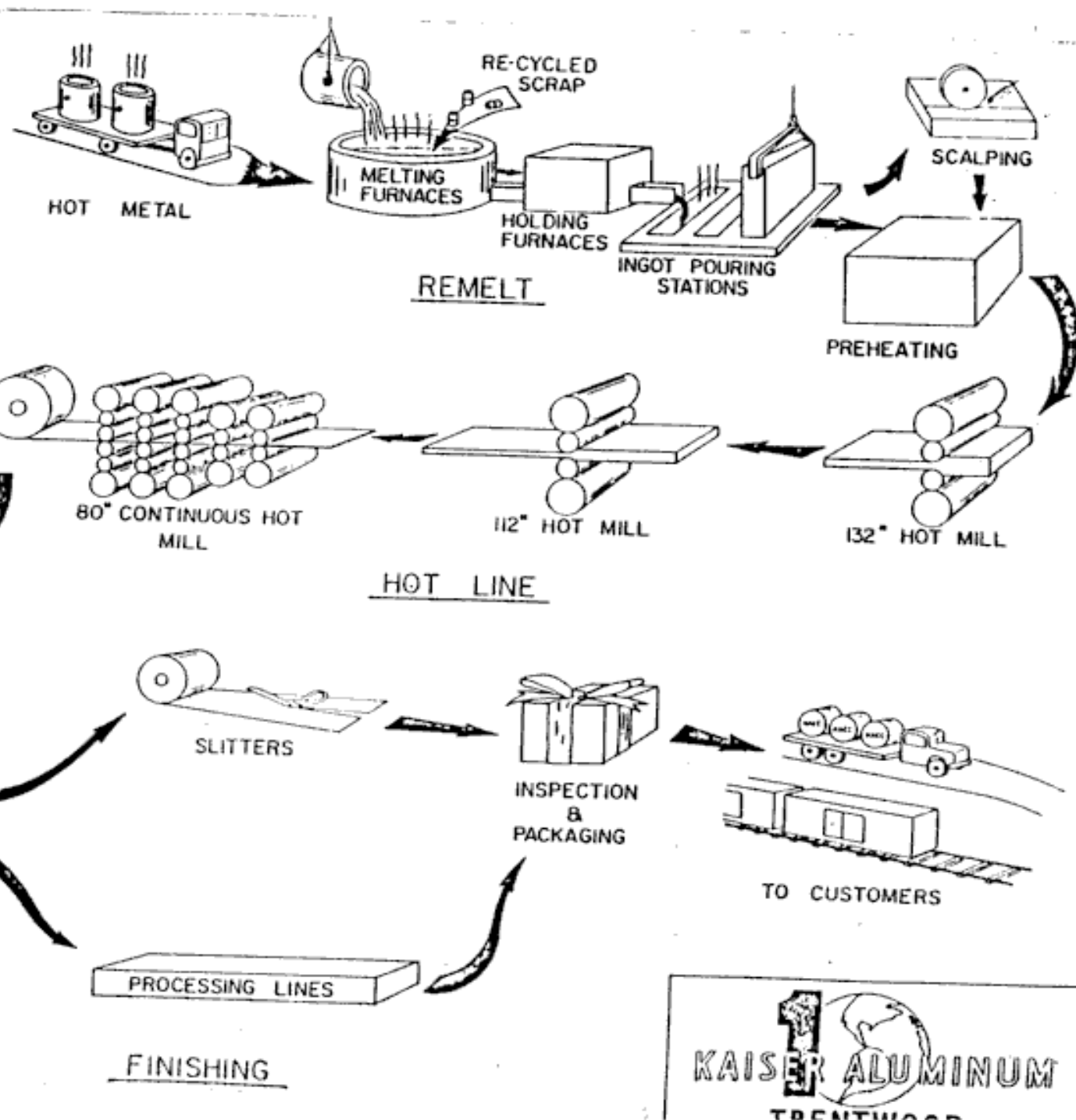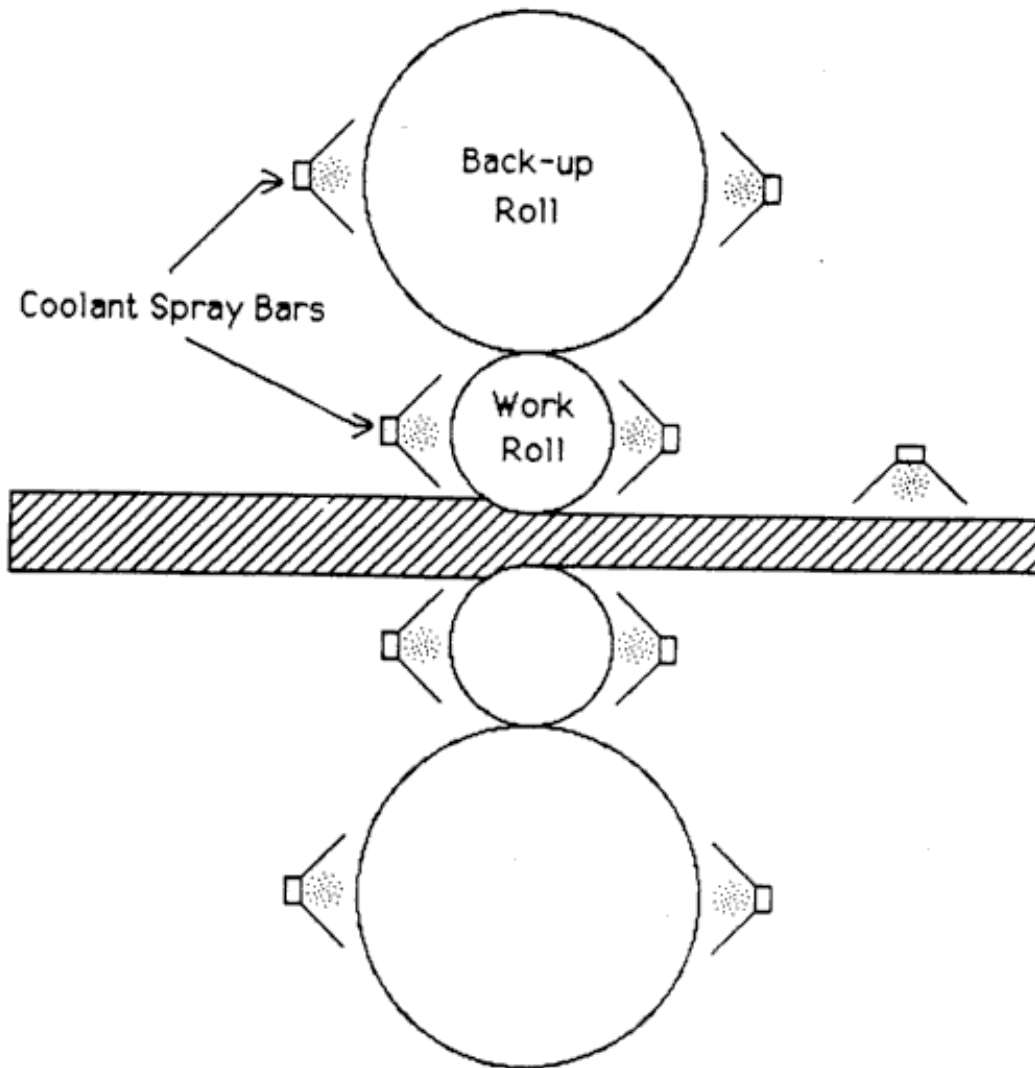
The Knowledge Wars™

Preserve Knowledge of the Company's Top Experts Worldwide

Automate and Share the Knowledge

1-800 CALL-SME

Follow the Rules

Bend the Rules

Break the Rules

Automate the Rules

Violate the Rules

Enforce the Rules

Greed

Serial Greed

BIZRULES®

OVER RIDE OFF

OVER RULE OFF

BYPASS OFF

CRUISE CONTROL ON

ON

OFF

Business Rules Engine

PROBLEM: Rules and knowledge in people's heads

KNOWLEDGE

- **EXPLICIT KNOWLEDGE i.e. INFORMATION**
  - Tangible
  - Visible knowledge
  - Public
  - Can be accessed by third persons
  - Once shared, it belongs to everybody
  - Can be seen "above the water"

- **TACIT KNOWLEDGE**
  - Intangible
  - Invisible knowledge
  - Private
  - Can be accessed on the first-person basis only
  - Hidden "underwater"

BizRules® com

SOLUTION: A process to transform knowledge and expert rules into models so you can retain, share, and automate it

Knowledge Acquisition

Knowledge Representation

Knowledge Modeling

Knowledge Automation

(K.A.R.M.A)

PROBLEM: Duplication & Redundancy of rules in code is a <u>huge</u> expense

Blue Shield of California spending over $200 Million reprogramming new and old systems at the same time to reflect the new Health Care rules.

