

Lay Inferences about Adventitious Agents

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Decision Science Approaches

Interdisciplinary field

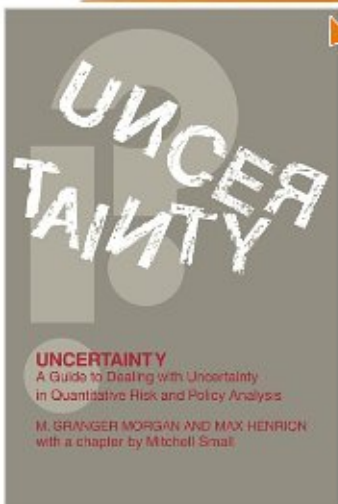
psychology, economics, statistics,
management science

Integrates

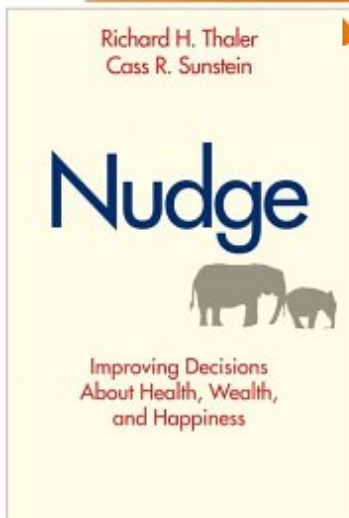
formal analysis of decisions

behavioral analysis of decision makers

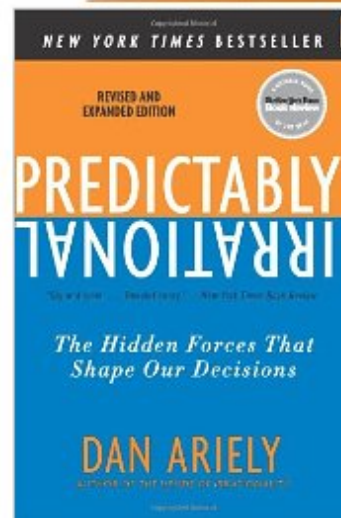
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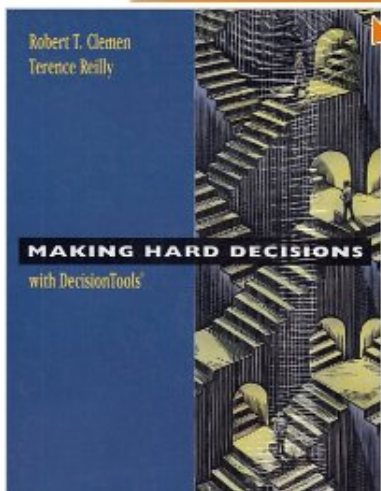
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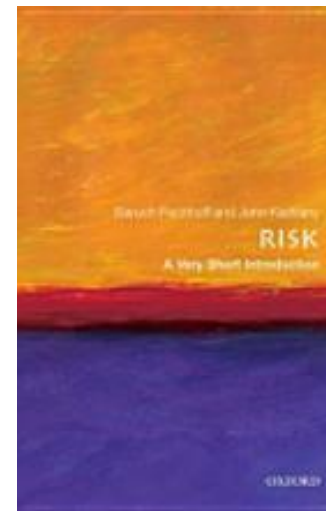
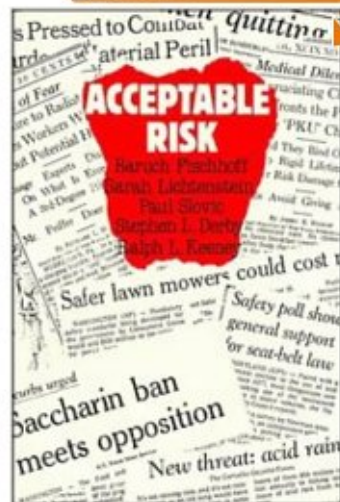
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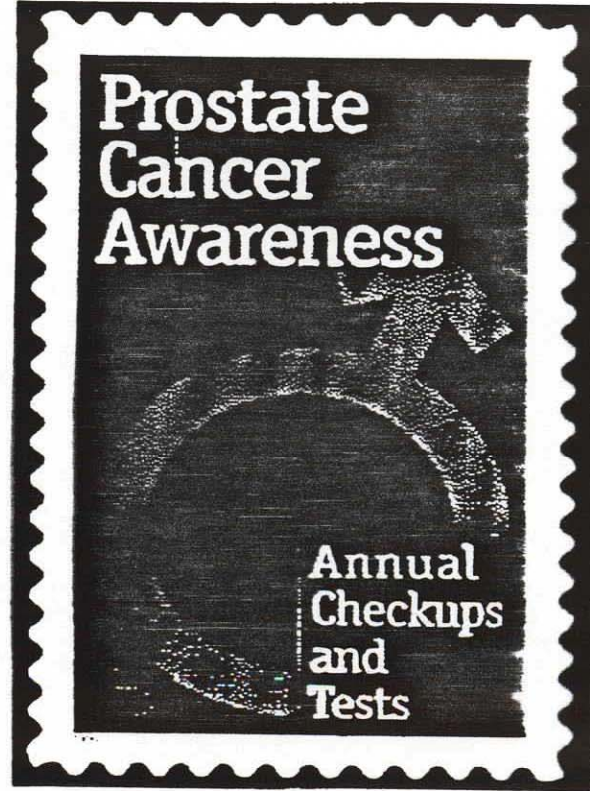
In order to aid decisions, communication design requires

Analysis: What decisions do people face?

Description: How do people intuitively deal with those decisions?

Intervention: How can people be helped to make wiser decisions (if need be)?

