

# Why Systems Work

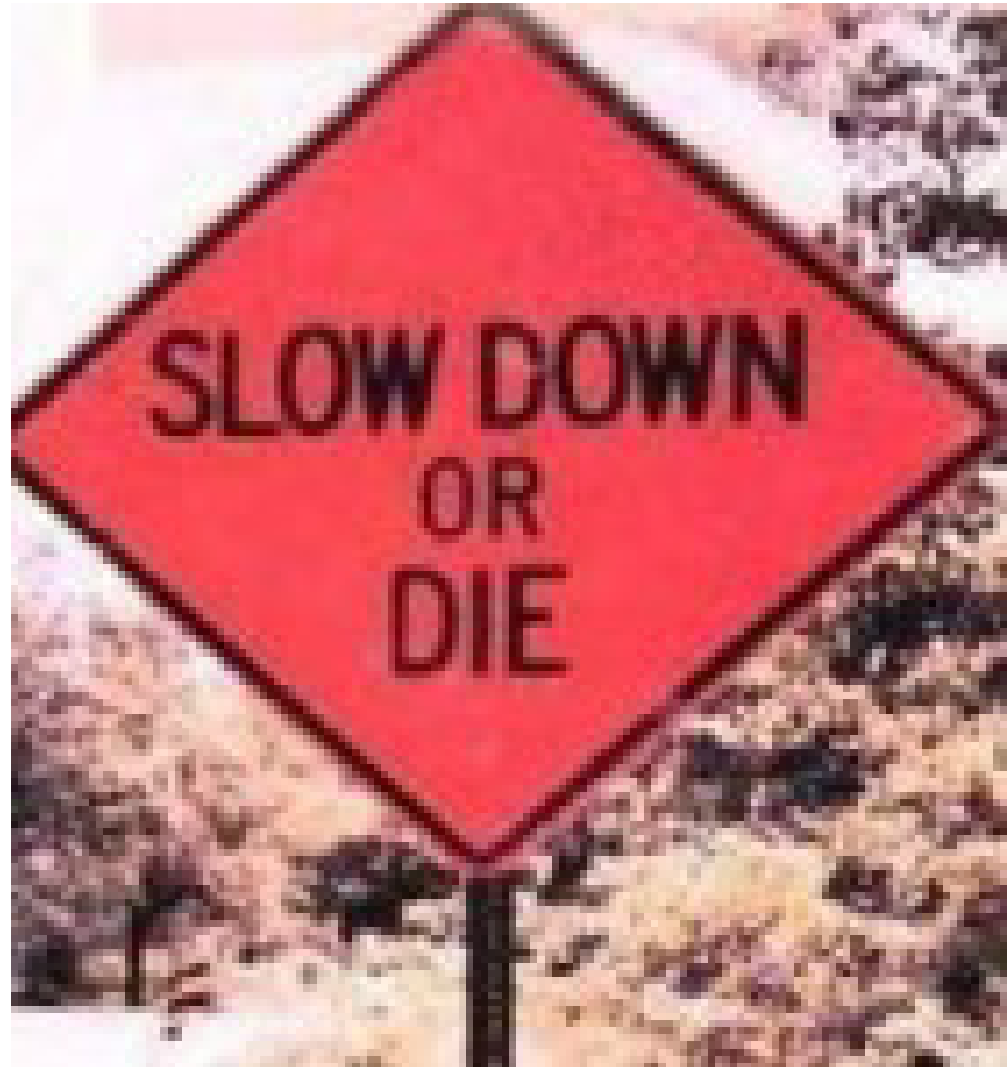
# Why systems work, change, and last

- Shared values and *principles*
- Clear and simple *rules*
- Business IT alignment
- A framework for designing and building any system
  - Enterprise architecture
  - Knowledge engineering

Shared values and *principles* that state what we should and should not do

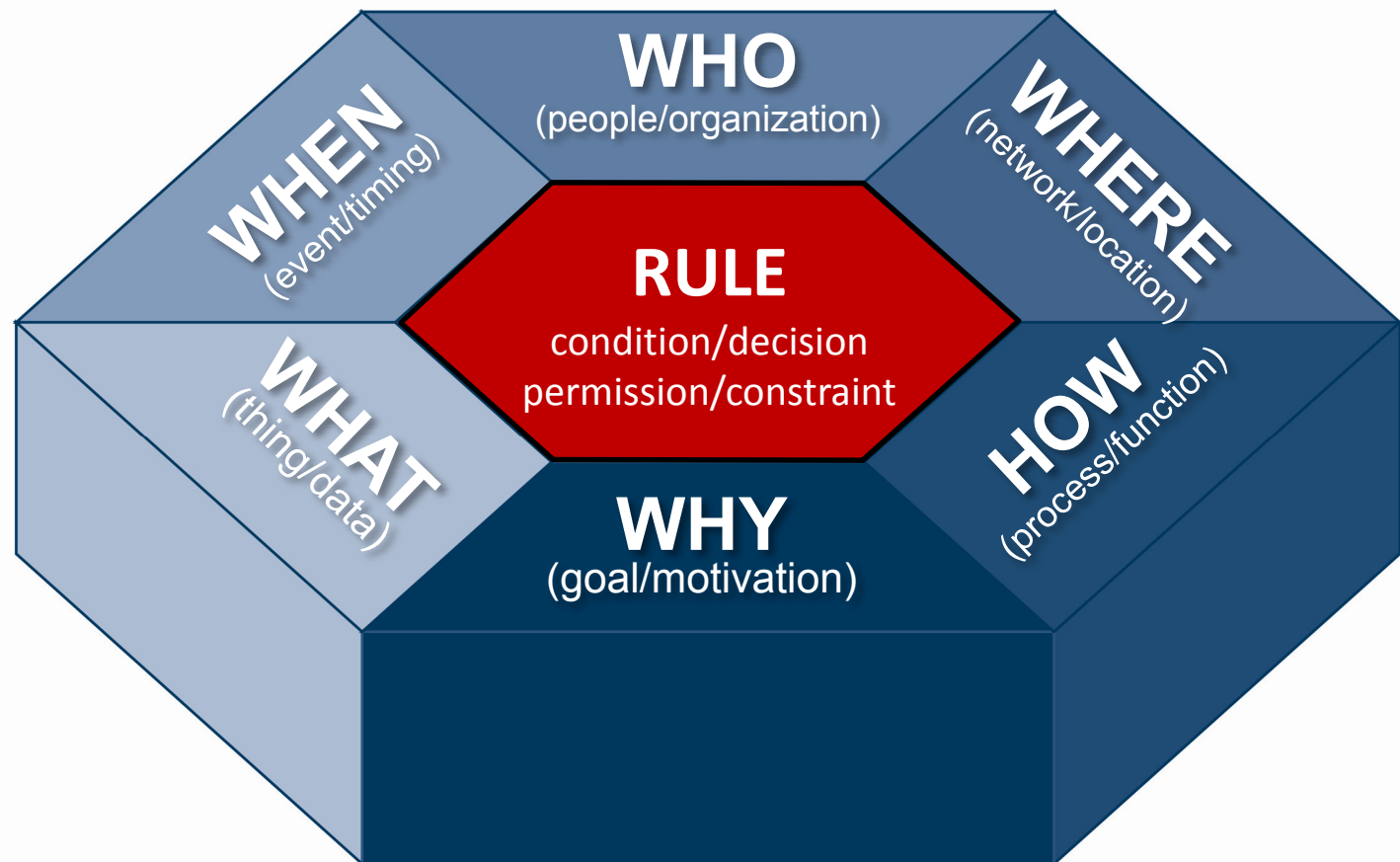


Clear and simple *rules* that state  
what you can and cannot do, must and must not do

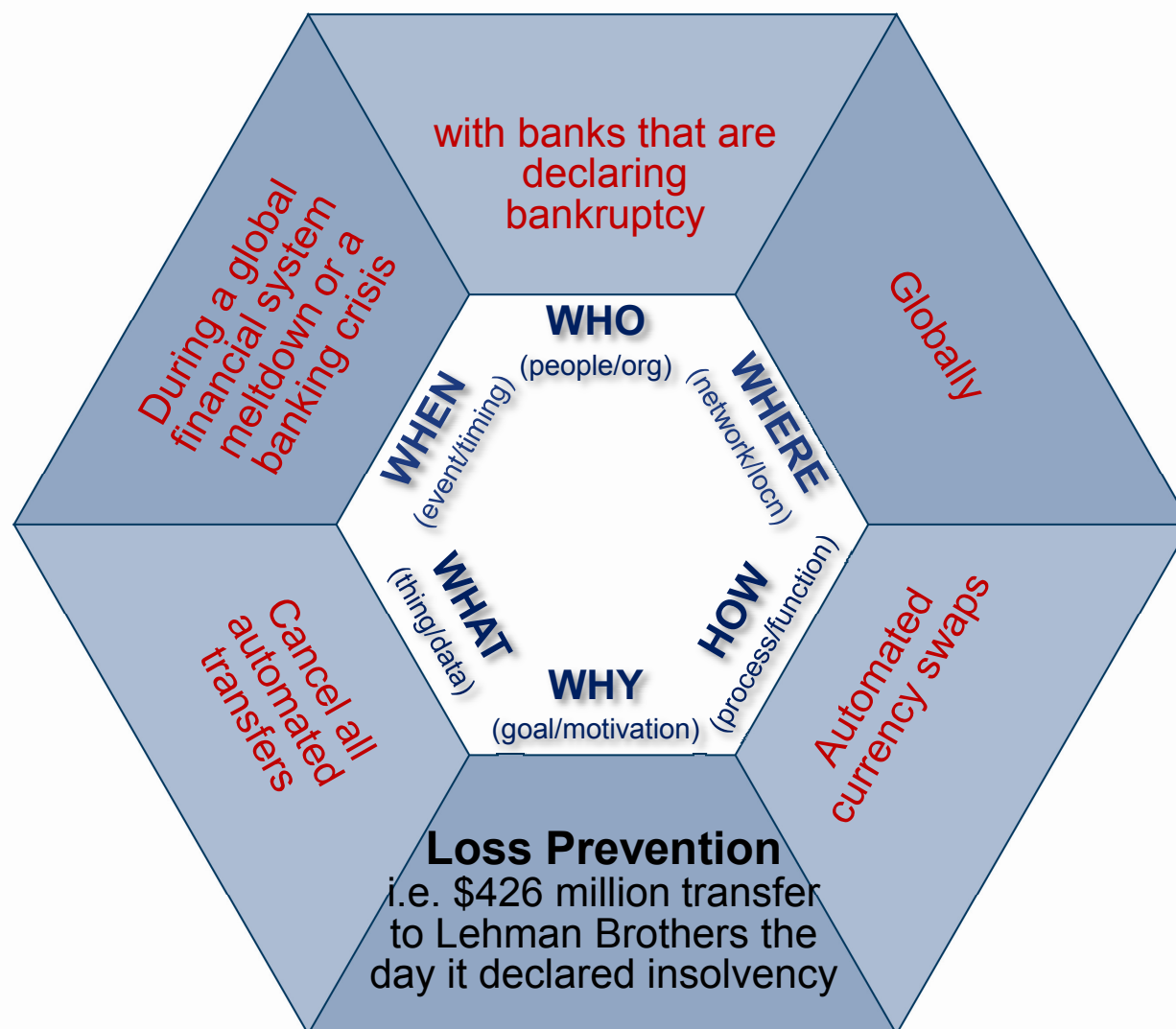




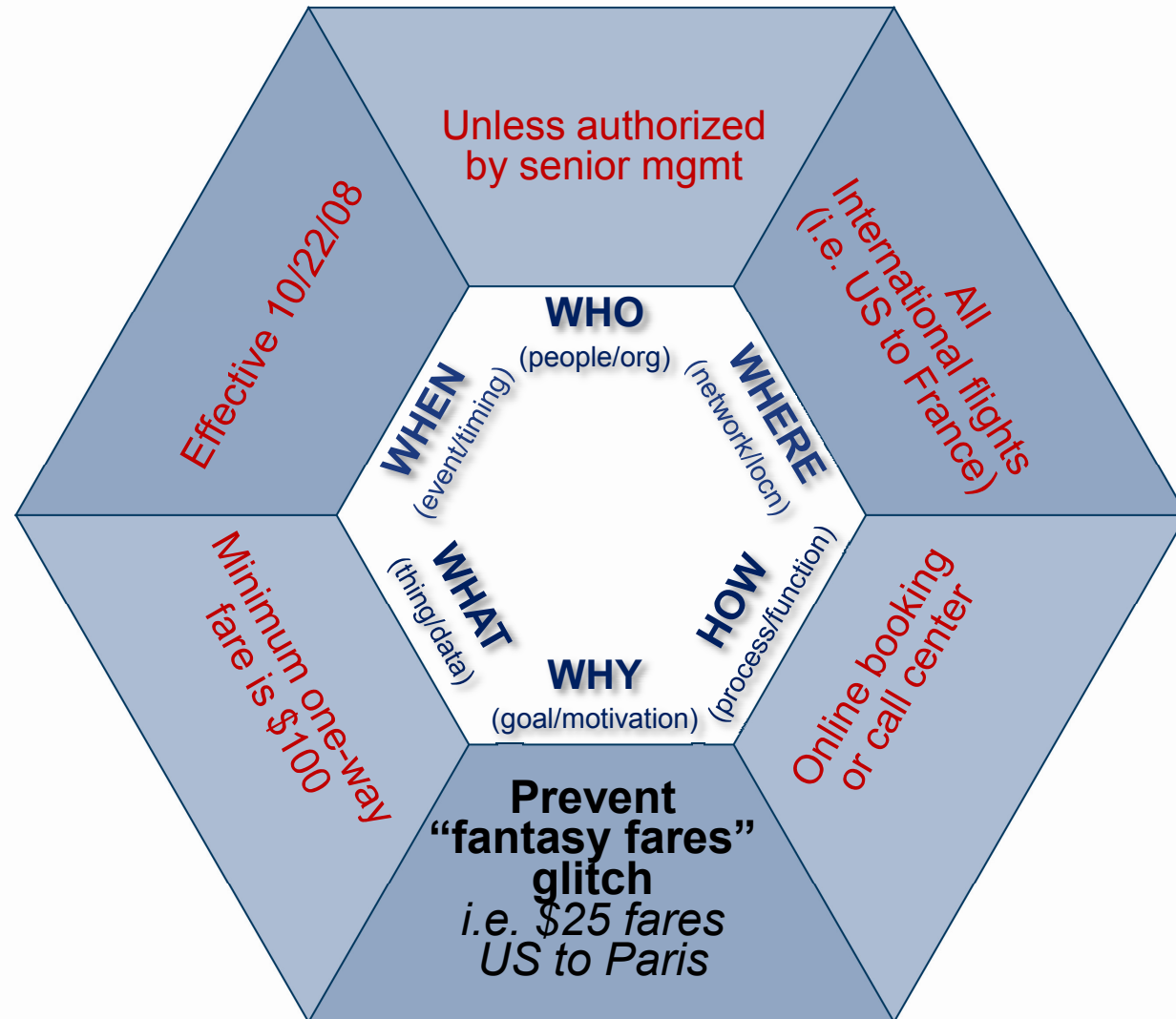
## A general framework for designing rules



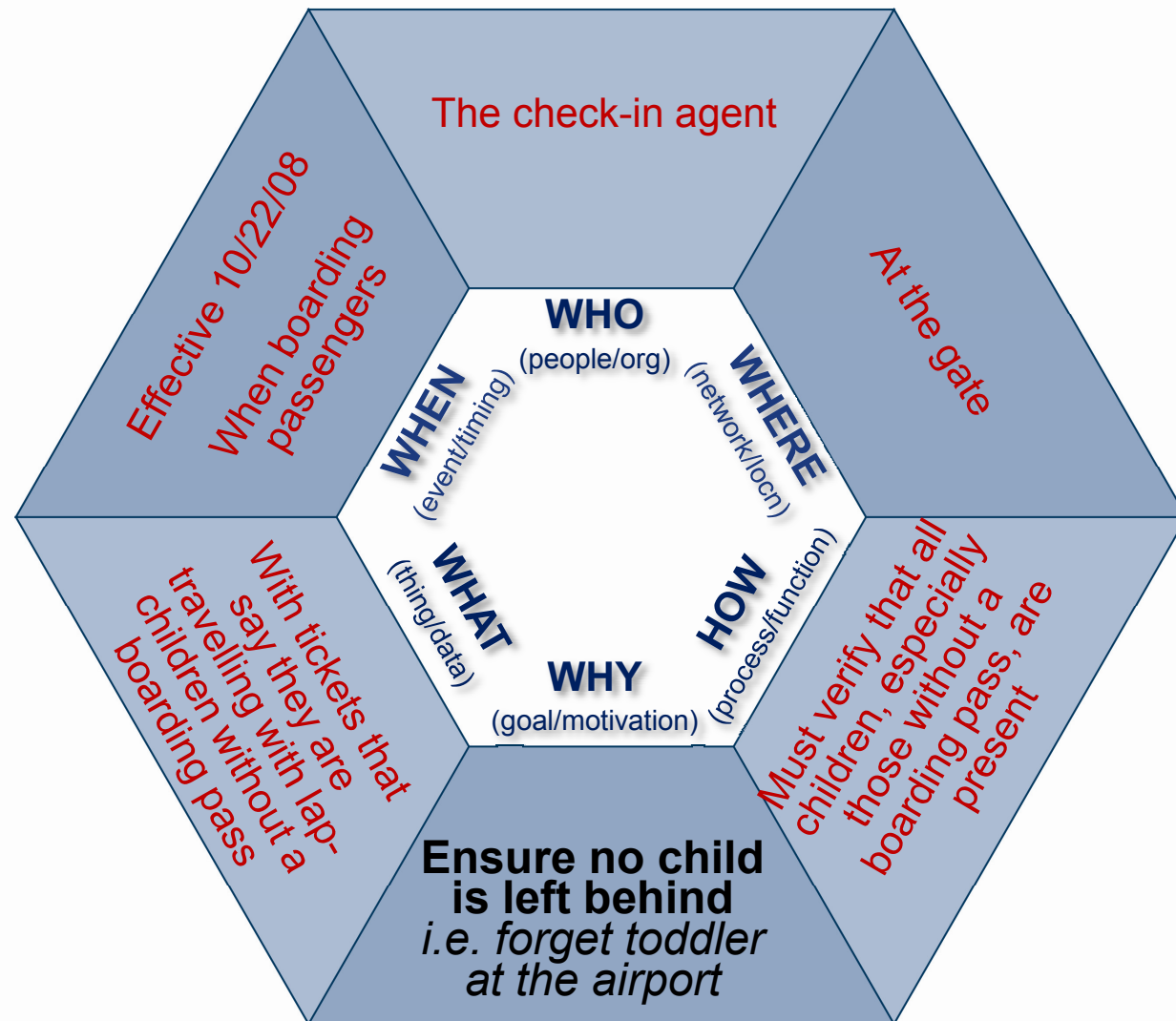
## Prevent “World’s Dumbest Bank” transfer



