

Port Security Challenges (US)

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U.S. Port Industry

- ~400 U.S. ports
- 5,000 marine terminals
- 25,000 miles of navigation channel
- 9 million containers enter annually
- 3.3 billion barrels of oil imported annually
- 8,000 foreign vessels make 50,000 port calls
- 110,000 commercial fishing vessels
- 70 million recreational boats in U.S.
- Domestic and international trade expected to double in 20 years



Port Security

Security: The quality or state of being free from risk or loss

From Latin *securus*, *se* without + *cura* care, Merriam-Webster

“Free from” is a pretty tough standard to meet

An alternative: *Port Security Management*, A systematic process for managing risks to sustain port operations and functions

Port Security Challenges

- Environmental
 - Invasive species
 - Chemical contaminants
 - Habitat
 - Natural events
- Human safety and property
 - Accidents
 - Criminal activity
- Business
 - Competitive position



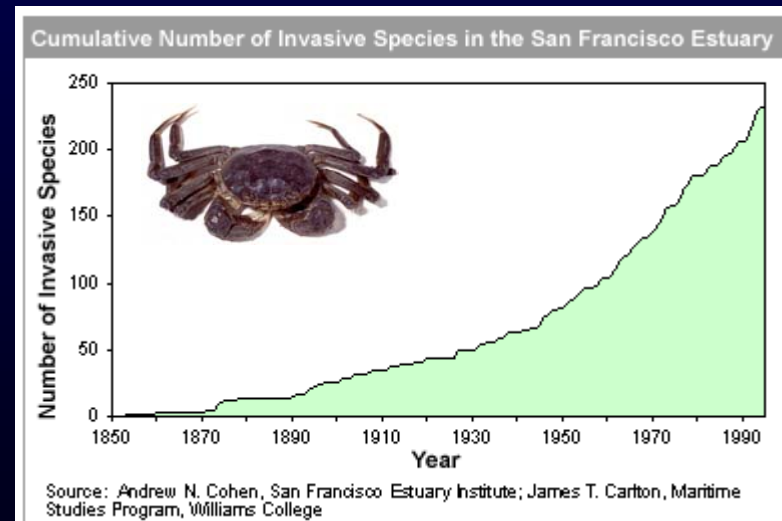
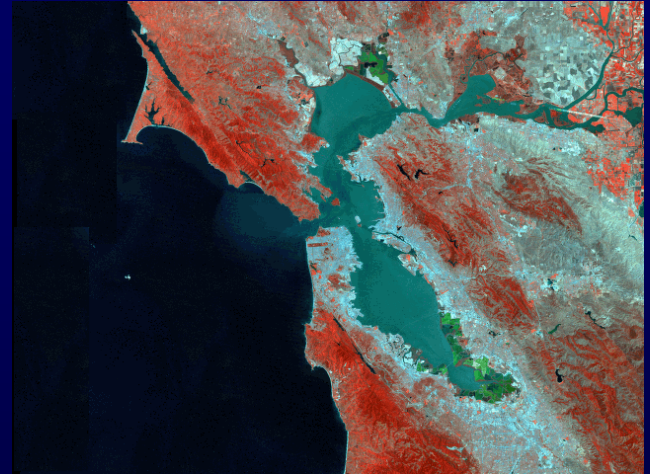
Environmental: Invasive Species

- Ballast water
 - Carried by ships for stability and to adjust trim
 - Most significant vector for transfer of marine species
 - Responsible for unintentional introduction of 10s-100s of species
 - IMO recommends voluntary ballast water exchange
- Cargo
 - Brown snake in Guam



Environmental: Invasive Species

- San Francisco Bay
 - 200 non-indigenous species identified in S.F. Bay
 - Rate of introduction has been increasing, currently 1 introduction every 14 weeks
 - E.g., Chinese Mitten Crab
 - Presence noted 1992
 - Large numbers and densities
 - Burrowing destabilizes banks and levees



