

Introduction to XMILE: An Open Standard for System Dynamics Modeling

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isee systems



Outline

- Review webinar series
- Advantages of System Dynamics
- Overview of XMILE



Climate Change



ReThink Health

ReThink Health - Anytown

Logout



Introduction [Create New Scenario](#) Results Select Scenarios Map Info

Select Initiatives...*

Sliders Set the Reach, Intensity, and Cost for Each Initiative*

Risk

Care

Capacity

Cost

Trends

Definitions

Specs

Rankings

Assumptions



Enable Healthier Behaviors



- For DisAdv Only
- For Youth Only
- For Working Age Only
- For Seniors Only



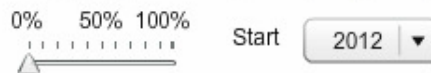
Reduce Crime



- For DisAdv Only



Reduce Environmental Hazards

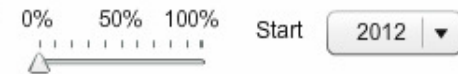


- For DisAdv Only



Create Pathways to Advantage

Student



Family



Reset All

* All choices will be retained for new scenarios, until reset

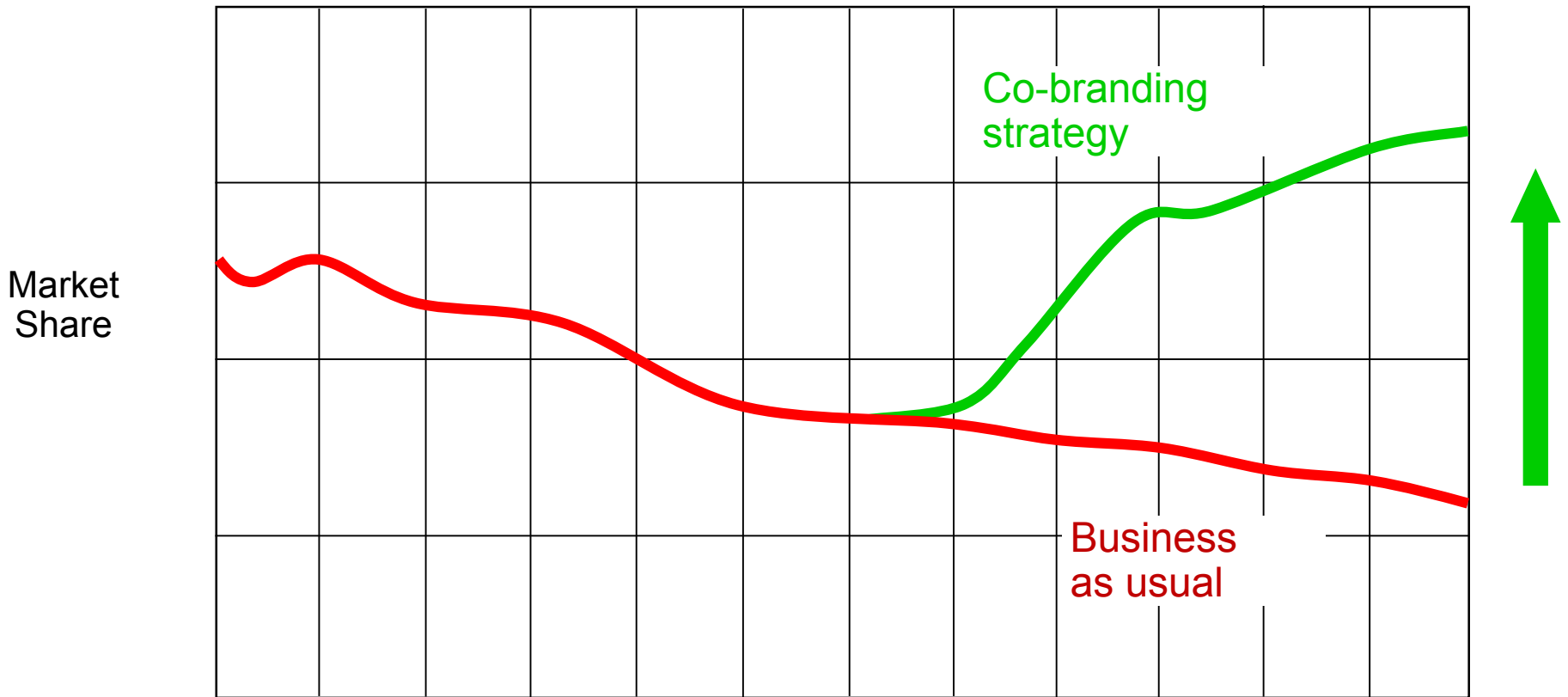
Fund Initiatives

Work-in

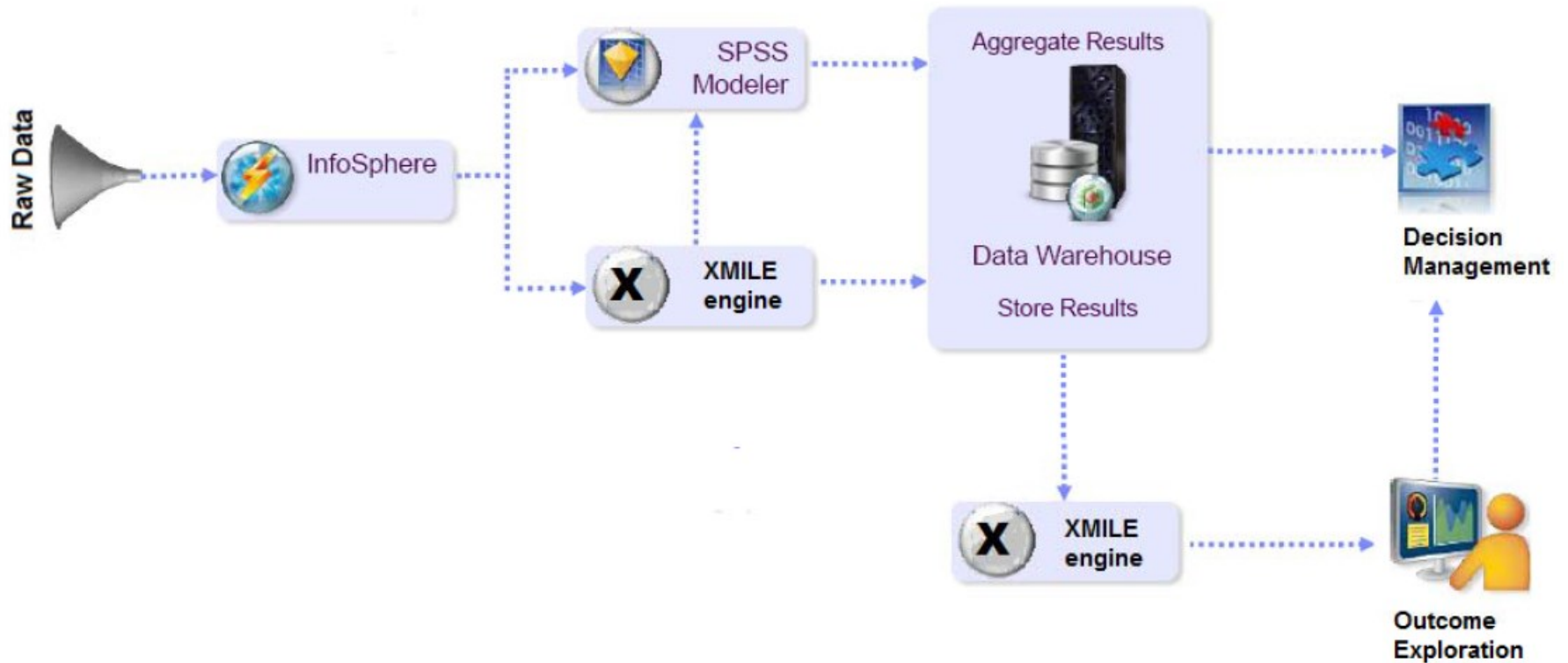


7.10.13

Credit Card Markets



Big Data and Retail



Energy Market Dynamics

Wind Integration Services

Return

1 1 12
Month of the Year

0 12,200 4,000
Wind Capacity

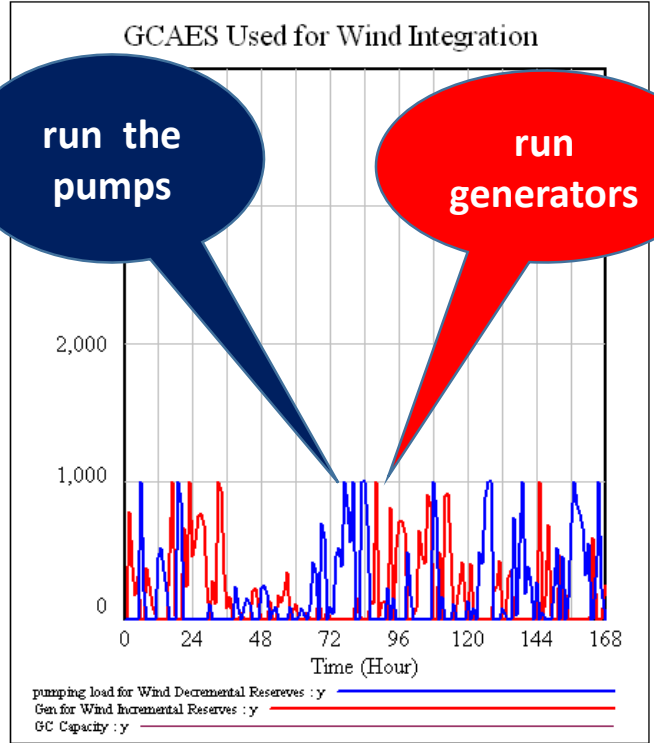
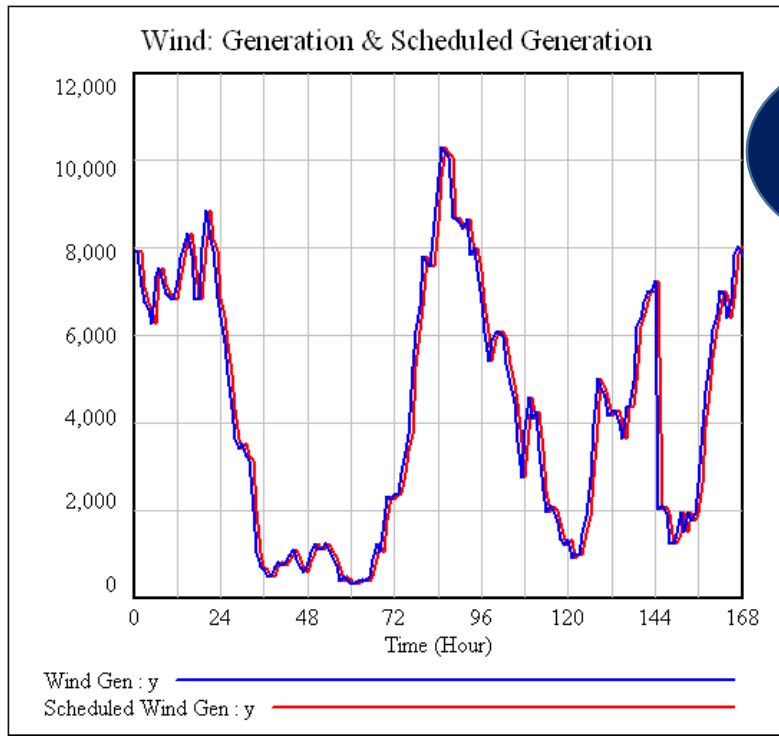
0 1,000 2,000
GC Cap for Wind Integration

2 5 20
Wind Integration Rate

0 0 1
"Wind Geographic Diversity?"

