

IBM Software

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## Delivery management: Connecting delivery with business strategy

*Murray Cantor, Ph.D.*

*IBM Distinguished Engineer*

# Delivery management: Connecting delivery with business strategy

**Murray Cantor**

*IBM Distinguished Engineer*

**Session Track Number: DR-1952**

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# Realities can stall software-driven innovation

*Complexities in software delivery compounded by market pressures*

## Complex, Multi-platform Systems and Applications

**62%** of companies have agile projects requiring integration with legacy systems

## Increasing Mandates

2010 Spending in U.S. on governance, risk and compliance was **\$29.8 billion**

## Globally Distributed Software and Product Supply Chains

**50%** of outsourced projects are expected to under perform

## Cost Reduction

**70%** budget locked in maintenance and **37%** of projects go over budget

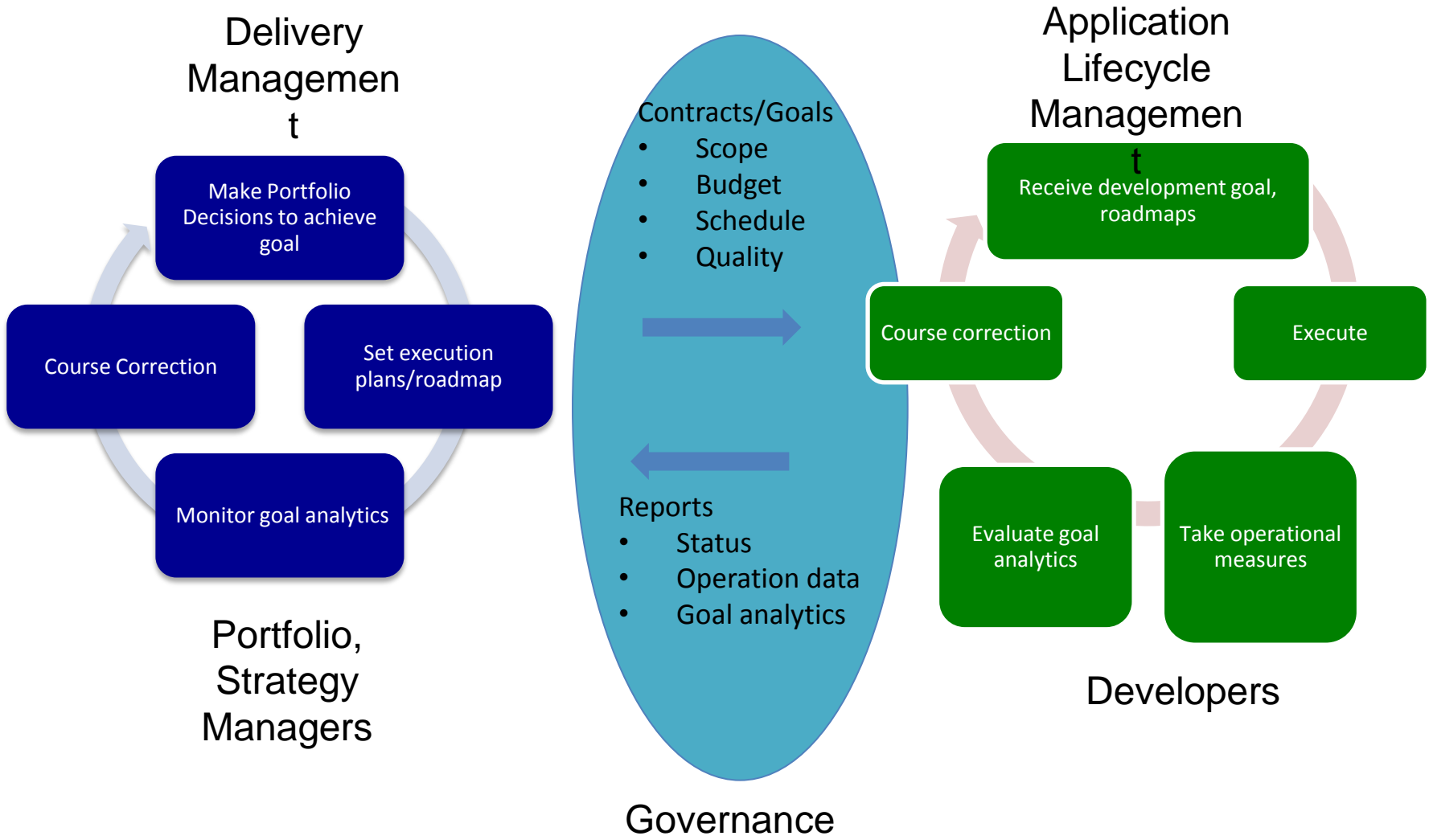
## Unpredictability in Software Delivery

**62%** of projects fail to meet intended schedule

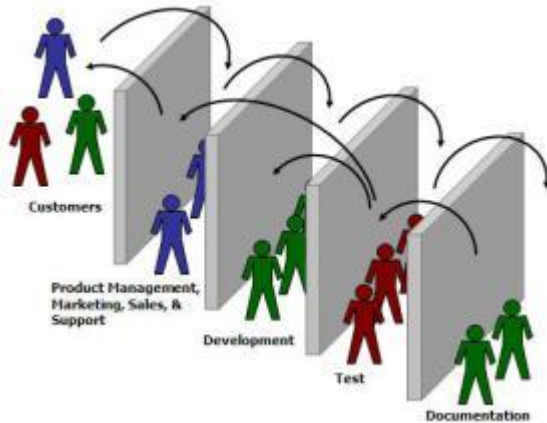
## Changing Requirements and Time to Market