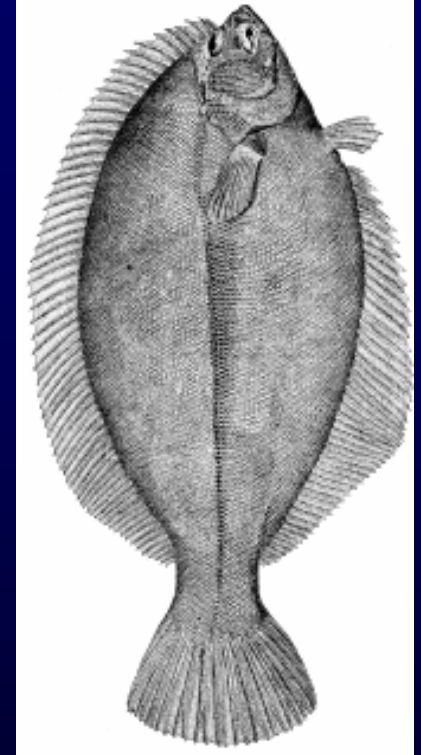
Environmental: Chemical Contaminants

- Dredged material
 - 300 mcy dredged annually in U.S.
 - \$1-100/cy cost range
 - Upstream legacy
- Wastewater
 - Ship and land-side operations
- Stormwater
 - Increasing attention



Environmental: Habitat

- Essential Fish Habitat
 - Concerned with activities affecting the quality of fish habitat
 - E.g., change in depth
- Endangered Species Act
 - E.g., Salmon in Pacific NW
- Dredging windows
 - Resuspended sediments affecting fish behavior



Environmental: Natural Events

- Storms
 - Structural damage to port infrastructure
 - Chemical releases
- Earthquakes
 - Structural damage to port infrastructure
 - Chemical releases



Human Safety and Property: Accidents

- Navigation
 - Potential loss of life
 - Property damage
 - Chemical releases
- Land-side operations
 - Big equipment and lots of moving parts
 - Double trade in 20 years?



Human Safety and Property: Criminal Activity

- Terrorism
 - Targets and point of entry
- Illegal immigration
- Smuggling
 - 5% inspection rate for containers
- Theft
- Vandalism

Dubai Ports World

CNN -- The DP World deal to obtain the right to operate in U.S. ports has engulfed Washington in controversy...



Business: The Market

- Port competition based on cost efficiency
 - Moving cargo faster, safer, cheaper
 - Port of LA handled 7.3 million TEU in 2005
 - Port of LB handled 6.7 million TEU in 2005
- Trade is increasing