**Research is always needed because
without it we get communications like**



BE INFORMED

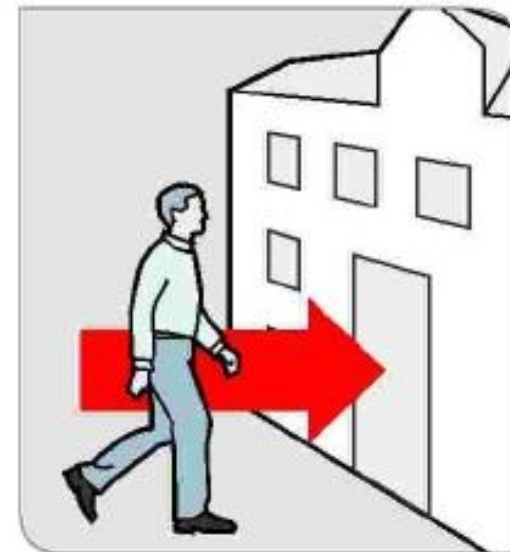
NUCLEAR BLAST



1. Take cover immediately, below ground if possible, though any shield or shelter will help protect you from the immediate effects of the blast and the pressure wave.



2. Consider if you can get out of the area;



3. Or if it would be better to go inside a building and follow your plan to "shelter-in-place".

(http://www.ready.gov/america/_downloads/nuclear.pdf
)

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DHS to Scrap Color Code Terror Alerts by April

Homeland Security Advisory System criticized for "scaring, not preparing"

By **PIERRE THOMAS** and **JASON RYAN**

January 26, 2011



Russia Adopts Color-Coded Terror Alert System


By **ELLEN BARRY**

Published: January 28, 2011

The New York Times



ServiceLine

A power-filled publication brought to you by  Duquesne Light

MORE OPTIONS TO SAVE ENERGY & MONEY

A 'Smart' Meter Is in Your Future

The Public Utility Commission recently approved Duquesne Light's plan to provide all customers smart-meter technology as part of its overall response to requirements of statewide energy-conservation legislation, Act 129, enacted in 2008.

Many of you already are saving energy and money through our Watt Choices program, which helps customers conserve energy while lowering their electricity costs through rebates for the installation of energy-efficient equipment, discounts on the purchase of compact fluorescent light bulbs and the recycling of old refrigerators and freezers. Smart meter technology – to be installed over the next eight years – will provide customers even more opportunities to manage their electricity consumption.

Traditional electric meters only measure the amount of power you use. Smart meters also measure when energy was consumed. Additional convenient smart-meter features will include web access to daily usage information and communications with in-home devices that provide near real-time price data. Duquesne Light also will offer optional time-of-use rates to customers who are willing to shift a portion of their electric usage to off-peak periods.

By having access to near real-time information, you can make more informed decisions on how you use



energy in a typical day. You also can determine if changing your behavior can help decrease your electric usage. In addition, by switching the time you do certain chores, such as using the clothes dryer or dishwasher, you eventually will be able to take advantage of lower electric rates.

There's a third way smart meters can benefit you – and help the environment. By using less power during hot spells in the summer, you reduce the need for utilities to purchase

electric generation when prices are at their highest (because customer demand typically is very high at that time). Lowering this peak customer demand will reduce the cost utilities and customers pay for this higher-priced power. It also benefits the environment by reducing the need for less efficient power plants to be used during peak periods.

Duquesne Light's tiered rollout of smart meters will begin in 2013. To ensure that the system-wide

rollout of smart meters is both cost-effective and in the best interest of our customers, Duquesne Light will conduct a thorough upfront analysis and a controlled implementation of the technology because meters are only one component of this massive project. Communications, infrastructure and other network systems are all needed to make the meter "smart."

As part of that process, Duquesne Light will be conducting two pilot programs in 2011-2012 involving approximately 1,100 customers. Early this year, we'll be looking for pioneering local homeowners interested in helping us develop a smart-meter program, in conjunction with time-of-use rates, that will benefit all of our customers.

We look forward to working with customers to create a smart meter/time-of-use program that provides opportunities for better personal management of their electric use while also helping to maintain a reliable, sustainable energy system. Ongoing customer education will be an important part of that process. Public Utility Commissioner Tyrone Christy said it best: "Smart meters will not work without smart consumers." Look for more information in *ServiceLine* and on our website, duquesnelight.com, in the months and years to come. ☞

New Default-Service Rates Go Into Effect Jan. 1

As detailed in the August issue of *ServiceLine*, Duquesne Light's new default-service electric supply rates for customers who do not choose to use another supplier go into effect Jan. 1, 2011.

Under our default-service plan, residential customers will have a fixed generation price through May 2013. The average residential customer using 600 kilowatt-hours per month will see an increase of \$4.23 in the overall monthly bill (\$82.59 to \$86.82).

Duquesne Light customers can choose to get their electricity from a competitive energy supplier at any time. You can seek offers from suppliers that may offer lower electricity supply prices, renewable

energy products or other supply products.

Customers seeking offers can go to www.papowerswitch.com. PAPowerSwitch is the Public Utility Commission's new website to help



consumers shop for power suppliers. Plug in your ZIP code and the site will give you a list of suppliers that service residential and commercial users in your area. You can then click on those suppliers and enter your monthly electrical usage to compare their charges. Part of that listing includes Duquesne Light's Price to Compare (PTC), currently at 8.89 cents per kilowatt-hour. Our PTC is the price we charge for our default supply service.

Continued on back page.

Live Chat Option Now Available

got a question?
ASK LIVE!

ONLINE



Customers using our website, DuquesneLight.com, to start, stop or transfer service now can use a "live-chat" option for assistance. Live chat enables you to interact with us in "real time" and quickly resolve any questions you have. Based on customer response, Duquesne Light will expand Live Chat to billing and credit inquiries. ☞

Research is always needed because

We can't trust our intuitions.