**30%** of project costs are due to rework and poor execution of requirements

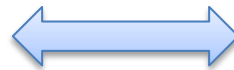
# Key Idea: Align DM and CLM through instrumented governance



# Shifting from managing projects to managing value and change



Engineering Governance



Economic Governance

Many project management approaches support the "happy path" from a proposal to requirements, onto project scope and delivery, but:

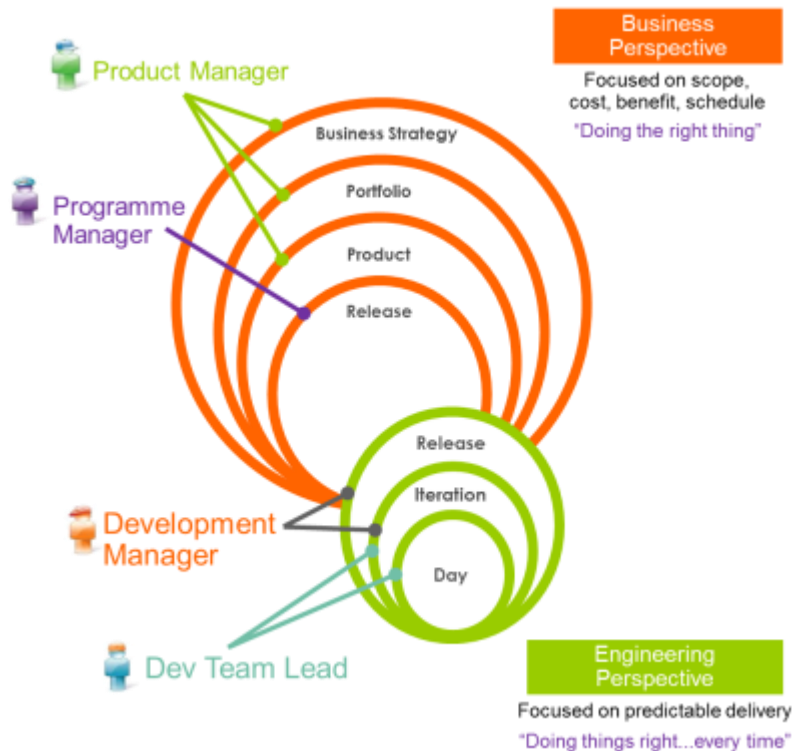
- What happens when the delivery team encounters problems or delays?
- How do you quickly identify delivery issues, and understand their business impact?
- What happens to delivery when customer priorities change?
- How do you adjust to enable successful delivery and also address your customer's priorities?

In addition to these basic hygiene factors, there is an increasing interest in "continuous delivery" - by providing a regular product or application releases, it is possible to make them more reliable, reduce delivery risk and get earlier feedback from customers.

- How do you capture your customer's input?
- How can you use it to inform future development cycles?
- How can you update your customer on progress and roadmaps?

# Delivery Management

## Coupled portfolio management and team planning



### Rational® Focal Point

- Capture, evaluate, and prioritise customer needs
- High-level financial analysis
- Road-mapping and high-level release planning
- High-level status, cost and benefit tracking

### Rational® Requirements Composer

- Elaborate customer needs with process flows, story boards or user interface sketches
- Review and approval of requirements
- Manage change and impact

### Rational® Team Concert

- Development iteration planning
- Task management and work item tracking
- Team collaboration
- Integrated developer IDE

# Example lifecycle of project scope items

Rational Focal Point



Agreement

Delivery



Rational Team Concert



# Example lifecycle of project scope items

Rational Focal Point



Agreement

Delivery



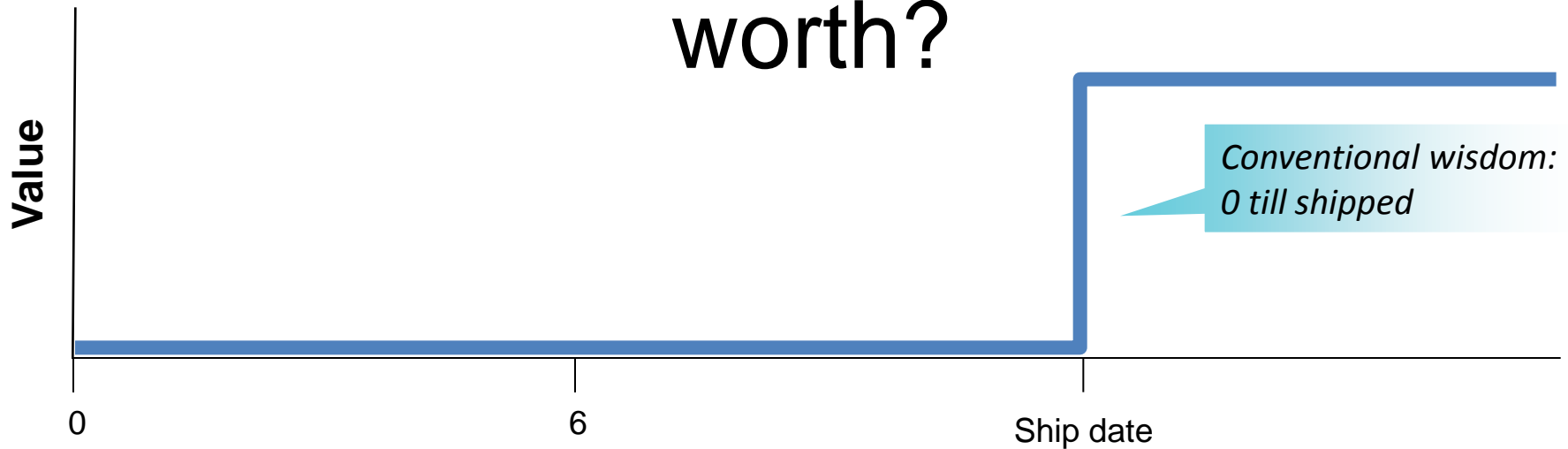
Rational Team Concert

Investment Analysis: Committing to initiating, continuing a development effort is a question of economics

