

# Comparing Open Vocabulary English and OMG SBVR

Application Semantics via Next Generation Business Rules

*Adrian Walker*

*[www.executable-english.com](http://www.executable-english.com)*

# Agenda

- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary

# Aligning IT and Business

- Aligning IT strategy with business strategy has been one of the top three issues confronting IT and business executives for more than 20 years
- Polling of CIOs and business executives conducted in 2004 revealed that aligning IT and business goals remains their No. 1 or 2 priority

-- Forrester

# Aligning IT and Business

- The stakeholders in a business IT project are usually a diverse group of people
- They can all converse, read, and write in English (or Spanish, French...)
- Smarter rules technology may be able to better exploit English communication

# Agenda

- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary

# Making Smart Connections

Good things happen when we make smart connections:

# Making Smart Connections

Good things happen when we make smart connections:

Software-----hardware

# Making Smart Connections

Good things happen when we make smart connections:

Software----- **Linux** -----hardware



# Making Smart Connections

Good things happen when we make smart connections:

Software----- **Linux** -----hardware

People----- -----all the web pages on the net

# Making Smart Connections

Good things happen when we make smart connections:

Software----- **Linux** -----hardware

People----- **Google** -----all the web pages on the net

# Making Smart Connections

Good things happen when we make smart connections:

Software----- **Linux** -----hardware

People----- **Google** -----all the web pages on the net

Buyers----- -----sellers

# Making Smart Connections

Good things happen when we make smart connections:

Software----- **Linux** -----hardware

People----- **Google** -----all the web pages on the net

Buyers----- **Ebay** -----sellers

# Making Smart Connections

Good things happen when we make smart connections:

Software----- **Linux** -----hardware

People----- **Google** -----all the web page on the net

Buyers----- **Ebay** -----sellers

Business analysts----- -----networked databases

# Making Smart Connections

Good things happen when we make smart connections:

Software----- **Linux** -----hardware

People----- **Google** -----all the web page on the net

Buyers----- **Ebay** -----sellers

Business analysts----- **Smart Rules Systems** -----networked databases

# Agenda

- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary

# Application Semantics via Next Generation Business Rules

Current rule systems:

- Rules are either forward chaining or back chaining
- A collection of rules is a program
- If you change the order of the rules you will get different results
- If the user interface deals with English, then there is a dictionary and a grammar in the system
- For rules to work efficiently over a database, someone must write and maintain SQL queries
- If you want explanations from a rule system, you must annotate the rules in English

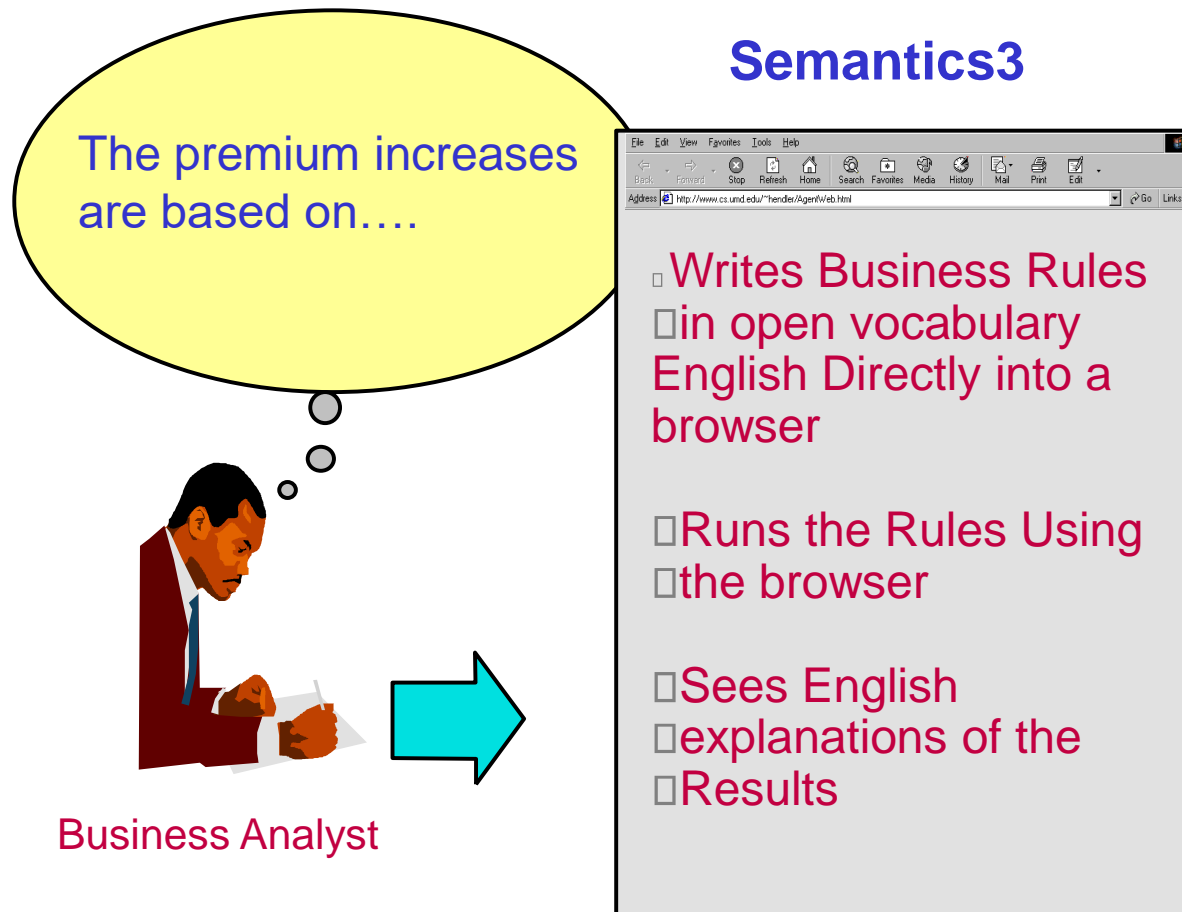


# Application Semantics via Next Generation Business Rules

Three kinds of semantics:

- **Semantics1** is "Data Semantics" as in a relational database, XML or RDF
- **Semantics2** specifies what a rule engine should do
- **Semantics3** is Application Semantics -- the meaning of English concepts at the author- and user-interface

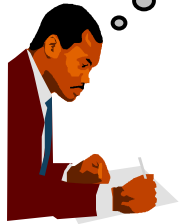
# Application Semantics via Next Generation Business Rules



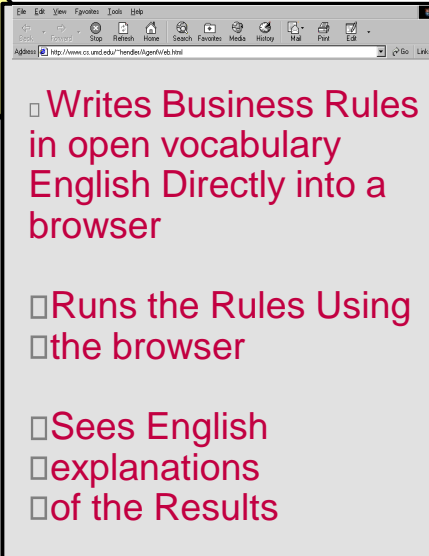
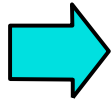
# Application Semantics via Next Generation Business Rules

## Semantics3

The premium increases are based on...



Business Analyst

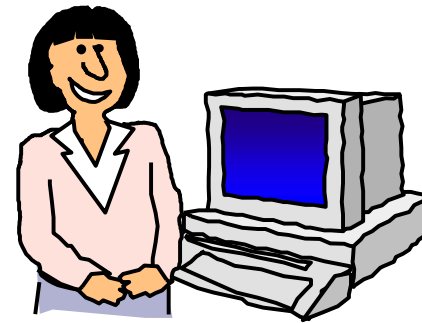


- Writes Business Rules in open vocabulary English Directly into a browser
- Runs the Rules Using the browser
- Sees English explanations of the Results

## Semantics2



Theory of Declarative Knowledge



Programmer

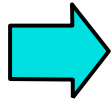
# Application Semantics via Next Generation Business Rules

## Semantics3

The premium increases are based on...