## Prevent United Airlines \$25 fare US to Paris



## Prevent parents boarding flight, forgetting children



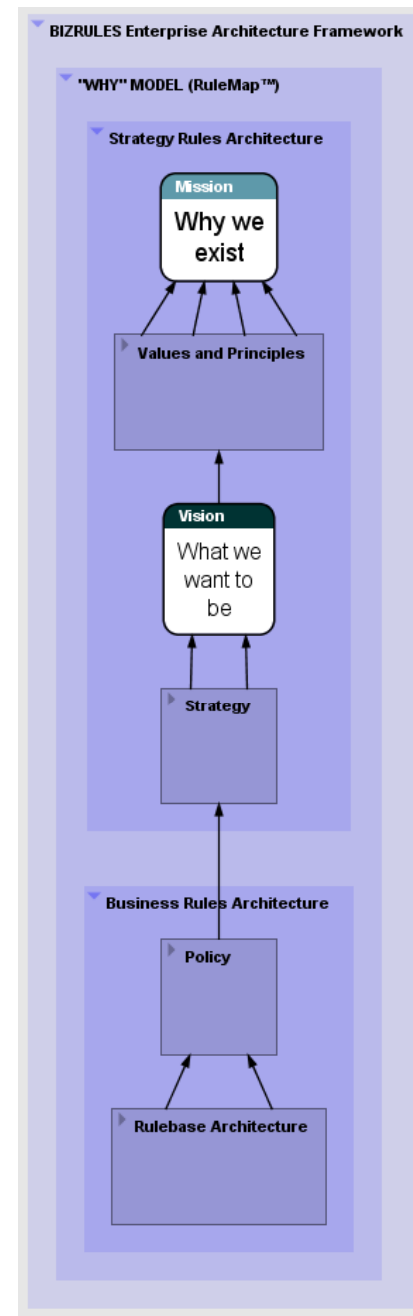
# Business IT Alignment

## Strategy Rules

- Mission
- Values
- Principles
- Vision
- Strategy

## Business Rules

- Policy
- Rules
  - Rulebase
    - Rulesets
    - Rules



To see a Flash video of the "Rules EA Framework RuleMap", visit [www.RuleMap.com](http://www.RuleMap.com)

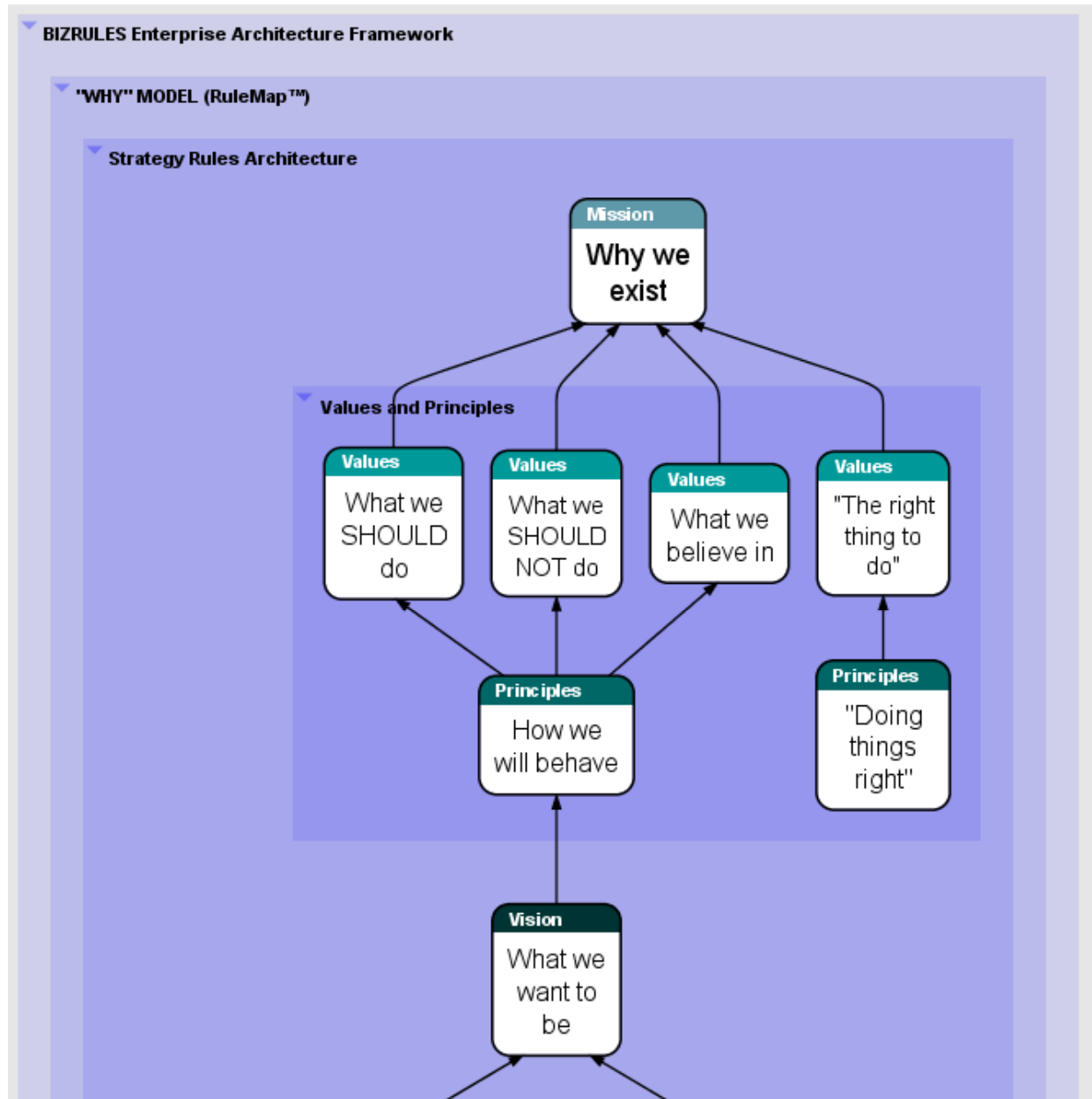
# Enterprise Architecture

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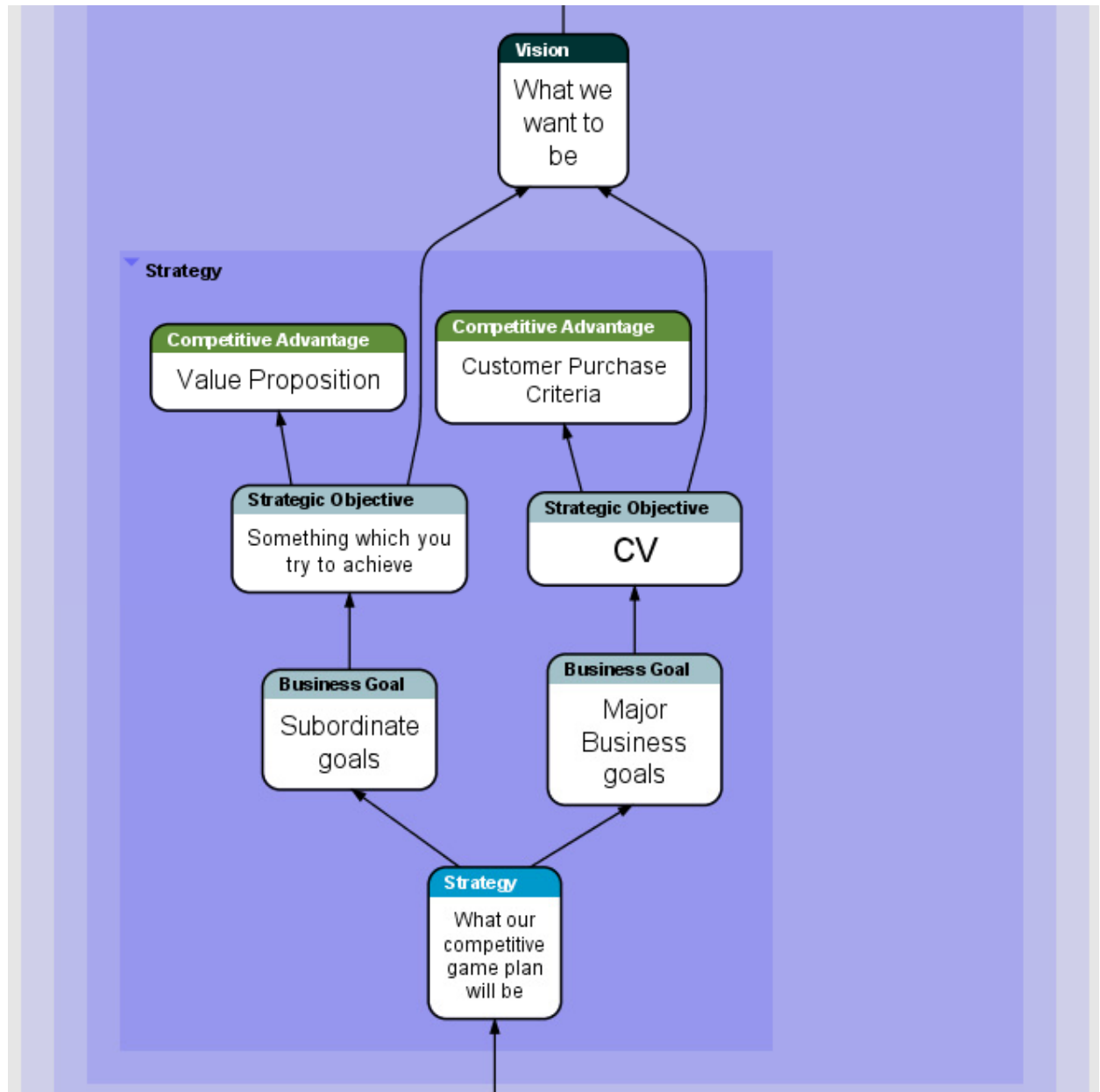
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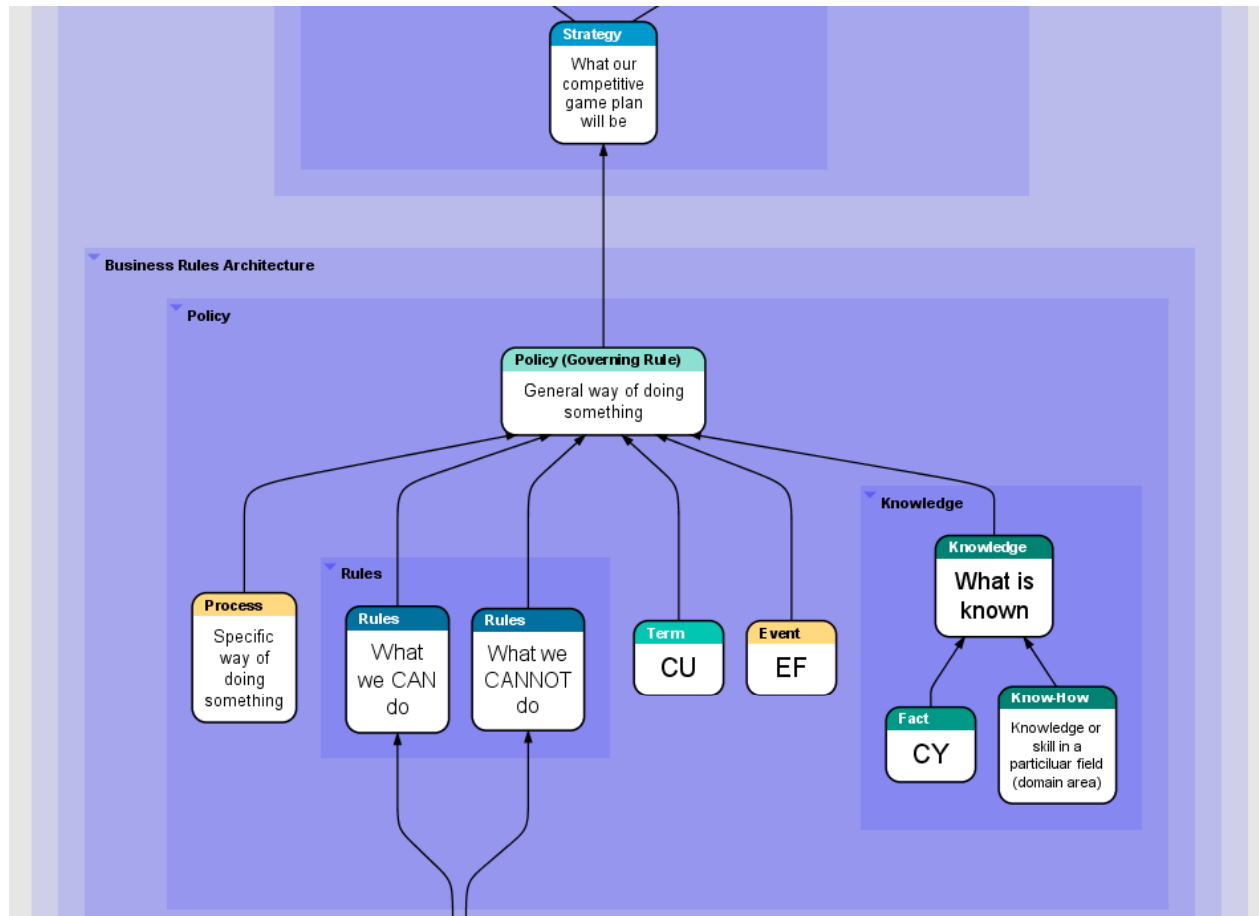
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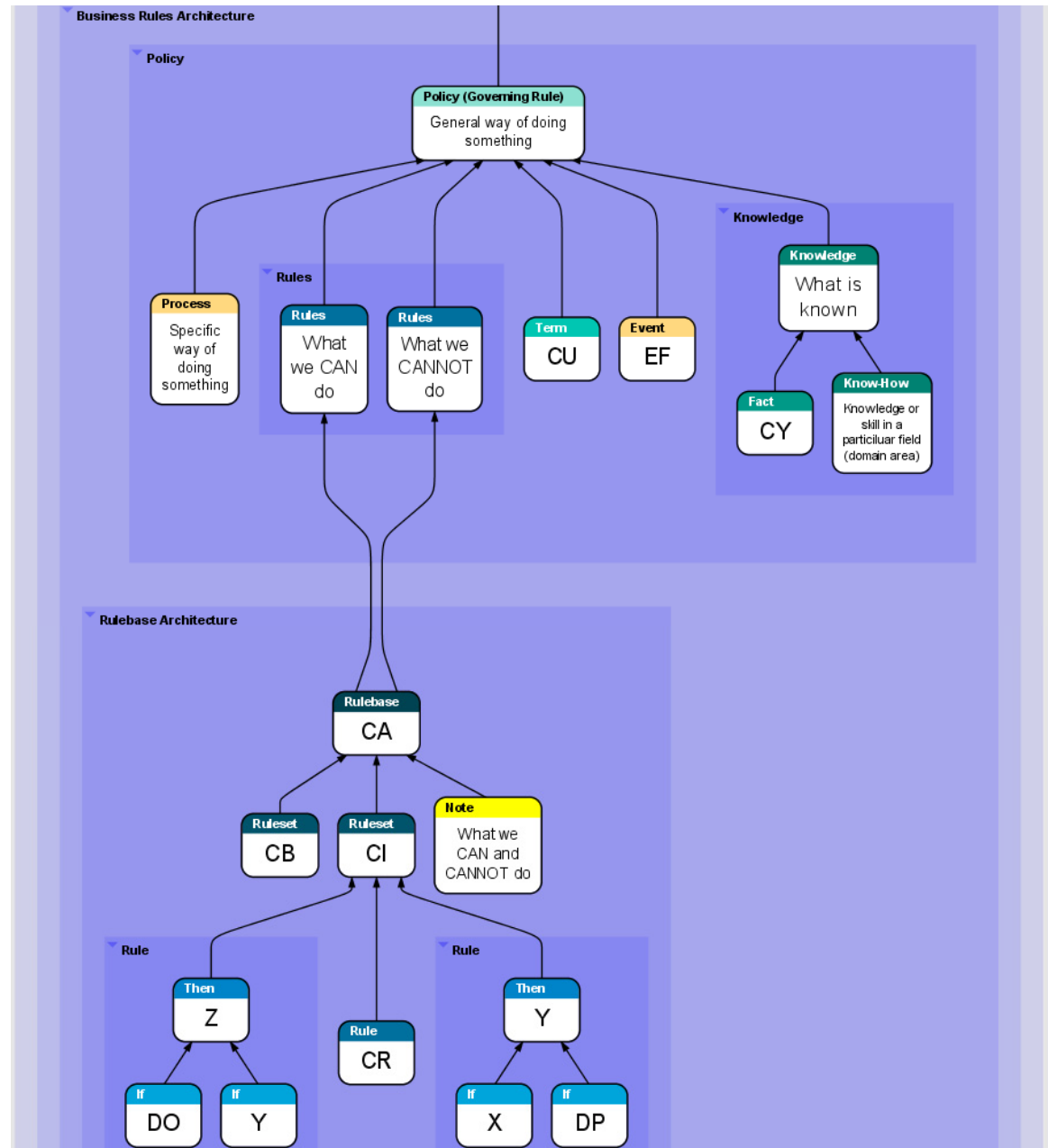
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- Principles
- Vision
- Strategy

## Business Rules

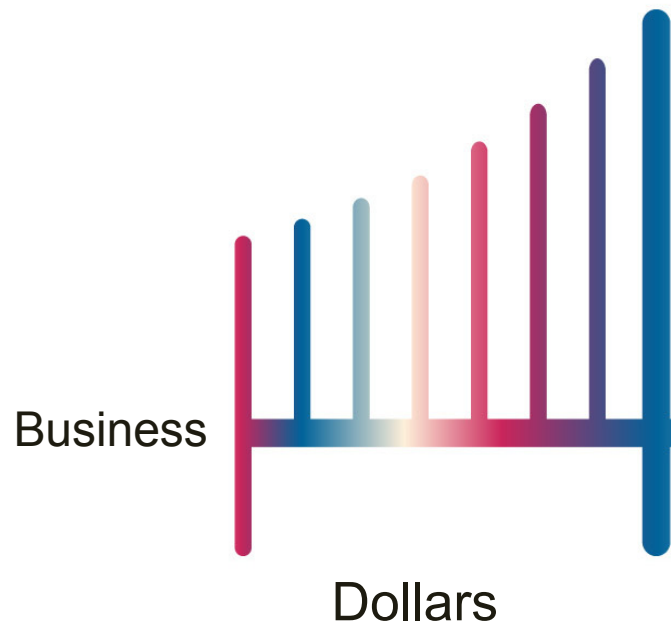
- Policy
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# The bridge between business and IT

# Business and IT are in different worlds



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## Technology

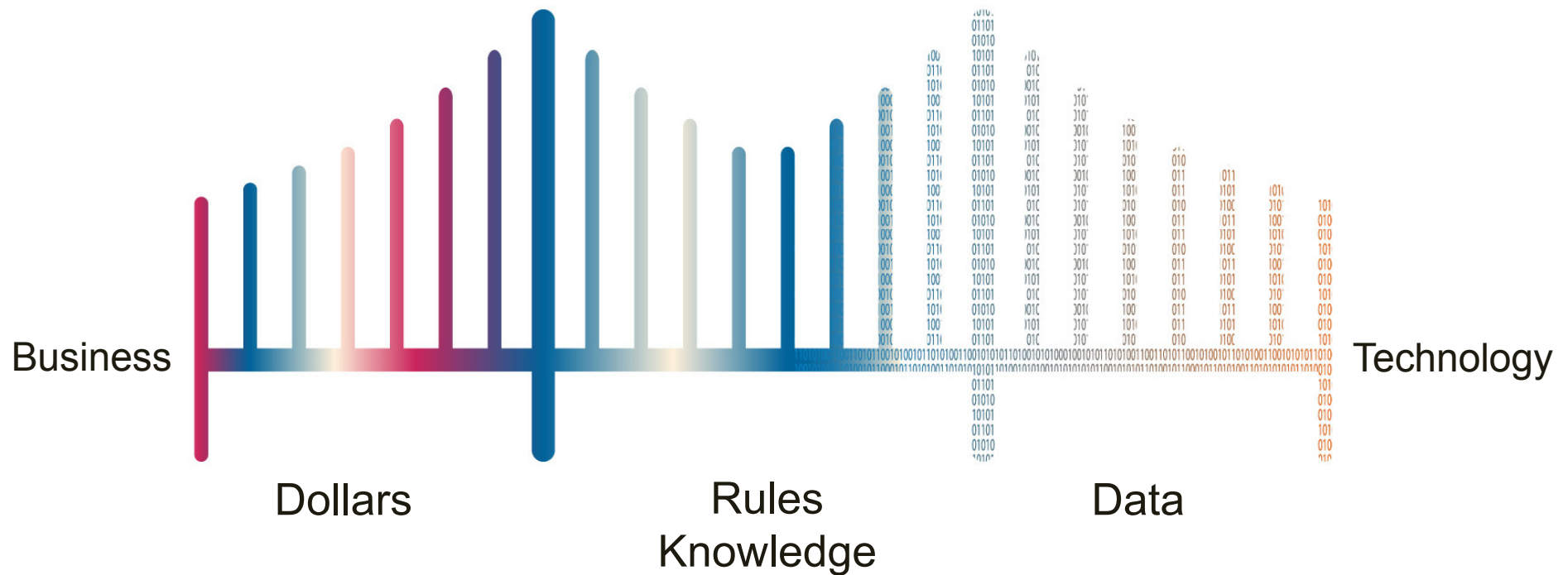
## Data

# Rules and knowledge are the bridge between Business and IT







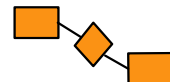
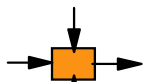
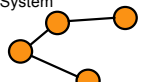
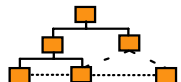


