An Example of Knowledge Representation to a Real Problem

Risk Management
and the Insurance Business
The Problem with Insurance Brokering

- Insurance Brokers interview their clients and determine their insurance needs.
  - How do they do it?
  - Accountability?

- Insurance Companies offer many policies they want brokers to sell.
  - How do they "advertise" what they have?

- Process often takes 6 months.

- Once policies are sold, how are claims handled?
The Technology Challenge

- Perform typical broker functions
  - Intelligence, not just database lookup

- Knowing what is going on
  - Real-time status, not a “black box”

- Justify our decisions
  - Explanations, not just “trust us”

- Using the same knowledge to do claims
The GoRisk Sales Scenario

Client

- Info Gathering

GoRisk

- Risk Analysis
- Policy Synthesis

Underwriter

- Coverage Design

Risk Management Program

- Identified Risks
- Policies
Demo
GoRisk Solutions

- A KR solution to programming intelligent systems
- A Software Agent solution to programming cooperative behavior
KR: Most Programs Are Ignorant

- Search for dog, but miss poodles; search for boxer, get dogs and Muhammad Ali
- No models, taxonomy, recognition, reflection, accountability
- What little knowledge a program may have is embedded in its code

A user interface is no substitute for knowledge
A Deep KR Model

- Company
  - has employee
- Person
  - insurer
  - has cost
- Policy
  - Coverage
    - Physical Damage Coverage
    - Business Interruption Coverage
    - Cargo Loss Coverage
- Risk
  - exposure
  - agent of danger
  - mitigates
- Coverage
  - mitigates
- Oil Company
  - produces Oil Products
  - production method
  - has employee
- Retail Company
  - customer profile
- Product Company
  - supplier
- Supplier
- Refinery
  - distribution
- Oil Products
  - Liquid Cargo
  - Pipeline
  - Distribution Channel
  - Earthquake
  - Business Interruption Risk
    - exposure
    - agent of danger
    - mitigates
  - Property Risk
    - exposure
    - agent of danger
    - mitigates
  - Cargo Risk
    - mitigates
  - Cargo Loss
    - mitigates
Company

Product

Company

Oil

Company

Business

Interruption

Risk

exposure

Earthquake

Risk
distribution

has

employee

Person

has

cost

Policy

insurer

Coverage

mitigates

Physical Damage

Coverage

mitigates

Business Interruption

Coverage

mitigates

Cargo Loss

Coverage

Cargo Policy

Cargo Loss

Limit: 5M

Asset Protection Policy

Business Interruption

20 Days

Physical Damage

Limit: 10M

GoRisk–Add Policy

OK
Nation Oil

SIC: 1234 (oil)
Revenue: 100M
Distribution: Pipeline in California

GoRisk-Add Info

Company
Retail Company
Product Company
Oil Company
Refinery
Oil Products
Pipeline
Liquid Cargo
Distribution Channel
Earthquake
Cargo Policy
Cargo Loss Coverage
Physical Damage Coverage
Business Interruption Coverage
Asset Protection Policy

Nation Oil
SIC: 1234 (oil)
Revenue: 100M
Distribution: California Pipeline
**Rule:** Having a pipeline in an earthquake area means a Business Interruption Risk.

**Rule:** Having property means a Property Risk.

**Rule:** Having a distribution channel means a Cargo Risk.
Nation Oil

GoRisk-Policy Match
Asset Protect. Policy
Bus. Interruption
Physical Damage
Cargo Policy: Cargo Loss

Nation Oil
SIC: 1234 (oil)
Revenue: 100M
Distribution: California Pipeline

Oil Products
Refinery

Company
Product Company
Retail Company
Person
Policy
Coverage

Risk
Physical Damage Coverage
Business Interruption Coverage
Cargo Loss Coverage

Property
Risk
Business Interruption Risk
Cargo Risk

Pipeline
Distribution Channel
Liquid Cargo

Earthquake

Policy cost
insurer

Has: Pipeline Business Interruption Risk
Pipeine Property Risk
Pipeline Cargo Risk

Asset Protection Policy
Business Interruption
20 Days
Physical Damage
Limit: 10M
Cargo Policy: Cargo Loss

Nation Oil:
● Asset Protection Policy
● Cargo Policy
Accountability:
Systems should know what’s going on

- Inferences can be traced and explained
- People hate systems that act like black boxes, especially when they misbehave

Sophisticated explanations and justifications give users confidence
GoRisk Solutions

- A KR solution to programming intelligent systems
- A Software Agent solution to programming cooperative behavior
Programming is Still an Art

◆ Sharable, reusable software: The Holy Grail
  • Programmers can barely use one another’s code
  • Independent systems barely interact
  • Granularity is usually
    – Too small (too little power), or:
    – Too big (no way to combine)

◆ Design and Build: A flawed methodology
  • Prototyping enables evolutionary designs
  • Prototyping requires enlightened managers
Agent Methodology: Getting the Granularity Right

- Independent programs with responsibilities; strategic messages, not tactical messages
- Think how a house is built—no one is in control, each employee does a job
  - Architect designs house
  - Contractor selects subs
  - Mason lays foundation
  - Framers, electricians, plumbers doing their thing

Flexible, non-hierarchical control; Path to Evolutionary Implementation
Agent Design for Sales Process

- **Screen Mgr**
  - MakeProposal(ts)
  - WhatsHappening(ts)
  - PresentProposal(ts, proposal)
  - LearnAbout(ts)
  - LearnedAbout(ts)

- **Client**
  - NeedCoverage(ts)

- **Risk Mgr**
  - AcceptProposal(ts, proposal)
  - RejectProposal(ts, proposal)
  - CounterOffer(ts, proposal, openIssues)
  - PresentProposal(ts, proposal)
  - MakeOffer(ts, proposal, openIssues)