Business Analyst



- Writes Business Rules in open vocabulary English Directly into a browser
- Runs the Rules Using the browser
- Sees English explanations of the Results



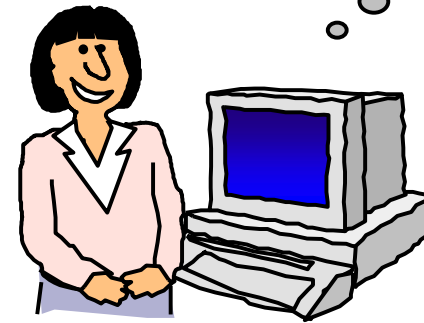
**Internet Business Logic**

Application Independent

## Semantics2



**Theory of Declarative Knowledge**



Programmer

# Application Semantics via Next Generation Business Rules

## Semantics3

The premium increases are based on...



Business Analyst

- Writes Business Rules in open vocabulary English Directly into a browser
- Runs the Rules Using the browser
- Sees English explanations of the Results

**Internet Business Logic**

Application Independent

**Semantics1**

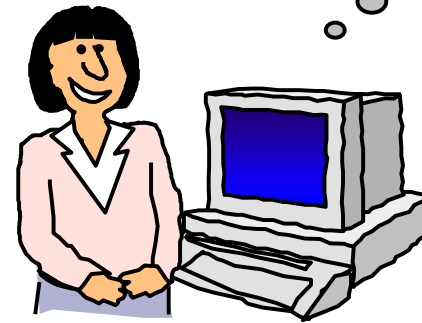
SQL

RDF

## Semantics2



**Theory of Declarative Knowledge**



Programmer

# Application Semantics via Next Generation Business Rules

Smarter rule systems:

- Rules are either forward chaining or back chaining
- Rules simply mean what they say
- A collection of rules is a program specification
- If you change the order of the rules you will get different the same results
- If the user interface deals with English, then there is a there need be no dictionary and a or grammar in the system
- For rules to work efficiently over a database, someone must write and maintain SQL queries can be generated and run automatically from the rules
- If you want explanations from a rule system, you must need not annotate the rules in English

# Agenda

- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary

# Application Semantics via Next Generation Business Rules

## Insurance -- UServ Product Derby Case Study:

### Requirement:

If young male driver and single and not located in CA, NY or VA, then increase premium by \$300.

### Rule

person some-CID some-name is classified in driver eligibility as Young Driver  
person that-CID that-name has Marital Status Single in his or her description  
not : person that-CID that-name resides in a state that is exceptional for driver premium purposes

---

person that-CID that-name is subject to a \$ 300 premium increase

### Facts

this-state is exceptional for driver premium purposes

=====

CA  
NY  
VA

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select InsuranceCaseStudy1



# Application Semantics via Next Generation Business Rules

## Insurance -- UServ Product Derby Case Study

Running the rules to get an answer:

person this-CID this-name is subject to premium increases totaling \$ this-total

=====

CID1	Sara Klaus	0
CID2	Spenser Klaus	300
CID3	Mark Houston	0
CID4	Angie Houston	300

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select InsuranceCaseStudy1

# Application Semantics via Next Generation Business Rules

**Insurance** -- UServ Product Derby Case Study -- An explanation:

person CID2 Spenser Klaus has a description file

sum an-amount : person CID2 Spenser Klaus is subject to a \$ an-amount premium increase = 300

---

person CID2 Spenser Klaus is subject to premium increases totaling \$ 300

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select InsuranceCaseStudy1

# Application Semantics via Next Generation Business Rules

**Insurance** -- UServ Product Derby Case Study -- An explanation:

person CID2 Spenser Klaus has a description file

sum an-amount : person CID2 Spenser Klaus is subject to a \$ an-amount premium increase = 300

---

person CID2 Spenser Klaus is subject to premium increases totaling \$ 300

person CID2 Spenser Klaus is classified in driver eligibility as Young Driver

person CID2 Spenser Klaus has Marital Status Single in his or her description

not: person CID2 Spenser Klaus resides in a state that is exceptional for driver premium purposes

---

person CID2 Spenser Klaus is subject to a \$ 300 premium increase

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select InsuranceCaseStudy1

# Application Semantics via Next Generation Business Rules

**Insurance** -- UServ Product Derby Case Study -- An explanation:

person CID2 Spenser Klaus has a description file

sum an-amount : person CID2 Spenser Klaus is subject to a \$ an-amount premium increase = 300

---

person CID2 Spenser Klaus is subject to premium increases totaling \$ 300

person CID2 Spenser Klaus is classified in driver eligibility as Young Driver

person CID2 Spenser Klaus has Marital Status Single in his or her description

not: person CID2 Spenser Klaus resides in a state that is exceptional for driver premium purposes

---

person CID2 Spenser Klaus is subject to a \$ 300 premium increase

person CID2 Spenser Klaus has Sex Male in his or her description

person CID2 Spenser Klaus has Age 17 in his or her description

17 is less than 25

---

person CID2 Spenser Klaus is classified in driver eligibility as Young Driver

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select InsuranceCaseStudy1

# Agenda

- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary

# Application Semantics via Next Generation Business Rules

**Car Rental:** EU-Rent is a (fictitious) company with branches in several countries.

**Requirement:** Assign a car to a rental reservation

**Rule:**

for demo purposes the current date and time is some-date some-time  
EU-rent customer some-Cnumber some-name has rental some-Rnumber  
starting that-date some-time1 ending some-date2 some-time2  
not : rental number that-Rnumber has a car assigned to it  
rental that-Rnumber is for a car some-group with pick up at some-branch1 and return at some-branch2  
car some-car in group that-group is currently available at branch that-branch1  
add : rental number that-Rnumber is assigned that-car

---

ASSIGN car that-car in group that-group to rental number that-Rnumber for customer that-Cnumber that-name

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select EU-rent2

# Application Semantics via Next Generation Business Rules

## Car Rental:

Running the rules to get an answer

ASSIGN car this-car in group this-group to rental number this-Rnumber for customer this-Cnumber this-name

=====

CAR103

group 3

R1409

C34

Adrian Walker

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select EU-rent2

# Application Semantics via Next Generation Business Rules

**Car rental** -- an explanation of a transaction before it is made

for demo purposes the current date and time is 20030610 1345

EU-rent customer C34 Adrian Walker has rental R1409 starting 20030610 0800 ending 20030611 1450

not: rental number R1409 has a car assigned to it

rental R1409 is for a car group 3 with pick up at branch 3 and return at branch 3

car CAR103 in group group 3 is currently available at branch branch 3

add : rental number R1409 is assigned CAR103

---

ASSIGN car CAR103 in group group 3 to rental number R1409 for customer C34 Adrian Walker

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select EU-rent2



# Application Semantics via Next Generation Business Rules

**Car rental** -- an explanation of a transaction before it is made

for demo purposes the current date and time is 20030610 1345

EU-rent customer C34 Adrian Walker has rental R1409 starting 20030610 0800 ending 20030611 1450

not: rental number R1409 has a car assigned to it

rental R1409 is for a car group 3 with pick up at branch 3 and return at branch 3

car CAR103 in group group 3 is currently available at branch branch 3

add : rental number R1409 is assigned CAR103

---

ASSIGN car CAR103 in group group 3 to rental number R1409 for customer C34 Adrian Walker

EU-rent currently owns CAR103

not: CAR103 is currently rented out

car CAR103 is in the group group 3

car CAR103 is currently owned by branch branch 3

---

car CAR103 in group group 3 is currently available at branch branch 3

.....