Basic behavioral research is indeterminate.

Faulty Intuitions

common knowledge effect
false consensus effect
fundamental attribution error
self-serving biases
myths (panic, adolescents' unique sense
of invulnerability ...)
disrupted feedback
...

Basic Research Is Indeterminate

Decision making follows simple principles.

Some Principles of Judgment

People are good at tracking what they see,
but not at detecting sample bias.

People have limited ability to evaluate the
extent of their own knowledge.

People have difficulty imagining themselves
in other visceral states.

People have difficulty projecting non-
linear trends.

People confuse ignorance and stupidity.

Some Principles of Choice

People consider the return on their investment in making decisions.

People dislike uncertainty, but can live with it.

People are insensitive to opportunity costs.

People are prisoners to sunk costs, hating to recognize losses.

People may not know what they want, especially with novel questions.

Basic Research Is Indeterminate

Decision making follows simple principles.

Basic Research Is Indeterminate

Decision making follows simple principles.

However,

- the set of principles is large,

- the contextual triggers are subtle, and

- the interactions are complex

As a result, decision-specific research is needed.

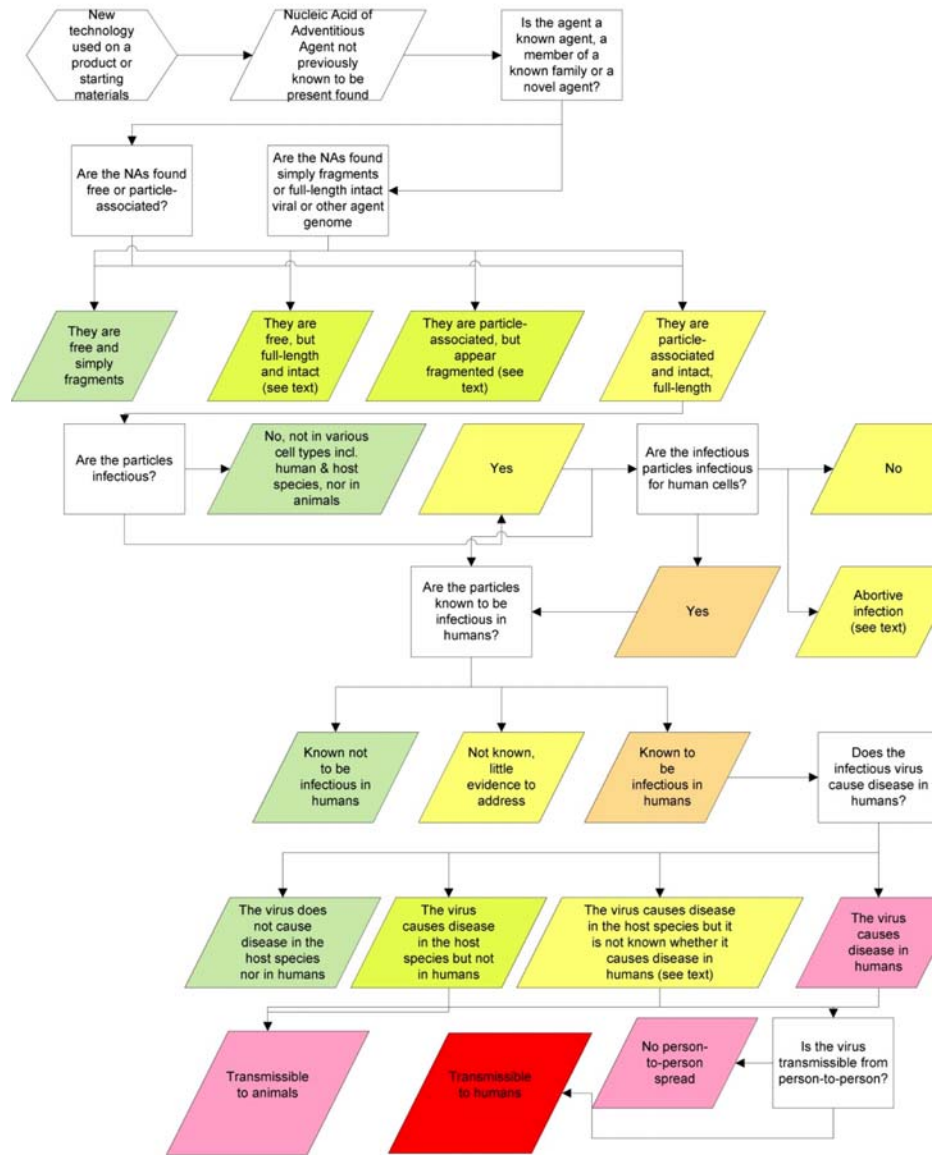
Empirical research is needed

Without scientifically sound data collection, one can only guess what people believe and want in any specific situation

As a result, analysis is needed, too

Search for evidence can be interminable, unless there is an analytic framework to guide decisions.