- **Negotiator**
  - AcceptProposal(ts, proposal)
  - RejectProposal(ts, proposal)
  - CounterOffer(ts, proposal, openIssues)

- **Company Information Source**
  - RetrieveRisks(ts)
  - RisksFor(ts, risks)
  - Parse10K(ts)
  - CompanyInfo(ts, stuff)
  - Done(ts)

- **Risk Analyzer**
  - DoRiskAnalysis(ts)
  - RiskAnalysis(ts, risk)
  - IsTherePolicyFor(risk)
  - HeresOne(policy, policyGenerator)
  - GotAnother?(policyGenerator)

- **KB**
  - Parse10K(ts)
  - CompanyInfo(ts, stuff)
  - Done(ts)

- **10K Reader**
  - Parse10K(ts)
  - CompanyInfo(ts, stuff)
  - Done(ts)

- **Underwriter**
  - MakeOffer(ts, proposal, openIssues)
  - Negotiate(ts, proposal)
  - Done(ts)

- **Policy Information Source**
  - RetrievePolicy(policy)
  - StorePolicy(policy)
  - PolicyInfo(ts, stuff)
  - Done(ts)

- **Policy Reader**
  - ParsePolicy(ts)
  - StorePolicy(policy)
  - PolicyInfo(ts, stuff)
  - Done(ts)

- **Coverage Analyzer**
  - IsTherePolicyFor(risk)
  - HeresOne(policy, policyGenerator)
  - GotAnother?(policyGenerator)

- **GoRisk**
The Claims Process

- The client makes a claim
- The client or his broker find the relevant coverages
- The underwriters are notified; The client is informed of his duties
- Underwriter assesses the claim
- A settlement is negotiated
A claim happens, how do you find the relevant policies?

Today, a broker or the client has to search for them

GoRisk does it **automatically**
- by reconstructing the original risk analysis that led to covering policies
The **GoRisk** Claims Scenario

Report Claim

Identify Risks

Lookup Policies

Assess Claim

Negotiate Settlement

Notify Underwriter

GoRisk

Settlement

Report Duties To Client

GoRisk Claim & Rules

Duties To Client

GoRisk
**Rule:** Having a pipeline in an earthquake area means a Business Interruption Risk.

**Rule:** Having property means a Property Risk.

**Rule:** Having a distribution channel means a Cargo Risk.
Agent Design for Claims Process

Client

Screen Mgr

MakeProposal(ts)

WhatIf(ts, proposal, event)

WhatsHappening(ts)

Risk Mgr

PresentProposal(ts, proposal)

LearnedAbout(ts)

LearnAbout(ts)

Negotiator

NeedCoverage(ts)

Coverage For(claim, policies)

Underwriter

AcceptProposal(ts, proposal)

RejectProposal(ts, proposal)

CounterOffer(ts, proposal, openIssues)

12 AcceptProposal(ts, proposal)

13 RejectProposal(ts, proposal)

14 CounterOffer(ts, proposal, openIssues)

Company Information Source

CompanyInfo(ts, stuff)

ParsePolicy(ts)

Store Policy(policy)

Policy Information Source

PolicyInfo(ts, stuff)

Parse10K(ts)

10K Reader

GotAnother?(policyGenerator)

GotAnother?(risk)

HeresOne(policy, policyGenerator)

Risk Analyzer

RiskAnalysis(ts, riskAnalysis)

IsTherePolicyFor(risk)

Duties(claim)

Notification(claim, policies)

Claims Mgr

AcceptProposal(ts, proposal)

RejectProposal(ts, proposal)

CounterOffer(ts, proposal, openIssues)

11 NeedCoverage(ts)

7 MakeOffer(ts, proposal, openIssues)

10K Reader

RetrieveRisks(ts)

RisksFor(ts, risks)

5 CompanyInfo(ts, stuff)

Policy Reader

WhatIf(ts, proposal, event)

MakeProposal(ts)

WhatsHappening(ts)

15 Done(ts)

1 DoRiskAnalysis(ts)

2 RiskAnalysis(ts, riskAnalysis)

3 GotCoverage?(claim, policies)

4 Parse10K(ts)

5 CompanyInfo(ts, stuff)

6 Done(ts)

9 AcceptProposal(ts, proposal)

10 RejectProposal(ts, proposal)

11 CounterOffer(ts, proposal, openIssues)

2 RiskAnalysis(ts, riskAnalysis)

3 CoverageFor(ts, policies)

4 ParsePolicy(ts)

5 CompanyInfo(ts, stuff)

6 Done(ts)

12 AcceptProposal(ts, proposal)

13 RejectProposal(ts, proposal)

14 CounterOffer(ts, proposal, openIssues)

15 Done(ts)
eCommerce to iCommerce
(Intelligent Internet Information)

◆ **GoRisk - Next Wave Web application**
  - All “simple” web applications are done
    - Shallow and passive
    - Links and databases
    - Users do all of the work
  - Business-Business apps waiting to be written
    - Active, in-depth, and informed
    - Attending to analysis, decisions, and process
    - Users have the right tools to do their job
Network Provider Taxonomy
Telecom Taxonomy

- Telecom Company
  - Teleconferencing
  - Internet Service
    - NewsGroup
    - WWW Service
      - HTTP (Browsing)
      - FTP
  - Fax
  - Pager
  - Web Hosting
  - E-mail
  - SMTP
  - ATM Service
  - Data Service
    - Internet Service
    - Voice Service
    - Video Service
  - SMS
  - Voice Mail
  - Toll Free Service

- Network Provider
- Has service

- Service Company
- Has service

- Network
- Has channel
The Pipeline Taxonomy
Company Taxonomy