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select EU-rent2

# Agenda

- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary

# Application Semantics via Next Generation Business Rules

**Business Intelligence** -- Mining coded medical data

**Requirement:** look for overlapping in-patient and out-patient treatments  
that may be medically inconsistent

**Rule:**

patient some-number date some-start1 some-fin1 had in-patient treatment for some-condition1  
patient that-number date some-start2 some-fin2 had out-patient treatment for some-condition2  
the period that-start1 to that-fin1 overlaps with the period that-start2 to that-fin2

-----  
patient that-number had in-patient treatment that-condition1 overlapping  
with out-patient treatment that-condition2

**Coded Medical Data:**

eg-lno	eg-ccprod	eg-cohort	eg-contract	eg-branch	eg-control	eg-cvgcd	eg-days	eg-daylast	eg-daynext
1	N	8	0	BCA	13660	3	2	0	0
2	N	8	0	BCA	13660	3	2	0	0
3	N	1	0	BCA	13660	3	3	0	0
....									

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Medmine2

# Application Semantics via Next Generation Business Rules

**Business Intelligence** -- Mining coded medical data -- Running the rules to get an answer

Answer:

patient this-number had in-patient treatment this-conditn1 overlapping with out-patient treatment this-conditn2

---

521049571	Antepartum, Med Complica	Cataract (Chronic)
521049571	Antepartum, Med Complica	Female infertility (Acute)
521049571	Chemotherapy	Female infertility (Acute)
521049571	Pelv Evis,Rad Hyst,Vulv	Cataract (Chronic)
521049571	Pelv Evis,Rad Hyst,Vulv	Female infertility (Acute)

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Medmine2

# Application Semantics via Next Generation Business Rules

**Business Intelligence** -- Mining coded medical data -- An explanation

patient 521049571 date 910702 910703 had in-patient treatment for Antepartum, Med Complica  
patient 521049571 date 900912 910928 had out-patient treatment for Female infertility (Acute)  
the period 910702 to 910703 overlaps with the period 900912 to 910928

---

patient 521049571 had in-patient treatment Antepartum, Med Complica  
overlapping with out-patient treatment Female infertility (Acute)

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Medmine2

# Application Semantics via Next Generation Business Rules

**Business Intelligence** -- Mining coded medical data -- An explanation

patient 521049571 date 910702 910703 had in-patient treatment for Antepartum, Med Complica  
patient 521049571 date 900912 910928 had out-patient treatment for Female infertility (Acute)  
the period 910702 to 910703 overlaps with the period 900912 to 910928

---

patient 521049571 had in-patient treatment Antepartum, Med Complica  
overlapping with out-patient treatment Female infertility (Acute)

910702 is less than or equal 910928  
900912 is less than or equal 910703

---

the period 910702 to 910703 overlaps with the period 900912 to 910928

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Medmine2

# Application Semantics via Next Generation Business Rules

**Business Intelligence** -- Mining coded medical data -- An explanation

patient 521049571 date 910702 910703 had in-patient treatment for Antepartum, Med Complica  
patient 521049571 date 900912 910928 had out-patient treatment for Female infertility (Acute)  
the period 910702 to 910703 overlaps with the period 900912 to 910928

---

patient 521049571 had in-patient treatment Antepartum, Med Complica  
overlapping with out-patient treatment Female infertility (Acute)

910702 is less than or equal 910928  
900912 is less than or equal 910703

---

the period 910702 to 910703 overlaps with the period 900912 to 910928

line 53 in part 1 of the Case table has an admission date corresponding to 910702  
line 53 in part 2 of the Case table has number of days 1  
1 day(s) after 910702 is 910703  
line 53 in part 3 of the Case table has Diagnosis Related Group 383

---

the drg code 383 describes the Diagnosis Related Group Antepartum, Med Complica

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Medmine2

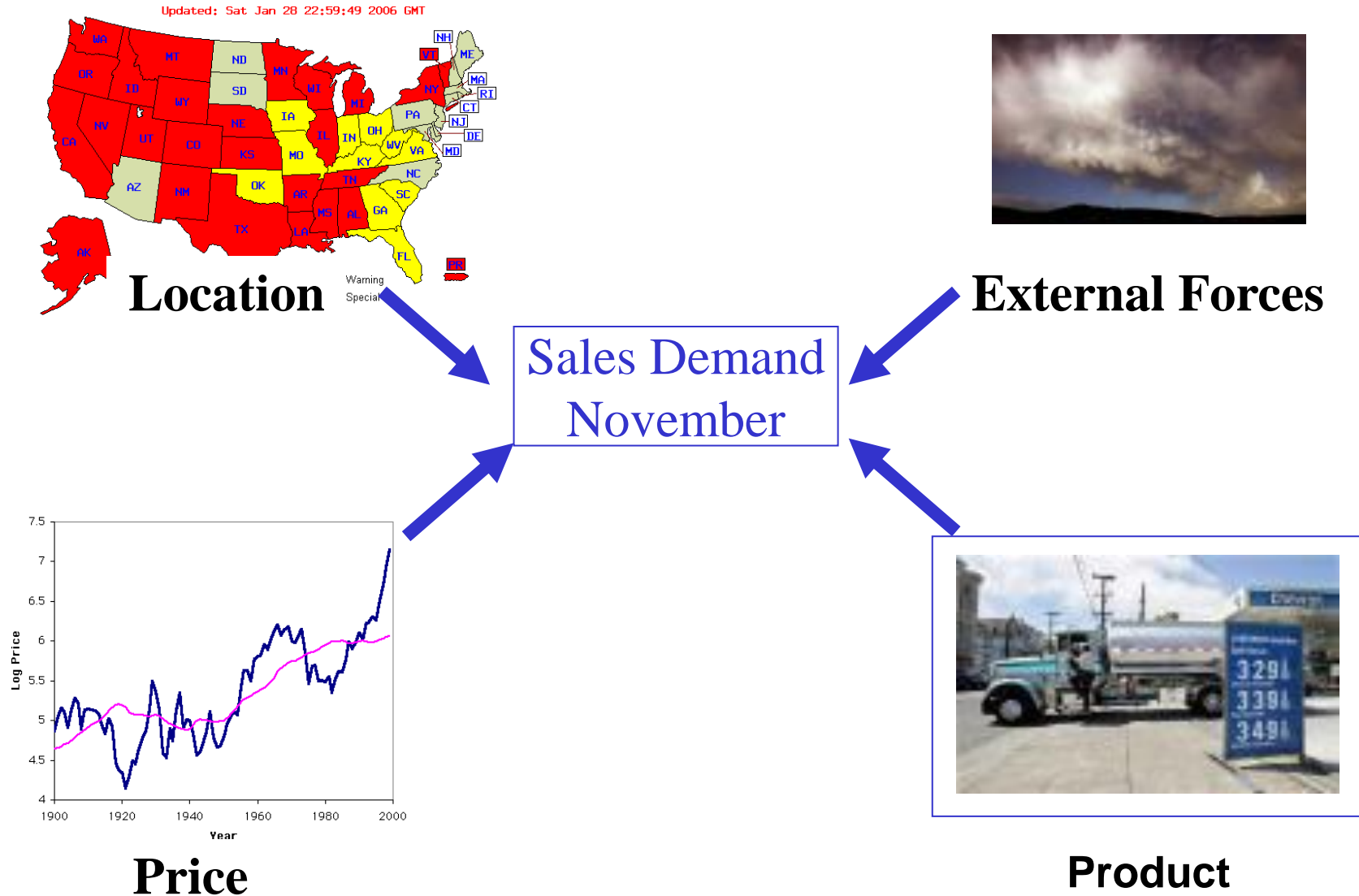
# Agenda

- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary



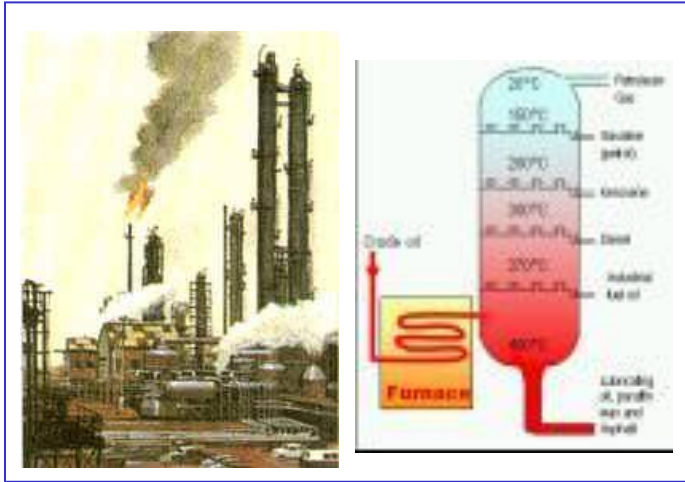
# Application Semantics via Next Generation Business Rules