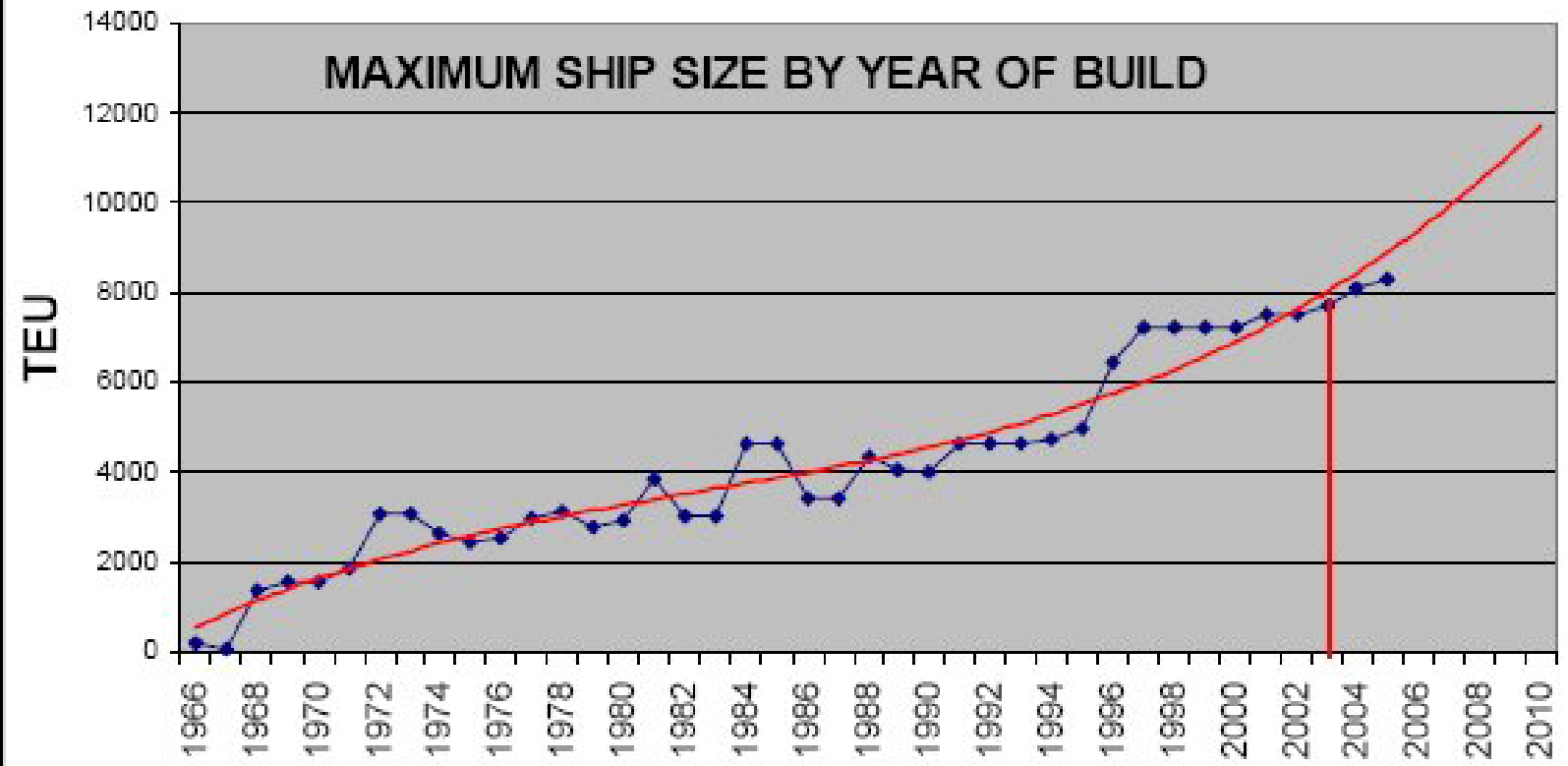


Business: Competitive Position

- Navigation infrastructure
 - Lightering
 - Transfer of bulk cargo onto smaller ships for port entry, e.g., due to insufficient channel size or depth
 - Super-container ships
 - Holding 8-10K TEU
 - >300 m x 45 m
 - 17 m channel depths

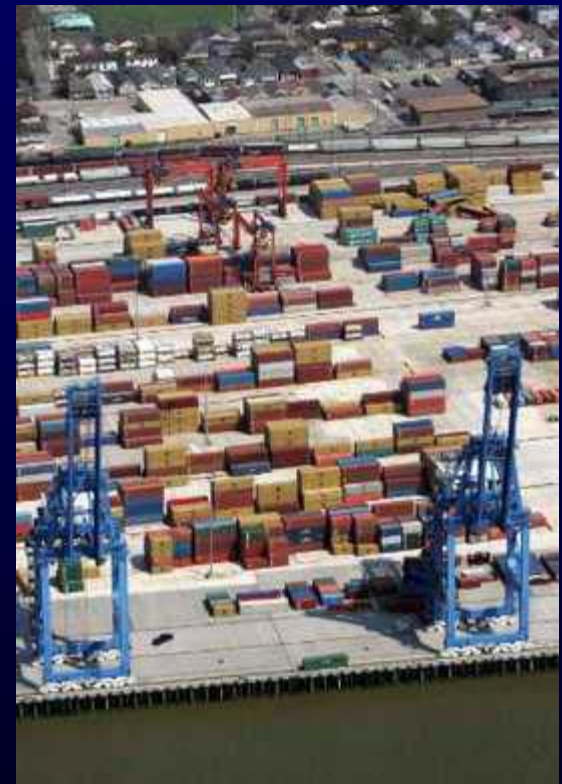


MAXIMUM SHIP SIZE BY YEAR OF BUILD



Business: Competitive Position

- Land-side development
 - Inter-modal infrastructure
 - Encroaching development
 - Double trade in 20 years?