1 1 2
wind schedule lag

0.8 1 1.2
inc dec sensitivity factor



[View Wind Geographical Diversity Effect](#)

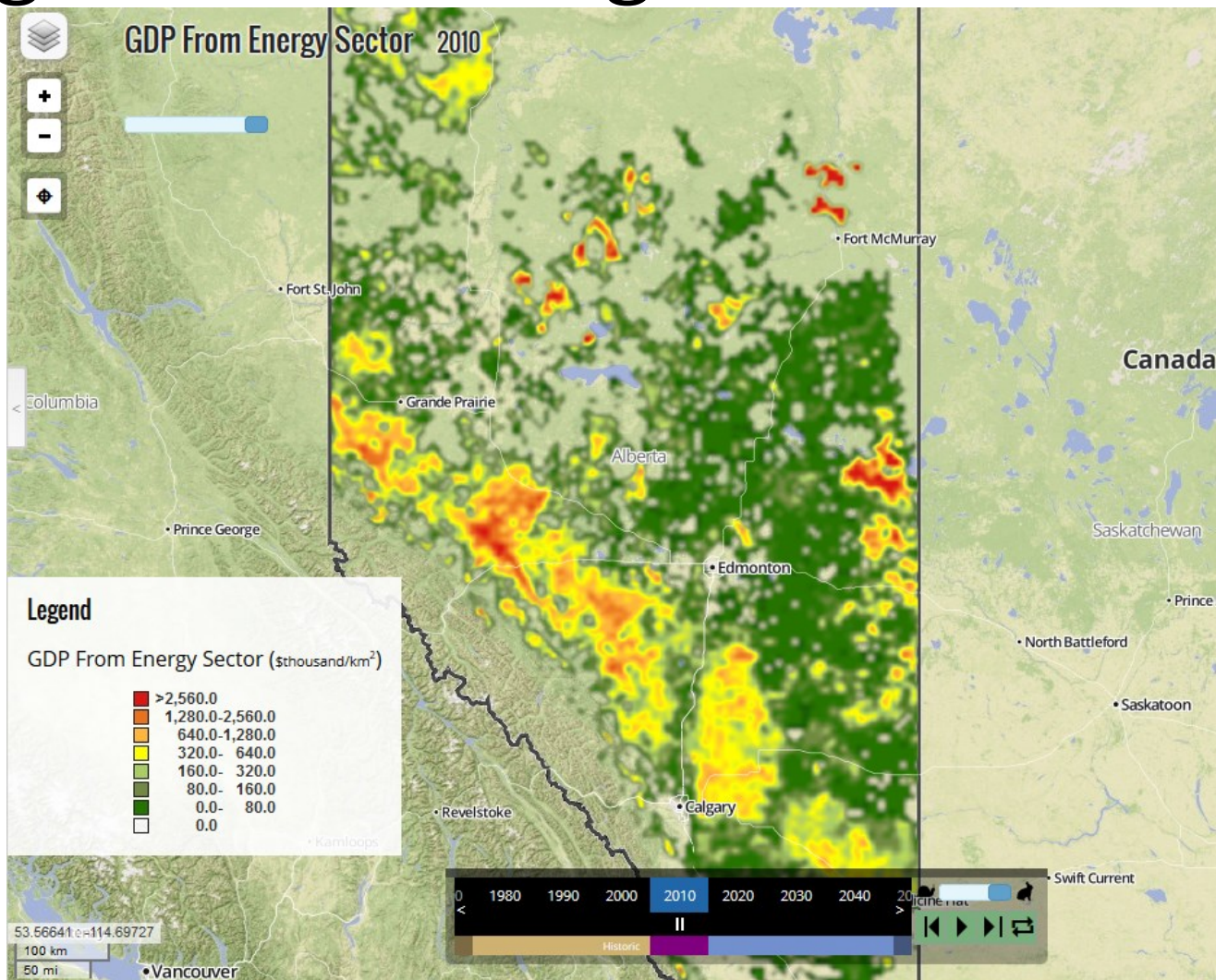
[MSP Jan 2013 Report on Schedule Error](#)

To illustrate: suppose the wind is integrated for every hour but one. You have integrated 167 out of 168 hours in the week = 99.4%.