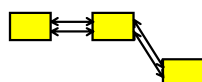
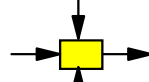
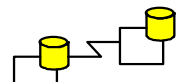
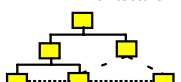

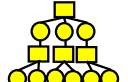
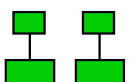
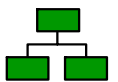
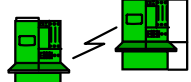
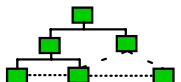
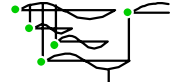
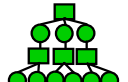








# Architecture is how to design systems

## Engineering is how to build systems



# Enterprise Architecture – A Framework™







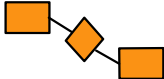
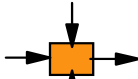

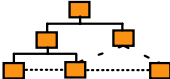


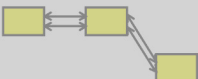
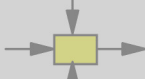
















	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
SCOPE (CONTEXTUAL)	List of Things Important to the Business 	List of Processes the Business Performs 	List of Locations in which the Business Operates 	List of Organizations Important to the Business 	List of Events Significant to the Business 	List of Business Goals/Strat 	SCOPE (CONTEXTUAL)
<i>Planner</i>	ENTITY = Class of Business Thing	Function = Class of Business Process	Node = Major Business Location	People = Major Organizations	Time = Major Business Event	Ends/Mean=Major Bus. Goal/ Critical Success Factor	<i>Planner</i>
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<i>Owner</i>	Ent = Business Entity ReIn = 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	<i>Owner</i>
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Enterprise Architecture – A Framework™

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# Complete “Business Model” Architecture







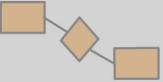
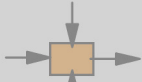

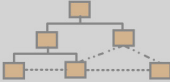


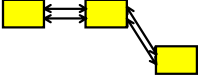
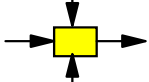
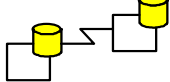
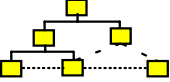

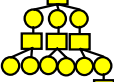
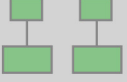











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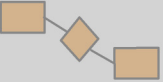
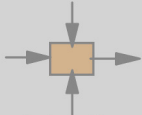

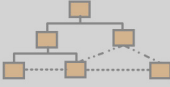

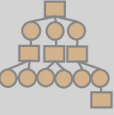

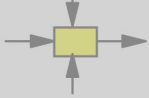
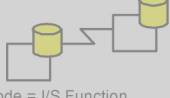



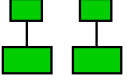
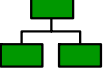
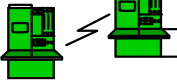

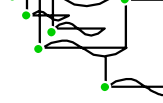
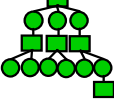






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# Complete “Technology Model” Architecture








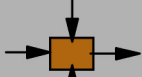

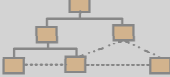


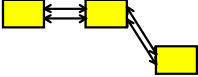
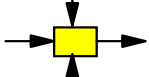
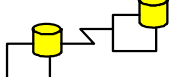
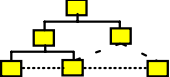



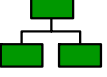










	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
SCOPE (CONTEXTUAL)	List of Things Important to the Business 	List of Processes the Business Performs 	List of Locations in which the Business Operates 	List of Organizations Important to the Business 	List of Events Significant to the Business 	List of Business Goals/Strat 	SCOPE (CONTEXTUAL)
<i>Planner</i>	ENTITY = Class of Business Thing	Function = Class of Business Process	Node = Major Business Location	People = Major Organizations	Time = Major Business Event	Ends/Mean=Major Bus. Goal/Critical Success Factor	<i>Planner</i>
ENTERPRISE MODEL (CONCEPTUAL)	e.g. Semantic Model 	e.g. Business Process Model 	e.g. Business Logistics System 	e.g. Work Flow Model 	e.g. Master Schedule 	e.g. Business Plan 	ENTERPRISE MODEL (CONCEPTUAL)
<i>Owner</i>	Ent = Business Entity ReIn = 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	<i>Owner</i>
SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model 	e.g. Application Architecture 	e.g. Distributed System Architecture 	e.g. Human Interface Architecture 	e.g. Processing Structure 	e.g., Business Rule Model 	SYSTEM MODEL (LOGICAL)
<i>Designer</i>	Ent = Data Entity ReIn = 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	<i>Designer</i>
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model 	e.g. System Design 	e.g. Technology Architecture 	e.g. Presentation Architecture 	e.g. Control Structure 	e.g. Rule Design 	TECHNOLOGY MODEL (PHYSICAL)
<i>Builder</i>	Ent = Segment/Table/etc. ReIn = 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	<i>Builder</i>
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)	e.g. Data Definition 	e.g. Program 	e.g. Network Architecture 	e.g. Security Architecture 	e.g. Timing Definition 	e.g. Rule Specification 	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
<i>Sub-Contractor</i>	Ent = Field ReIn = 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	<i>Sub-Contractor</i>
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

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# Object Oriented Modeling (UML; Use Cases)







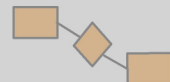
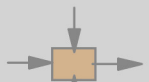

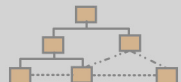


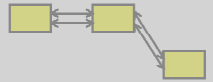
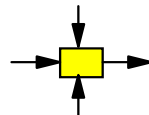

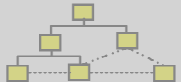
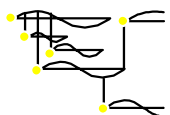

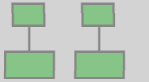
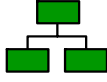
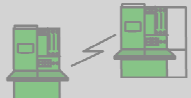
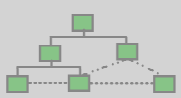
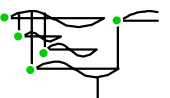







	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
SCOPE (CONTEXTUAL)	List of Things Important to the Business 	List of Processes the Business Performs 	List of Locations in which the Business Operates 	List of Organizations Important to the Business 	List of Events Significant to the Business 	List of Business Goals/Strat 	SCOPE (CONTEXTUAL)
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SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model 	e.g. Application Architecture 	e.g. Distributed System Architecture 	e.g. Human Interface Architecture 	e.g. Processing Structure 	e.g. Business Rule Model 	SYSTEM MODEL (LOGICAL)
<i>Designer</i>	Ent = Data Entity ReIn = 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	<i>Designer</i>
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model 	e.g. System Design 	e.g. Technology Architecture 	e.g. Presentation Architecture 	e.g. Control Structure 	e.g. Rule Design 	TECHNOLOGY MODEL (PHYSICAL)
<i>Builder</i>	Ent = Segment/Table/etc. ReIn = 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	<i>Builder</i>
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)	e.g. Data Definition 	e.g. Program 	e.g. Network Architecture 	e.g. Security Architecture 	e.g. Timing Definition 	e.g. Rule Specification 	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
<i>Sub-Contractor</i>	Ent = Field ReIn = 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	<i>Sub-Contractor</i>
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

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# Structured Methods Modeling








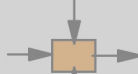




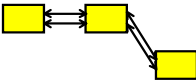
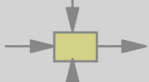




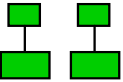











	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
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<i>Owner</i>	Ent = Business Entity ReIn = Business Relationship	Proc. = Business Process I/O = Business Resources	Node = Business Location Link = Business Linkage	People = Organization Unit Work = Work Product	Time = Business Event Cycle = Business Cycle	End = Business Objective Means = Business Strategy	<i>Owner</i>
SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model 	<b>e.g. Application Architecture</b>  <b>Proc. = Application Function</b> <b>I/O = User Views</b>	e.g. Distributed System Architecture 	e.g. Human Interface Architecture 	<b>e.g. Processing Structure</b>  <b>Time = System Event</b> <b>Cycle = Processing Cycle</b>	e.g., Business Rule Model 	SYSTEM MODEL (LOGICAL)
<i>Designer</i>	Ent = Data Entity ReIn = Data Relationship		Node = I/S Function (Processor, Storage, etc) Link = Line Characteristics	People = Role Work = Deliverable		End = Structural Assertion Means = Action Assertion	<i>Designer</i>
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model 	e.g. System Design  <b>Proc. = Computer Function</b> <b>I/O = Data Elements/Sets</b>	e.g. Technology Architecture 	e.g. Presentation Architecture 	e.g. Control Structure  <b>Time = Execute</b> <b>Cycle = Component Cycle</b>	e.g. Rule Design 	TECHNOLOGY MODEL (PHYSICAL)
<i>Builder</i>	Ent = Segment/Table/etc. ReIn = Pointer/Key/etc.		Node = Hardware/System Software Link = Line Specifications	People = User Work = Screen Format		End = Condition Means = Action	<i>Builder</i>
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)	e.g. Data Definition 	e.g. Program  <b>Proc. = Language Stmt</b> <b>I/O = Control Block</b>	e.g. Network Architecture 	e.g. Security Architecture 	e.g. Timing Definition  <b>Time = Interrupt</b> <b>Cycle = Machine Cycle</b>	e.g. Rule Specification 	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
<i>Sub-Contractor</i>	Ent = Field ReIn = Address		Node = Addresses Link = Protocols	People = Identity Work = Job		End = Sub-condition Means = Step	<i>Sub-Contractor</i>
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

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# Complete “Data Model” Architecture







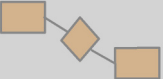
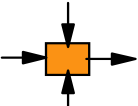

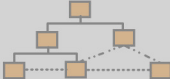


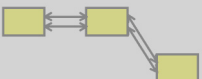
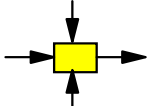





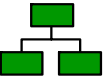










	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
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# Complete “Business Process Model” Architecture

	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
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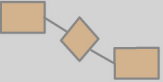
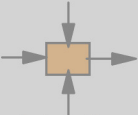

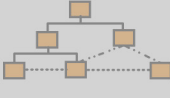

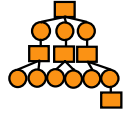
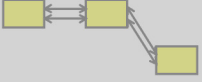
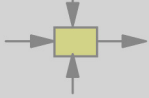
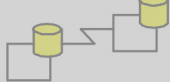

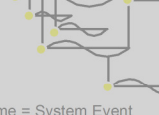
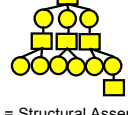
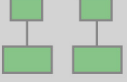




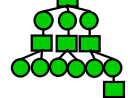





Enterprise Architecture – A Framework™

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# Complete “Business Rule Model” Architecture

	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
SCOPE (CONTEXTUAL)	List of Things Important to the Business 	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 	List of Business Goals/Strat 	SCOPE (CONTEXTUAL)
<i>Planner</i>	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	<i>Planner</i>
ENTERPRISE MODEL (CONCEPTUAL)	e.g. Semantic Model 	e.g. Business Process Model 	e.g. Business Logistics System 	e.g. Work Flow Model 	e.g. Master Schedule 	e.g. Business Plan 	ENTERPRISE MODEL (CONCEPTUAL)
<i>Owner</i>	Ent = Business Entity ReIn = 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	<i>Owner</i>
SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model 	e.g. Application Architecture 	e.g. Distributed System Architecture 	e.g. Human Interface Architecture 	e.g. Processing Structure 	e.g., Business Rule Model 	SYSTEM MODEL (LOGICAL)
<i>Designer</i>	Ent = Data Entity ReIn = 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	<i>Designer</i>
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model 	e.g. System Design 	e.g. Technology Architecture 	e.g. Presentation Architecture 	e.g. Control Structure 	e.g. Rule Design 	TECHNOLOGY MODEL (PHYSICAL)
<i>Builder</i>	Ent = Segment/Table/etc. ReIn = 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	<i>Builder</i>
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)	e.g. Data Definition 	e.g. Program 	e.g. Network Architecture 	e.g. Security Architecture 	e.g. Timing Definition 	e.g. Rule Specification 	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
<i>Sub-Contractor</i>	Ent = Field ReIn = 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	<i>Sub-Contractor</i>
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

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# 2008 BRE FAMILY TREE™

BizRules®.com

Rete Algorithm

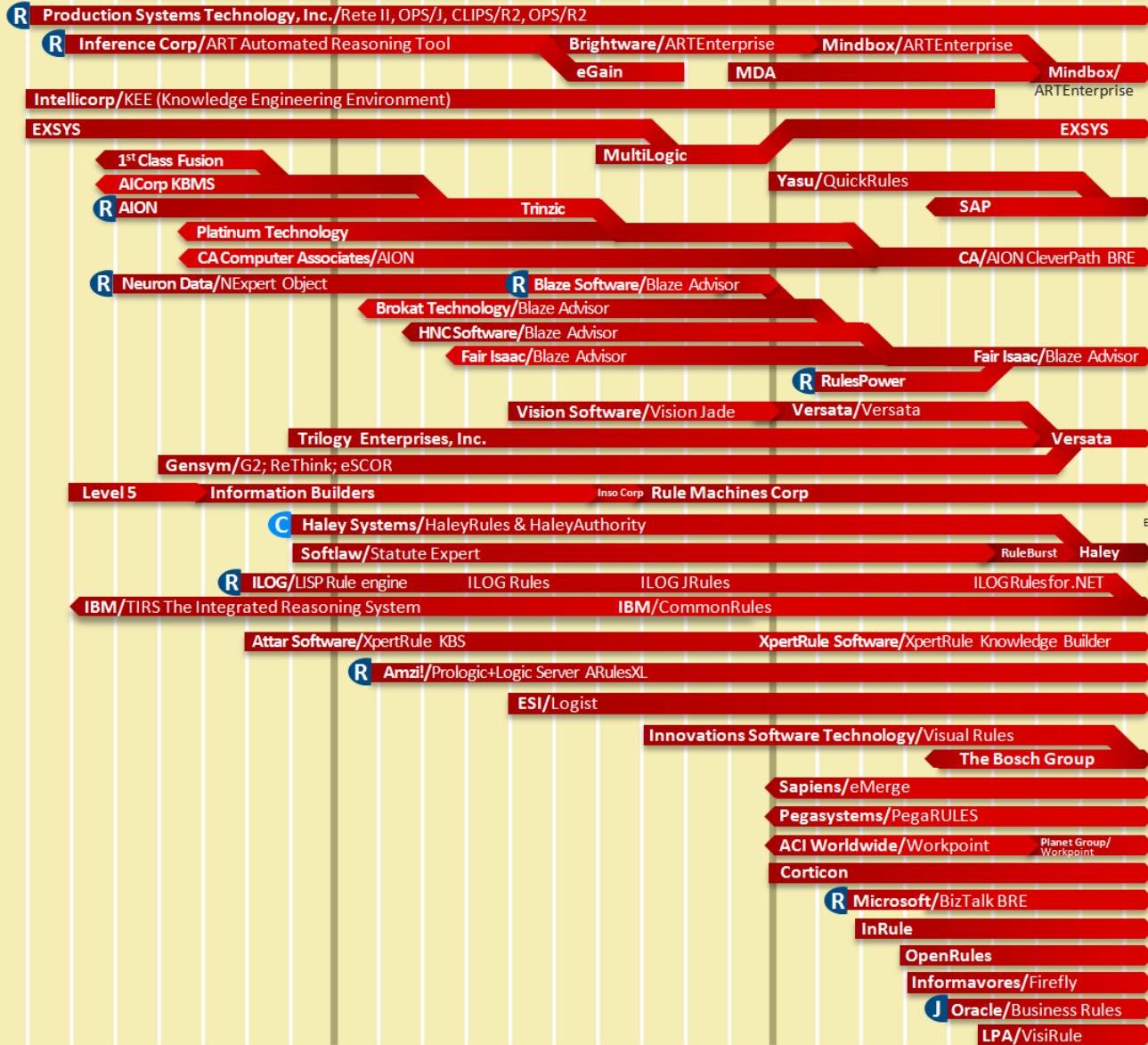
Drools (OO Rete)

JBoss Rules

Red Hat JBoss Rules

Jess – Java Expert System Shell (Java version of Rete)

CLIPS – C Language Integrated Production System (C implementation of Rete)



BRE Can be run from:  
+ BRE runs natively in:  
COBOL C++ Java .Net

1980

1990

2000

2010

# Traditional Procedural Language

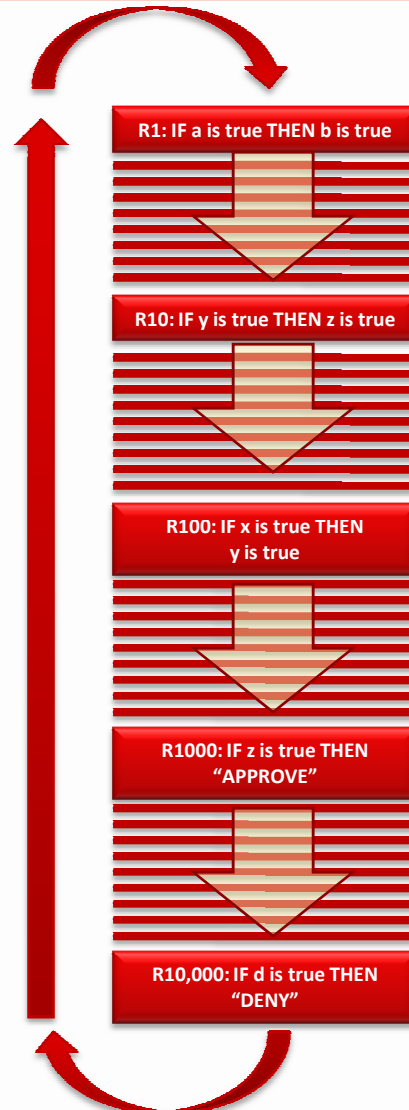
**DATA:**  
**X is TRUE**

**Loop #1**  
**Ran 10,000 rules**  
**1 rule fired**  
**(R100)**

**Loop #2**  
**Ran 10,000 rules**  
**2 rules fired**  
**(R10, R1000)**

**CONCLUSION:**  
**Approve**

**Results**  
**Ran 20,000 rules**  
**Only 3 rules fired**



Traditional Procedural language is sequential, forward only

Suppose your rules are out of order?

- Problems arise if sequence is incorrect

What if you have to add a new rule?