## Supply Chain -- oil industry



# Application Semantics via Next Generation Business Rules

Supply Chain -- oil industry



**Refinery**



**Terminal  
Storage**



**Service  
Station**

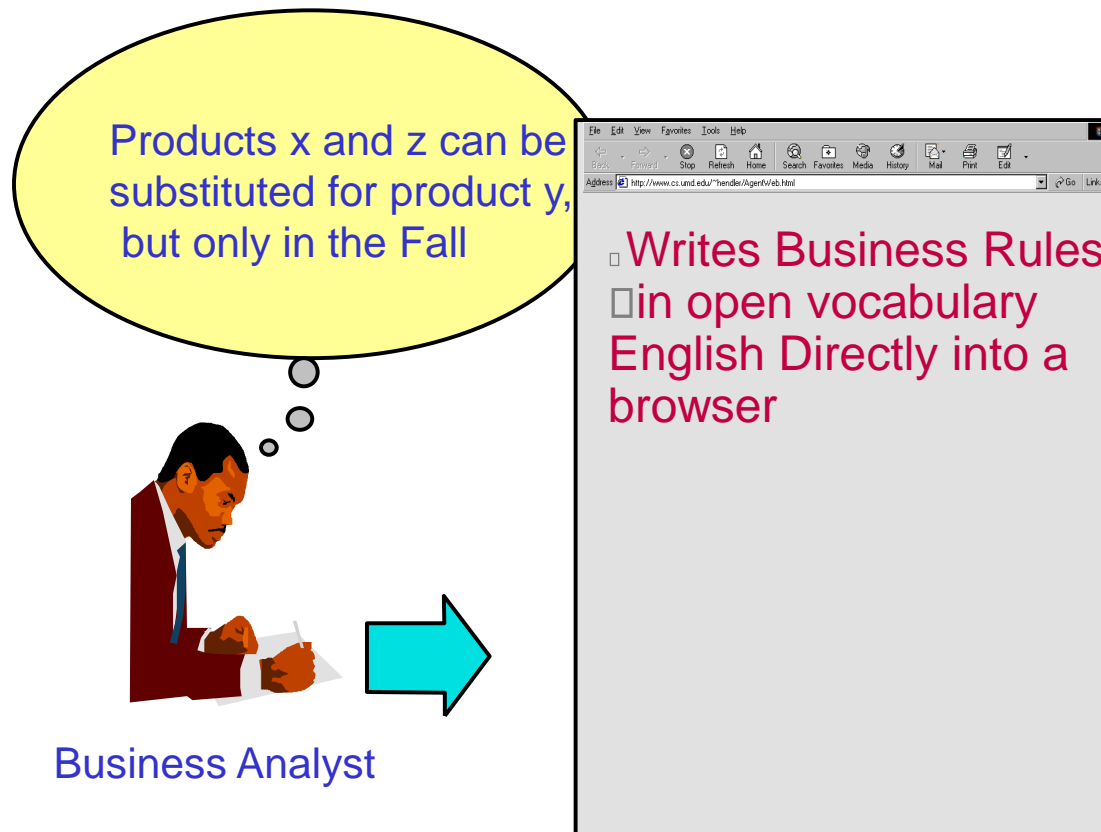


**Terminal  
Pickup**

# Application Semantics via Next Generation Business Rules

## Supply Chain -- oil industry

**Requirement:** Meet customer demand for an oil product, given that other products may be used, depending on the season and the available transportation



To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1

# Application Semantics via Next Generation Business Rules

## Supply Chain -- oil industry Rules:

estimated demand some-id in some-region is for some-quantity gallons of some-finished-product  
in some-month of some-year

for estimated demand that-id some-fraction of the order will be some-product from some-refinery  
that-quantity \* that-fraction = some-amount

---

for demand that-id that-region for that-quantity that-finished-product we use that-amount that-product from that-refinery

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1

# Application Semantics via Next Generation Business Rules

## Supply Chain -- oil industry Rules:

estimated demand some-id in some-region is for some-quantity gallons of some-finished-product  
in some-month of some-year

for estimated demand that-id some-fraction of the order will be some-product from some-refinery  
that-quantity \* that-fraction = some-amount

---

for demand that-id that-region for that-quantity that-finished-product we use that-amount that-product from that-refinery

estimated demand some-id in some-region is for some-quantity gallons of some-finished-product  
in some-month of some-year

for demand that-id for that-finished-product refinery some-refinery can supply some-amount gallons of some-product  
for demand that-id the refineries have altogether some-total gallons of acceptable base products  
that-amount / that-total = some-long-fraction  
that-long-fraction rounded to 2 places after the decimal point is some-fraction

---

for estimated demand that-id that-fraction of the order will be that-product from that-refinery

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1

# Application Semantics via Next Generation Business Rules

## Supply Chain -- oil industry Rules:

estimated demand some-id in some-region is for some-quantity gallons of some-finished-product  
in some-month of some-year

for estimated demand that-id some-fraction of the order will be some-product from some-refinery  
that-quantity \* that-fraction = some-amount

---

for demand that-id that-region for that-quantity that-finished-product we use that-amount that-product from that-refinery

estimated demand some-id in some-region is for some-quantity gallons of some-finished-product  
in some-month of some-year

for demand that-id for that-finished-product refinery some-refinery can supply some-amount gallons of some-product  
for demand that-id the refineries have altogether some-total gallons of acceptable base products  
that-amount / that-total = some-long-fraction  
that-long-fraction rounded to 2 places after the decimal point is some-fraction

---

for estimated demand that-id that-fraction of the order will be that-product from that-refinery

estimated demand some-id in some-region is for some-amount gallons of some-product in some-month of some-year  
sum a-num :

for demand that-id for that-product refinery some-name can supply some-num gallons of some-product1 = a-total