- Need to reason about where to assign constrained resources
- Balance quick wins against long term benefit
- Show return on investment for innovation

Key challenge is conventional wisdom (and FASB rules): Incomplete projects have no value

# The key question: How much is an incomplete development program worth?



- The conventional wisdom:
  - Fails to acknowledge value of work already done
  - Provides no opportunity for ongoing value management
- Can only discuss cost, not value

*If all unshipped efforts are worthless, there is no way to compare investments*



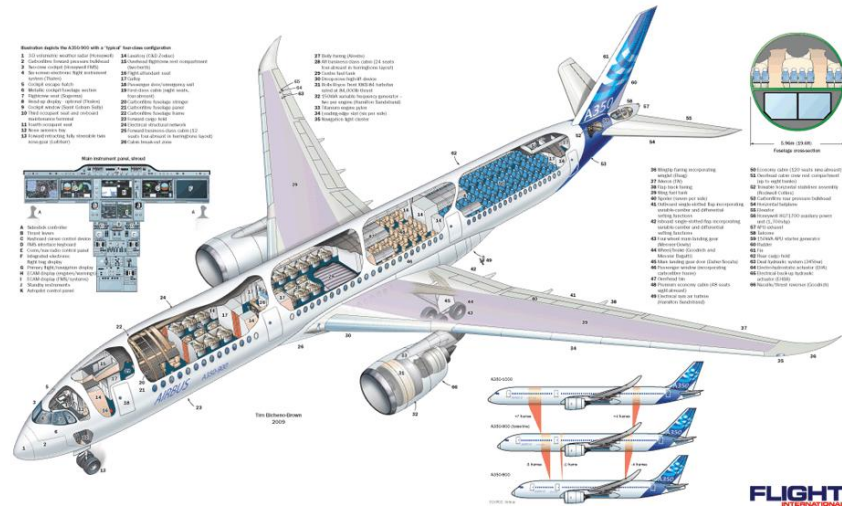
## Another approach: Things are worth what someone might pay for them

- Imagine (if you will) you could sell your incomplete development program
- The buyer would spend money now to obtain the option to invest in completing the program to receive its benefits
- How would one reason about the fair price?
  - The buyer, **reasoning like an investor**, to compute return on investment needs
    - Probability of the cost to complete
    - Probability of the benefit to be received

The economists call this “*incomplete market reasoning*”

# For example

- For how much would Airbus sell the A350 program?
- Certainly not zero!
- The buyer would get the right to spend the rest of the money to get the future benefits



# What concepts are needed?

- For expected costs and value:
  - Must deal with the time value of money – Net Present Value (NPV)
- For the risk to be undertaken:
  - Must deal with uncertainty in costs and benefits – Random variables from statistics

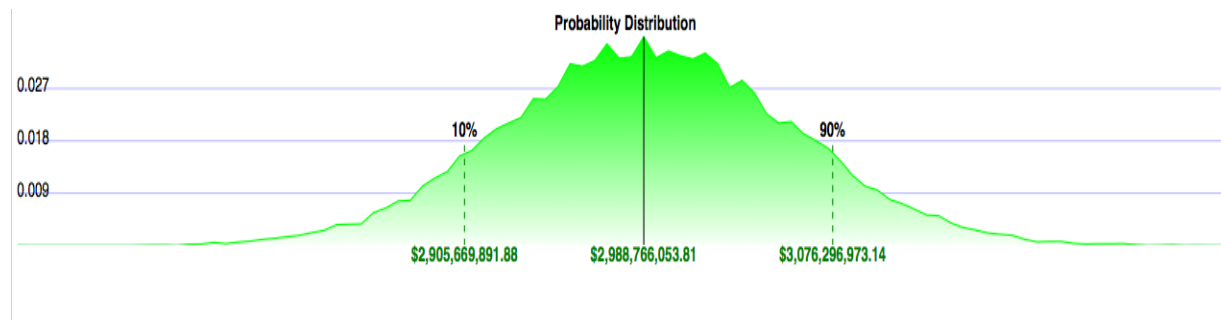
# The cost and benefit streams are provided by each stakeholder

- Stakeholders might include
  - Business analyst
  - Product manager
  - Development manager
  - Operations manager
  - Service manager
  - ....
- By quarter, each stakeholder provides the actuals and updated estimates for their stream
  - High, low, expected values
  - Reasoning for the input
- Finance provides cost of money and other indirect costs, if needed.



# The NPV itself is a distribution found by applying Monte Carlo simulation to the summations

- The mean of the distribution is its fair value and
- The standard deviation is a measure of its risk.