Evaluation of the risk associated to the agent



Making risk research relevant to decisions requires knowing

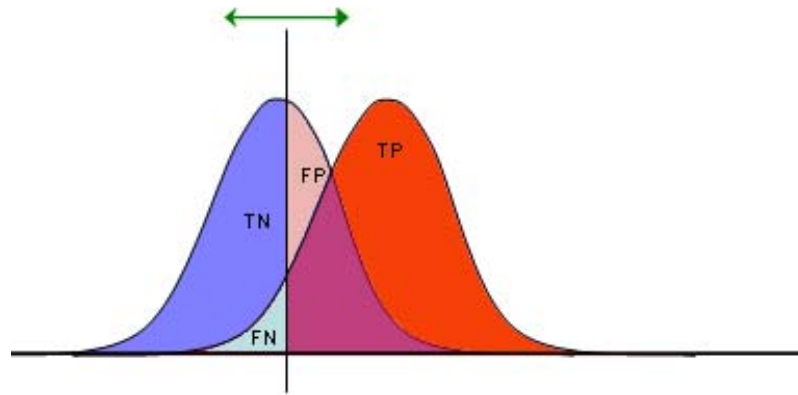
Discrimination Ability (d')

how well can we distinguish different states

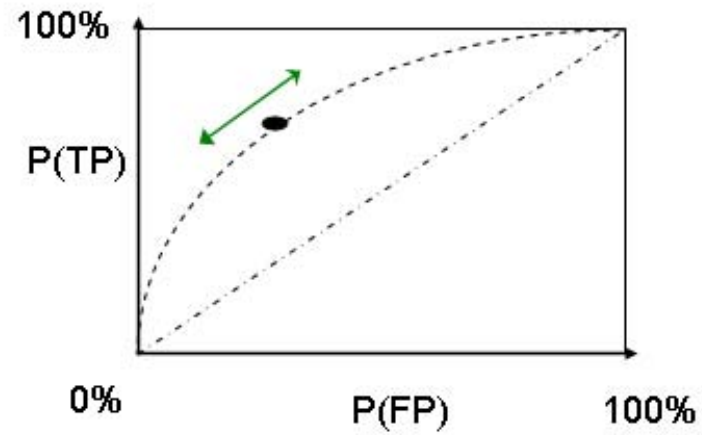
Decision Rules (β)

what weights do we assign to different outcomes

Signal Detection Theory



TP	FP
FN	TN
1	1



**Risk (and uncertainty) must also
be placed in the context of other
decision elements**

FDA Benefit-Risk Framework

Under development.

Capture rationale of FDA evaluation of evidence and decision making.

Clarify potential reasons for disagreement.

Intuitive and accessible, while being consistent with detailed analyses.

Decision Factor	Evidence and Uncertainties	Conclusions and Reasons
Analysis of Condition	Summary of evidence:	Conclusions (implications for decision):
Unmet Medical Need	Summary of evidence:	Conclusions (implications for decision):
Clinical Benefit	Summary of evidence:	Conclusions (implications for decision):
Risk	Summary of evidence:	Conclusions (implications for decision):
Risk Management	Summary of evidence:	Conclusions (implications for decision):

Five Decision Factors

Analysis of condition

Unmet medical need

Clinical benefit

Risk

Risk management

Two Kinds of Summary

Evidence and Uncertainties

Scientific evidence

Capture range of FDA expert opinion

Conclusions and Reasons

Implications, given FDA regulatory mandate

Inform FDA decisions

A Potential Analytical and Empirical Success

A communication is adequate, if...

- it has the information the people need
- people can understand that information
- people can access that information

Prescription Drug Facts: Lunesta (Eszopiclone)

What is this drug for?	To make it easier to fall or to stay asleep
Who might consider taking it?	Adults age 18 and older with insomnia for at least 1 month
Who should NOT take it?	People under age 18
Recommended testing	No blood tests, watch out for abnormal behavior
Other things to consider doing	Reducing caffeine (especially at night), exercise, regular bedtime, avoid daytime naps

LUNESTA STUDY FINDINGS

788 healthy adults with insomnia for at least 1 month -- sleeping less than 6.5 hours per night and/or taking more than 30 minutes to fall asleep-- were given LUNESTA or a sugar pill nightly for 6 months. Here's what happened:

What difference did LUNESTA make?	People given a sugar pill	People given LUNESTA (3 mg each night)
Did LUNESTA help? LUNESTA users fell asleep faster (15 minutes faster)	45 minutes to fall asleep	30 minutes to fall asleep
LUNESTA users slept longer (37 minutes longer)	5 hours 45 minutes	6 hours 22 minutes
Did LUNESTA have side effects? <i>Life threatening side effects</i> No difference between LUNESTA and a sugar pill	None observed	
<i>Symptom side effects</i> More had unpleasant taste in their mouth (additional 20% due to drug)	6% 6 in 100	26% 26 in 100
More had dizziness (additional 7% due to drug)	3% 3 in 100	10% 10 in 100
More had drowsiness (additional 6% due to drug)	3% 3 in 100	9% 9 in 100
More had dry mouth (additional 5% due to drug)	2% 2 in 100	7% 7 in 100
More had nausea (additional 5% due to drug)	6% 6 in 100	11% 11 in 100

How long has the drug been in use?

Lunesta was approved by FDA in 2005. As with all new drugs we simply don't know how its safety record will hold up over time. In general, if there are unforeseen, serious drug side effects, they emerge after the drug is on the market (when a large enough number of people have used the drug).

Design Principles

Shows need to choose

Offers quantitative risk and benefit estimates

Has useful units (e.g., minutes to fall asleep)

Gives two expressions (% , frequency)