Risk-Based Decision-Making

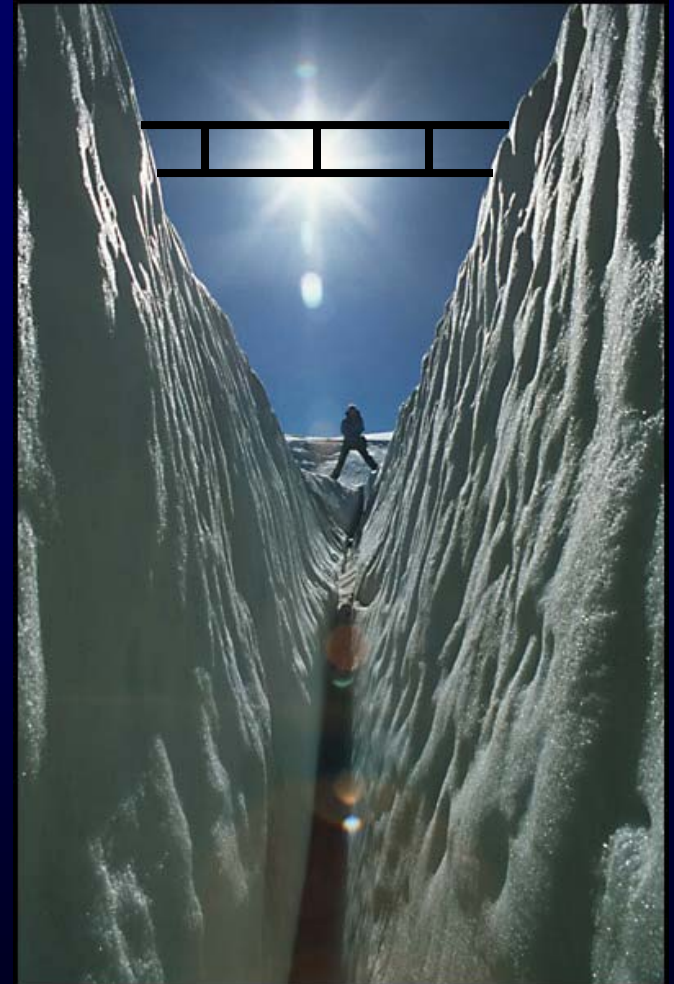
- *Risk assessment*: A process for developing a quantitative understanding of the processes shaping the scope and nature of risks and uncertainties that is sufficient to support decision making
 - Why and how are the risks occurring?
 - How do the management alternatives differ in terms of risk reduction performance?
 - What are the quantified uncertainties associated with management alternative performance?