Cumulative Wind Generation (000 MWh)	713.05
Value of Wind Integration (millions of \$)	3.204
Percent of hours integrated	89.88



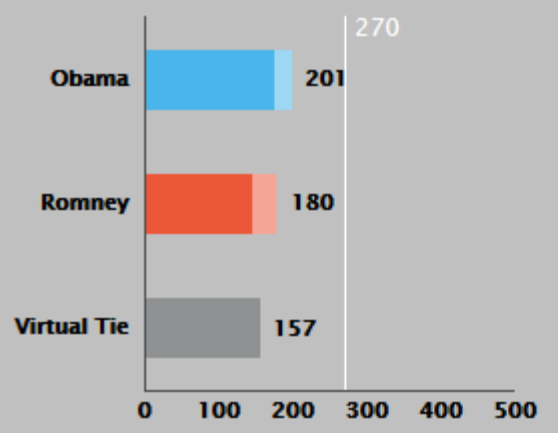
Regional Planning



Online Analytics

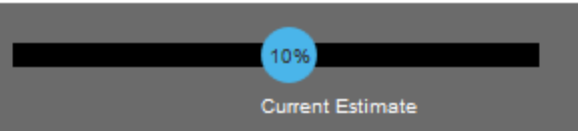
Electoral Votes

Show who is leading virtual ties



Strongly Obama:	177
Obama Leaning:	24
Strongly Romney:	148
Romney Leaning:	32
Virtual Tie:	157