Does the math

Suggests quality of evidence

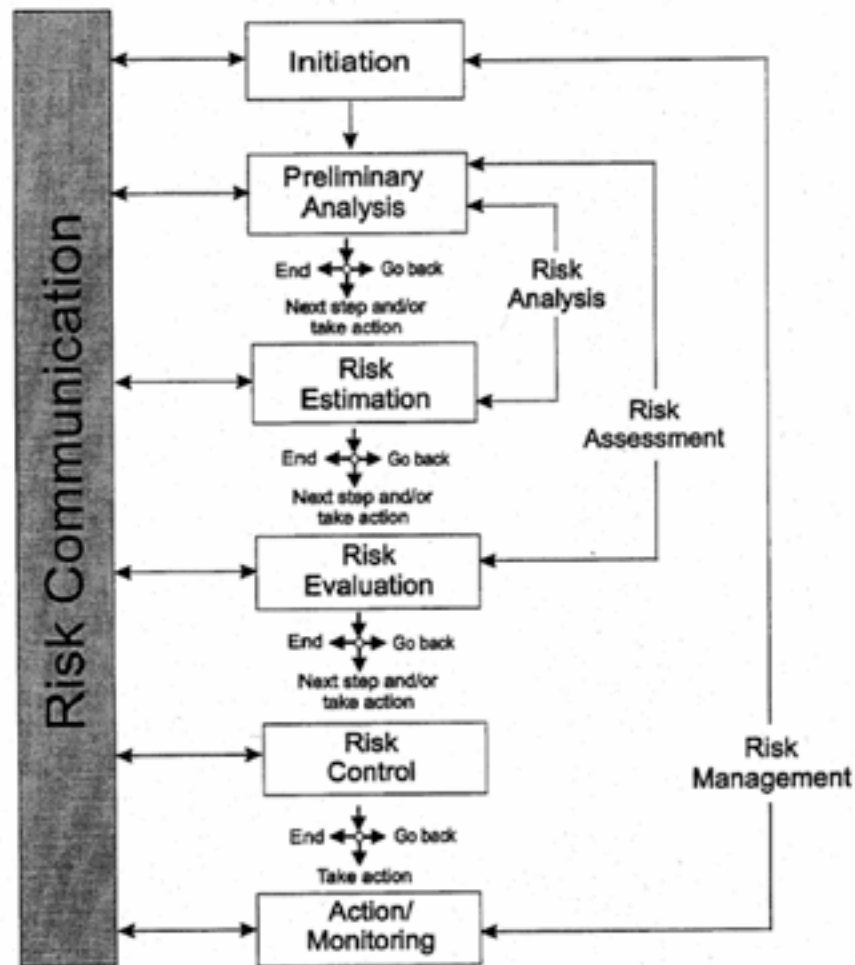
Communication as a Strategy



CAN/CSA-Q850-97
***Risk Management:
Guideline for
Decision-Makers***

*A National Standard of
Canada*





Note: Risk communication with stakeholders is an important part of each step in the decision process.

Figure 2
Steps in the Q850 Risk Management Decision-Making Process — Simple Model

Staffing

Domain specialists, for representing the science relevant to the decisions

Decision analysts, for identifying the information critical to choices

Social scientists, for designing and evaluating human engagement

System specialists, for creating and maintaining engagement channels

**FDA'S
STRATEGIC PLAN
FOR
RISK COMMUNICATION**

Fall, 2009

Risk Communication Advisory Committee

Formal roles (under FDAAA of 2007)
permanent committee
specific charges (recalls, DTC ...)
general consultation resource

Informal roles

channel to science
research seminars
recommendations

Evidence-Based Communication

FDA RCAC Meetings

Feb 2008 Briefings, food recalls

May 2008 DTC advertising

Aug 2008 Science of communication

Feb 2009 Usefulness of CMI

April 2009 FDA Strategic Plan

Aug 2009 Food recalls (2)

Nov 2009 Tobacco, ClinicalTrials.gov, emerging events

Feb 2010 Communication guidelines, updates/warnings

April 2010 Science forum

Nov 2010 Food recalls (3), in-home medical devices

May 2011 Social media

Formal Recommendations

Consumer medication information (Feb 09)

Strategic risk communication plan (Apr 09)

Emerging events (Aug 09)

<http://www.fda.gov/oc/advisory/OCRCACACpg.html>

Recommendations on Emerging Events

Have a consistent policy in all domains

Provide useful, timely information

Address: risks, benefits, uncertainty,
personal actions, FDA actions

Audience needs should drive agency
analyses

Use standard formats

Evaluate routinely

Consider needs of diverse populations

FDA Evidence-Based Guide to Risk and Benefit Communication

What does the science say?

What does the science mean?

(best guesses for communication)

How can you tell how well you've done?

(how good are your best guesses?)

Topics (1)

Strategy

Goals

Evaluation

Adequacy

Defining “risk” and “benefit”

Language/framing

Kinds of Information

Quantitative

Qualitative

Warnings and disclosures

Persuasion

Topics (2)

Audiences

Low literacy (readability)

Emotion

Life-span (young, old)

Underserved

Professionals

Media

Decision aids

Mass media

Design (packages, devices)