## Investment analyzer features:

- Can build
  - Simple initial business cases with less confidence
  - More elaborate, faithful business cases when warranted
- Wide range of financial measures: RoI, IRR, payback
  - Expression language available to extend
- Reusable templates
- Include actuals as they become available
  - Can compare actuals against forecasts for accountability, process improvement
- Capture organizations business logic for calculating costs and benefits
- Capture snapshots in for trending
- Both monetary and non-monetary benefits

# Investment analysis allows for uncertainty

- Easy inputs of future costs and benefits: three values:
  - L, the lowest monetary value you believe could occur (no chance of a lower value)
  - E, the most likely or expected monetary value
  - H, the highest monetary value you believe could occur (no chance of a higher value)
- Can support direct or calculated input



# Direct input screen

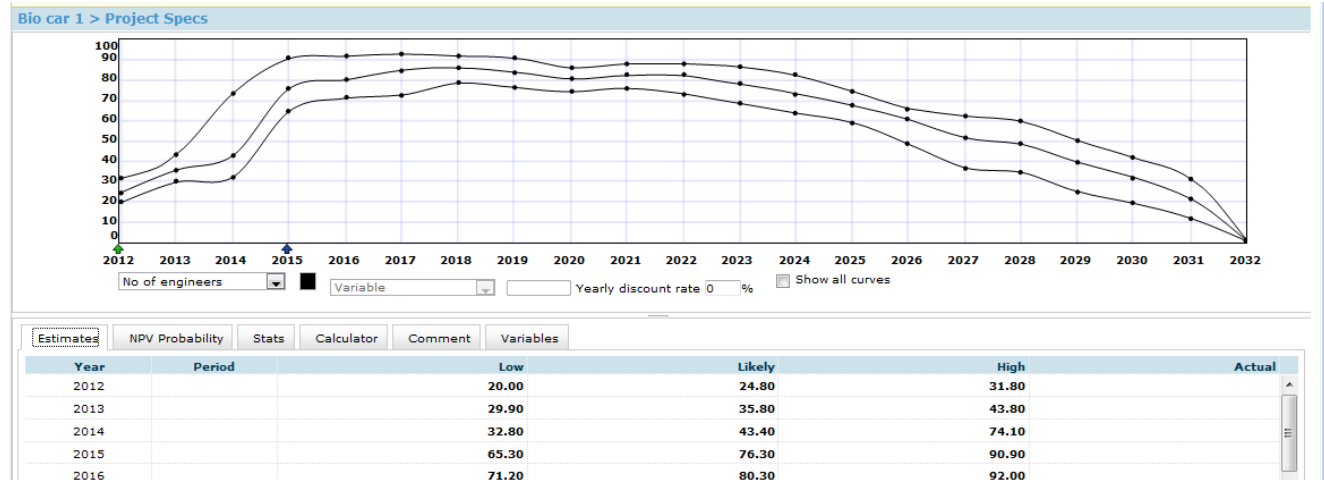
**Modules**

- Elements
- Criteria
- Releases
- Checkpoints
- Resource Types
- BioCars**
- Test

**Display**

- Reports
- Configure
- Members
- Information
- Advanced

001:Bio car 1  
003:Biocar 3



# Variables specification

Rational Focal Point

Workspaces | Home | Preferences | Admin | Help [Help Updater | Change Password | Remote Center] | Log Out

Modules > BioCars

Cars IA

BioCars (1/2)

- 001:Bio car 1
- 003:Biocar 3

Menu

Bio car 1 > Project Specs

Estimates | NPV Probability | Stats | Calculator | Comment | Variables

Name	Description	Type	Value	Result
CE	Cost per engineer	Normal	250,000	50,000
BOMP	BOM per car	Triangular	1,250	1,500
ASM	Assembly per car	Triangular	800	1,300
Markup	Markup value for margins	Triangular	1.5	2.5
Parts	Price of parts per car	Triangular	1,250	1,750
W1	Warranty cost for 1st year	Triangular	300	400
W2	Warranty cost for 2nd year	Triangular	400	1,000
W3	Warranty cost for 3rd year	Triangular	600	1,200

Add Variable | Save as Default

Auto recal |  Graph results | 10000 | Run Simulation

# Calculated Input

IBM Rational Focal Point interface showing a project specification for 'Bio car 1'.

**Bio car 1 > Project Specs**

Services and Warranty Cost USD Yearly discount rate 0 % Show all curves

Estimates NPV Probability Stats Calculator Comment Variables

Apply Simulation to 2012 Clear 2012

Visibility Local

**Warranty**

Total warranty cost

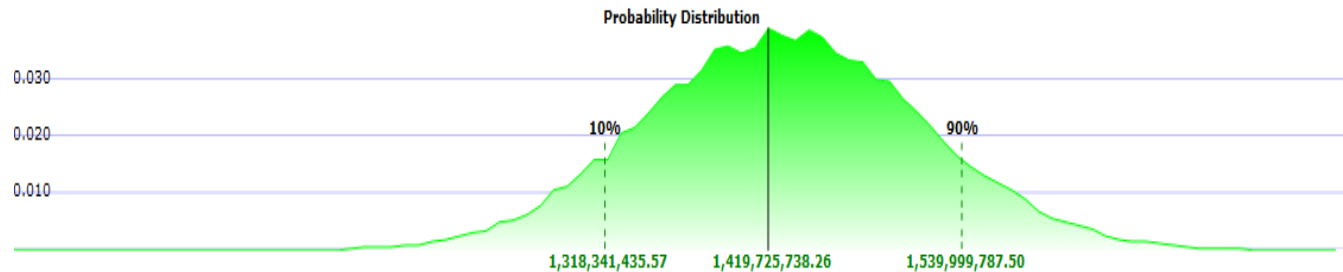
Name	Description	Type	Value	Result
WAR1		Formula	W1*Quantity[PERIOD]	✖
WAR2		Formula	W2*Quantity[(PERIOD-1)]	✖
WAR3		Formula	W3*Quantity[(PERIOD-2)]	✖
WAR		Formula	WAR1+WAR2+WAR3	✖

Save Close

IBM. For better performance in charts, install the browser plug-in Microsoft® Silverlight® Rational software

# Investment analysis summary

- Take an investment perspective
- Identify , forecast, calculate cost and benefit streams
- Accounts for uncertainties, financial risk
- Forecast financial returns
  - NPV
  - RoI
  - ....