"About 250 employees are leading teams responsible for reprogramming computer systems."

Source: Insurers Scramble to Comply With New Rules, NYT.com, 9/22/2010
Law: Patient Protection and Affordable Care Act of 2010

SOLUTION: Transform your Rules into Corporate Assets

Classic	Legacy	Current
Applications (DATA, RULES, CODE)	Database Engine (DATA) / Applications (RULES, CODE)	Rules Engine (RULES) / Database Engine (DATA) / Applications (CODE)
Operating Environment	Operating Environment	Operating Environment
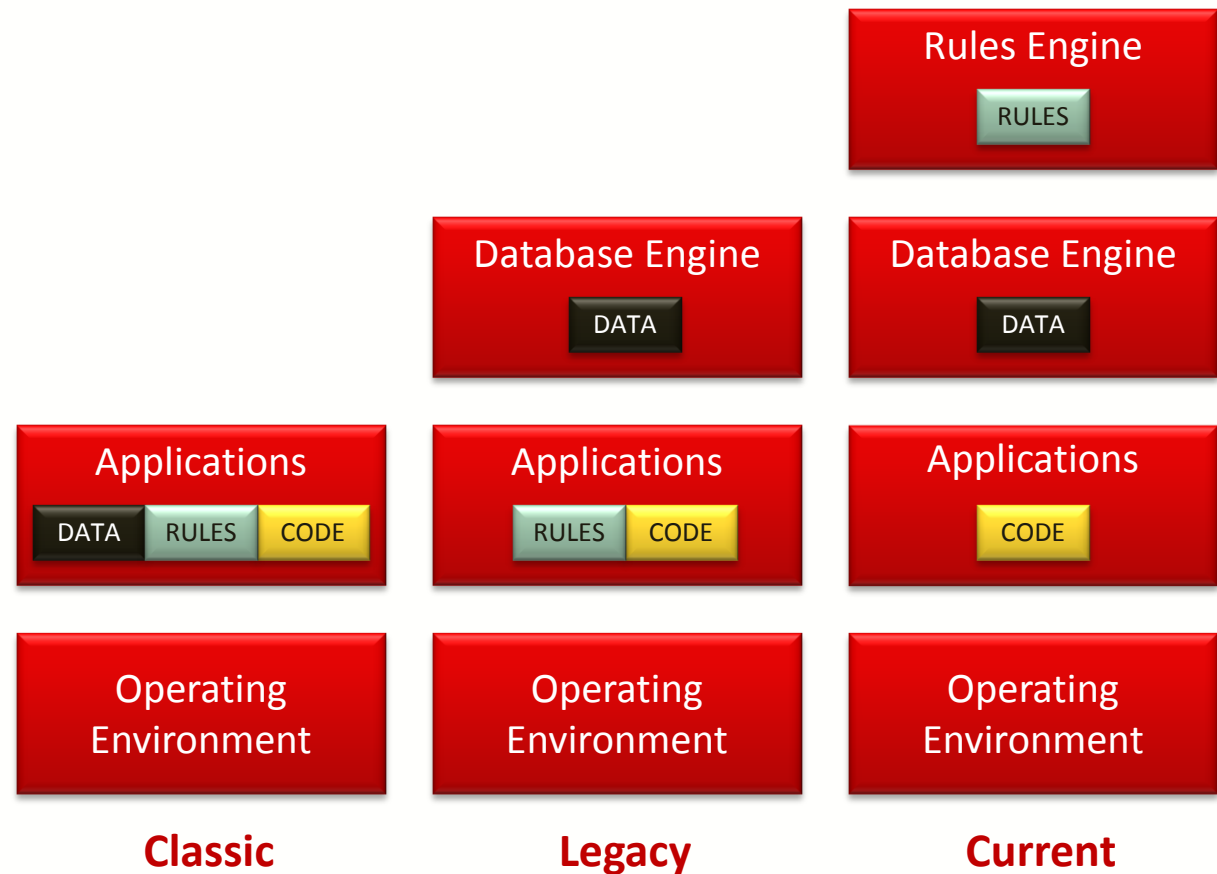
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PROBLEM: Rules everywhere
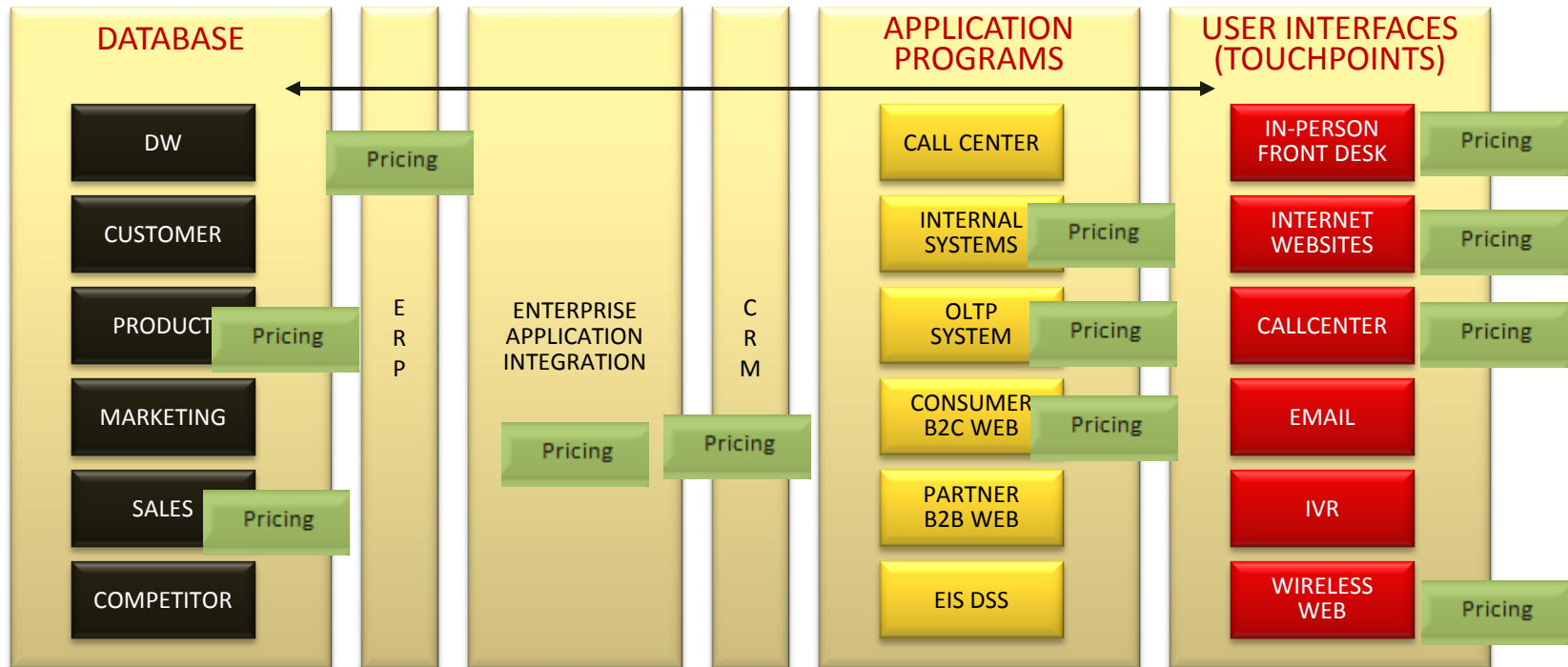
BizRules®.com