- Developer has to figure out what order to put it in
- Adding a new rule could break existing rules

Once you get an answer, the rest of the rules fire anyway

You have to loop a few times to get around sequence problem



# Declarative (Rule-based) Language

## Cycle #1

Ran 2 rules  
Fired 1 rule  
(R100)

## Cycle #2

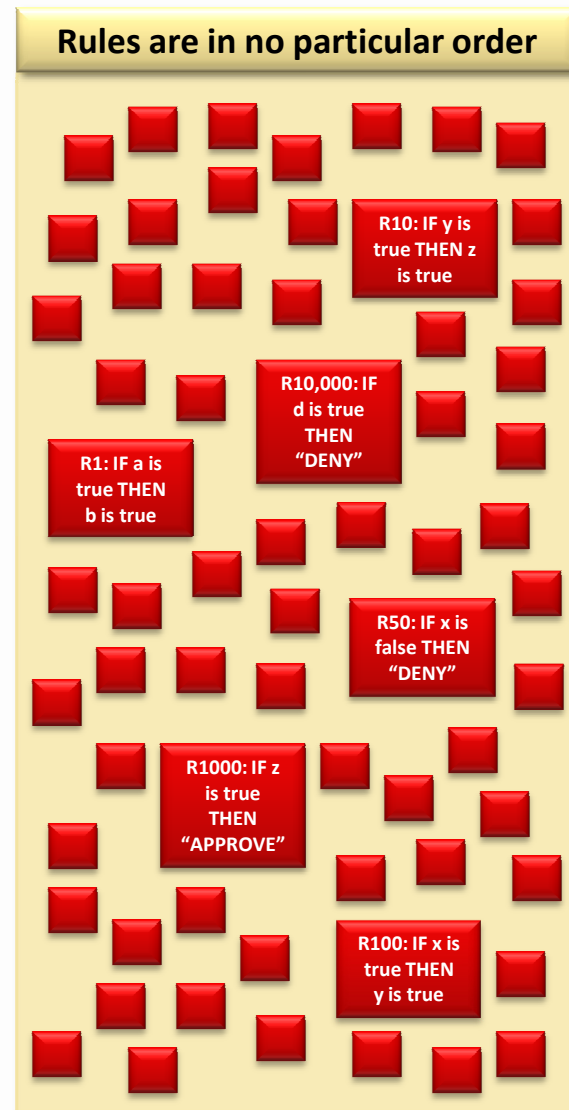
Ran 1 rule  
Fired 1 rule  
(R10)

## Cycle #3

Ran 1 rule  
Fired 1 rule  
(R1000)

## Results

Search found  
4 matching rules  
Only 3 rules fired



DATA: X is TRUE

Search for rules that match the data

R50: IF x is false THEN "Deny"

R100: IF x is true THEN y is True

Execute those rules

R50 does not fire

R100 fires because x is true

DATA: X is TRUE  
Y is TRUE

Search for rules that match the data

R10: IF y is true THEN z is True

Execute those rules

R10 fires because y is true

DATA: X is TRUE  
Y is TRUE  
Z is true

Search for rules that match the data

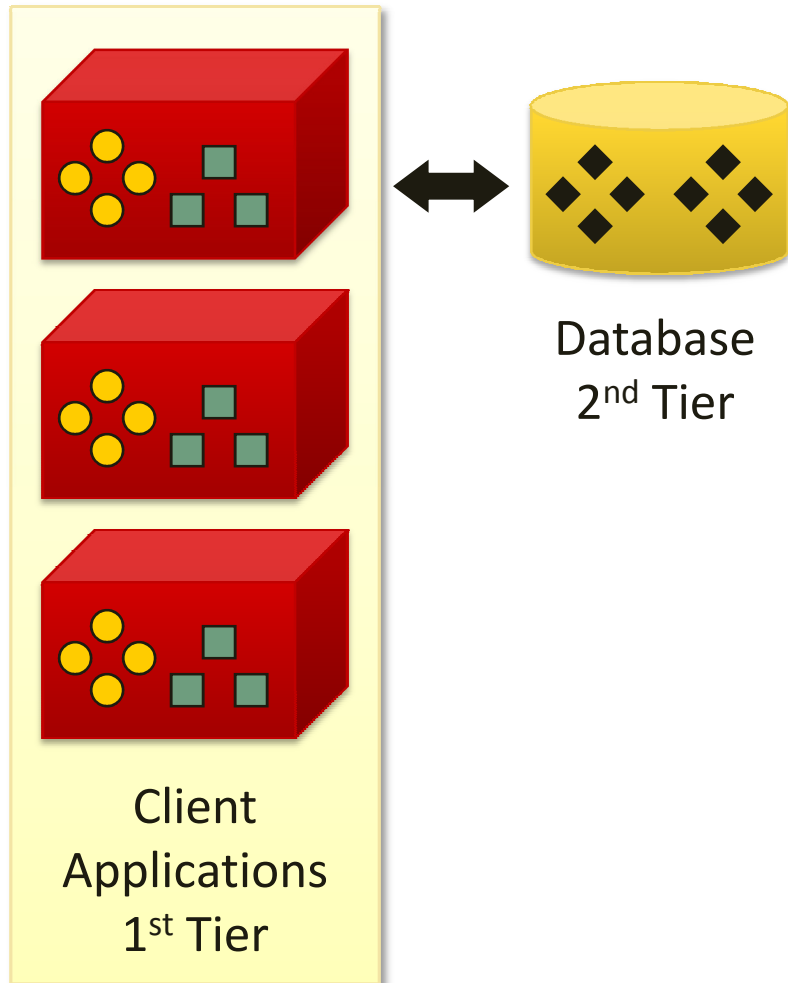
R1000: IF z is true THEN "APPROVE"

Execute those rules

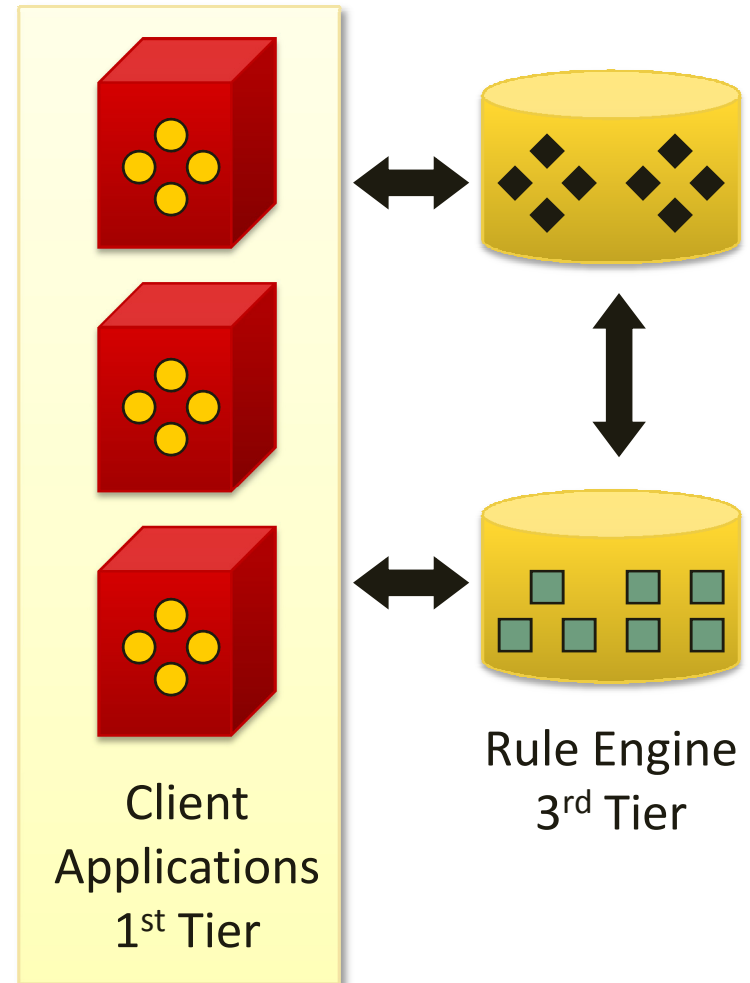
R1000 fires because z is true

CONCLUSION: APPROVE

## Traditional approach using hard-coded rules



## Modern approach using business rules



● Code    ■ Business Rules    ◆ Data

## Benefits of centralizing rules in one rulebase

- Can take a **broader** view of the customer

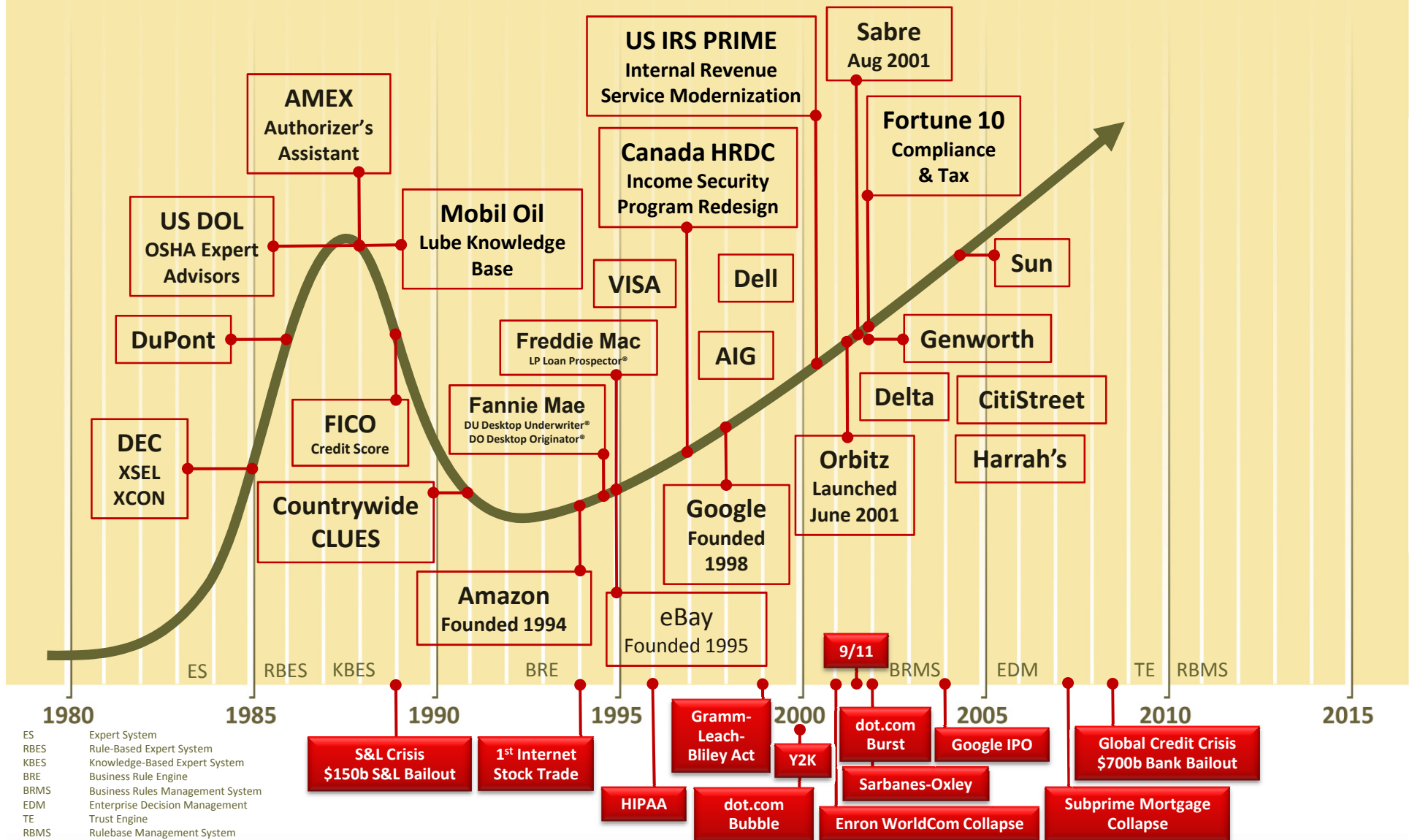
- If you just cancelled my policy...
- If you just raised my premium...
- If you just lost my luggage...

...stop sending me email or text messages with special offers for a while → I'm not happy with you right now

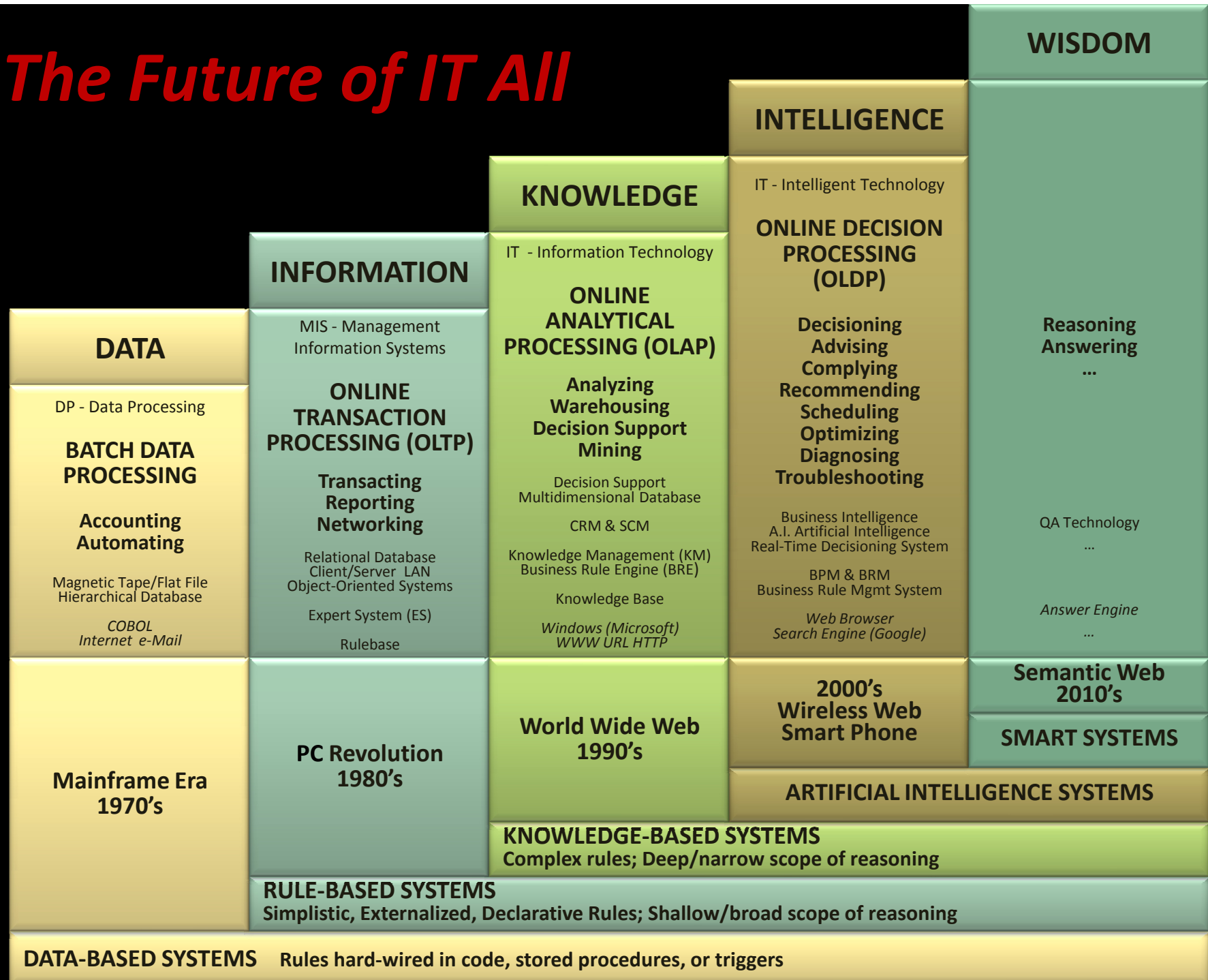
- Less code
- Easier maintenance (\$6/\$1)
- Faster time to market
- ... etc...

# Who uses rules technology?

## A.I. Expert Systems, Rulebase, and Knowledgebase Case Studies



# The Future of IT All

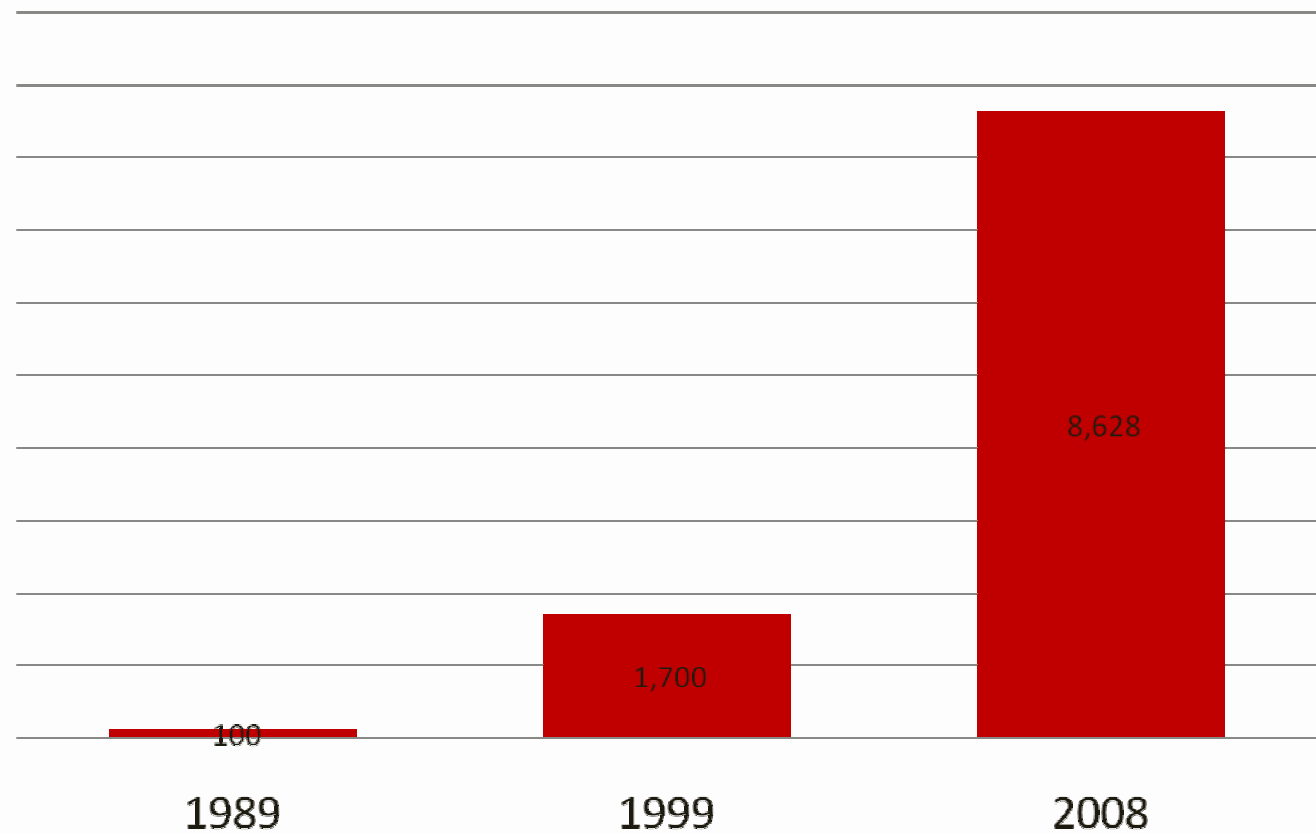


## What is the difference between data-based, rule-based, and knowledge-based systems?

	<b>Data-Based System</b>	<b>Rule-Based System</b>	<b>Knowledge-Based System</b>
<b>Can process</b>	Data	Data Rules	Data Rules Knowledge
<b>Can output</b>	Information	Information Decisions Real-Time Decisions	Information Decisions Answers Expert Advice Recommendations
<b>Commonly implemented using</b>	"Hard-coded rules" Procedural languages	"Rule-based" Declarative languages Deterministic	Fuzzy Logic, CBR, Probabilistic reasoning, other AI/ES techniques
<b>Ideal for</b>	IT/System rules Application rules	Simplistic business rules	Complex business rules
<b>Best for these types of applications</b>	Transacting Reporting (Traditional information systems)	Decisioning Compliance	Advising Product selection Recommending Troubleshooting
<b>Intelligence Capability</b>	Not intelligent	Shallow logic Broad domains	Deep Logic Narrow domain