# Introducing ANDES: Detecting and Remediating Threats to On-time Software and Systems Delivery

- ANDES is an analytics solution that provides early, actionable insight into issues that are putting on-time delivery at risk by:
  - Assessing the evolving likelihood of on-time product delivery and amount of risk remaining
  - Diagnosing common development issues that are adversely affecting the likelihood of on-time delivery using *patterns* in development data
  - Providing actionable insight into what caused the issues, and next steps to take towards resolution
  - Enabling “what-if” analysis to explore the most likely outcomes of different solutions to issues
- ANDES makes predictions and diagnoses based on data you already have (in Rational Team Concert)
  - Work items
  - Iteration/milestone plans
  - Business case
  - Etc.
- ANDES uses modern analytic methods to combine expert opinion with project data to make outcome predications

# The goal: On time delivery of agile efforts

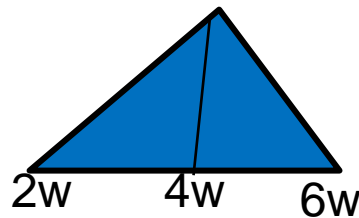
- The impact of missing a scheduled delivery results in
  - Higher costs:
    - Additional develop time may mean blow budgets
    - Technical debt – Rushing the code out the door may mean cutting corners on quality resulting in after delivery costs
    - Wasted stakeholder efforts: marketing, sale, support, operation, ...
  - Less benefits
    - Revenue
      - Missing market window, especially of software embedded in larger product
      - Missed contractual commitments
      - Missed operational commitments
- Yet, interesting, economically valuable software has uncertainties that make schedule commitments hard to meet



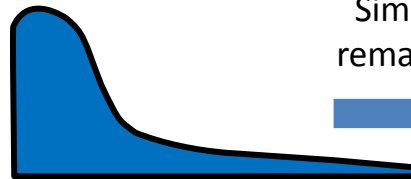
# ANDES is a Monte Carlo simulation to lifecycle of project scope items



Developer Duration Estimates



Actual Distribution of WI completion time



Monte Carlo Simulation of remaining work



Uncertainty is reduced as

- Higher risk work is completed
- Plan items are scoped as work items

# The Andes Solution

Global Health

**Likelihood of Shipping on Time: 84%**

84 %
16 %

Predicted Delivery Date

**Delivery Date Risk Trend**

Expected Delivery

Date of Estimate

**Burndown**

Planned Delivery: Jan 31, 2013

Diagnosis / Alerts (5)

**Feature Burnup**

*A plan item is either increasing in scope, or it is significantly larger in scope than originally anticipated*

▶ Details      ▶ Suggested Actions

**Overload Induced by Increased Workload**

*Work overload has been observed during a period of increased quantity of work*

▶ Details      ▶ Suggested Actions

**Rescheduled Blocking Item**

*A work item that blocks other work items has been rescheduled*

▶ Details      ▶ Suggested Actions

**Item Depends on Slipping Blocker**

*A work item depends on an item that is slipping its due date or increasing its estimated hours*

▶ Details      ▶ Suggested Actions

**Repeatedly Rescheduled Item**

*A work item has been rescheduled more than once*

▶ Details      ▶ Suggested Actions

What-if Analysis

**Team Velocity**

Actual: 9    Override:

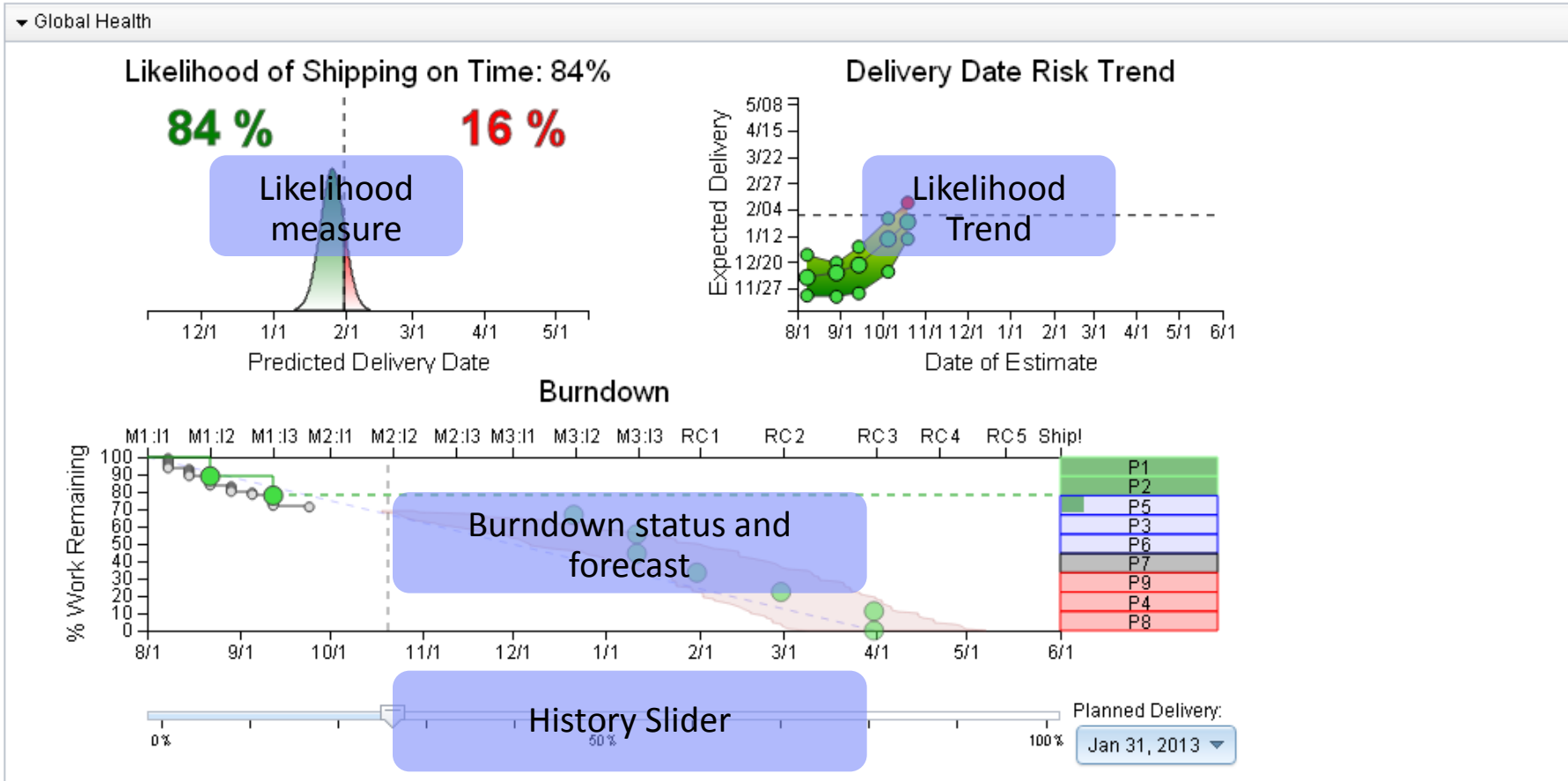
**Committed Work**

Item	Actual	Estimate	Status
<input checked="" type="checkbox"/> P1: Data reorganization	3w		Completed
<input checked="" type="checkbox"/> P2: Reduce technical debt in rules engine	3w		Completed
<input checked="" type="checkbox"/> P3: Increase the customizability of energy-management policies	Estimate: 1w 2w 3w		On Schedule
<input checked="" type="checkbox"/> P4: Improve reporting functionality	Estimate: 1w 2w 3w		At Risk
<input checked="" type="checkbox"/> P5: Develop infrastructure for cross-site management	Estimate: 1w 2w 3w		On Schedule
<input checked="" type="checkbox"/> P6: Improve the facility-modeling tools	Estimate: 1w 2w 3w		On Schedule
<input checked="" type="checkbox"/> P7: Cross-site security	Estimate: 1w 2w 3w		On Schedule
<input checked="" type="checkbox"/> P8: Uniform UX (user experience)	Estimate: 1w 2w 3w		At Risk
<input checked="" type="checkbox"/> P9: Expand analytics capabilities	Estimate: 1w 2w 3w		At Risk

Reset    Apply

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# The Andes Solution



# The Andes Solution

▼ Diagnosis / Alerts (5)

## Feature Burnup

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- ▶ Details
- ▶ Suggested Actions

Pattern identification and diagnosis

## Item Depends on Slipping Blocker

*A work item depends on an item that is slipping its due date or increasing its estimated hours*

- ▶ Details
- ▶ Suggested Actions

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*A work item has been rescheduled more than once*

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# The Andes Solution

## Committed Work

<input checked="" type="checkbox"/>	P1: Data reorganization	Actual:	3w				Completed
<input checked="" type="checkbox"/>	P2: Reduce technical debt in rules engine	Actual:	3w				Completed
<input checked="" type="checkbox"/>	P3: Increase the customizability of energy-management policies	Estimate:	1w	2w	3w		On Schedule
<input checked="" type="checkbox"/>	P4: Improve reporting functionality	Estimate:	1w	2w	3w		At Risk
<input checked="" type="checkbox"/>	P5: Develop infrastructure for cross-site management	Estimate:	1w	2w	3w		On Schedule
<input checked="" type="checkbox"/>	P6: Improve the facility-modeling tools	Estimate:	1w	2w	3w		On Schedule
<input checked="" type="checkbox"/>	P7: Cross-site security	Estimate:	1w	2w	3w		On Schedule
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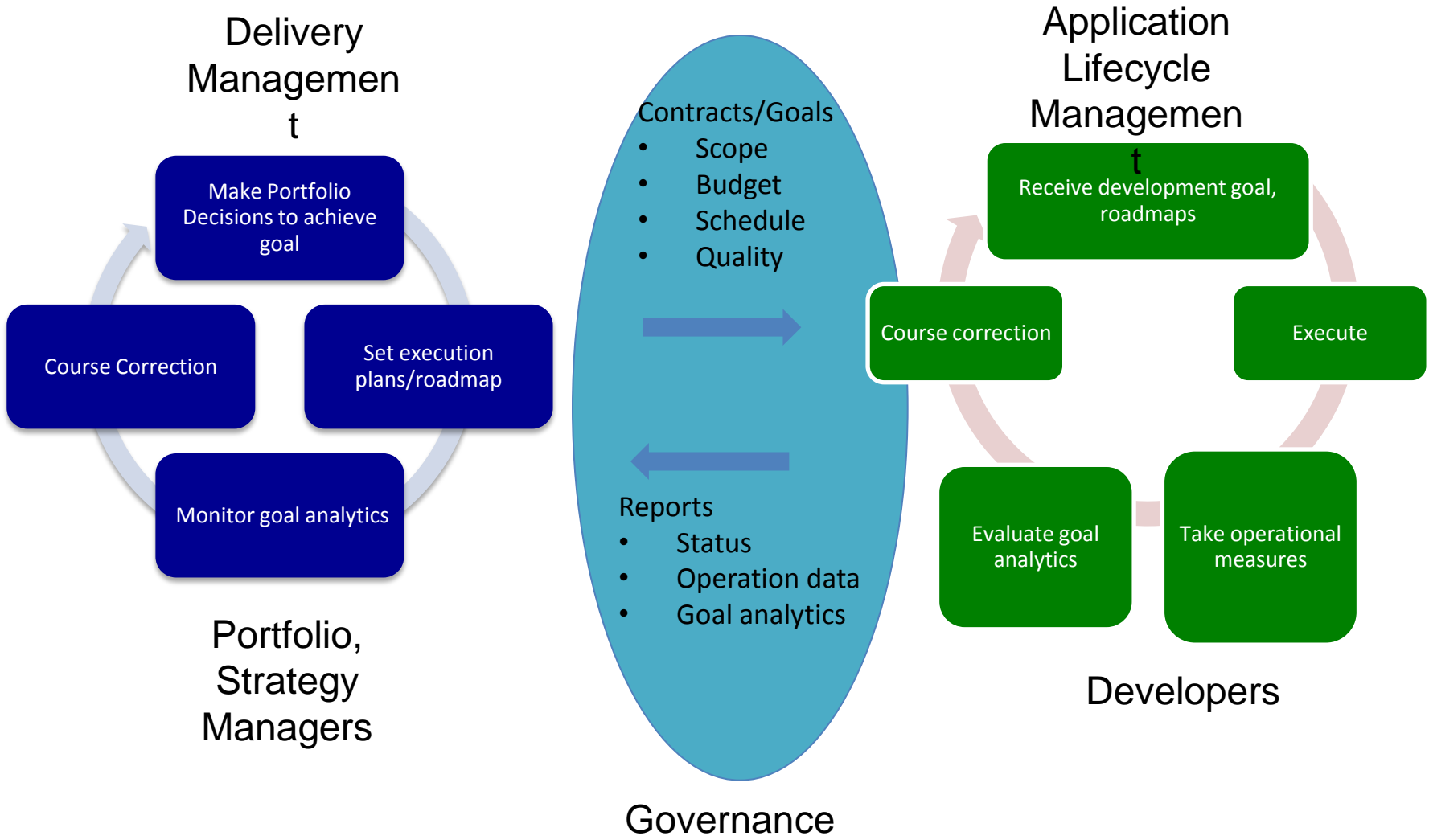
Scope management