SOLUTION: Centralize Rules in the Rulebase

DATABASE	ERP	ENTERPRISE APPLICATION INTEGRATION	CRM	APPLICATION PROGRAMS	USER INTERFACES (TOUCHPOINTS)
DW				CALL CENTER	IN-PERSON FRONT DESK
CUSTOMER				INTERNAL SYSTEMS	INTERNET WEBSITES
PRODUCT				OLTP SYSTEM	CALLCENTER
MARKETING				CONSUMER B2C WEB	EMAIL
SALES				PARTNER B2B WEB	IVR
COMPETITOR				EIS DSS	WIRELESS WEB

BUSINESS RULES (RULEBASE)

Pricing
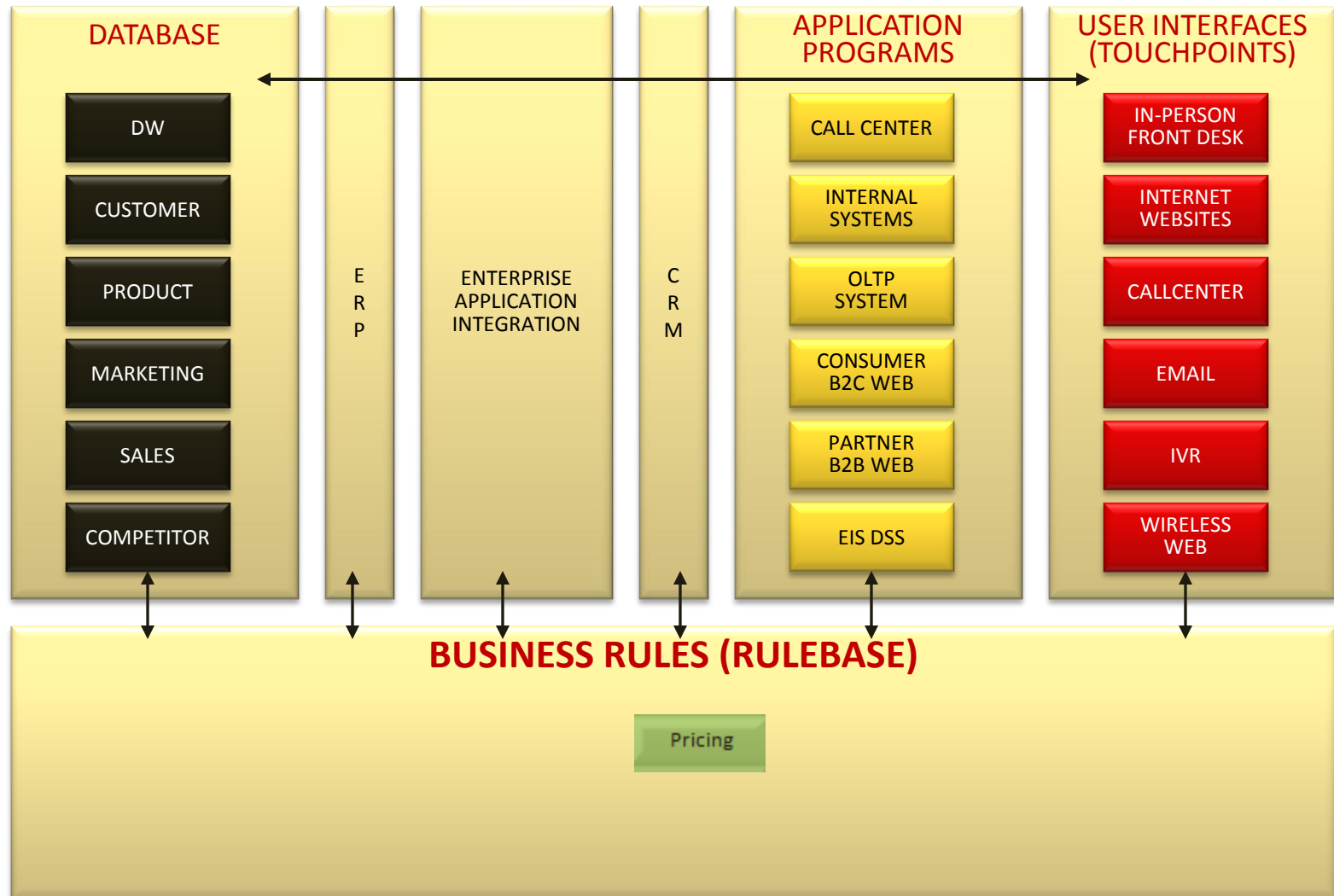
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GOAL: Change Rules one time… one place

DATABASE				APPLICATION PROGRAMS	USER INTERFACES (TOUCHPOINTS)
DW				CALL CENTER	IN-PERSON FRONT DESK
CUSTOMER				INTERNAL SYSTEMS	INTERNET WEBSITES
PRODUCT	E R P	ENTERPRISE APPLICATION INTEGRATION	C R M	OLTP SYSTEM	CALLCENTER
MARKETING				CONSUMER B2C WEB	EMAIL
SALES				PARTNER B2B WEB	IVR
COMPETITOR				EIS DSS	WIRELESS WEB

BUSINESS RULES (RULEBASE)

Entity	Statutory	Tax	Accounting	HR	Rooftops	Cost Center	Billing	Compliance	Sarbanes	Policy
Eligibility	Promotions	Pricing	Commission	Recording	Reporting	Up Sell	Cross Sell	Delivery	VIP/New	SOP
OSHA	EPA	FTC	SEC	FDA	County	IP	Risk Mgmt	Profitability	Crisis Mgmt	Retention
Prospect	Customer	Acct History	Geography	Margins	Product Selection	Inventory	Supply Chain	Problem Resolution	Expert Decisions	Expert Advice

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VISION: Ruling the Clouds℠

Rules shall set you free

Fred Simkin, BIZRULES

How do you begin capturing knowledge and rules?