Training/organization

What Might We Find: Two Studies

MMR

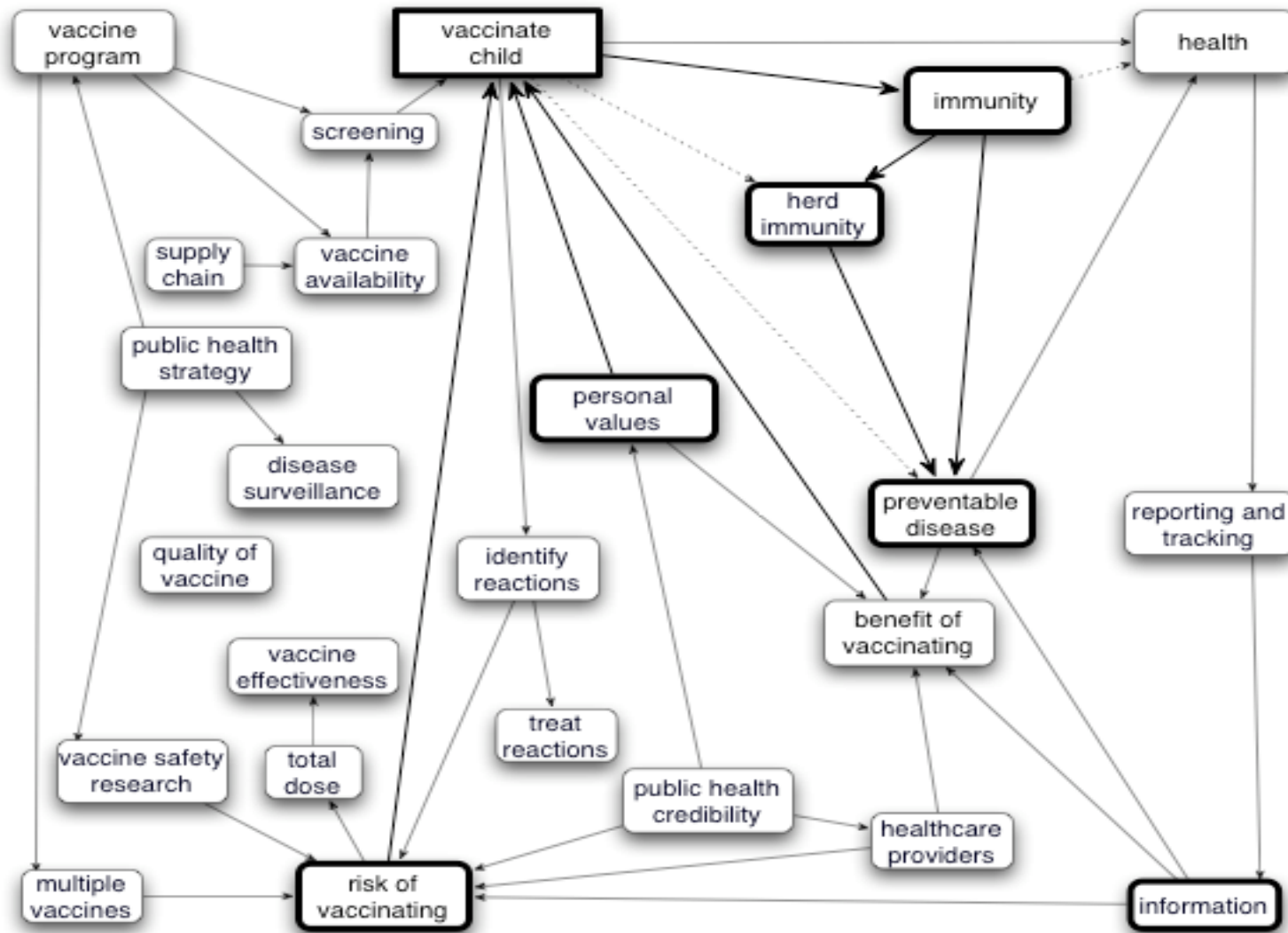
xenotransplantation

MMR Vaccine

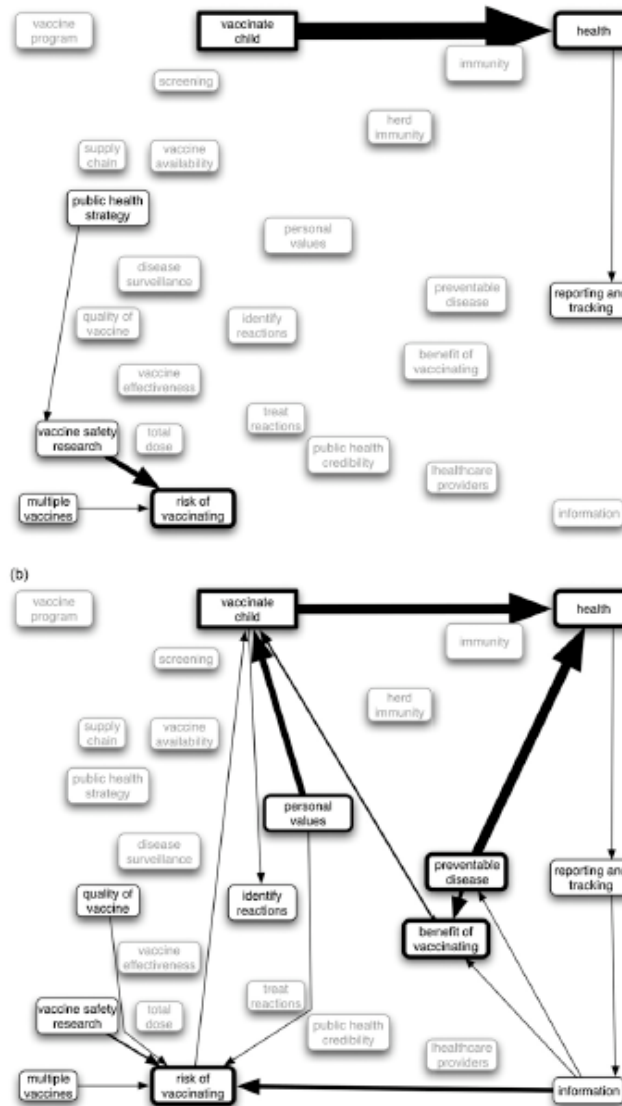
Approved for efficacy
Persistent low-level opposition

Downs, J. S., Bruine de Bruin, W., & Fischhoff, B. (2008). Patients' vaccination comprehension and decisions, *Vaccine*, 26, 1595-1607