Reset Apply

# Wrapping up AnDes

- ANDES introduces an analytic method for predicting likelihood of making project commitments
  - First instance is scope management
  - Later instances might include quality and budget management
- Part of the Rational/Research joint program
- ANDES is architected to fit into Rational jazz framework.

# Key Idea: Align DM and CLM through instrumented governance



# QUESTIONS





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**“I used to think  
collaboration was a  
hippie word leftover  
from the 1960’s...now I  
define it as survival”**

Innovate 2011 speaker



Why did we  
decide that?

## To compute the value of the program:

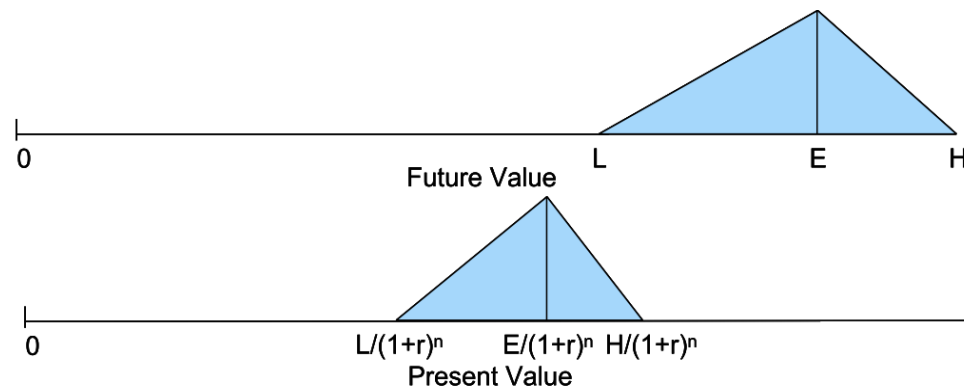
Apply the Net Present Value formula

$$NPV(SSD) = \sum_{i=t_D}^{t_E} \frac{B_i}{(1+r_B)^i} - \sum_{j=t_t}^{t_D} \frac{D_j}{(1+r_D)^j} - \sum_{k=t_D}^{t_E} \frac{M_k}{(1+r_M)^k}$$

With:

1.  $B_i$  = Benefits future values
2.  $D_j$  = Development expenses future value
3.  $M_k$  = Maintenance, after delivery expenses future values
4.  $t_t$  = Today, the current period
5.  $t_D$  = Delivery period
6.  $t_E$  = End of life period
7. The  $r_B$ ,  $r_M$ ,  $r_D$  are discount rates accounting for the time value of money.