Latino Portion of U.S. Electorate

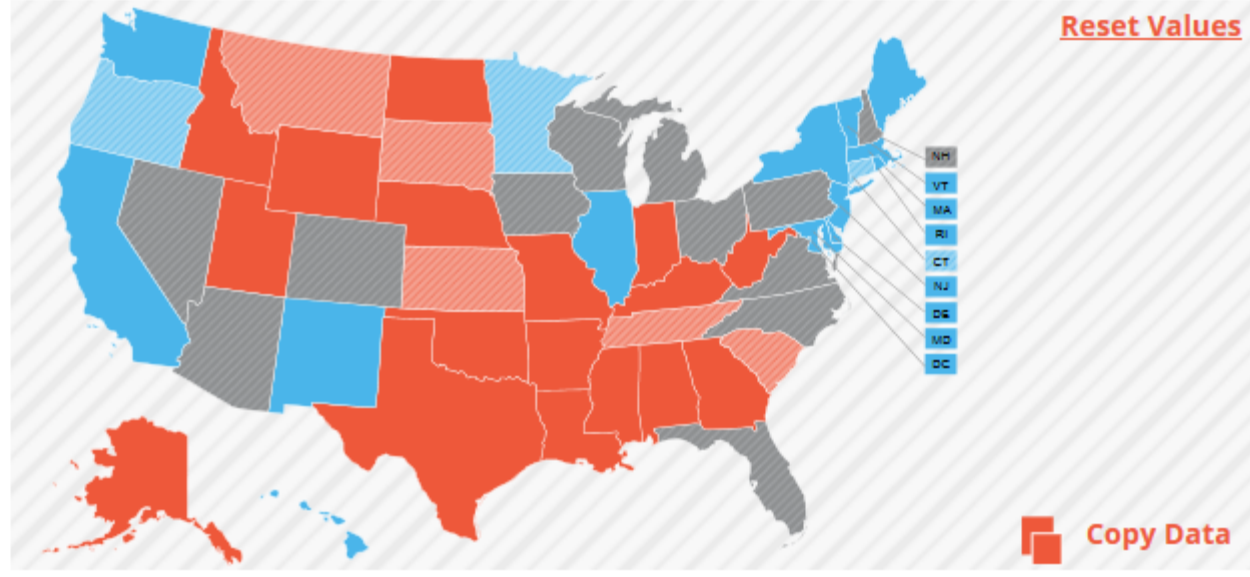


Percent Voting GOP Among Latinos



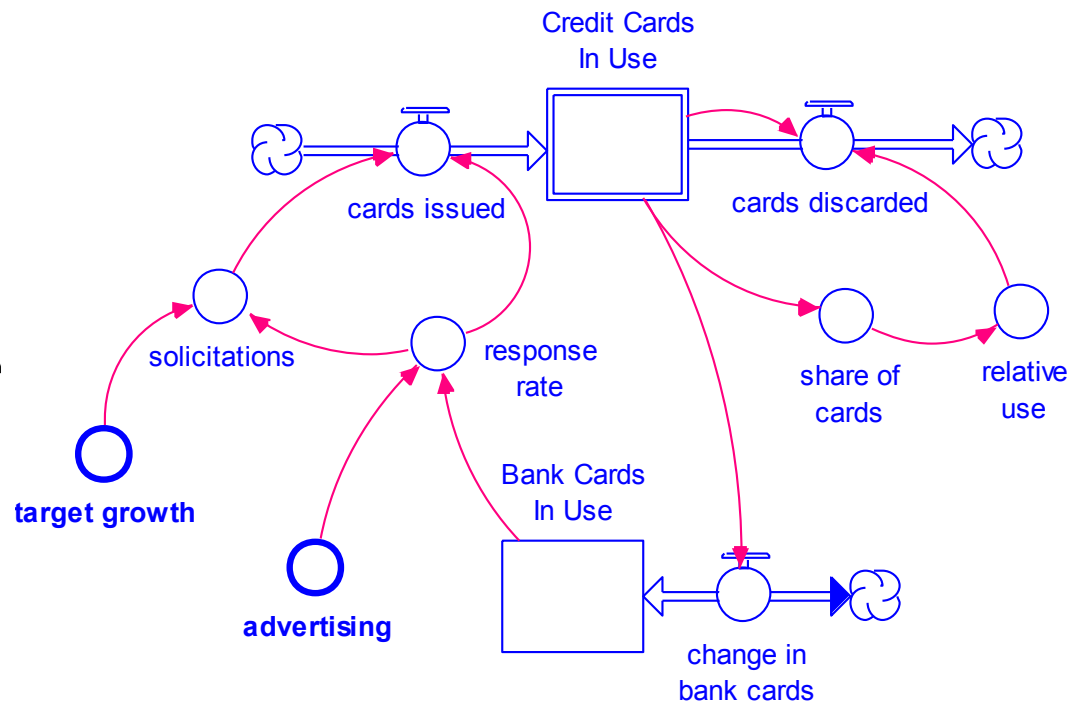
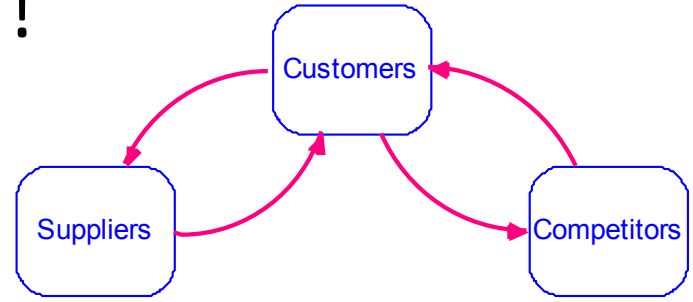
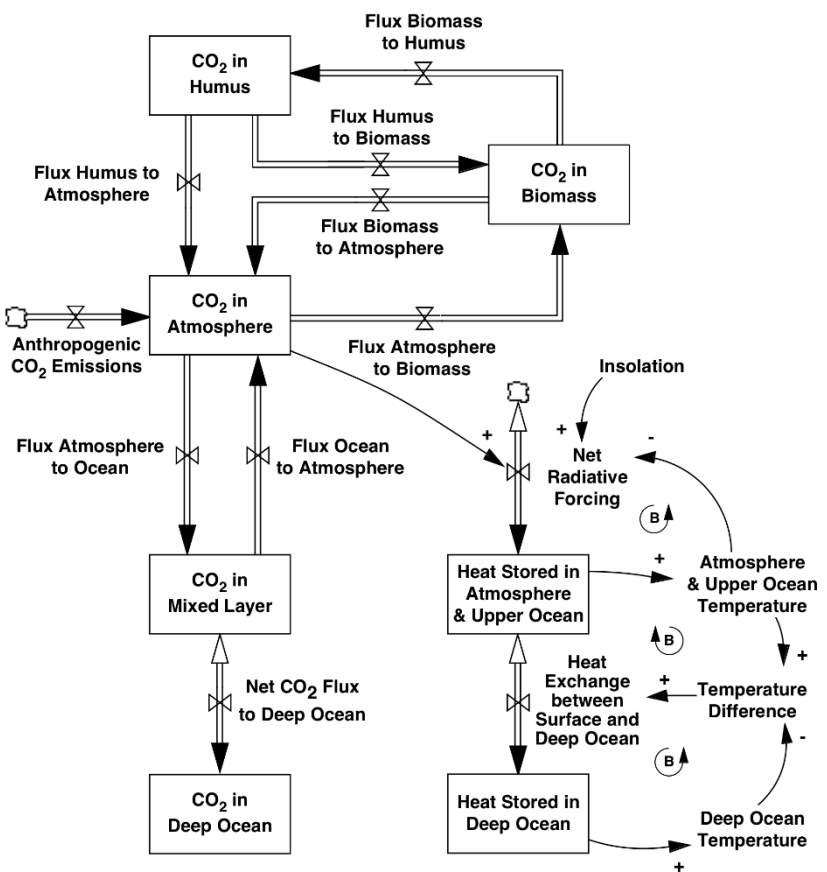
Last updated **Dec 10, 2012** . [About data](#)

Tip Click on each state for state-specific estimates and data.



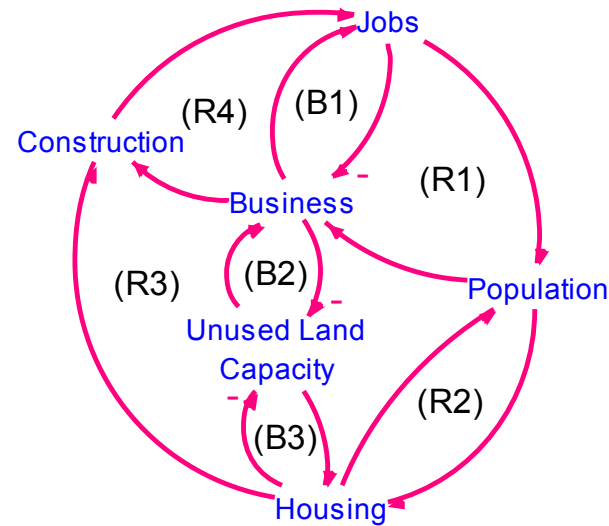
What do these have in common?

→ System Dynamics!

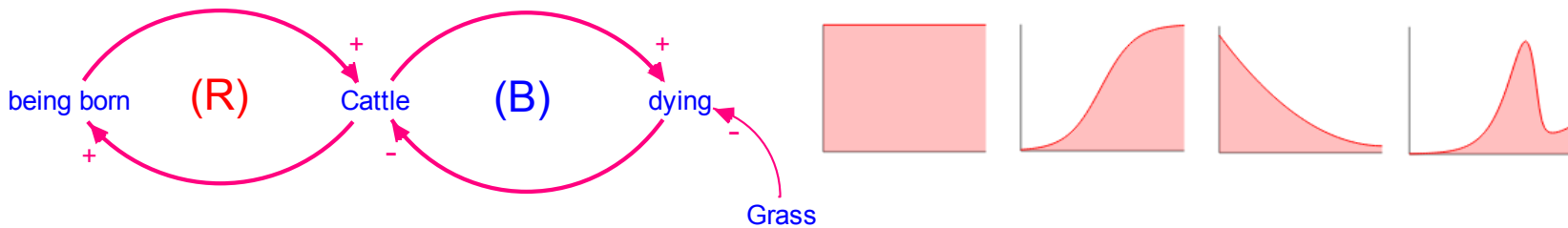


Why System Dynamics (SD)?