Risk-Based Decision-Making

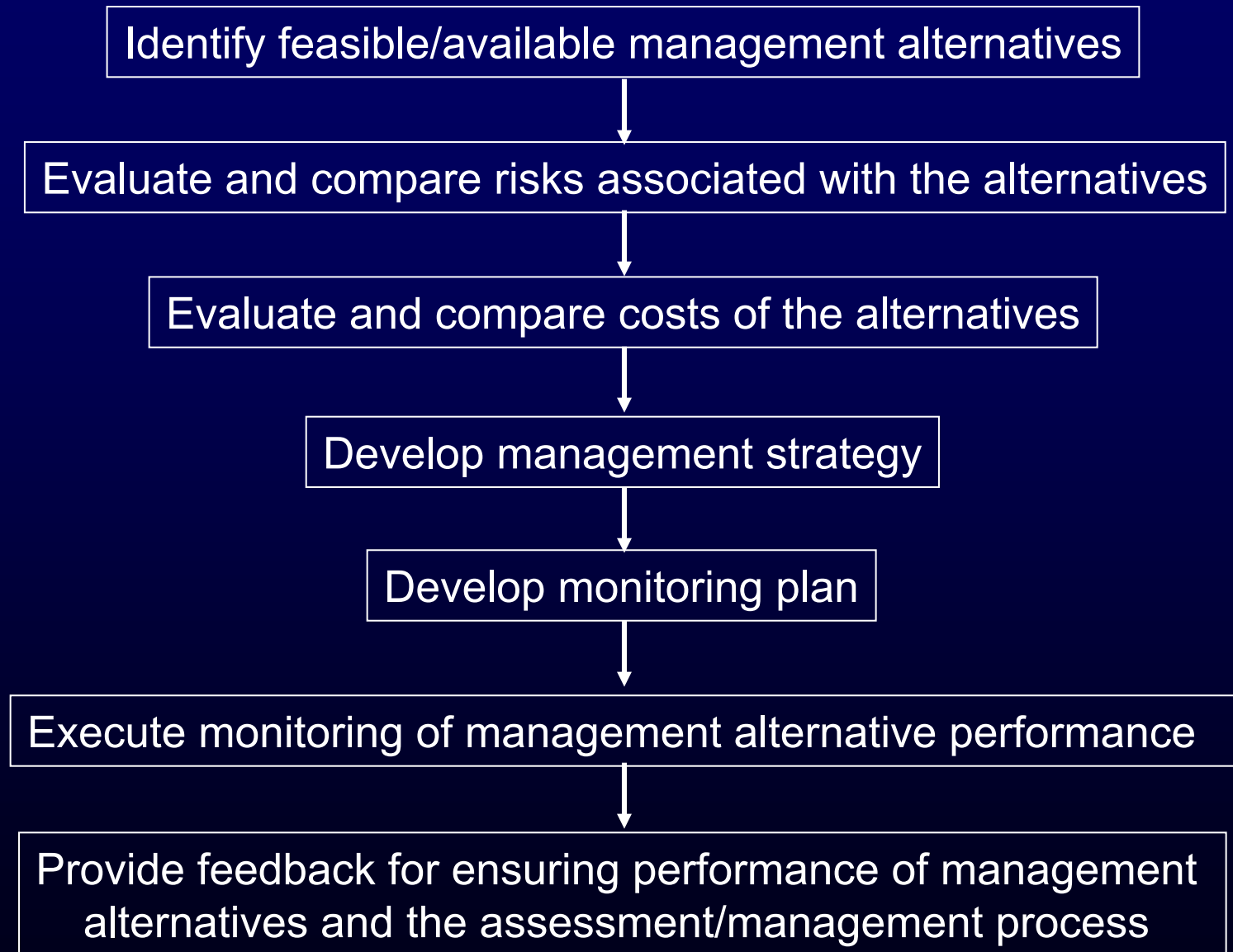
- *Risk management*: Actions taken to reduce risks to acceptable levels and manage uncertainties in a manner that is informed by facts about the risks.
 - How do I balance the trade-offs inherent to decision making?
 - How do I apply the rules of decision-making in a consistent and transparent way?
 - How do I develop an understanding of the influence of values in my decision?

The Decision-Makers Challenge

- The questions are complex
- Limited resources to address the questions
- Risk assessment provides dense and diverse information
- Bridging the crevasse between analysis and decision making
- The goal: structured and defensible decision making
- The ladder: RA—CRA—MCDA