# Number of US Patents

Mentioning keyword “Artificial Intelligence”

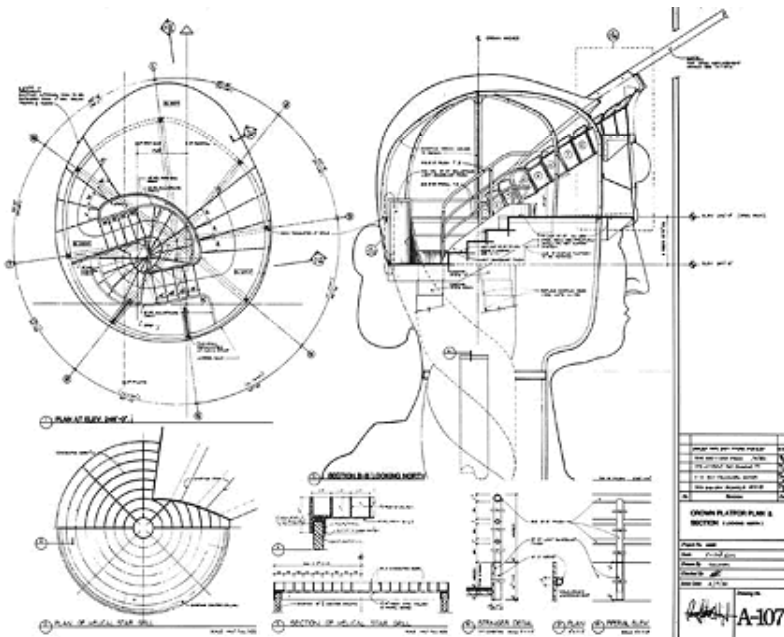


# Framework for building and designing systems that *work, change,* and *last*



Architecture  
Engineering  
Idea  
Logical  
Representation

The result of architecture  
Design & Build  
Implementation  
Physical  
Instantiation



# A general framework for building any system

Architecture → Engineering → Design → Build



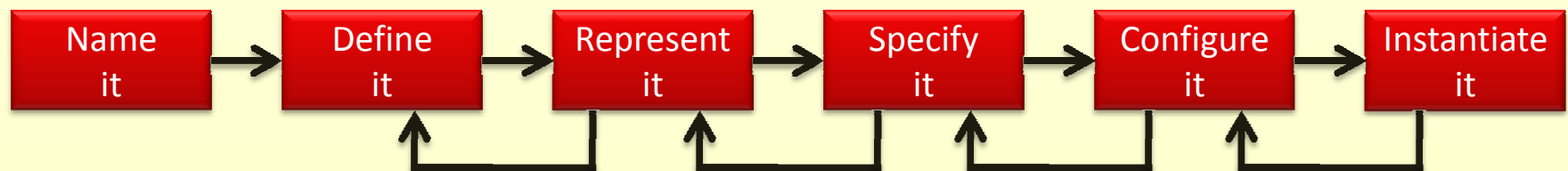
Lack of specificity in one step leads to ambiguity in the next steps...

Lack of quality in one step leads to mistakes in the next steps...

Lack of completeness in one step leads to gaps in the next steps...

# A general framework for *building* any system

Architecture → Engineering → Design → Build



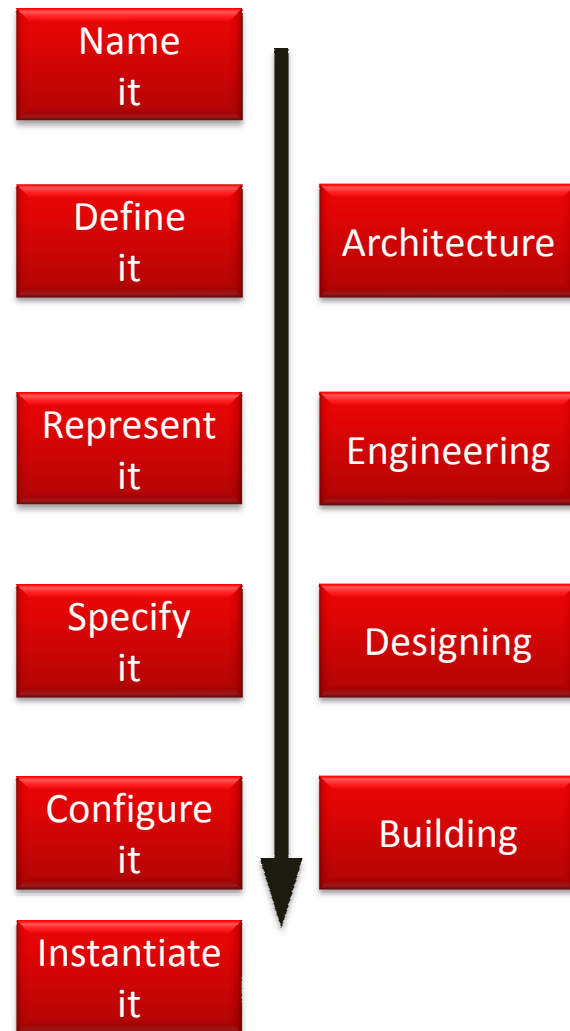
Lack of specificity in one step leads to ambiguity in the next steps...

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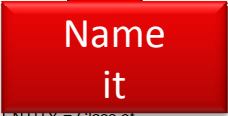




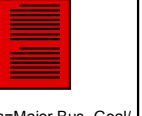


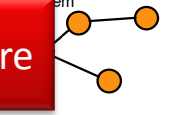
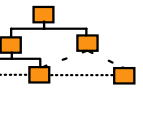

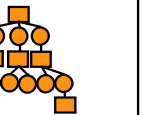


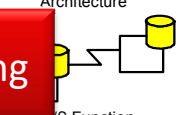
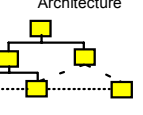

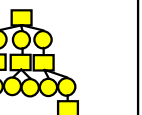


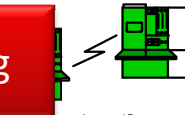
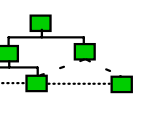
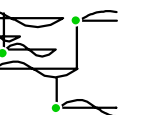
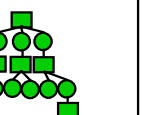







Lack of completeness in one step leads to gaps in the next steps...

and thus the need for reiteration & rework in the process

## A general framework for *building* any system



# Enterprise Architecture – A Framework™

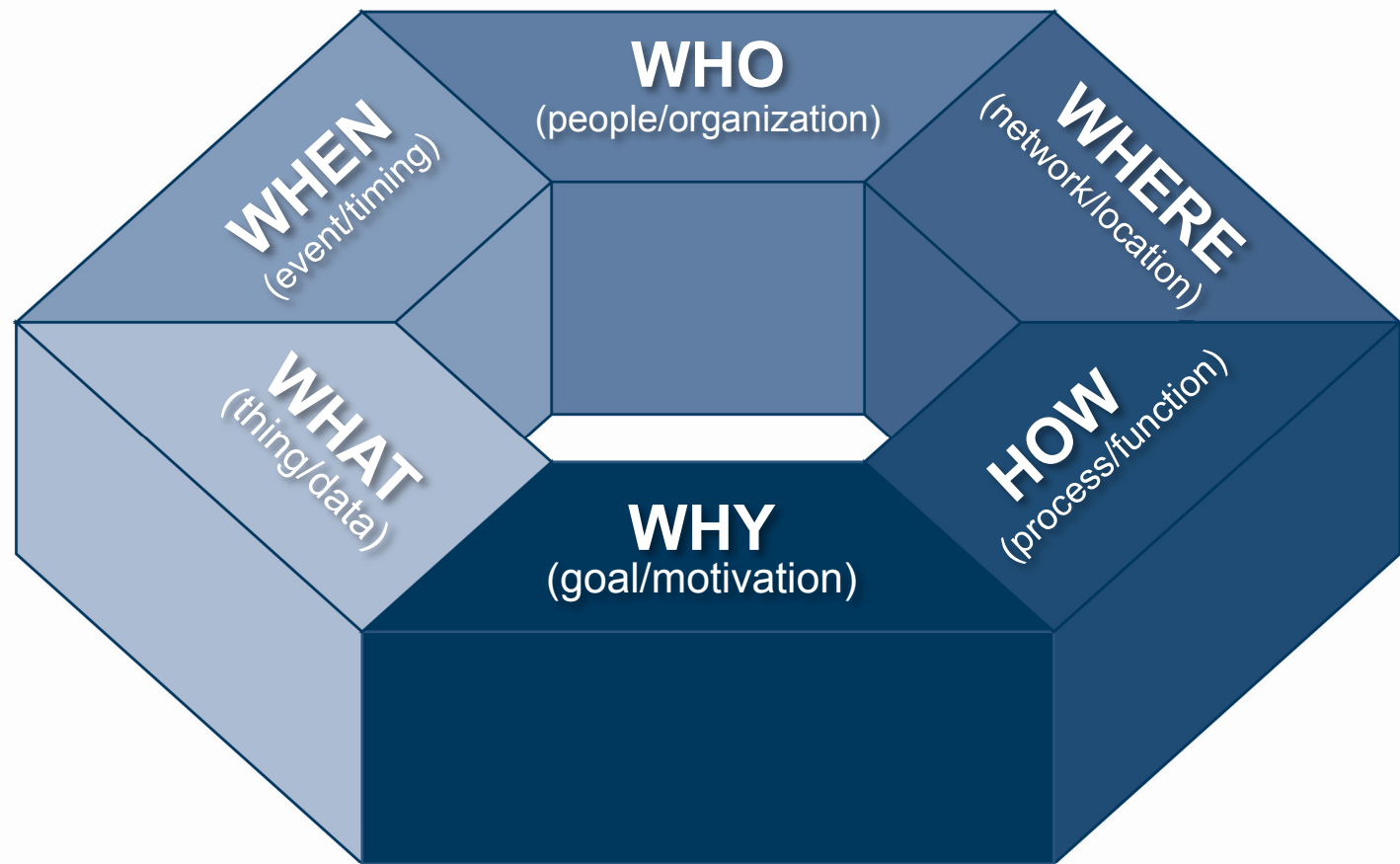
	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
SCOPE (CONTEXTUAL)	List of Things Important to the Business  ENTITY = Class of Business Thing	List of Processes the Business Performs  Function = Class of Business Process	List of Locations in which the Business Operates  Node = Major Business Location	List of Organizations Important to the Business  People = Major Organizations	List of Events Significant to the Business  Time = Major Business Event	List of Business Goals/Strat  Ends/Mean=Major Bus. Goal/ Critical Success Factor	SCOPE (CONTEXTUAL)
ENTERPRISE MODEL (CONCEPTUAL)	e.g. Semantic Model  Ent = Business Entity ReIn = Business Relationship	e.g. Business Process Model  Proc. = Business Process I/O = Business Resources	e.g. Business Logistics  Node = Business Location Link = Business Linkage	e.g. Work Flow Model  People = Organization Unit Work = Work Product	e.g. Master Schedule  Time = Business Event Cycle = Business Cycle	e.g. Business Plan  End = Business Objective Means = Business Strategy	ENTERPRISE MODEL (CONCEPTUAL)
SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model  Ent = Data Entity ReIn = Data Relationship	e.g. Application Architecture  Proc. = Application Function I/O = User Views	e.g. Distributed System Architecture  Node = System Function (Processor, Storage, etc.) Link = Line Characteristics	e.g. Human Interface Architecture  People = Role Work = Deliverable	e.g. Processing Structure  Time = System Event Cycle = Processing Cycle	e.g., Business Rule Model  End = Structural Assertion Means = Action Assertion	SYSTEM MODEL (LOGICAL)
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model  Ent = Segment/Table/etc. ReIn = Pointer/Key/etc.	e.g. System Design  Proc. = Computer Function I/O = Data Elements/Sets	e.g. Technology Architecture  Node = Hardware/System Software Link = Line Specifications	e.g. Presentation Architecture  People = User Work = Screen Format	e.g. Control Structure  Time = Execute Cycle = Component Cycle	e.g. Rule Design  End = Condition Means = Action	TECHNOLOGY MODEL (PHYSICAL)
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)	e.g. Data Definition  Ent = Field	e.g. Program  Proc. = Language Stmt I/O = Control Block	e.g. Network Architecture  Node = Addresses Link = Protocols	e.g. Security Architecture  People = Identity Work = Job	e.g. Timing Definition  Time = Interrupt Cycle = Machine Cycle	e.g. Rule Specification  End = Sub-condition Means = Step	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
FUNCTIONING ENTERPRISE		e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

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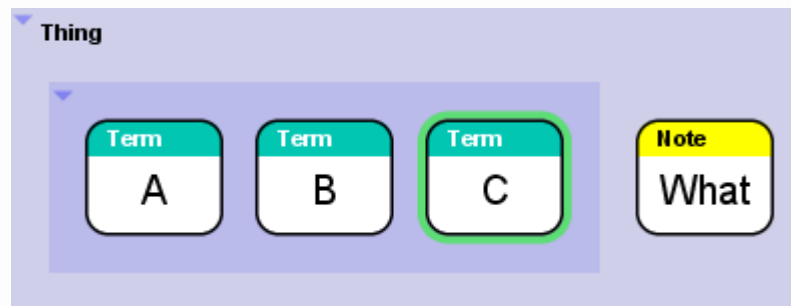
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## A general framework for *designing* any system