Process
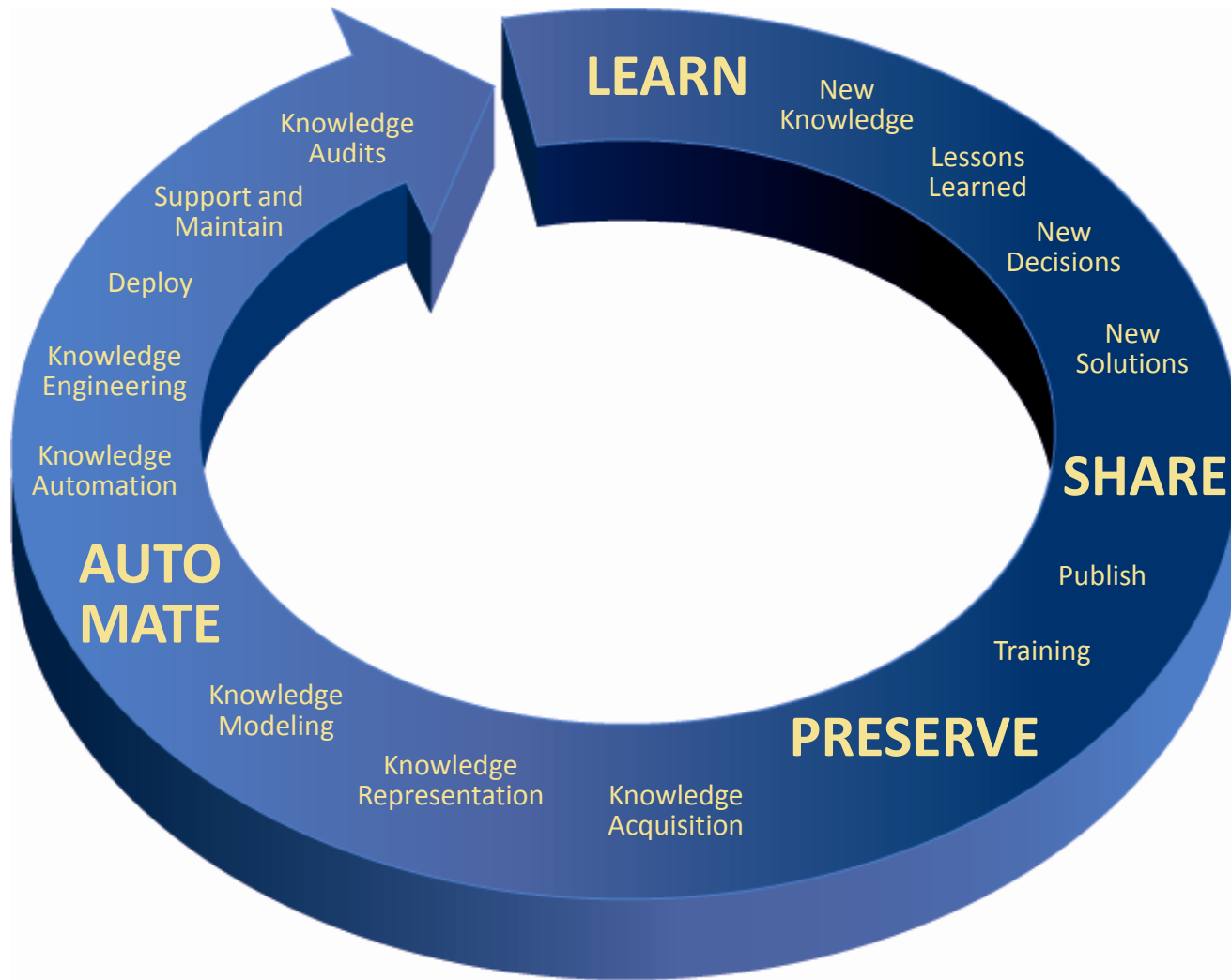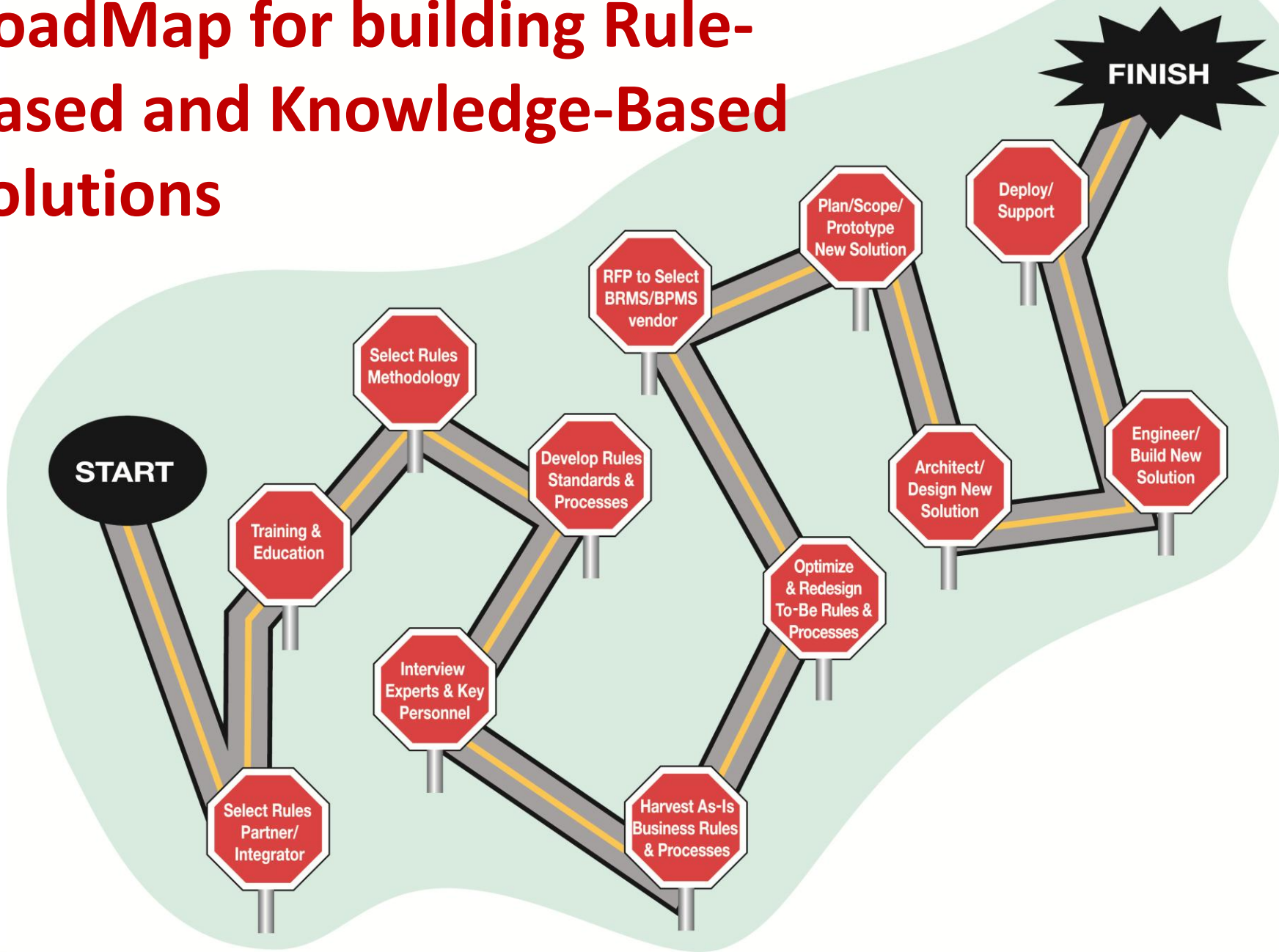
Roadmap