MMR Vaccine



MMR Vaccine and Autism



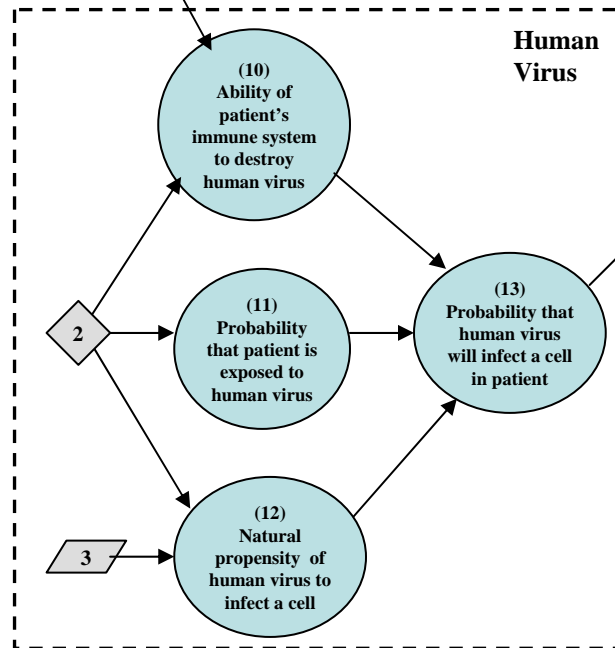
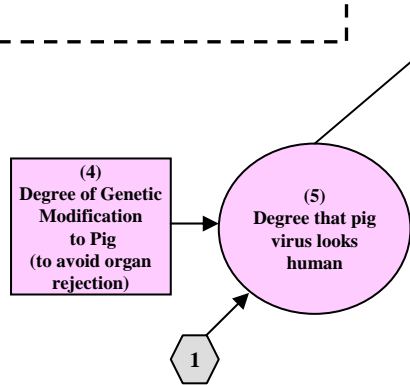
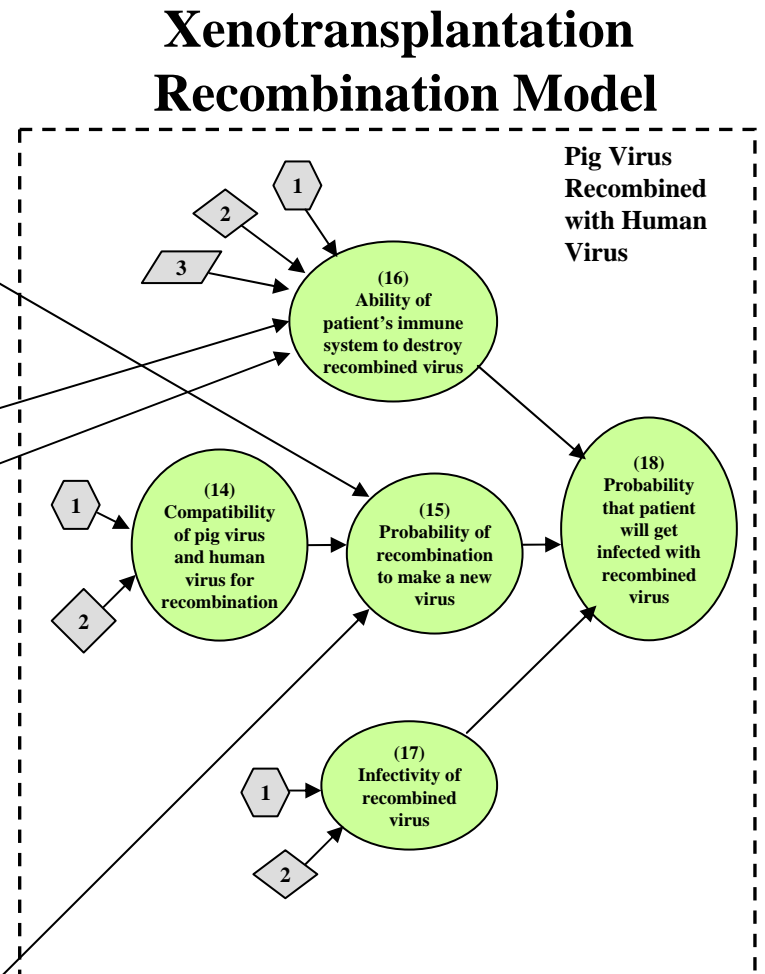
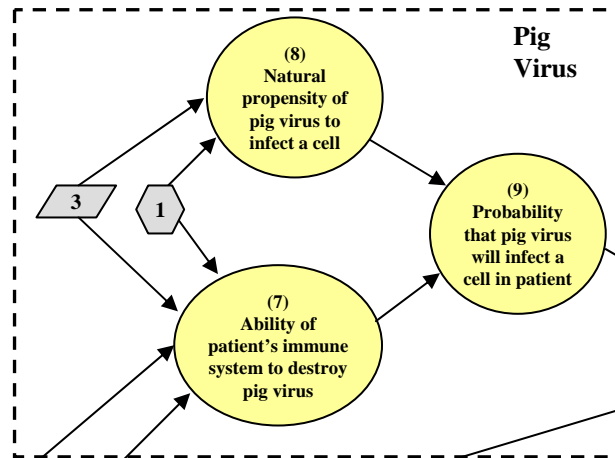
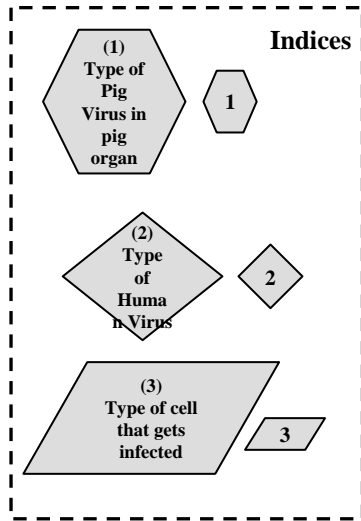
Conclusions (partial)

Medical community has a better story to tell than it is getting out. It could help to use more common language, explain bases of risk and benefit estimates, and (perhaps) include narratives.