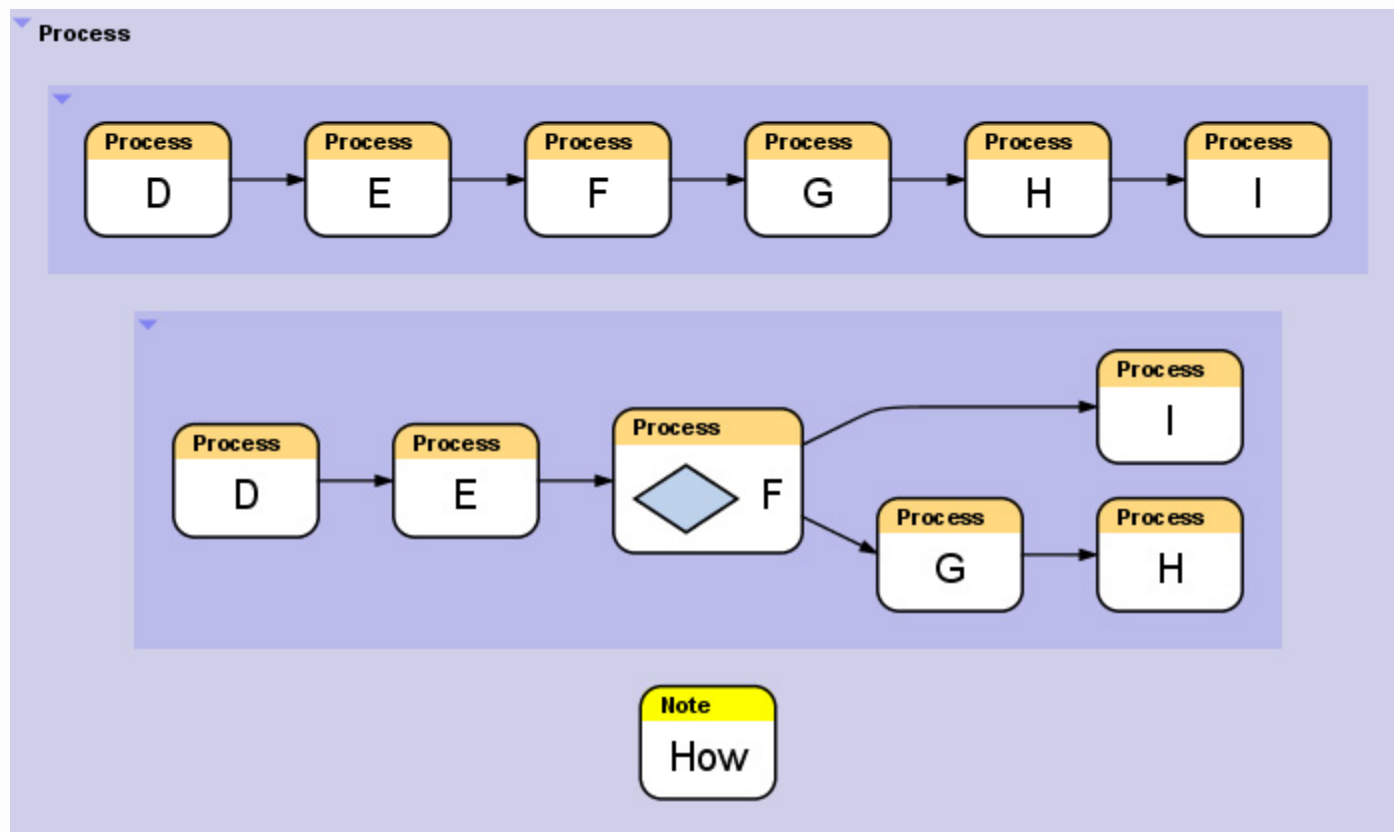
# Data / What

- Things
- Inventory sets



# Process / How

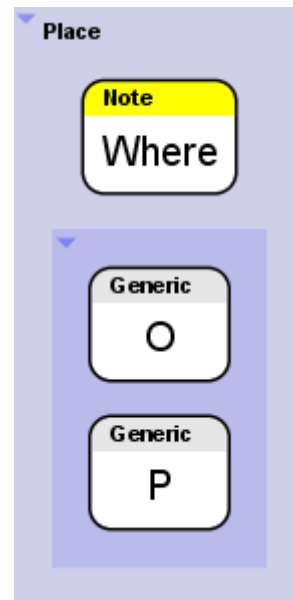
- Process transformations





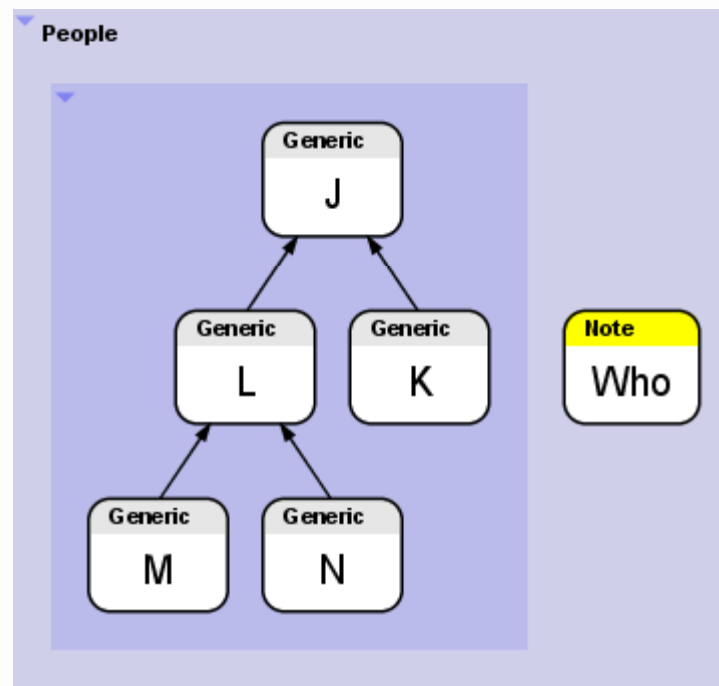
# Place / Where

- Transportations
- Locations
- Network nodes



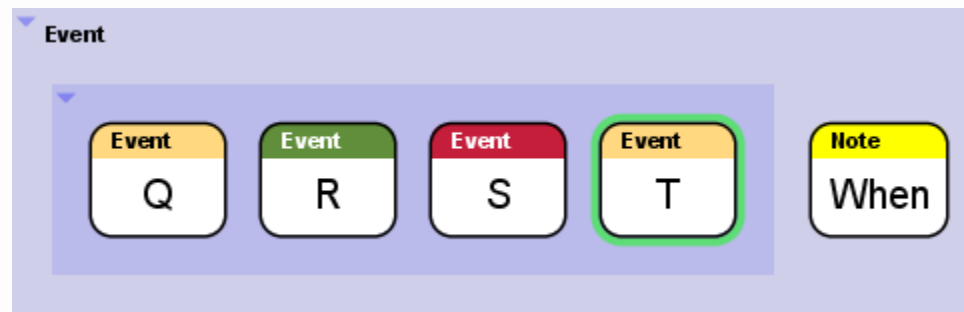
# People / Who

- Organization Groups



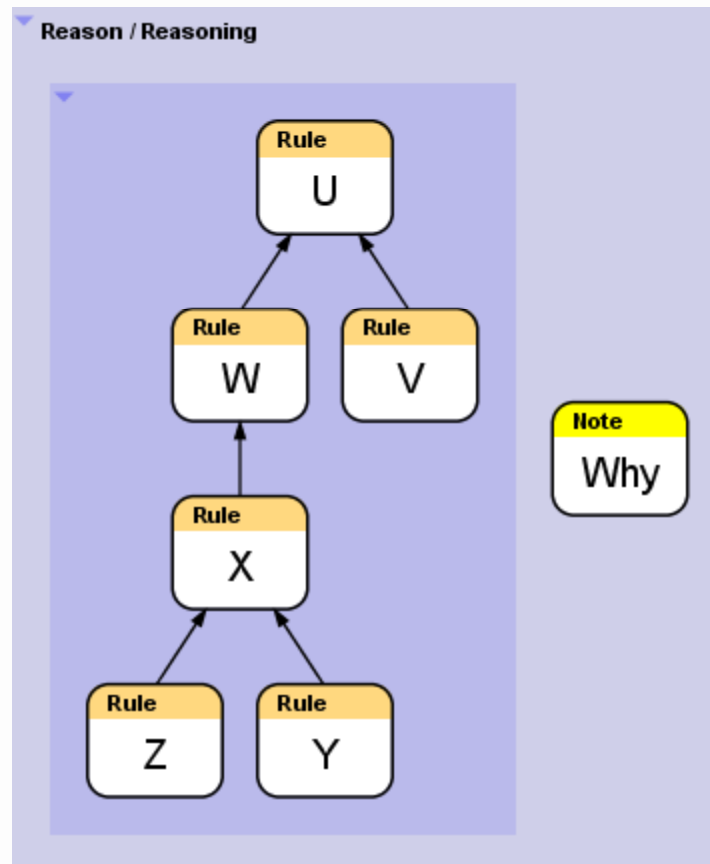
# Event / When

- Timing periods
- Master schedules
- Deadlines
- Due dates



# Reasons / Why

- Motivation reasons
- Reasoning
- Strategy
- Mission
- Goals
- Objectives



**Enterprise architecture  
ensures that all the parts of the  
business system connect, fit, and  
work**

## Data



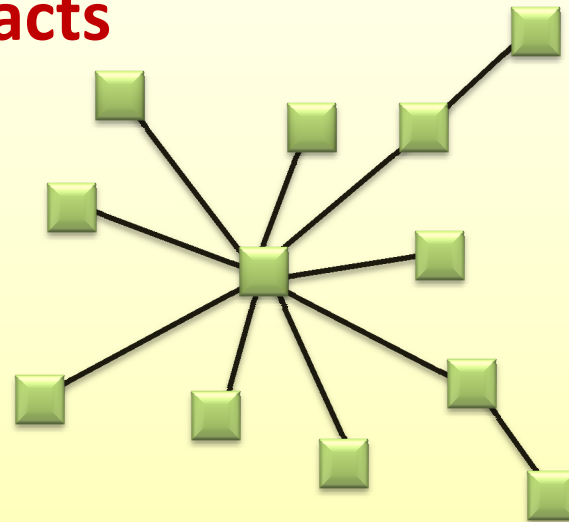
## Rules



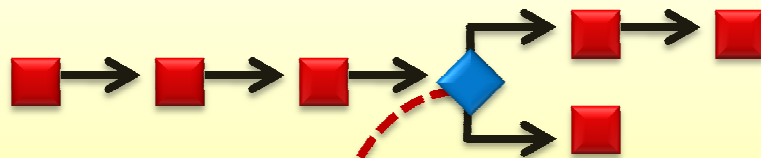
## Terms



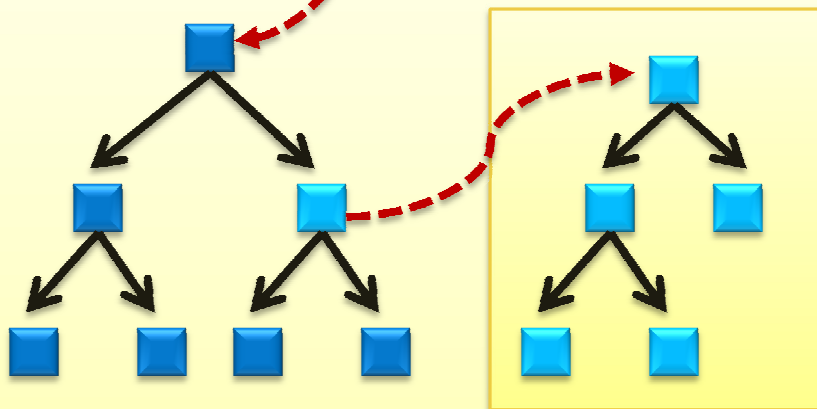
## Facts



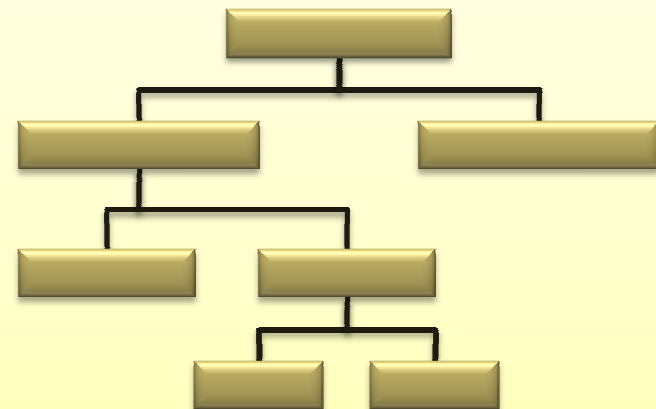
## Process



## Ruleset



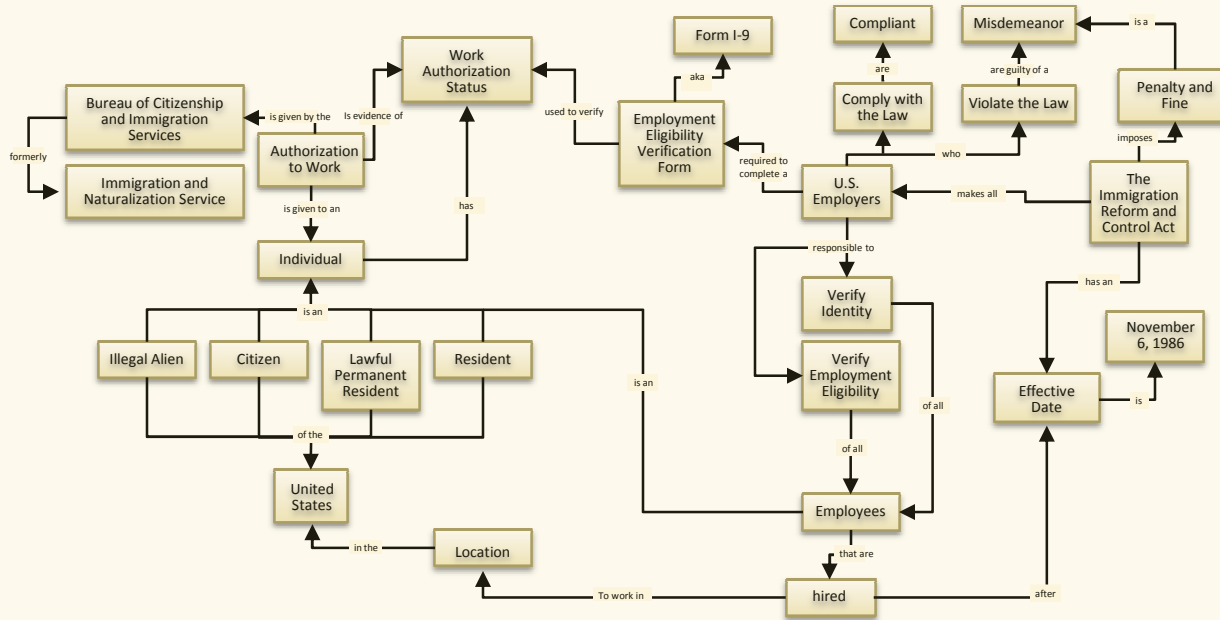
## Rulebase Hierarchy



# 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).

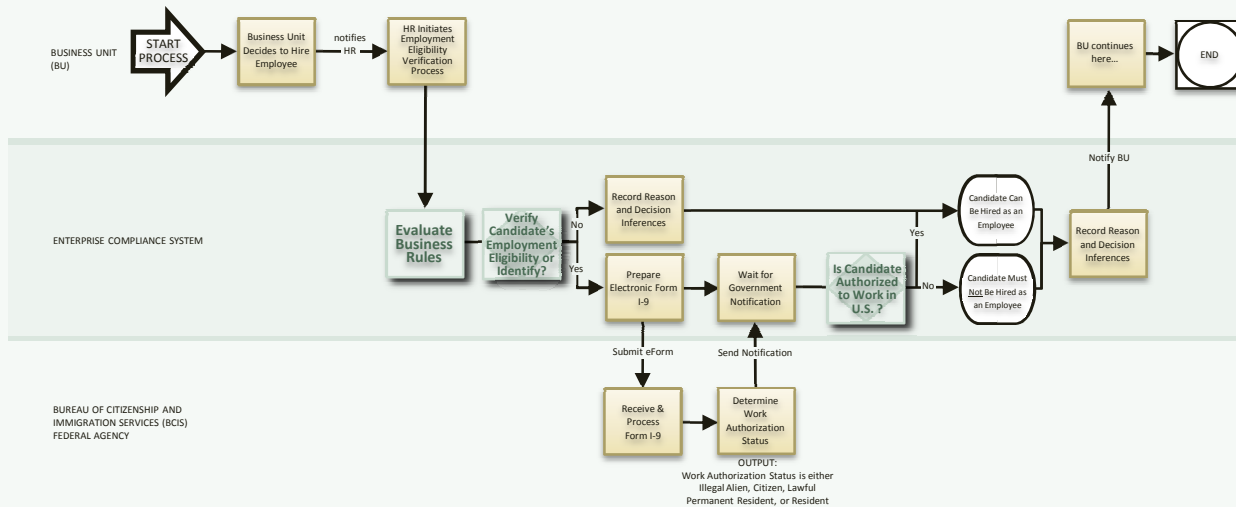
## GOVERNING RULES

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.

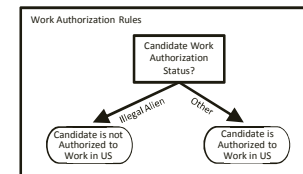
Anyone Employing an Illegal Alien without Verifying his or her Work Authorization Status is Guilty of a Misdemeanor.

DIGITIZED PROCESS (BUSINESS PROCESS MODEL)





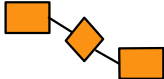
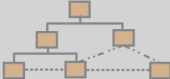

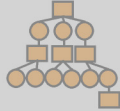
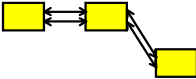
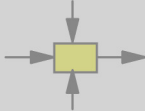




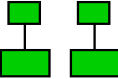


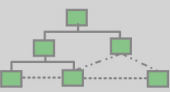










## BUSINESS RULES

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	-	Contractor	-	-
	Candidate Work Location is _____	In the US	-	-	Outside the US	-
	Candidate Hire Date is _____	After	-	-	-	On or before
	Nov. 6, 1986					
THEN	Submit I-9 form					
	Company must verify Candidate's Employment Eligibility	Yes	No	No	No	No
	Company must verify Candidate's Identity	Yes	No	No	No	No



# Terms and Facts

	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
SCOPE (CONTEXTUAL)	List of Things Important to the Business 	<b>Terms</b>		List of Organizations Important to the Business 	List of Events Significant to the Business 	List of Business Goals/Strat 	SCOPE (CONTEXTUAL)
<i>Planner</i>	ENTITY = Class of Business Thing			People = Major Organizations	Time = Major Business Event	Ends/Mean=Major Bus. Goal/ Critical Success Factor	<i>Planner</i>
ENTERPRISE MODEL (CONCEPTUAL)	e.g. Semantic Model 	<b>Facts &amp; Fact Models</b>		e.g. Work Flow Model 	e.g. Master Schedule 	e.g. Business Plan 	ENTERPRISE MODEL (CONCEPTUAL)
<i>Owner</i>	Ent = Business Entity ReIn = Business Relationship			People = Organization Unit Work = Work Product	Time = Business Event Cycle = Business Cycle	End = Business Objective Means = Business Strategy	<i>Owner</i>
SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model 	e.g. Application Architecture 	e.g. Distributed System Architecture 	e.g. Human Interface Architecture 	e.g. Processing Structure 	e.g., Business Rule Model 	SYSTEM MODEL (LOGICAL)
<i>Designer</i>	Ent = Data Entity ReIn = 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	<i>Designer</i>
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model 	e.g. System Design 	e.g. Technology Architecture 	e.g. Presentation Architecture 	e.g. Control Structure 	e.g. Rule Design 	TECHNOLOGY MODEL (PHYSICAL)
<i>Builder</i>	Ent = Segment/Table/etc. ReIn = 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	<i>Builder</i>
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)	e.g. Data Definition 	e.g. Program 	e.g. Network Architecture 	e.g. Security Architecture 	e.g. Timing Definition 	e.g. Rule Specification 	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
<i>Sub-Contractor</i>	Ent = Field ReIn = 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	<i>Sub-Contractor</i>
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE





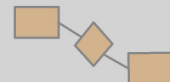
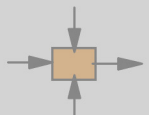
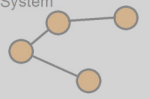
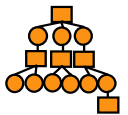
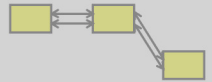
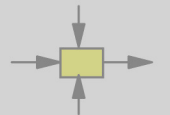

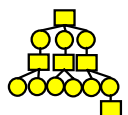
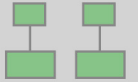


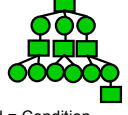




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# Goals, Rules and Decisions








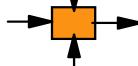
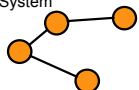
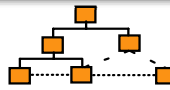
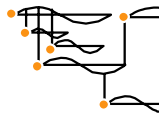
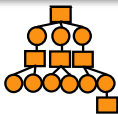
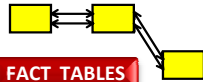
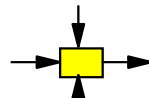
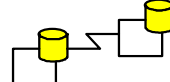
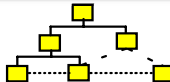
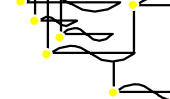
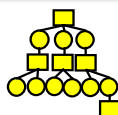
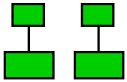
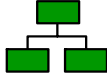
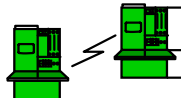
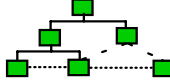
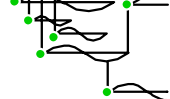
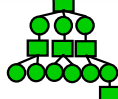






	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
SCOPE (CONTEXTUAL)	List of Things Important to the Business 	List of Processes the Business Performs 	List of Locations in which the Business Operates 	<b>Mission &amp; Goals/Objectives</b> <b>Management Intention</b>		List of Business Goals/Strat 	SCOPE (CONTEXTUAL)
<i>Planner</i>	ENTITY = Class of Business Thing	Function = Class of Business Process	Node = Major Business Location			Ends/Mean=Major Bus. Goal/ Critical Success Factor	<i>Planner</i>
ENTERPRISE MODEL (CONCEPTUAL)	e.g. Semantic Model 	e.g. Business Process Model 	e.g. Business Logistics System 	<b>Strategy &amp; Policy (Governing Rules)</b> <b>Informal or Detailed Description</b>		e.g. Business Plan 	ENTERPRISE MODEL (CONCEPTUAL)
<i>Owner</i>	Ent = Business Entity Rein = Business Relationship	Proc. = Business Process I/O = Business Resources	Node = Business Location Link = Business Linkage			End = Business Objective Means = Business Strategy	<i>Owner</i>
SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model 	e.g. Application Architecture 	e.g. Distributed System Architecture 	<b>Rulebase/Rulesets (Textual/Decision Trees/Decision Tables)</b> <b>Detailed Logical Definition</b>		e.g., Business Rule Model 	SYSTEM MODEL (LOGICAL)
<i>Designer</i>	Ent = Data Entity Rein = Data Relationship	Proc. = Application Function I/O = User Views	Node = I/S Function (Processor, Storage, etc) Link = Line Characteristics			End = Structural Assertion Means = Action Assertion	<i>Designer</i>
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model 	e.g. System Design 	e.g. Technology Architecture 	<b>Formal/Detailed Rules (Textual/If...Then)</b> <b>Detailed Technical Specification</b>		e.g. Rule Design 	TECHNOLOGY MODEL (PHYSICAL)
<i>Builder</i>	Ent = Segment/Table/etc. Rein = Pointer/Key/etc.	Proc. = Computer Function I/O = Data Elements/Sets	Node = Hardware/System Software Link = Line Specifications			End = Condition Means = Action	<i>Builder</i>
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)	e.g. Data Definition 	e.g. Program 	e.g. Network Architecture 	<b>Source Code (Automated Rules)</b> <b>Implementation</b>		e.g. Rule Specification 	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
<i>Sub-Contractor</i>	Ent = Field Rein = Address	Proc. = Language Stmt I/O = Control Block	Node = Addresses Link = Protocols			End = Sub-condition Means = Step	<i>Sub-Contractor</i>
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	<b>Enterprise Decision</b>		e.g. STRATEGY	FUNCTIONING ENTERPRISE

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# How do business rules fit into the Enterprise Architecture?