Methodology
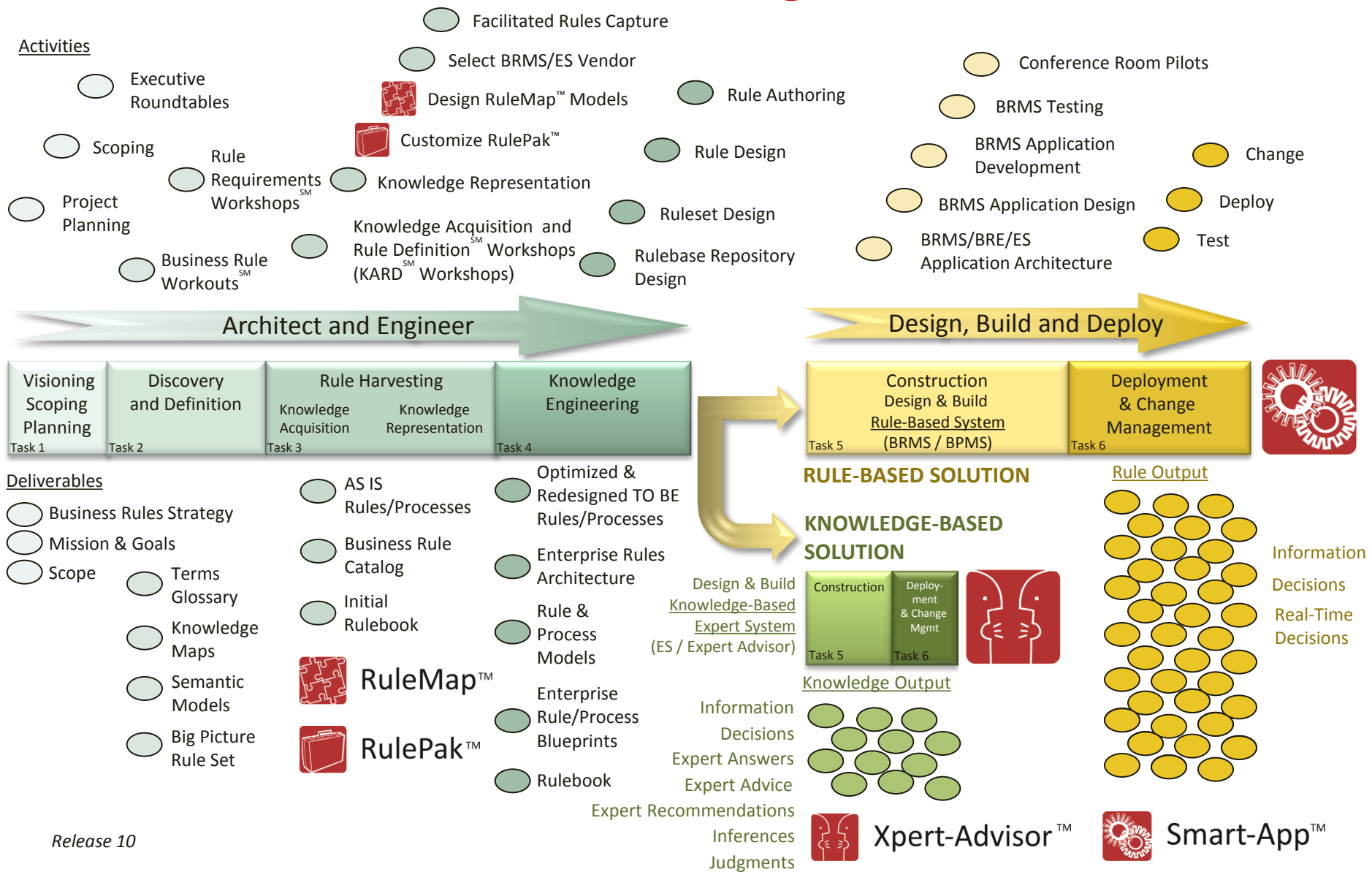
Framework

You need a Knowledge Supply Chain

LEARN
- New Knowledge
- Lessons Learned
- New Decisions
- New Solutions

SHARE
- Publish
- Training

PRESERVE
- Knowledge Acquisition
- Knowledge Representation
- Knowledge Modeling

AUTO MATE
- Knowledge Automation
- Knowledge Engineering
- Deploy
- Support and Maintain
- Knowledge Audits

October 2010 Rev 1
BIZRULES® Knowledge Supply Chain™

RoadMap for building Rule-Based and Knowledge-Based Solutions
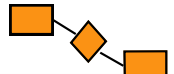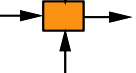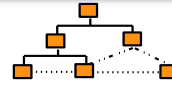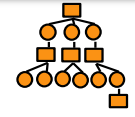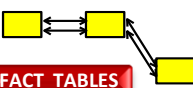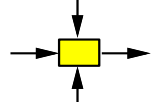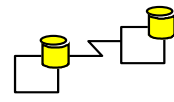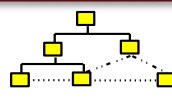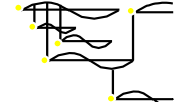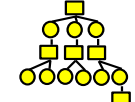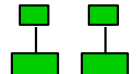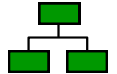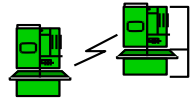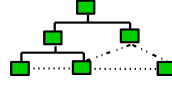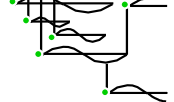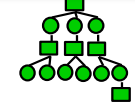
Methodology for building Rule-Based and Knowledge-Based Solutions

Activities

- Facilitated Rules Capture
- Select BRMS/ES Vendor
- Design RuleMap™ Models
- Customize RulePak™
- Executive Roundtables
- Scoping
- Rule Requirements Workshops[SM]
- Project Planning
- Business Rule Workouts[SM]
- Knowledge Representation
- Knowledge Acquisition and Rule Definition[SM] Workshops (KARD[SM] Workshops)
- Rule Authoring
- Rule Design
- Ruleset Design
- Rulebase Repository Design
- Conference Room Pilots
- BRMS Testing
- BRMS Application Development
- BRMS Application Design
- BRMS/BRE/ES Application Architecture
- Change
- Deploy
- Test

Architect and Engineer → Design, Build and Deploy →

Visioning Scoping Planning Task 1	Discovery and Definition Task 2	Rule Harvesting — Knowledge Acquisition / Knowledge Representation Task 3	Knowledge Engineering Task 4

Construction Design & Build Rule-Based System (BRMS / BPMS) Task 5	Deployment & Change Management Task 6

RULE-BASED SOLUTION

KNOWLEDGE-BASED SOLUTION

Design & Build Knowledge-Based Expert System (ES / Expert Advisor)	Construction Task 5	Deployment & Change Mgmt Task 6

Deliverables

- Business Rules Strategy
- Mission & Goals
- Scope
- Terms Glossary
- Knowledge Maps
- Semantic Models
- Big Picture Rule Set

- AS IS Rules/Processes
- Business Rule Catalog
- Initial Rulebook

RuleMap™

RulePak™

- Optimized & Redesigned TO BE Rules/Processes
- Enterprise Rules Architecture
- Rule & Process Models
- Enterprise Rule/Process Blueprints
- Rulebook

Rule Output

Information

Decisions

Real-Time Decisions

Knowledge Output

Information

Decisions

Expert Answers

Expert Advice

Expert Recommendations

Inferences

Judgments

Xpert-Advisor™

Smart-App™

Release 10

Your Rules & Knowledge Models should align with your Enterprise Architecture

	DATA *What*	FUNCTION *How*	NETWORK *Where*	PEOPLE *Who*	TIME *When*	MOTIVATION *Why*	
SCOPE (CONTEXTUAL)	**TERMS**	List of Processes the Business Performs	List of Locations in which the Business Operates	List of Organizations Important to the Business	List of Events Significant to the Business	**MISSION & GOALS**	**SCOPE (CONTEXTUAL)**
Planner	ENTITY = Class of Business Thing	Function = Class of Business Process	Node = Major Business Location	People = Major Organizations	Time = Major Business Event	Ends/Means=Major Bus. Goal/ Critical Success Factor	*Planner*
ENTERPRISE MODEL (CONCEPTUAL)	e.g. Semantic Model / **FACT MODELS**	**BUSINESS PROCESS MODELS**	e.g. Business Logistics System	**WORK FLOW MODELS**	e.g. Master Schedule	**GOVERNING RULES**	**ENTERPRISE MODEL (CONCEPTUAL)**
Owner	Ent = Business Entity / Reln = Business Relationship	Proc. = Business Process / I/O = Business Resources	Node = Business Location / Link = Business Linkage	People = Organization Unit / Work = Work Product	Time = Business Event / Cycle = Business Cycle	End = Business Objective / Means = Business Strategy	*Owner*
SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model / **FACT TABLES**	e.g. Application Architecture	e.g. Distributed System Architecture	**USER INTERFACE ARCHITECTURE**	e.g. Processing Structure	**BUSINESS RULE MODELS**	**SYSTEM MODEL (LOGICAL)**
Designer	Ent = Data Entity / Reln = Data Relationship	Proc .= Application Function / I/O = User Views	Node = I/S Function (Processor. Storage. etc) / Link = Line Characteristics	People = Role / Work = Deliverable	Time = System Event / Cycle = Processing Cycle	End = Structural Assertion / Means =Action Assertion	*Designer*
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model	e.g. System Design	e.g. Technology Architecture	e.g. Presentation Architecture	e.g. Control Structure	**RULE DESIGNS**	**TECHNOLOGY MODEL (PHYSICAL)**
Builder	Ent = Segment/Table/etc. / Reln = Pointer/Key/etc.	Proc.= Computer Function / I/O = Data Elements/Sets	Node = Hardware/System Software / Link = Line Specifications	People = User / Work = Screen Format	Time = Execute / Cycle = Component Cycle	End = Condition / Means = Action	*Builder*
DETAILED REPRESEN- TATIONS (OUT-OF- CONTEXT)	e.g. Data Definition	e.g. Program	e.g. Network Architecture	e.g. Security Architecture	e.g. Timing Definition	**RULE SPECIFICATIONS**	**DETAILED REPRESEN- TATIONS (OUT-OF- CONTEXT)**
Sub- Contractor	Ent = Field / Reln = Address	Proc.= Language Stmt / I/O = Control Block	Node = Addresses / Link = Protocols	People = Identity / Work = Job	Time = Interrupt / Cycle = Machine Cycle	End = Sub-condition / Means = Step	*Sub- Contractor*
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	**FUNCTIONING ENTERPRISE**

Business Rules   If [Conditions] Then [Actions]   [Goals]

Enterprise Architecture – A Framework™
©John A. Zachman, Zachman International (810) 231-0531