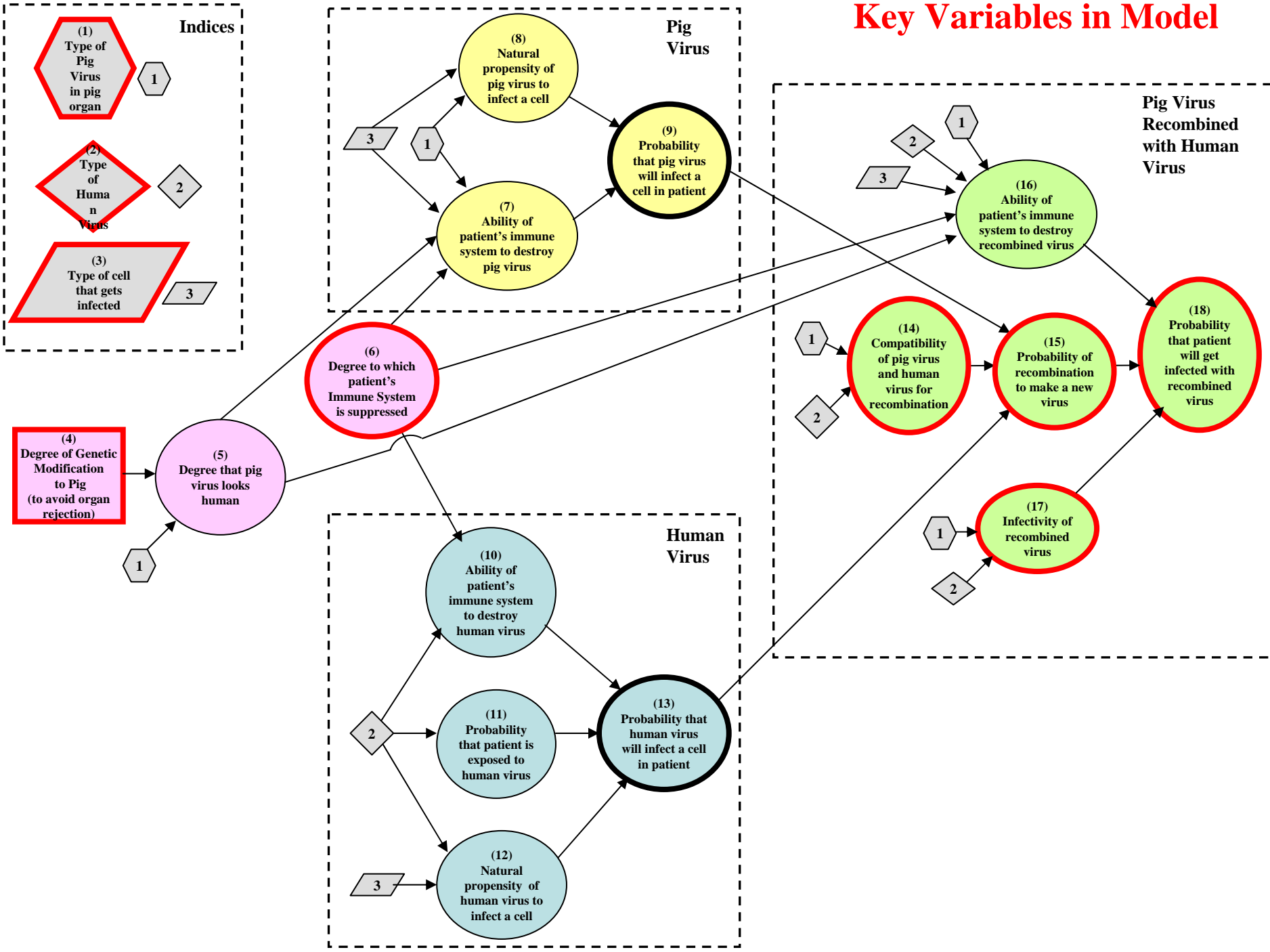
Xenotransplantation

Model vs. narrative communication of complex, unquantified risk.

**Bruine de Bruin, W., Güvenç, Ü., Fischhoff, B., Armstrong, C.M., & Caruso, D. (2009).
Communicating about xenotransplantation. *Risk Analysis*, 29, 1105-1115.**



Key Variables in Model



Model-Based Scenario Generation

- A scenario = One **simulation run**
- For each scenario:
 - Start from **left**, move gradually to **right** (on model)
 - Sample **one value from each node**
 - **Cover** each node **once** for each scenario
 - Express them together in **verbal, story-like** form
 - Use **the same wording** as the model variables
- Too many nodes and values → Pick **key variables**
- Build **scenario themes** around key variables
 - **Coherence** in each scenario
 - “Sufficient” **variation** of values **for each node** (across different scenarios)

Scenario Themes

- Three scenarios
- “Successful” infection (Edith’s case)
- Failed recombination due to incompatible viruses (Rudolph’s case)
- Failed infection due to non-infectious new virus (Nancy’s case)

Lung Transplant Scenario

1. Edith has been suffering from a lung disease and has been in desperate need of a lung transplant. Because there are not enough human lungs available, some patients have received lungs from genetically modified pigs that were raised for this purpose. Edith is one of those patients.

Conclusions (partial)

Models communicated better than scenarios, with combination in between.

At Your Service

FDA RCAC
Decision sciences

Additional Resources

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- Morgan, M.G., Fischhoff, B., Bostrom, A., & Atman, C. (2001). *Risk communication: The mental models approach*. New York: Cambridge University Press.

Center for Risk Perception and Communication: <http://sds.hss.cmu.edu/risk/>

Center for Behavioral Decision Research <http://cbdr.cmu.edu/>