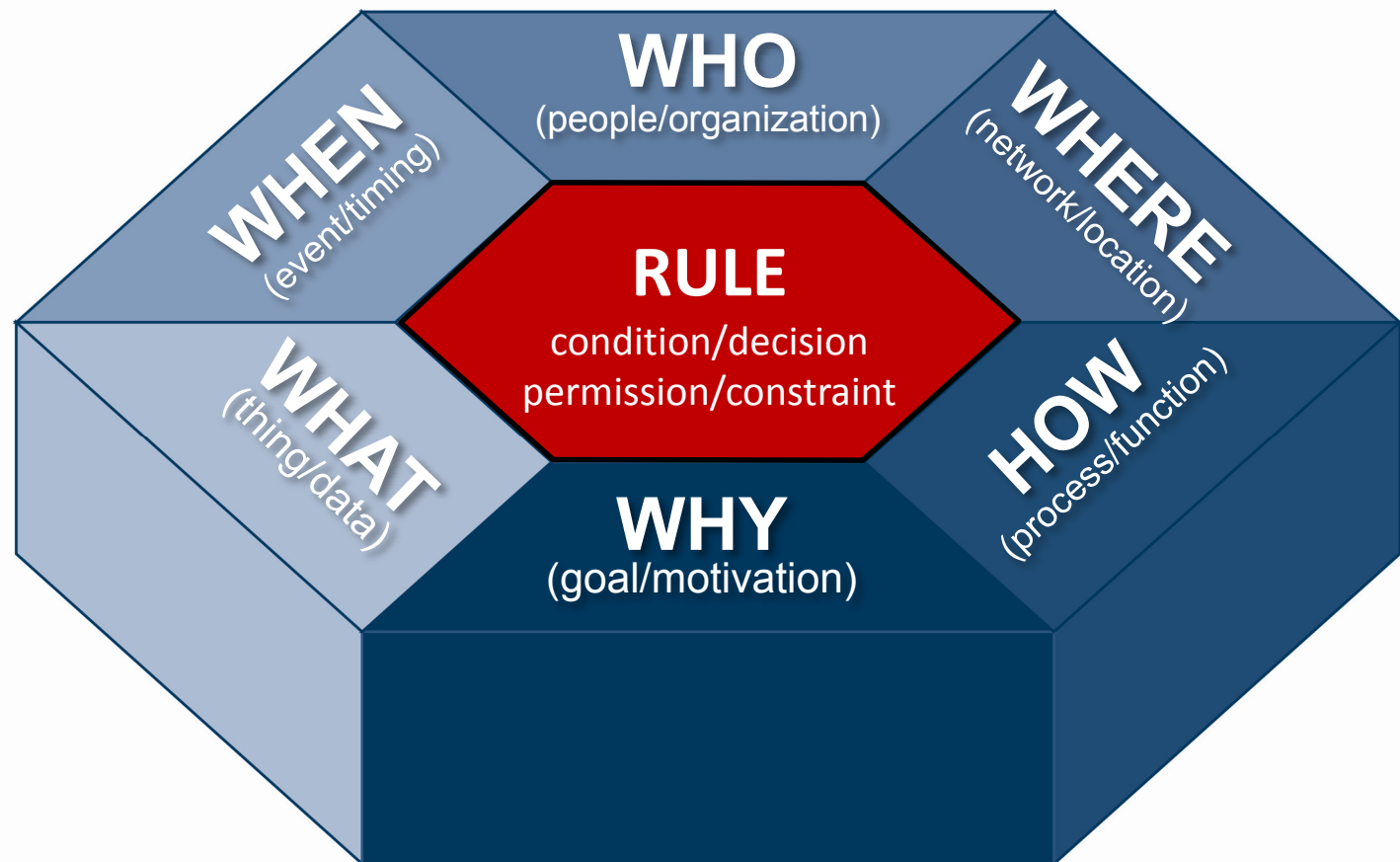
	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
SCOPE (CONTEXTUAL)	<b>TERMS</b> 	List of Processes the Business Performs 	List of Locations in which the Business Operates 	List of Organizations Important to the Business 	List of Events Significant to the Business 	<b>MISSION &amp; GOALS</b> 	SCOPE (CONTEXTUAL)
<i>Planner</i>	ENTITY = Class of Business Thing	Function = Class of Business Process	Node = Major Business Location	People = Major Organizations	Time = Major Business Event	Ends/Mean=Major Bus. Goal/ Critical Success Factor	<i>Planner</i>
ENTERPRISE MODEL (CONCEPTUAL)	e.g. Semantic Model  <b>FACT MODELS</b>	<b>BUSINESS PROCESS MODELS</b> 	e.g. Business Logistics System 	<b>WORK FLOW MODELS</b> 	e.g. Master Schedule 	<b>GOVERNING RULES</b> 	ENTERPRISE MODEL (CONCEPTUAL)
<i>Owner</i>	Ent = Business Entity ReIn = 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	<i>Owner</i>
SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model  <b>FACT TABLES</b>	e.g. Application Architecture 	e.g. Distributed System Architecture 	<b>USER INTERFACE ARCHITECTURE</b> 	e.g. Processing Structure 	<b>BUSINESS RULE MODELS</b> 	SYSTEM MODEL (LOGICAL)
<i>Designer</i>	Ent = Data Entity ReIn = 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	<i>Designer</i>
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model 	e.g. System Design 	e.g. Technology Architecture 	e.g. Presentation Architecture 	e.g. Control Structure 	<b>RULE DESIGNS</b> 	TECHNOLOGY MODEL (PHYSICAL)
<i>Builder</i>	Ent = Segment/Table/etc. ReIn = 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	<i>Builder</i>
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)	e.g. Data Definition 	e.g. Program 	e.g. Network Architecture 	e.g. Security Architecture 	e.g. Timing Definition 	<b>RULE SPECIFICATIONS</b> 	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
<i>Sub-Contractor</i>	If [Conditions] Then [Actions]					[Goals]	<i>Sub-Contractor</i>
Ent = Field ReIn = 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		
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

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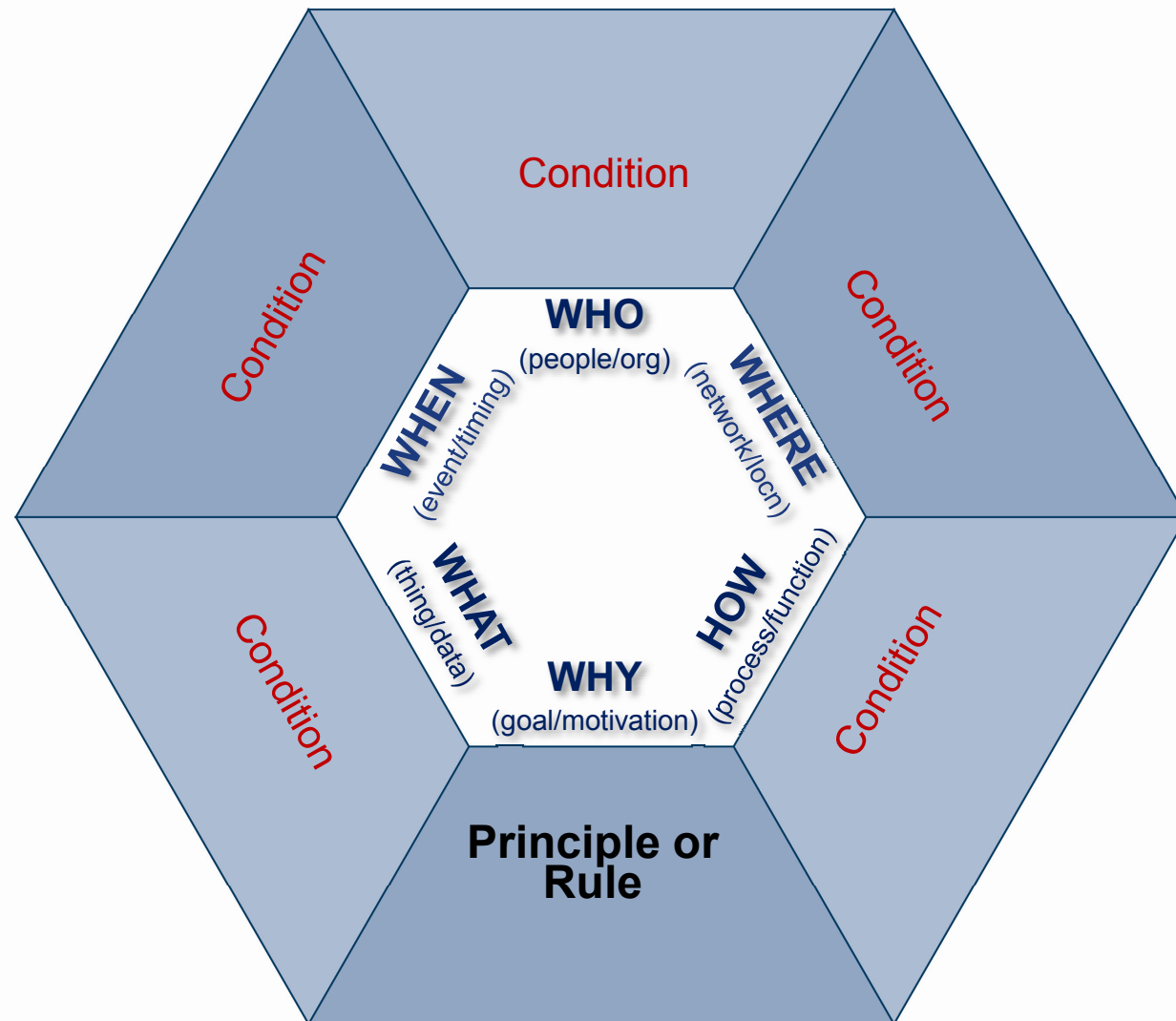
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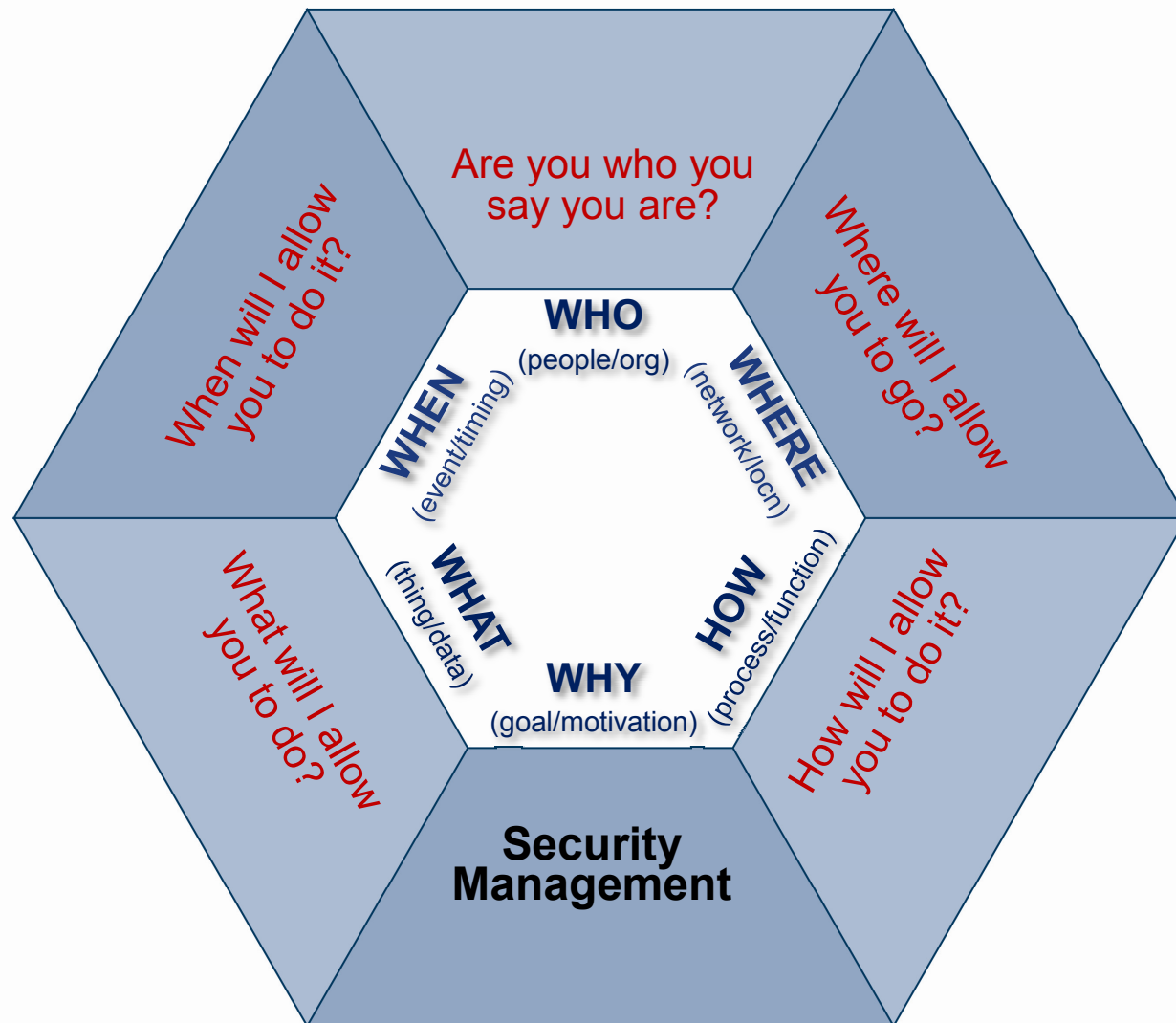
## A general framework for designing rules