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How do we fit rules into the Enterprise Architecture?
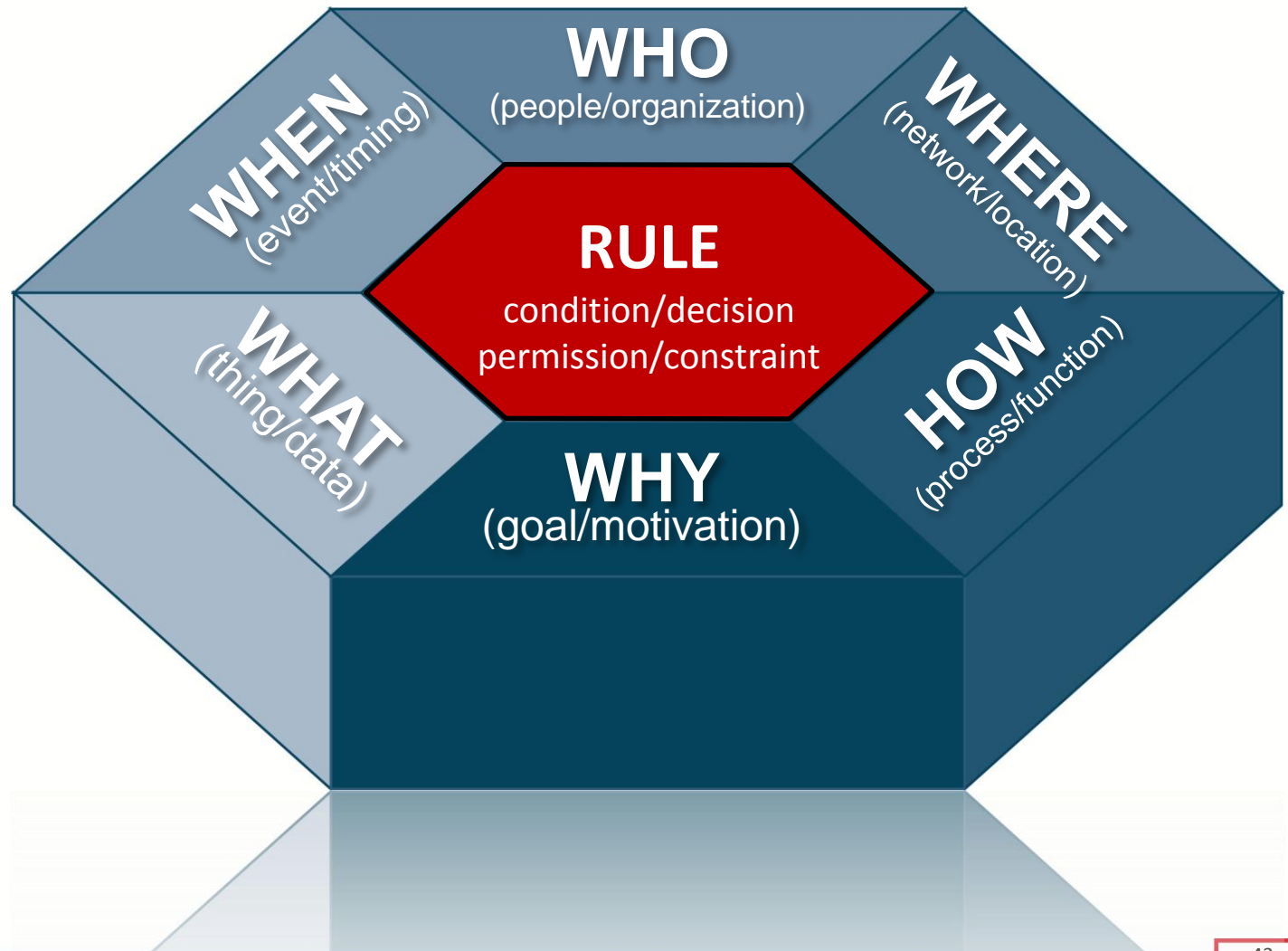
Don't hard-code rules
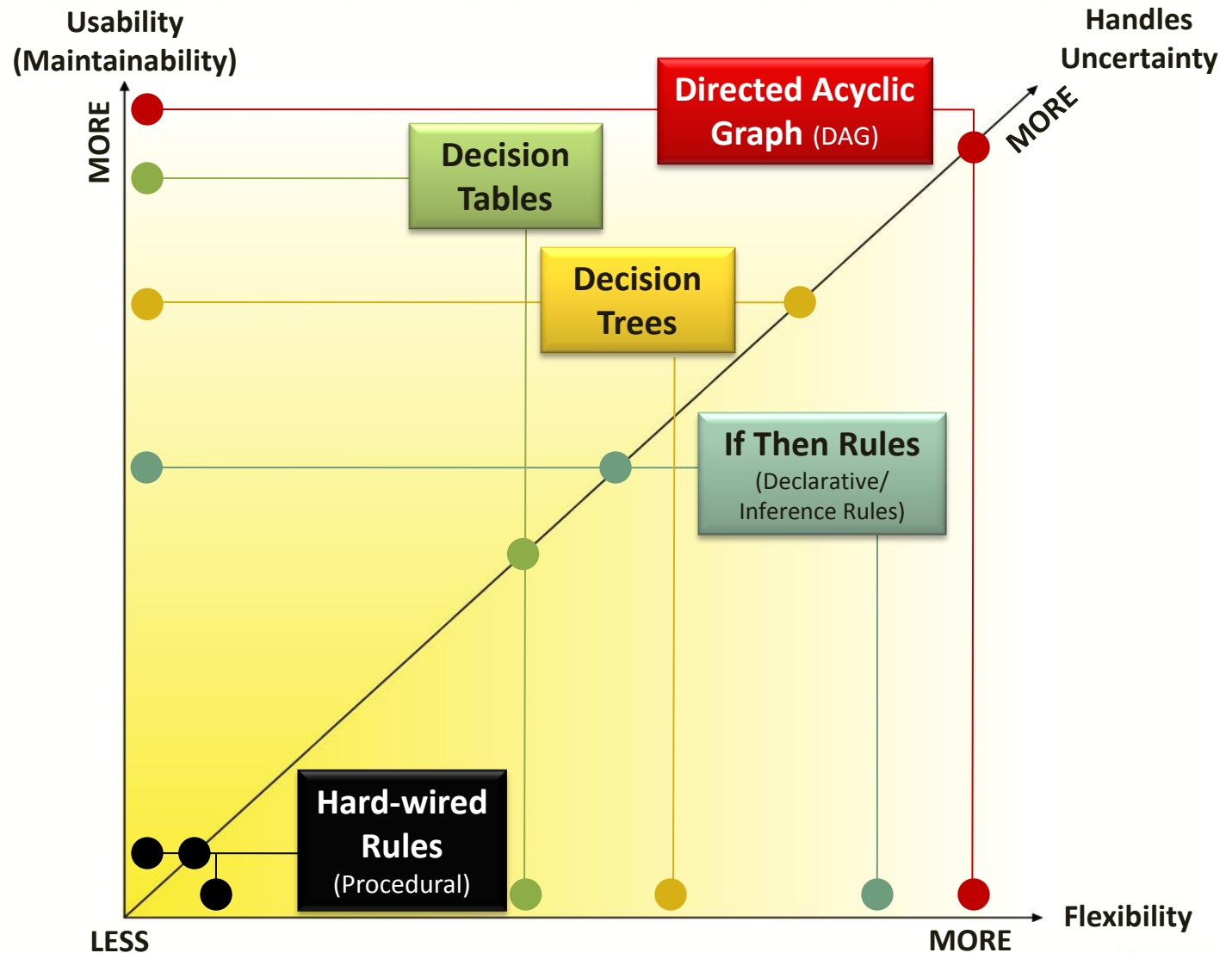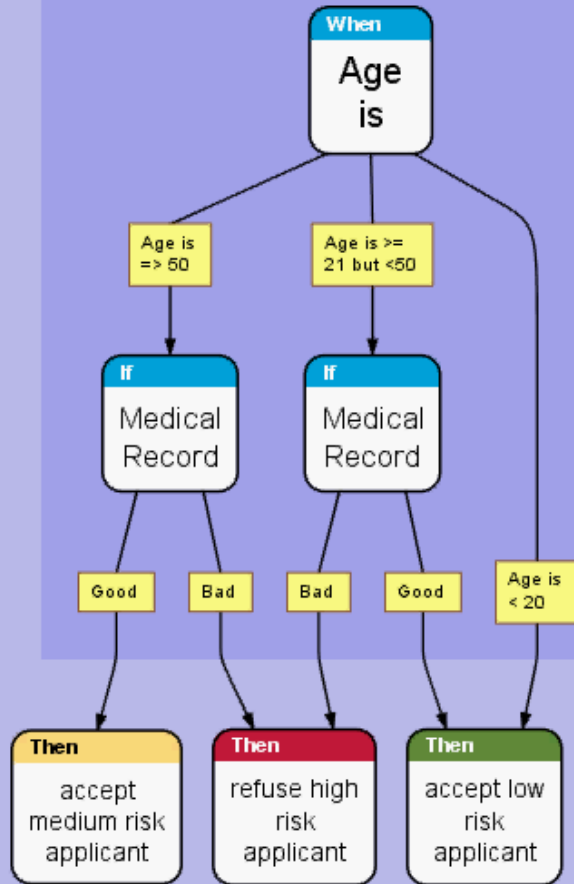
Usability (Maintainability)