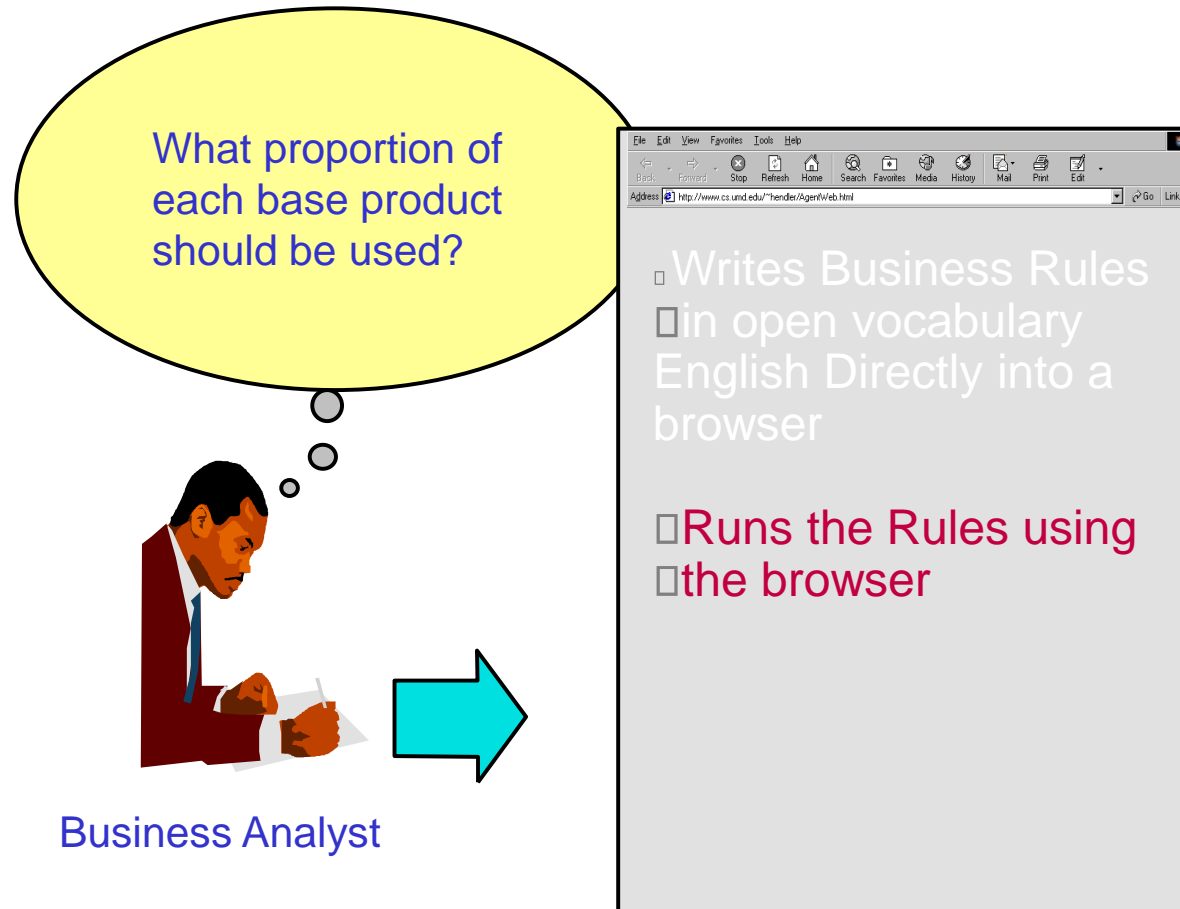
---

for demand that-id the refineries have altogether that-total gallons of acceptable base products

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1

# Application Semantics via Next Generation Business Rules

Supply Chain -- oil industry:



To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1

# Application Semantics via Next Generation Business Rules

**Supply Chain** ---- oil industry ---- answer:

for demand this-id this-region for this-quantity this-finished-product we use this-amount this-product from this-refinery

```
=====
523    NJ        1000    product-y        190.0    product-x    Shell Canada One
523    NJ        1000    product-y        310.0    product-y    Shell Canada One
523    NJ        1000    product-y        500.0    product-z    Shell Canada One
```

Example based on:

“Oil Industry Supply Chain Management Using English Business Rules Over SQL”

by Ted Kowalski and Adrian Walker,

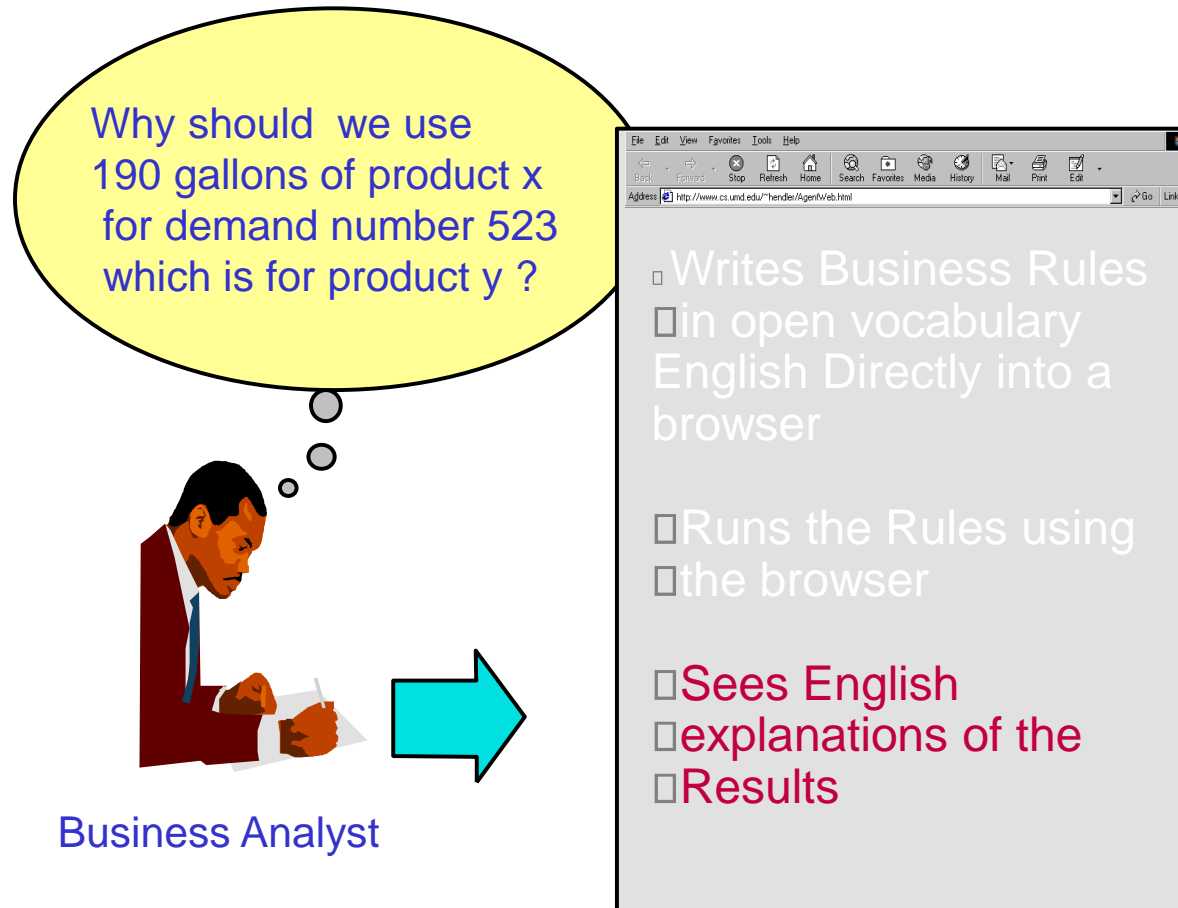
[www.executable-english.com/Oil\\_Industry\\_Supply\\_Chain\\_by\\_Kowalski\\_and\\_Walker.pdf](http://www.executable-english.com/Oil_Industry_Supply_Chain_by_Kowalski_and_Walker.pdf)

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1



# Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- explanation:



To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1

# Application Semantics via Next Generation Business Rules

**Supply Chain** ---- oil industry ---- explanation:

estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005  
for estimated demand 523 0.19 of the order will be product-x from Shell Canada One  
 $1000 * 0.19 = 190$

---

for demand 523 NJ for 1000 product-y we use 190 product-x from Shell Canada One

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1

# Application Semantics via Next Generation Business Rules

**Supply Chain** ---- oil industry ---- explanation:

estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005  
for estimated demand 523 0.19 of the order will be product-x from Shell Canada One  
 $1000 * 0.19 = 190$

---

for demand 523 NJ for 1000 product-y we use 190 product-x from Shell Canada One

estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005  
for demand 523 for product-y refinery Shell Canada One can supply 300 gallons of product-x  
for demand 523 the refineries have altogether 1600 gallons of acceptable base products  
 $300 / 1600 = 0.1875$   
0.1875 rounded to 2 places after the decimal point is 0.19

---

for estimated demand 523 0.19 of the order will be product-x from Shell Canada One

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1

# Application Semantics via Next Generation Business Rules

## Supply Chain ---- oil industry ---- explanation:

estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005  
for estimated demand 523 0.19 of the order will be product-x from Shell Canada One  
 $1000 * 0.19 = 190$

---

for demand 523 NJ for 1000 product-y we use 190 product-x from Shell Canada One

estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005  
for demand 523 for product-y refinery Shell Canada One can supply 300 gallons of product-x  
for demand 523 the refineries have altogether 1600 gallons of acceptable base products  
 $300 / 1600 = 0.1875$   
0.1875 rounded to 2 places after the decimal point is 0.19

---

for estimated demand 523 0.19 of the order will be product-x from Shell Canada One

estimated demand 523 in NJ is for 1000 gallons of product-y in October of 2005

sum eg-amount :

for demand 523 for product-y refinery eg-refinery can supply eg-amount gallons of eg-product1 = 1600