- SD models ecosystems
 - interconnected systems
 - complex feedback



- structure determines behavior



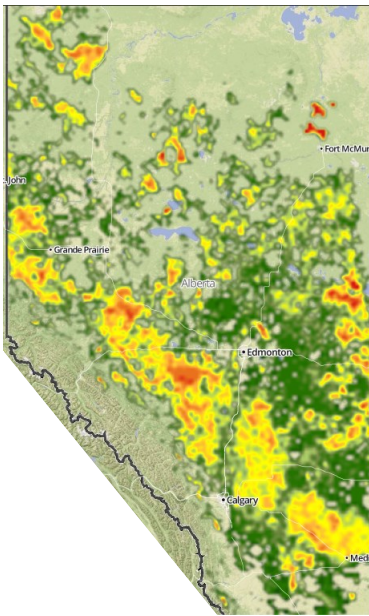
- tertiary effects over long time horizons



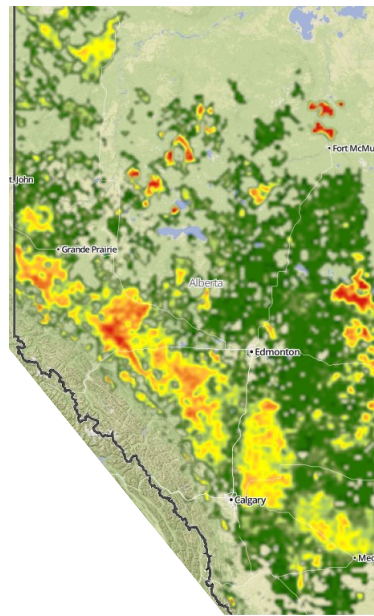
Why System Dynamics?

SD models dynamics over time

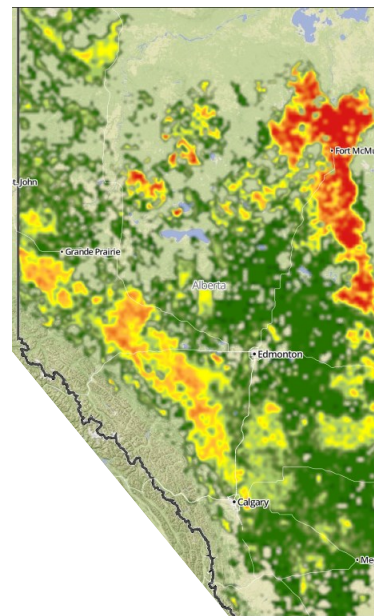
GDP from Energy Sector (Alberta, Canada)



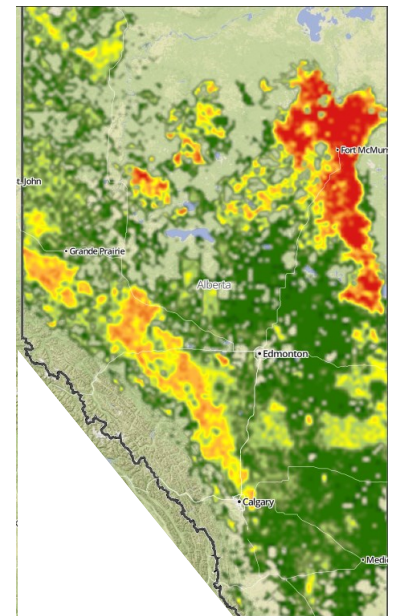
2000



2010



2020



2030

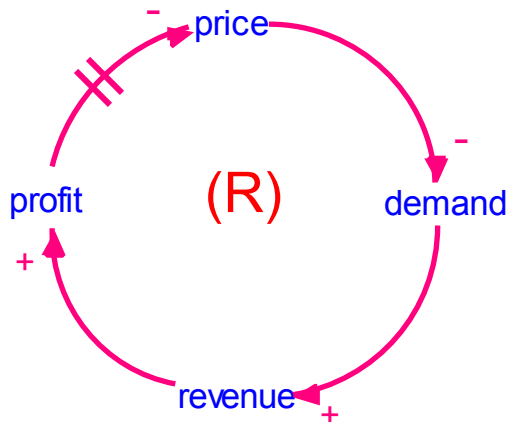


Why System Dynamics?

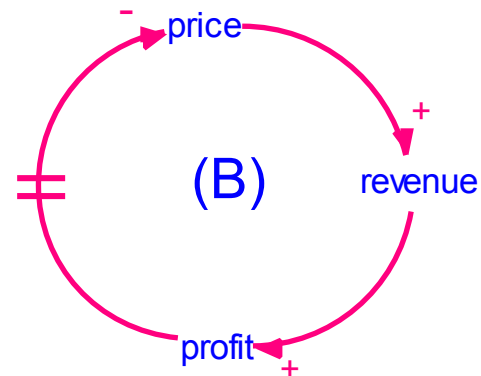
SD exposes implicit mental models and assumptions