Using triangular distributions as the future values

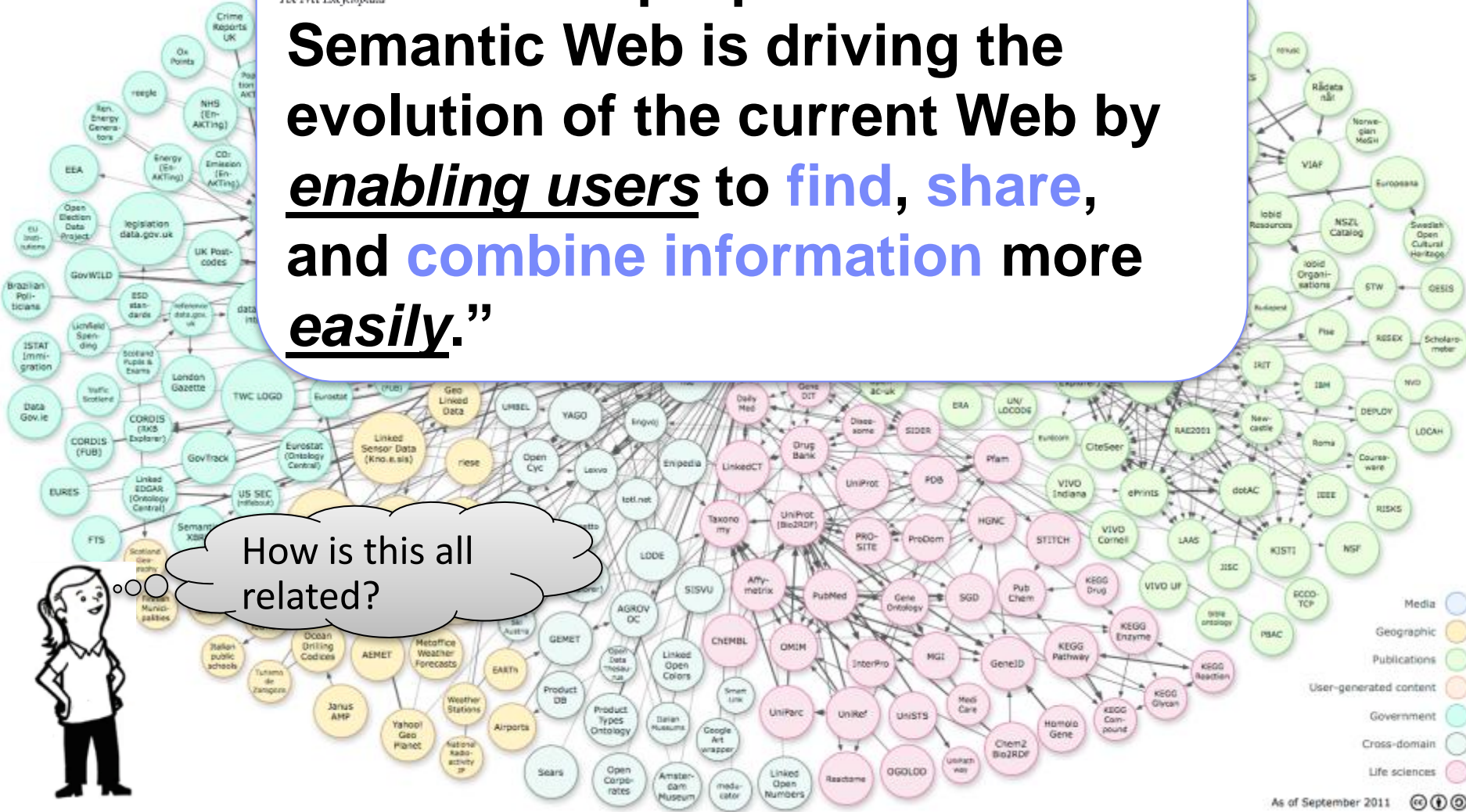




WIKIPEDIA  
The Free Encyclopedia

The main purpose of the Semantic Web is driving the evolution of the current Web by enabling users to find, share, and combine information more easily."

How is this all related?



As of September 2011

ARE WE THERE YET?

6,426 UNREACHED PEOPLE GROUPS

WHAT MORE CAN I DO?



Where exactly are we headed?

**Failure happens all the time.  
It happens every day in  
practice. What makes you  
better is how you react to it.**

-Mia Hamm, FIFA World Player of the Year



How can we  
make this  
better?



IBM Rational Focal Point interface showing a project simulation for 'Bio car 1'.

**Navigation:** Modules > BioCars

**Project Structure:** BioCars (1|2)
 

- 001:Bio car 1
- 003:Biocar 3

**Simulation Chart: Bio car 1 > Project Specs**

The chart displays three curves representing different metrics over time from 2012 to 2032. The Y-axis ranges from 0 to 30,000,000. The X-axis shows years from 2012 to 2032. The curves show an initial increase, peaking around 2018, followed by a gradual decline.

**Simulation Parameters:**

- Category: Engineering
- Cost: USD
- Yearly discount rate: 0%
- Show all curves:

**Simulation Controls:**

- Estimates | NPV Probability | Stats | Calculator | Comment | Variables
- Apply Simulation to 2012 | Clear 2012
- Visibility: Local

**Table: Total engineering cost**

Name	Description	Type	Value	Result
TEC	Total engineering cost	Formula	CE*No of engineers[PERIOD]	

**Simulation Options:**

- Add Variable
- Auto recal:
- Graph results: 10000
- Run Simulation

Buttons: Save, Close

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Cars IA - Rational Focal Point - Windows Internet Explorer

http://9.124.90.190:8080/fp/ser/let/WorkSpaceController?file=/common/index.jsp&FP\_projectid=1&SKEY=AC999E3110CFA4E0BCCC326A827F9B4C

IBM Cars IA - Rational Focal Point

Rational Focal Point

Workspaces | Home | Preferences | Admin | Help [Help Updater | Change Password | Remote Center] | Log Out

Modules > BioCars

BioCars (1/2)

- 001:Bio car 1
- 003:Biocar 3

Menu

Bio car 1 > Project Specs

500,000,000  
400,000,000  
300,000,000  
200,000,000  
100,000,000  
0

2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032

Sales Revenue Benefit USD Yearly discount rate 0 % Show all curves

Estimates NPV Probability Stats Calculator Comment Variables

Apply Simulation to 2012 Clear 2012

Tapes Sales Visibility Local

Total sales revenue

Name	Description	Type	Value	Result
Sales		Formula	Markup*Manufacturing[PERIOD]	

Add Variable Auto recal Graph results 10000 Run Simulation

Save Close

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Done Internet | Protected Mode: Off 95%