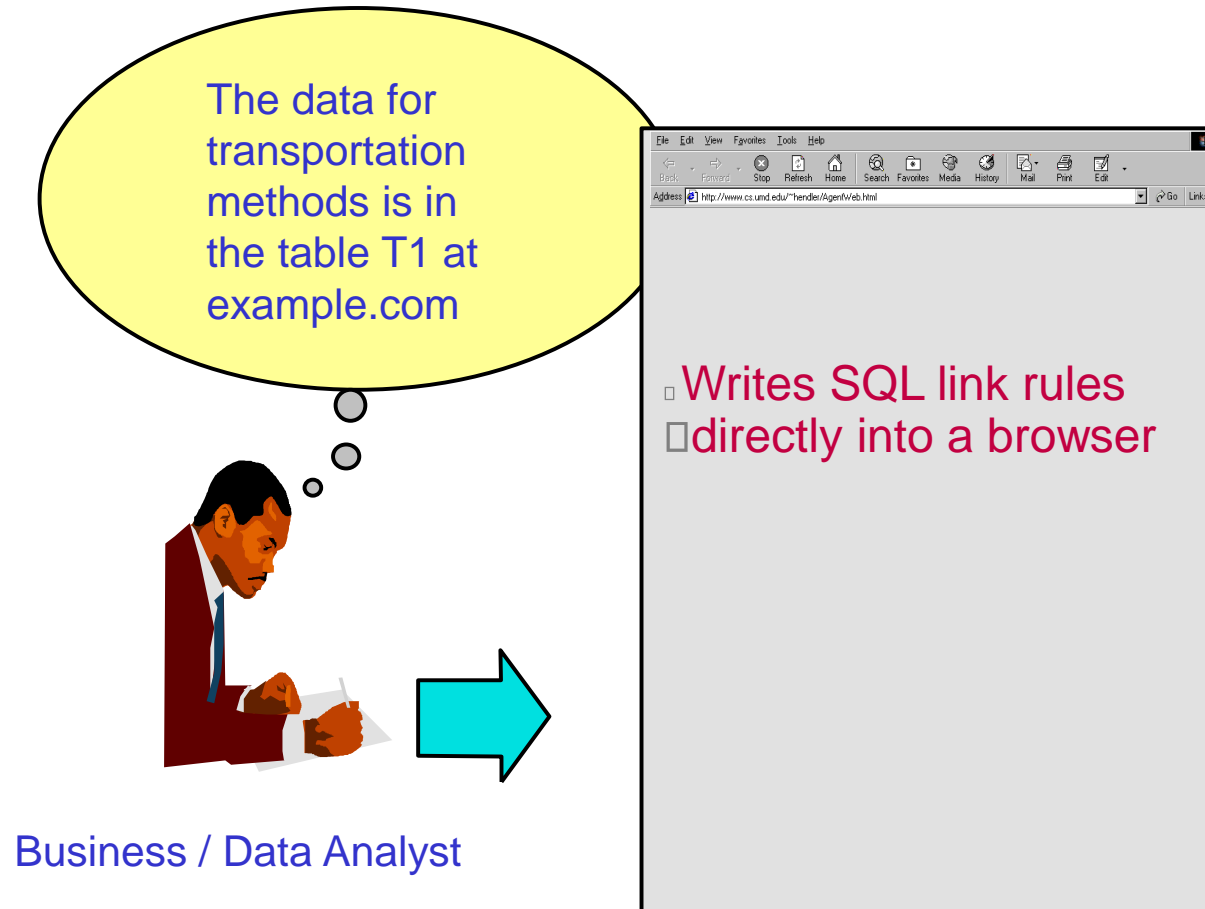
---

for demand 523 the refineries have altogether 1600 gallons of acceptable base products

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1

# Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- automatic generation of complex SQL queries:



To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1MySql1

# Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- finding SQL data on the internet:

A data table

we have this-method transportation from refinery this-name to region this-region

```
=====
truck                Shell Canada One    NJ
rail                 Shell Canada One    NJ
```

A link rule that says how to find an equivalent table "T1" on the internet

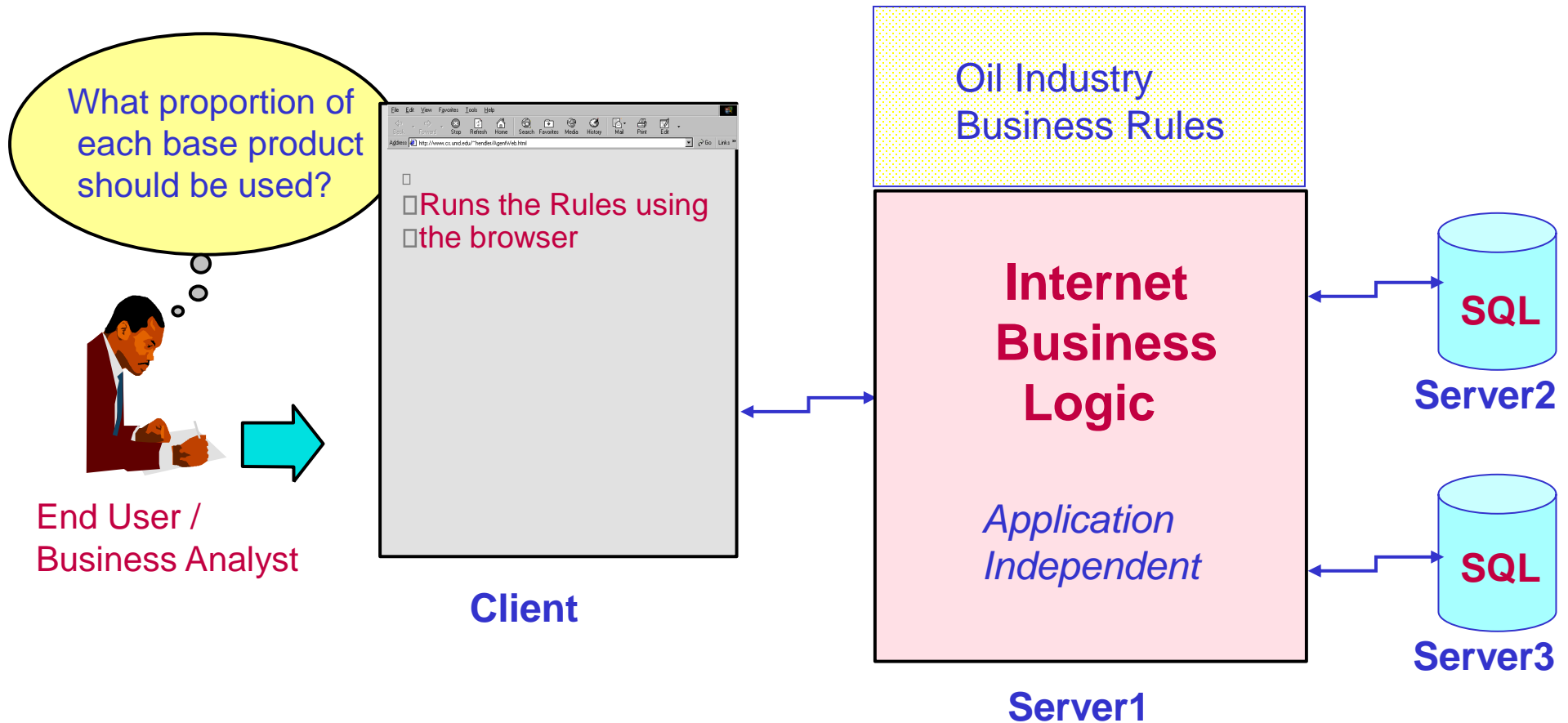
url:example.com dbms:mysql dbname:transport tablename:T1 port:3306 id:id123 password:pw345

-----  
we have this-method transportation from refinery this-name to region this-region

To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1MySql1

# Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- automatic generation of complex SQL queries :



To view, run and change this example, please point a browser to [executable-english.com](http://executable-english.com) and select Oil-IndustrySupplyChain1MySql1