Handles Uncertainty

MORE

Directed Acyclic Graph (DAG)

Decision Tables

Decision Trees

If Then Rules (Declarative/ Inference Rules)

Hard-wired Rules (Procedural)

MORE

Flexibility

LESS

MORE

BizRules® com

DAG and Decision Tree
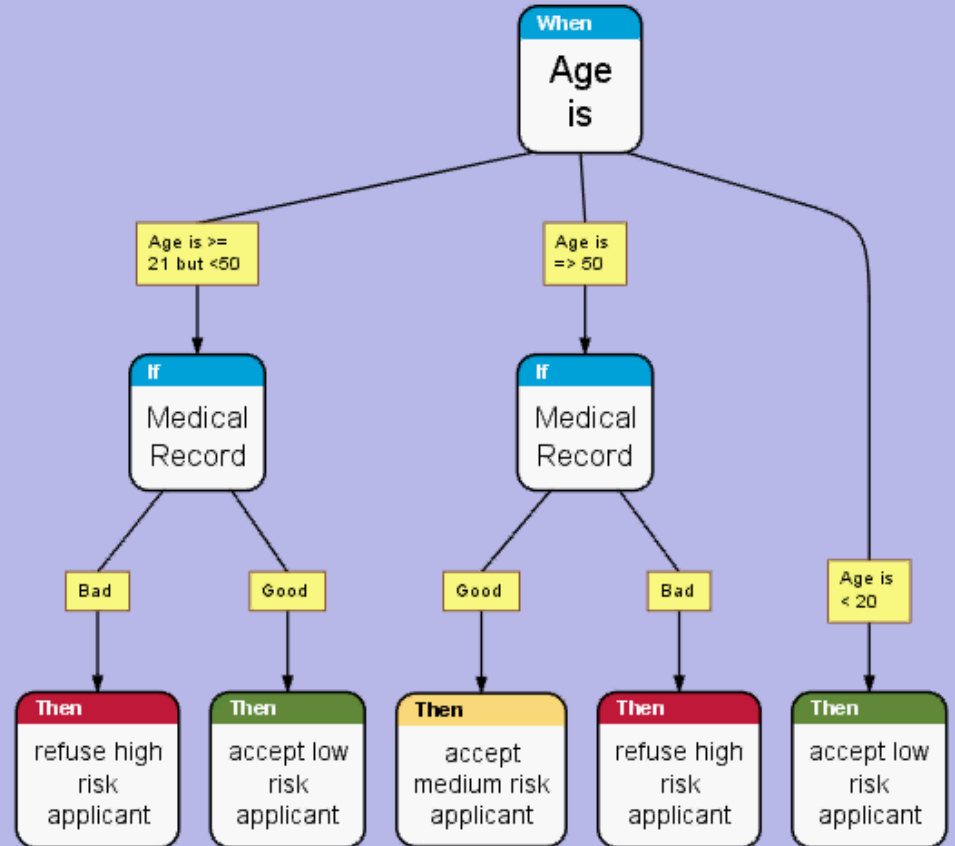
To see a Flash video of the "Decision Tree vs. DAG RuleMap", visit www.RuleMap.com
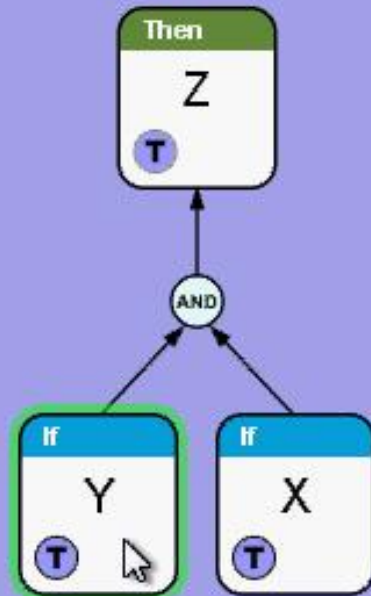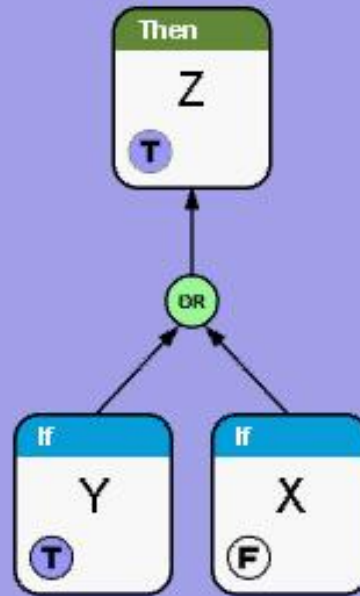
Rule simulation
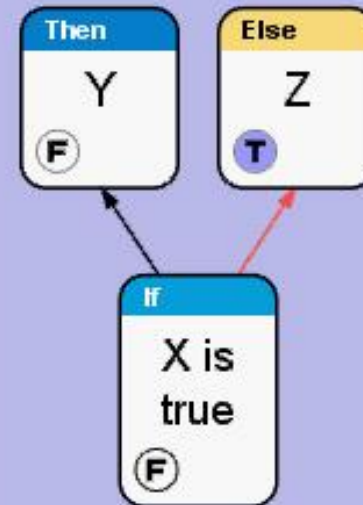
To see a Flash video of the "Rule Modeling & Simulation Demo", visit www.RuleMap.com

A picture is worth a million bucks

Fred Simkin, BIZRULES

Data
Instances

Rules
Logic

Terms
Meaning

Facts

Process

Do
Sequential Activity , Procedure , Code

Decide   *The Moment of Truth*

Know   *Concepts Ontology , Relationships , Semantic Map*

Ruleset

Think   *Reasoning*

IF / THEN
Decision Table / Tree
Directed Acyclic Graph (DAG)