- shared understanding
- reduces misunderstandings

My understanding

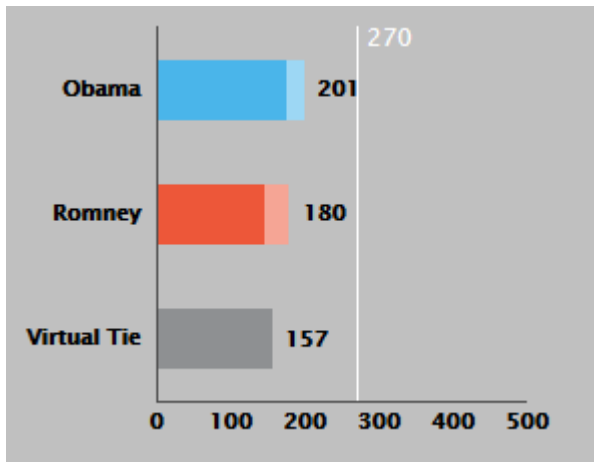
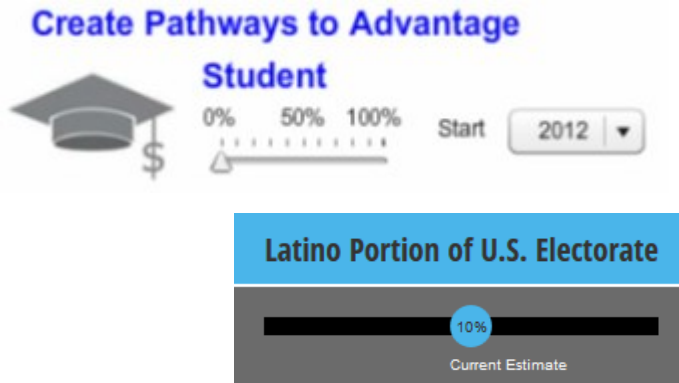


Your understanding

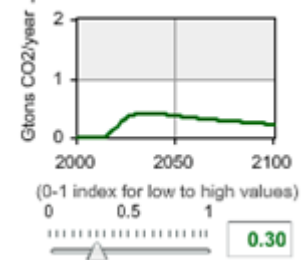


Why System Dynamics?

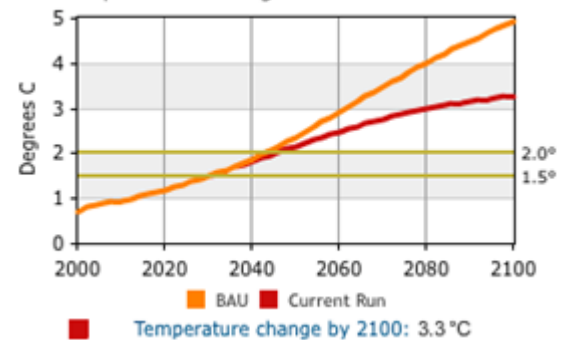
Safely test policies and validate outcomes



Sequestration from Afforestation



Temperature Change Over Preindustrial



XMILE

- An open standard for System Dynamics (SD)
- Being developed in OASIS
- XML representation of SD models
- Provides
 - Standard language
 - Means to extend language
 - Stock-flow diagram
 - Interactive components



Open Standards

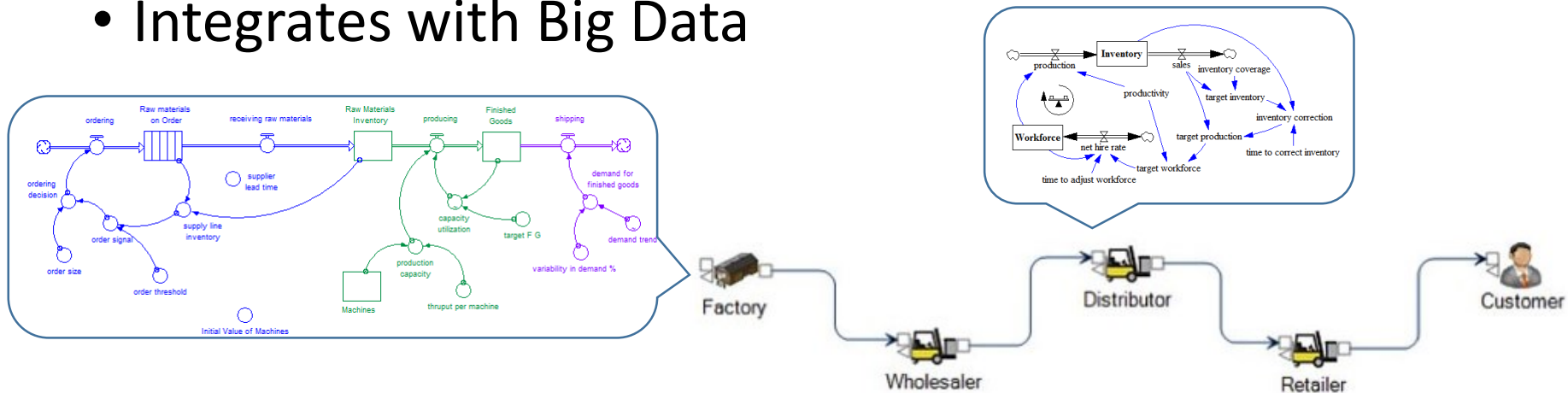
- Enable integration and interoperability
- Open doors to new applications
- Promote innovation and competition
- Increase collaboration
- Legitimize the market
- Reduce risk to large corporate users
- Increase demand

→ Increase the market



XMILE Technical Benefits

- Sharing and archiving of models
- Re-use of common components
- Opens development of add-on tools
- Makes System Dynamics more accessible
- Integrates with Big Data



XMILE Technical Details

XMILE Technical Goals

- Core subset of functionality
- Stock-flow diagram not required
- Interactive components not required
- Advanced language features, e.g., arrays and submodels, not required
- Extensible in both representation and simulation behavior
- Small file size
- Human readable and editable
- Includes metadata – models can be indexed & searched



Standard language

- Stocks, Flows, Auxiliaries
- Graphical Functions
- Groups
- Units
- Builtin Functions