# Application Semantics via Next Generation Business Rules

Supply Chain ---- oil industry ---- automatic generation of complex SQL queries :

```
select distinct x6,T2.PRODUCT,T1.NAME,T2.AMOUNT,x5 from
T6 tt1,T6 tt2,T5,T4,T3,T2,T1,T6,
(select x3 x6,T6.FINISHED_PRODUCT x7,T6.ID x8,tt1.ID x9,tt2.ID x10,sum(x4) x5 from
T6,T6 tt1,T6 tt2,
((select T6.ID x3,T3.PRODUCT1,T1.NAME,T2.AMOUNT x4,T2.PRODUCT from
T1,T2,T3,T4,T5,T6,T6 tt1,T6 tt2 where
T1.NAME=T2.NAME and T1.REGION=T6.REGION and T2.MONTH1=T4.MONTH1 and
T2.MONTH1=T6.MONTH1 and T2.PRODUCT=T3.PRODUCT2 and T4.MONTH1=T6.MONTH1 and
T3.PRODUCT1=T6.FINISHED_PRODUCT and T3.SEASON=T4.SEASON and T3.SEASON=T5.SEASON and
T4.SEASON=T5.SEASON and T6.ID=tt1.ID and T6.ID=tt2.ID and tt1.ID=tt2.ID)
union
(select T6.ID x3,T2.PRODUCT,T1.NAME,T2.AMOUNT x4,T2.PRODUCT from
T1,T2,T3,T4,T5,T6,T6 tt1,T6 tt2 where
T1.NAME=T2.NAME and T1.REGION=T6.REGION and T2.MONTH1=T6.MONTH1 and
T2.PRODUCT=T6.FINISHED_PRODUCT and T6.ID=tt1.ID and T6.ID=tt2.ID and tt1.ID=tt2.ID)
) group by T6.FINISHED_PRODUCT,T6.ID,tt1.ID,tt2.ID,x3) where
T6.ID=tt2.ID and tt1.ID=T6.ID and T6.FINISHED_PRODUCT=x7 and T6.ID=x8 and tt1.ID=x8 and
tt2.ID=x8 and T1.NAME=T2.NAME and T1.REGION=tt2.REGION and T2.MONTH1=T4.MONTH1 and
T2.MONTH1=tt2.MONTH1 and T2.PRODUCT=T3.PRODUCT2 and
T3.PRODUCT1=tt1.FINISHED_PRODUCT and T3.PRODUCT1=tt2.FINISHED_PRODUCT and
T3.SEASON=T4.SEASON and T3.SEASON=T5.SEASON and T4.MONTH1=tt2.MONTH1 and
T4.SEASON=T5.SEASON and T6.ID=x6 and tt1.FINISHED_PRODUCT=tt2.FINISHED_PRODUCT and
tt1.ID=tt2.ID and tt1.ID=x6 and tt2.ID=x6
order by x6,T2.PRODUCT,T1.NAME,T2.AMOUNT,x5;
```



# Application Semantics via Next Generation Business Rules

**Supply Chain** ---- oil industry ---- automatic generation of complex SQL queries :

- It would be difficult to
  - write the SQL query reliably by hand
  - manually reconcile it with the business knowledge specified in the rules.
- Yet this example is simpler than for a real supply chain !
  
- How do we know that the automatically generated SQL implements the business rules correctly ?
- Because we can still get step-by-step business level English explanations

# Application Semantics via Next Generation Business Rules

**Supply Chain** ---- oil industry ---- Automatic generation of complex SQL queries :

- Could a programmer write more readable SQL by hand ?
- Yes, but we would need to add comments in English to help people to reconcile the hand-written query with the business knowledge
- By their nature, the comments would not be used during machine processing  
-- correctness of the hand written-SQL would rely on lengthy,  
and error prone manual verification
- Comments are sometimes not kept up to date with the code!

# Agenda

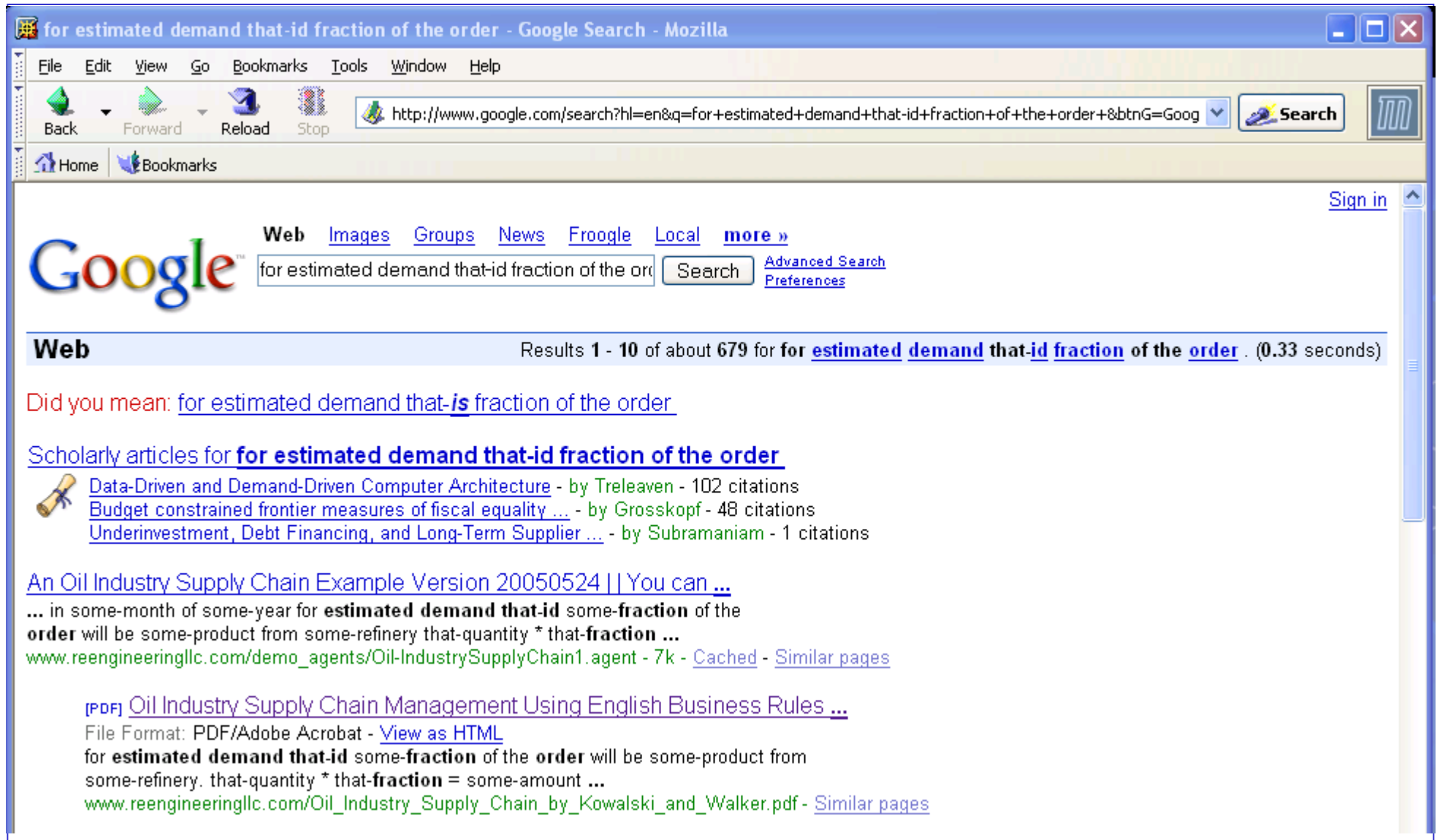
- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary

# Google and Business rules in English

**Search:** for estimated demand that-id fraction of the order

# Google and Business rules in English

**Search:** for estimated demand that-id fraction of the order



The screenshot shows a Mozilla browser window with the title "for estimated demand that-id fraction of the order - Google Search - Mozilla". The address bar contains the URL "http://www.google.com/search?hl=en&q=for+estimated+demand+that-id+fraction+of+the+order+&btnG=Goog". The search results page displays the Google logo, navigation links for "Web", "Images", "Groups", "News", "Froogle", "Local", and "more". The search query is "for estimated demand that-id fraction of the order". The results show "Results 1 - 10 of about 679 for for **estimated demand that-id fraction of the order** . (0.33 seconds)". A "Did you mean" suggestion is "for estimated demand that-*is* fraction of the order". Under "Scholarly articles for **for estimated demand that-id fraction of the order**", there are three results: "Data-Driven and Demand-Driven Computer Architecture - by Treleven - 102 citations", "Budget constrained frontier measures of fiscal equality ... - by Grosskopf - 48 citations", and "Underinvestment, Debt Financing, and Long-Term Supplier ... - by Subramaniam - 1 citations". A snippet from "An Oil Industry Supply Chain Example Version 20050524 || You can ..." is shown, along with a PDF link "Oil Industry Supply Chain Management Using English Business Rules ...".