Infer   *Inference*

Conclude   *Deduction , Induction*

Backward / Forward Chaining
Single / Multi Fire

Rulebase Hierarchy

Global Rules
reuse

Local Rules
Specialize

Single / Multiple Inheritance

BIZRULES® RULEMAP™ EXAMPLE

GLOBAL ENTITY MANAGEMENT: U.S. EMPLOYER COMPLIANCE RULES

Employment Eligibility Verification   BUSINESS MAP (FACT MODEL)
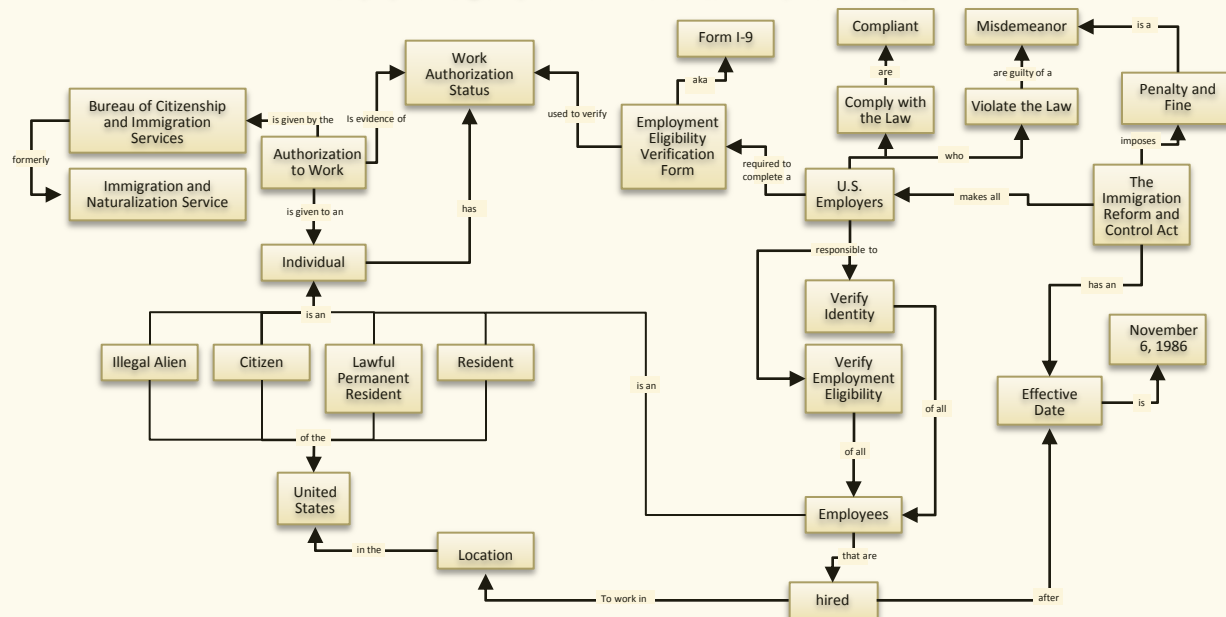
TERMS

Authorization To Work
Illegal Alien
Individual
U.S. Citizen
Lawful Permanent Resident
Bureau of Citizenship and Immigration Services
U.S. Employers
Employing
Employment Eligibility
Identify
Employees
Hired to Work
Employment Eligibility Verification Form (Form I-9)
Work Authorization Status
Guilty
Misdemeanor

FACTS

An Illegal Alien is an individual, who is not a Citizen or a Lawful Permanent Resident and who has not been given Authorization To Work by the Bureau of Citizenship and Immigration Services (formerly, the Immigration and Naturalization Service).

GOVERNING RULES

U.S. Employers must verify the Employment Eligibility and Identify of all Employees Hired to Work in the United States after November 6, 1986.

Employers are required to complete Employment Eligibility Verification Forms (Form I-9) for all Employees, including U.S. Citizens.

Anyone Employing an Illegal Alien without Verifying his or her Work Authorization Status is Guilty of a Misdemeanor.

DIGITIZED PROCESS (BUSINESS PROCESS MODEL)
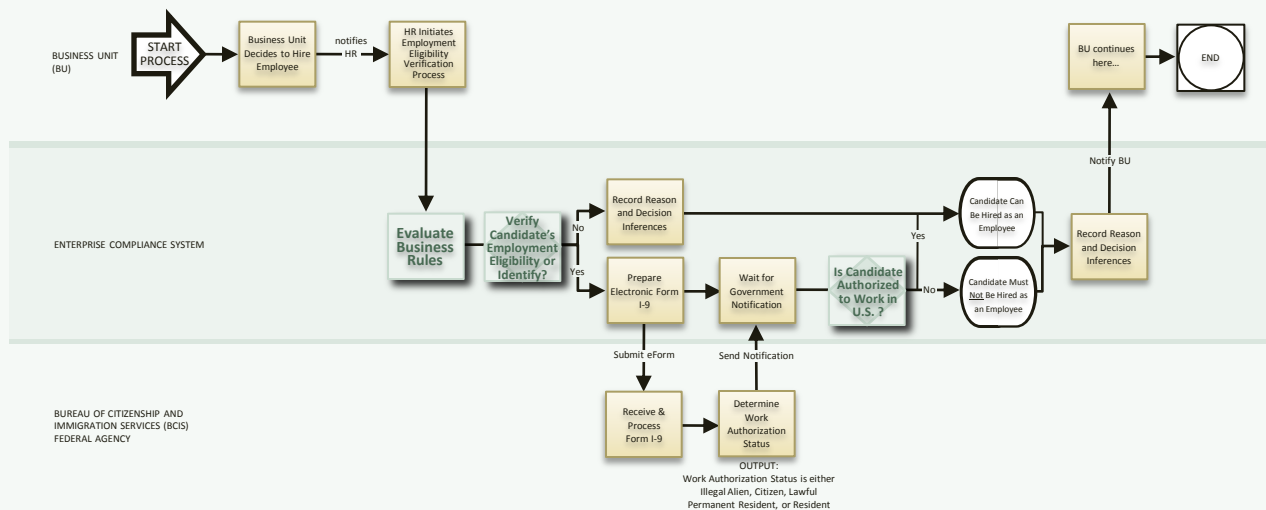
BUSINESS RULES

Corporate / External / Compliance Rules Business Rules for Employment Eligibility	RULE NO. 1	2	3	4	5
NOTES IF					
Company is _____	a US Employer	not a US Employer	-	-	-
Company wants to hire an _____	Employee	-	Con-tractor	-	-
Candidate Work Location is _____	In the US	-	-	Outside the US	-
Candidate Hire Date is _____ Nov. 6, 1986	After	-	-	-	On or before
Submit I-9 form THEN					
Company must verify Candidate's Employment Eligibility	Yes	No	No	No	No
Company must verify Candidate's Identity	Yes	No	No	No	No

Work Authorization Rules

	ENTITY MANAGEMENT RULEBOOK		
1	LEGAL ENTITY MASTERFILE	10/06/08	FINAL
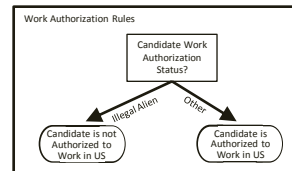
Models help us build a bridge to connect Business and Technology

Business

Technology

Dollars

Knowledge Models Rules

Data

The Future of IT All

DATA

DP - Data Processing

BATCH DATA PROCESSING

**Accounting
Automating**

Magnetic Tape/Flat File
Hierarchical Database

*COBOL
Internet e-Mail*

INFORMATION

MIS - Management Information Systems

ONLINE TRANSACTION PROCESSING (OLTP)

**Transacting
Reporting
Networking**

Relational Database
Client/Server LAN
Object-Oriented Systems

Expert System (ES)

Rulebase

KNOWLEDGE

IT - Information Technology

ONLINE ANALYTICAL PROCESSING (OLAP)

**Analyzing
Warehousing
Decision Support
Mining**

Decision Support
Multidimensional Database

CRM & SCM

Knowledge Management (KM)
Business Rule Engine (BRE)

Knowledge Base

*Windows (Microsoft)
WWW URL HTTP*

INTELLIGENCE

IT - Intelligent Technology

ONLINE DECISION PROCESSING (OLDP)

**Decisioning
Advising
Complying
Recommending
Scheduling
Optimizing
Diagnosing
Troubleshooting**

Business Intelligence
A.I. Artificial Intelligence
Real-Time Decisioning System

BPM & BRM
Business Rule Mgmt System

*Web Browser
Search Engine (Google)*

WISDOM

**Reasoning
Answering
...**

QA Technology
...

*Answer Engine
...*

**Mainframe Era
1970's**

**PC Revolution
1980's**

**World Wide Web
1990's**

**2000's
Wireless Web
Smart Phone**

**Semantic Web
2010's**

SMART SYSTEMS

ARTIFICIAL INTELLIGENCE SYSTEMS

KNOWLEDGE-BASED SYSTEMS
Complex rules; Deep/narrow scope of reasoning

RULE-BASED SYSTEMS
Simplistic, Externalized, Declarative Rules; Shallow/broad scope of reasoning

DATA-BASED SYSTEMS Rules hard-wired in code, stored procedures, or triggers

Thanks for your time!

Rolando Hernandez

Founder & CEO

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