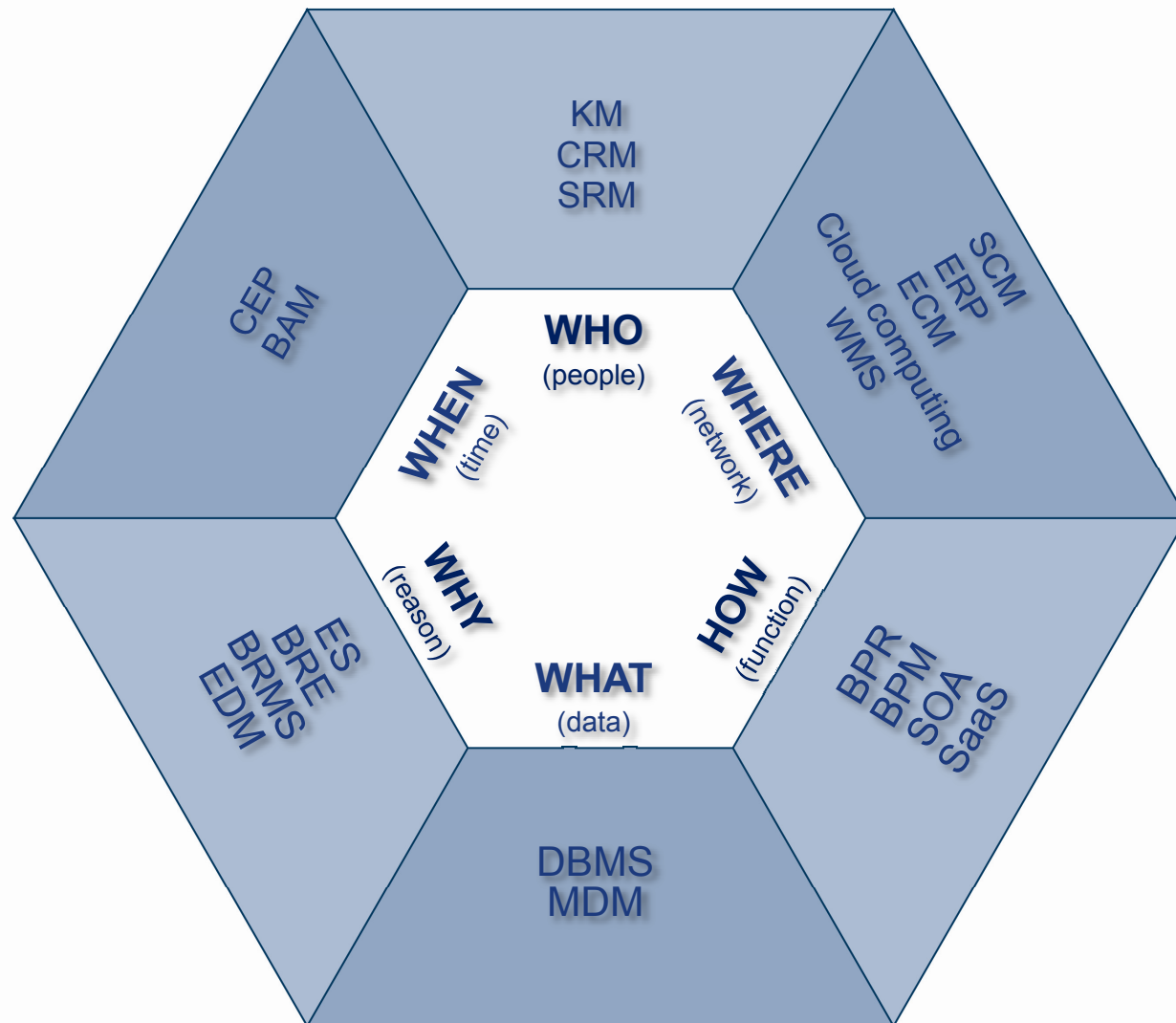
# General Rule Pattern



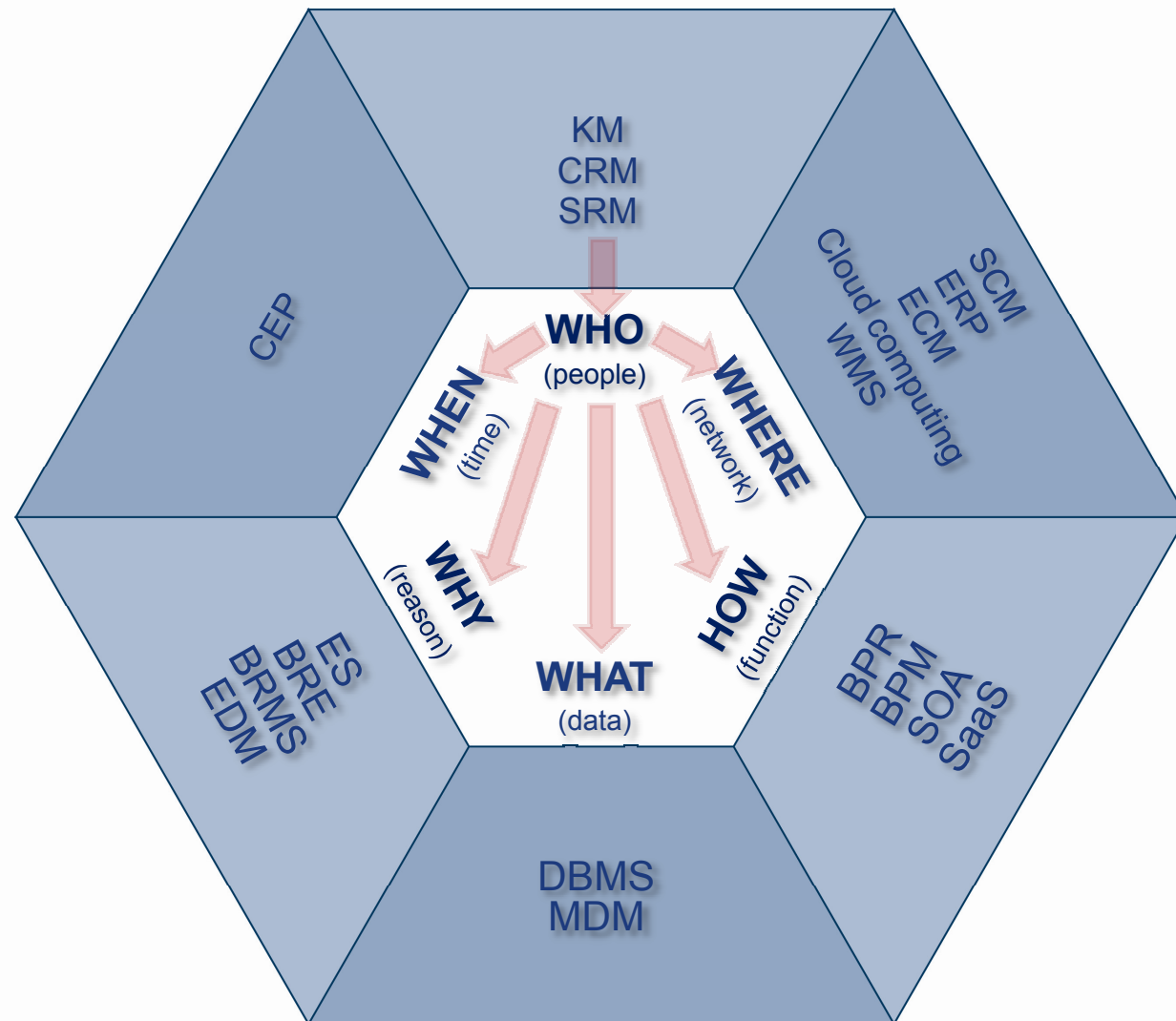
# Security Rule Pattern



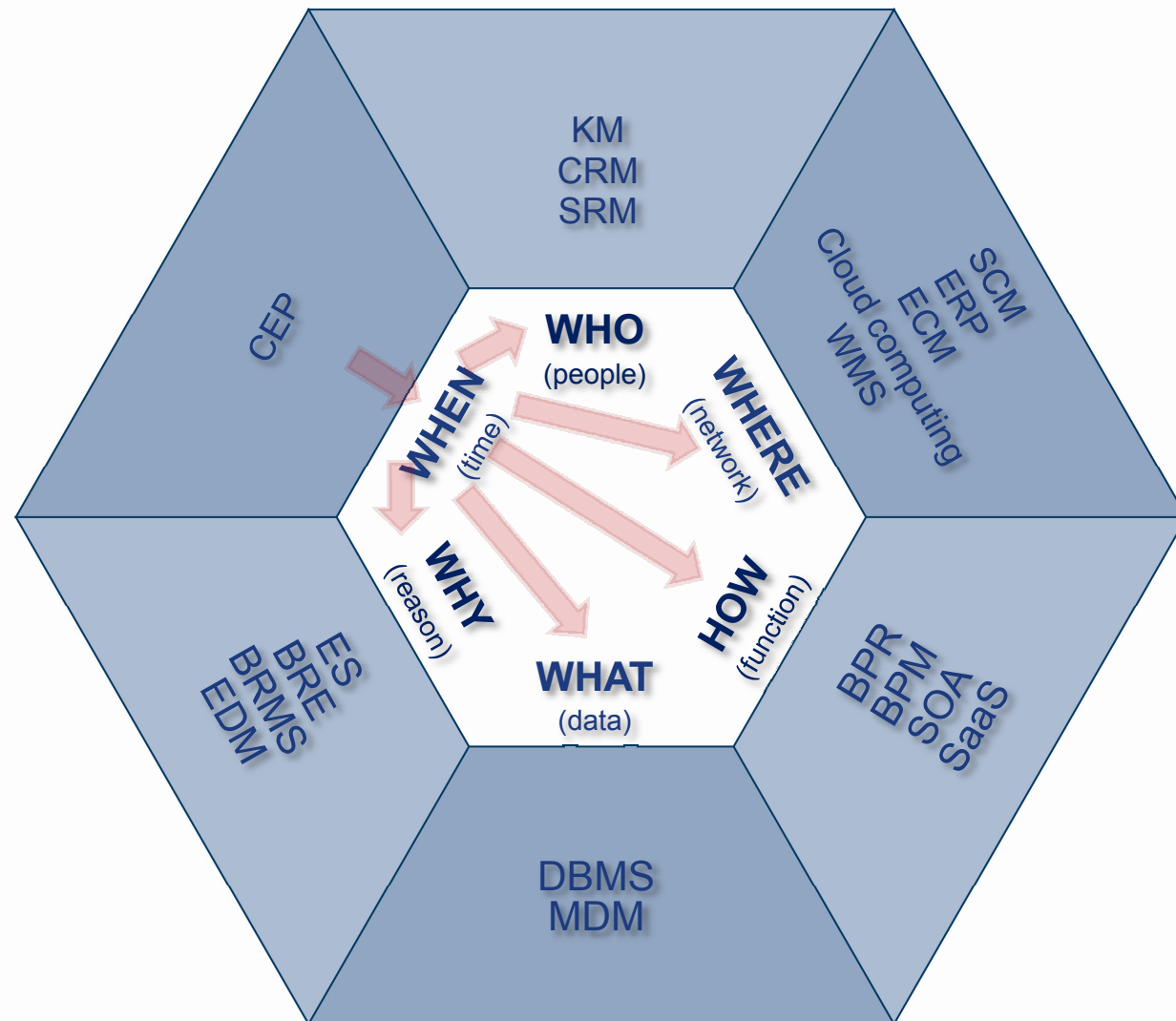
# Technology Integration and Architecture™



# Enterprise Rules Integration™

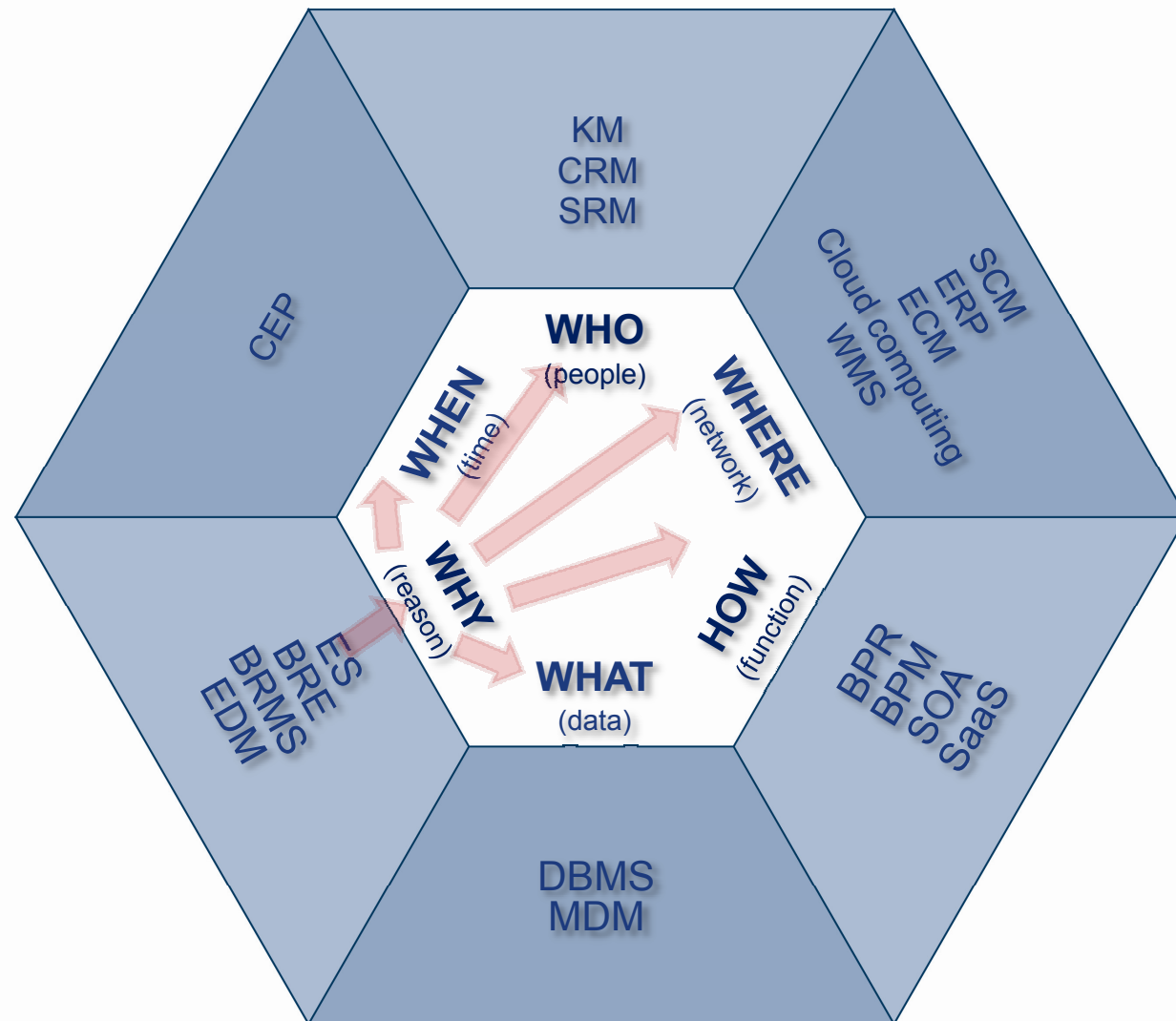


# Enterprise Rules Integration™

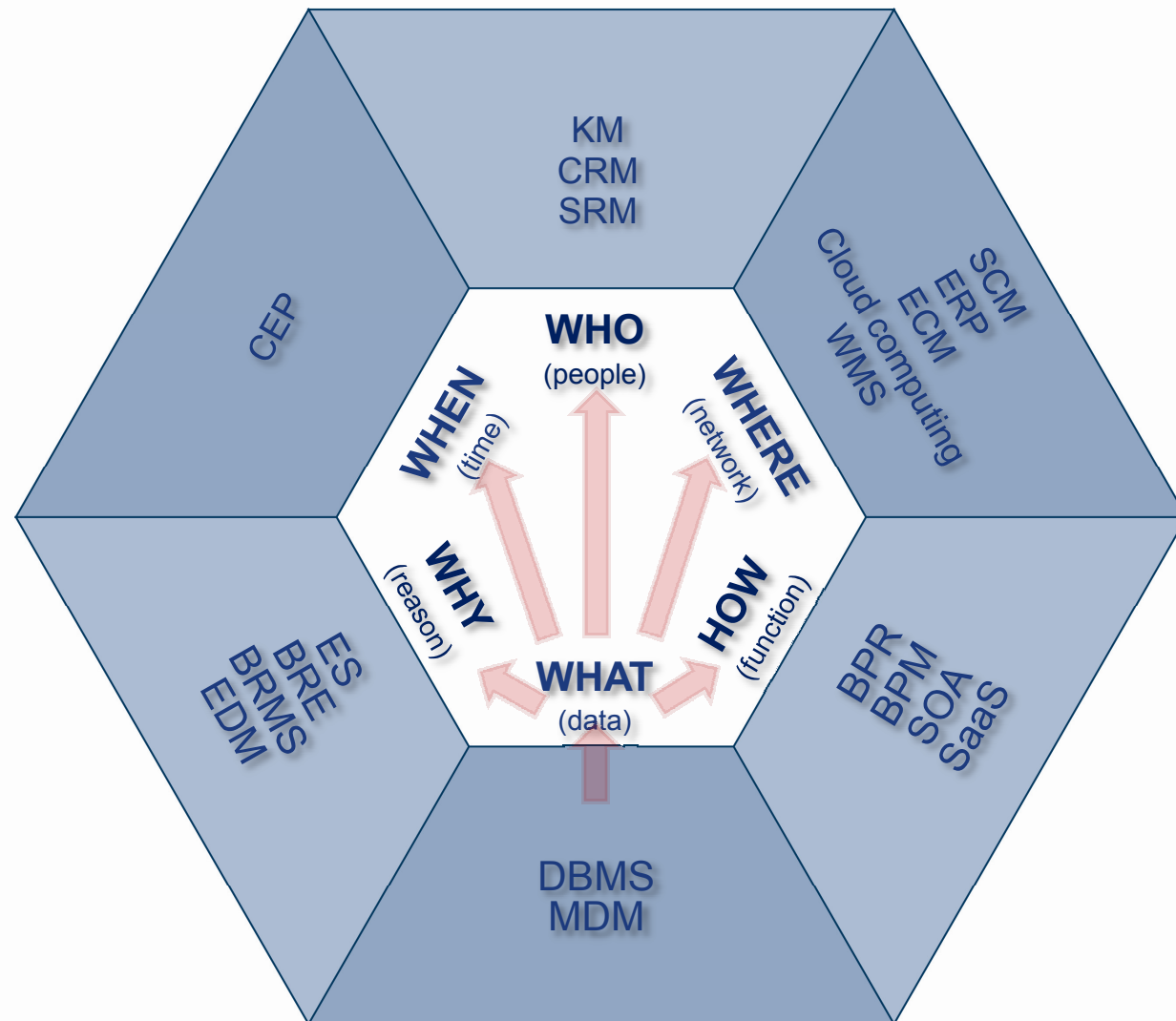




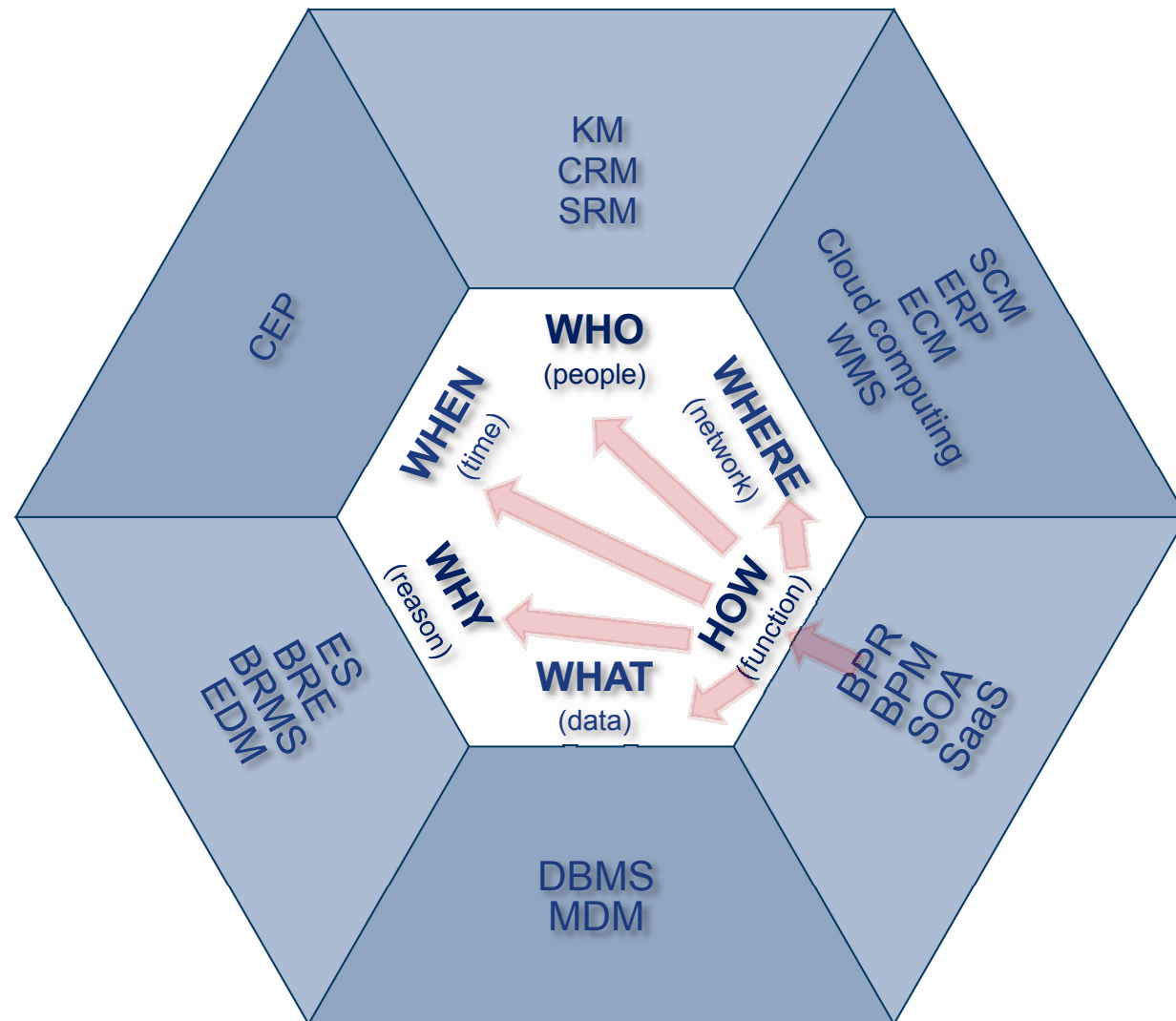
# Enterprise Rules Integration™



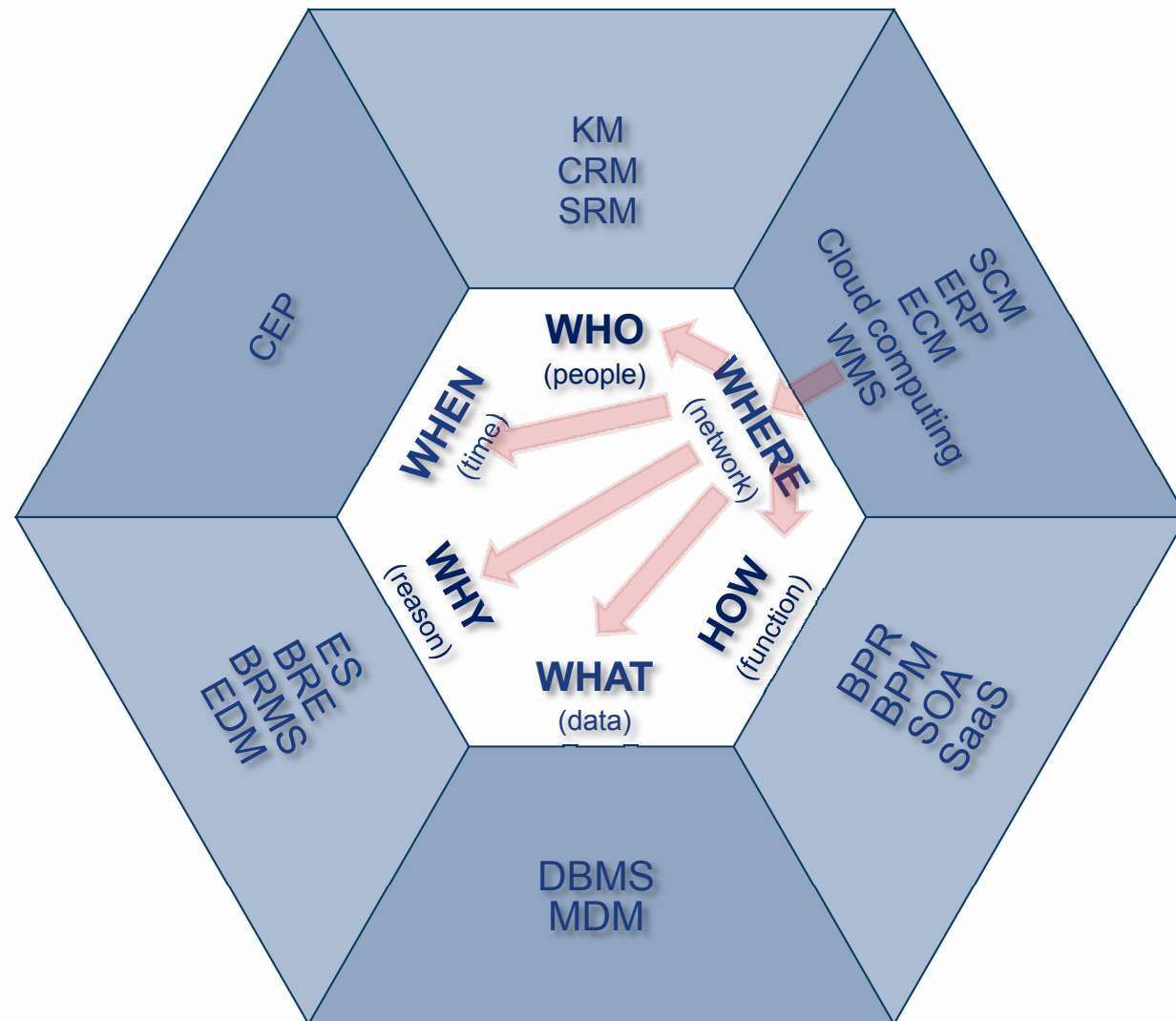
# Enterprise Rules Integration™



# Enterprise Rules Integration™



# Enterprise Rules Integration™



# Thank you

Rolando Hernandez  
Chief Rules Architect, BIZRULES  
ORF2008@BizRules.com  
972-987-1685