# Google and Business rules in English

**Search:** for estimated demand that-id fraction of the order

for estimated demand that-id fraction of the order - Google Search - Mozilla

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop <http://www.google.com/search?hl=en&q=for+estimated+demand+that-id+fraction+of+the+order+&btnG=Goog> Search

Home Bookmarks Sign in

Google Web Images Groups News Froogle Local more »

for estimated demand that-id fraction of the order Search [Advanced Search](#) [Preferences](#)

**Web** Results 1 - 10 of about 679 for **for estimated demand that-id fraction of the order** . (0.33 seconds)

Did you mean: [for estimated demand that-is fraction of the order](#)

Scholarly articles for **for estimated demand that-id fraction of the order**

- [Data-Driven and Demand-Driven Computer Architecture](#) - by Treleven - 102 citations
- [Budget constrained frontier measures of fiscal equality ...](#) - by Grosskopf - 48 citations
- [Underinvestment, Debt Financing, and Long-Term Supplier ...](#) - by Subramaniam - 1 citations

[An Oil Industry Supply Chain Example Version 20050524 || You can ...](#)  
... in some-month of some-year for **estimated demand that-id** some-fraction of the **order** will be some-product from some-refinery that-quantity \* that-fraction ...  
[www.reengineeringllc.com/demo\\_agents/Oil-IndustrySupplyChain1.agent](http://www.reengineeringllc.com/demo_agents/Oil-IndustrySupplyChain1.agent) - 7k - [Cached](#) - [Similar pages](#)

[\[PDF\] Oil Industry Supply Chain Management Using English Business Rules ...](#)  
File Format: PDF/Adobe Acrobat - [View as HTML](#)  
for **estimated demand that-id** some-fraction of the **order** will be some-product from some-refinery. that-quantity \* that-fraction = some-amount ...  
[www.reengineeringllc.com/Oil\\_Industry\\_Supply\\_Chain\\_by\\_Kowalski\\_and\\_Walker.pdf](http://www.reengineeringllc.com/Oil_Industry_Supply_Chain_by_Kowalski_and_Walker.pdf) - [Similar pages](#)

The executable English rules and facts that define the application

A paper that describes the application

# Agenda

- Aligning IT and business
- Making smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google and Business rules in English
- Comparing Open Vocabulary English and OMG SBVR
- Summary

# Comparing Open Vocabulary English and OMG SBVR

**IBL = Open Vocabulary English** [executable-english.com]

Conceptually simple system that *internally* combines three kinds of semantics:

**SBVR = Semantics of Business Vocabulary and Business Rules**

A 390-page document specifying a design approach and a methodology [SBVR-06-03-02]

“unfortunately .... the material is rather difficult to approach”



# Comparing Open Vocabulary English and OMG SBVR

## **IBL = Open Vocabulary English** [executable-english.com]

Conceptually simple system that *internally* combines three kinds of semantics:

Semantics1: "Data Semantics" as in a relational database, XML or RDF

Semantics2: specifies what a rule engine should do

Semantics3: Application Semantics -- the meaning of English concepts at the author- and user-interface

## **SBVR = Semantics of Business Vocabulary and Business Rules**

A 390-page document specifying a design approach and a methodology [SBVR-06-03-02]

“unfortunately .... the material is rather difficult to approach”

# Comparing Open Vocabulary English and OMG SBVR

## **IBL = Open Vocabulary English** [executable-english.com]

Conceptually simple system that *internally* combines three kinds of semantics:

Semantics1: "Data Semantics" as in a relational database, XML or RDF

Semantics2: specifies what a rule engine should do

Semantics3: Application Semantics -- the meaning of English concepts at the author- and user-interface

## **SBVR = Semantics of Business Vocabulary and Business Rules**

A 390-page document specifying a design approach and a methodology [SBVR-06-03-02]

“unfortunately .... the material is rather difficult to approach”

Contributions from 19 industrial organizations, saying that information systems should comply with:

A logical formulation of Semantics

Common Logic

A business vocabulary

Structured English notation, with many keywords

Business rules -- rules that are under business jurisdiction

OMG XML and XMI for Meta Object Facility generation from vocabulary

# Comparing Open Vocabulary English and OMG SBVR

## IBL = Open Vocabulary English [executable-english.com]

Conceptually simple system that *internally* combines three kinds of semantics:

Semantics1: "Data Semantics" as in a relational database, XML or RDF

Semantics2: specifies what a rule engine should do

Semantics3: Application Semantics -- the meaning of English concepts at the author- and user-interface

## SBVR = Semantics of Business Vocabulary and Business Rules

A 390-page document specifying a design approach and a methodology [SBVR-06-03-02]

“unfortunately .... the material is rather difficult to approach”

Contributions from 19 industrial organizations, saying that information systems should comply with:

A logical formulation of Semantics

Common Logic -- **compatibility problems with rules and relational databases**

A business vocabulary

Structured English notation, with many keywords -- **intensive dictionary & grammar maintenance**

Business rules -- rules that are under business jurisdiction

OMG XML and XMI for Meta Object Facility generation from vocabulary

# Comparing Open Vocabulary English and OMG SBVR

## **IBL = Open Vocabulary English**

Conceptually simple system that *internally* combines three kinds of semantics:

## **SBVR = Semantics of Business Vocabulary and Business Rules**

A 390-page document specifying a design approach and a methodology

“unfortunately .... the material is rather difficult to approach”

## **Suggestion**

Use parts of the SBVR approach, as needed, to get agreement among stakeholders

In parallel, write exploratory rules in the IBL, and run them over sample data

Then write for production purposes using the IBL or other rule system

# Summary

- Importance of aligning IT and business -- Forrester
- Good things happen when we make smart connections
- Application semantics via next generation business rules
  - System architecture
  - Examples
    - Insurance, Car rental, Business Intelligence, Supply chain
- Google indexes and searches Business rules in English
- Comparison of Open Vocabulary English system and OMG SBVR specification

# Links

1. These slides can be downloaded from [www.executable-english.com](http://www.executable-english.com)
2. What a reasoner **should** do to be compatible with relational database usage:  
Backchain Iteration: Towards a Practical Inference Method that is Simple Enough to be Proved Terminating, Sound and Complete. Journal of Automated Reasoning, 11:1-22.

3. The English inferencing examples

InsuranceCaseStudy1

EU-rent2

Medmine2

Oil-IndustrySupplyChain1

Oil-IndustrySupplyChain1MySql1

(and many other examples provided) can be run, changed, and re-run as follows:

1. Point a browser\* to <https://www.executable-english.com/quickstart.html>
2. Follow the indicated steps to look at an app and then run it
3. When you get an answer, follow the steps to see an explanation
4. You are cordially invited to write and run your own examples.  
(Shared use of the system is free)
5. See also [https://www.executable-english.com/IBL\\_tutorial\\_part1.html](https://www.executable-english.com/IBL_tutorial_part1.html)

\* The Executable English system works best with the Chrome, Firefox, Brave, or Edge browser

# About the Author

- Author of over 20 papers, and an Addison-Wesley book, on business rule systems and databases
- Manager of Principles and Applications of Logic Programming, IBM Yorktown Research Laboratory
- Manager, Internet Development at Eventra (a manufacturing supply chain company)
- Assistant Professor at Rutgers University