Optional Extensions

- Event triggers
- Macros
- Conveyors
- Queues
- Submodels
- Arrays

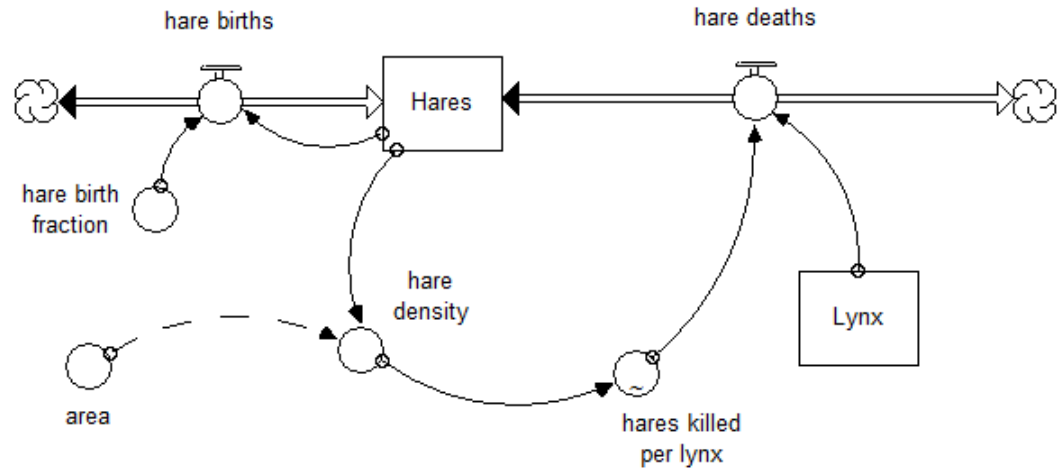


Sample Model

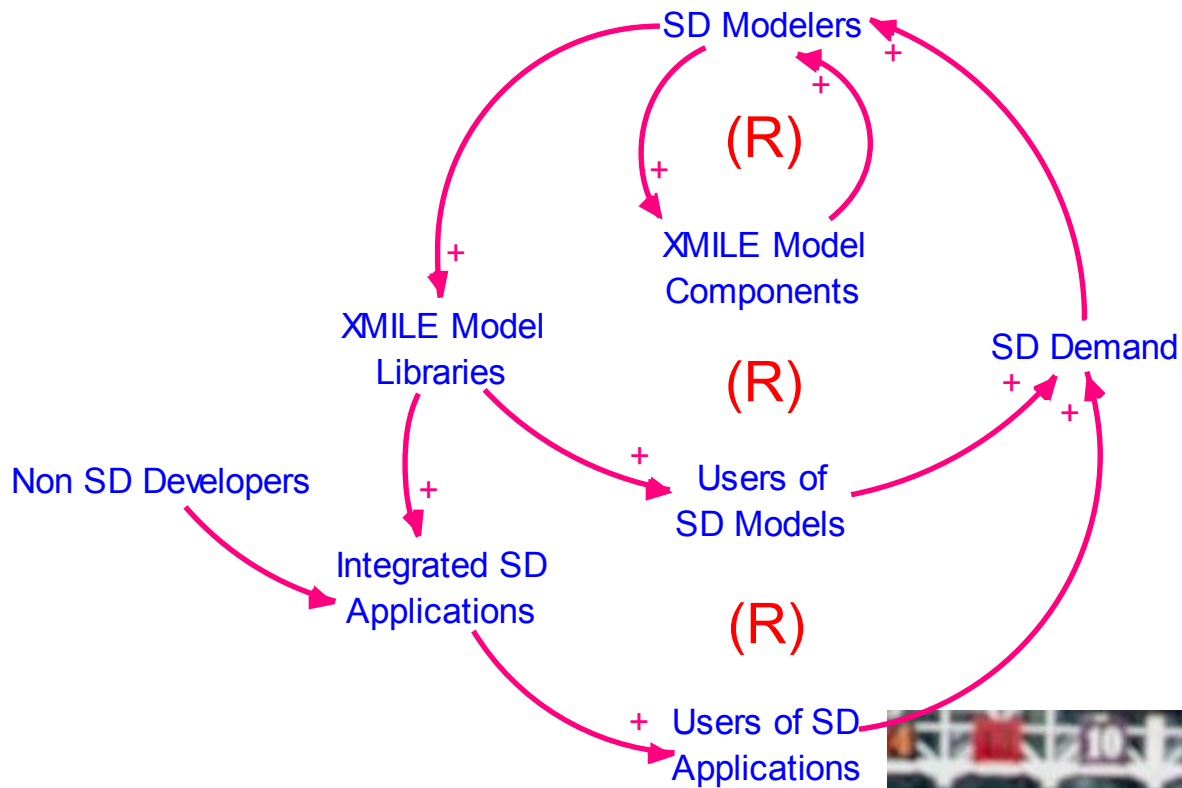
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    </stock>
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    </flow>
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    <aux name="hare\ndensity">
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    </aux>
    <aux name="area">
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    </aux>
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      <gf>
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      </gf>
    </aux>
  </variables>
</model>

```



XMILE *for* System Dynamics



Timeline

- Working draft released: June 2013
- XMILE TC formed: June 2013
- First TC meeting: July 2013
- Early TC draft: January 2014
- Draft of XMILE 1.0: June 2014
- Review by SD community: July 2014
- Public review: August and September 2014
- XMILE standard adoption: October 2014



XMILE Technical Committee

XMILE overview webinar schedule:

- May 20: Simulation Capabilities
- June 3: Display and Interface
- June 24: Panel Discussion
- July 21-23: Delft Conference
 - Round table discussion and ballot

www.oasis-open.org/committees/xmile/
xmile.systemdynamics.org