Evaluating and Selecting Risk Management Alternatives



Use of Conceptual Models

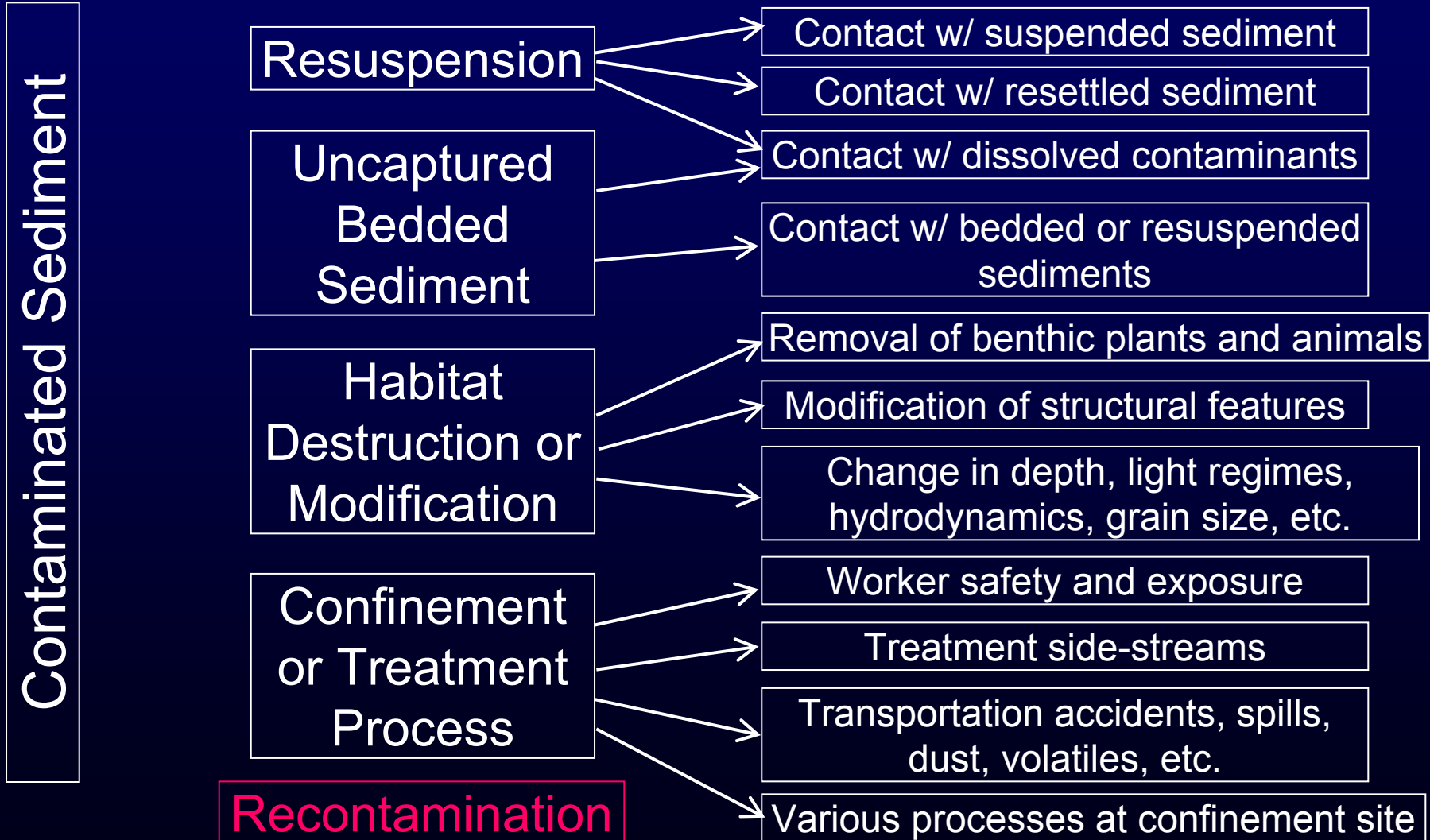
- The primary purpose of models is to test assumptions and hypotheses
 - “The fact that an opinion has been widely held is no evidence whatever that it is not utterly absurd; indeed in view of the silliness of the majority of mankind, a widespread belief is more likely to be foolish than sensible.” Bertrand Russell
- Expand the use of conceptual models to link studies and risk assessment to actual decisions
 - Conceptual models describe cause and effect pathways and processes under different risk management scenarios

Dredging Conceptual Model

Source

Proximate Stressor

Exposure Processes



Managing Uncertainty

- Uncertainty must be managed throughout assessment and management
- Think ahead
 - What questions will I want answers to when deciding among management options
- Use of adaptive management principles to optimize management actions through time and to manage uncertainties



The Need for Superimposing Management Actions on a Future World

“No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be...”

Isaac Asimov

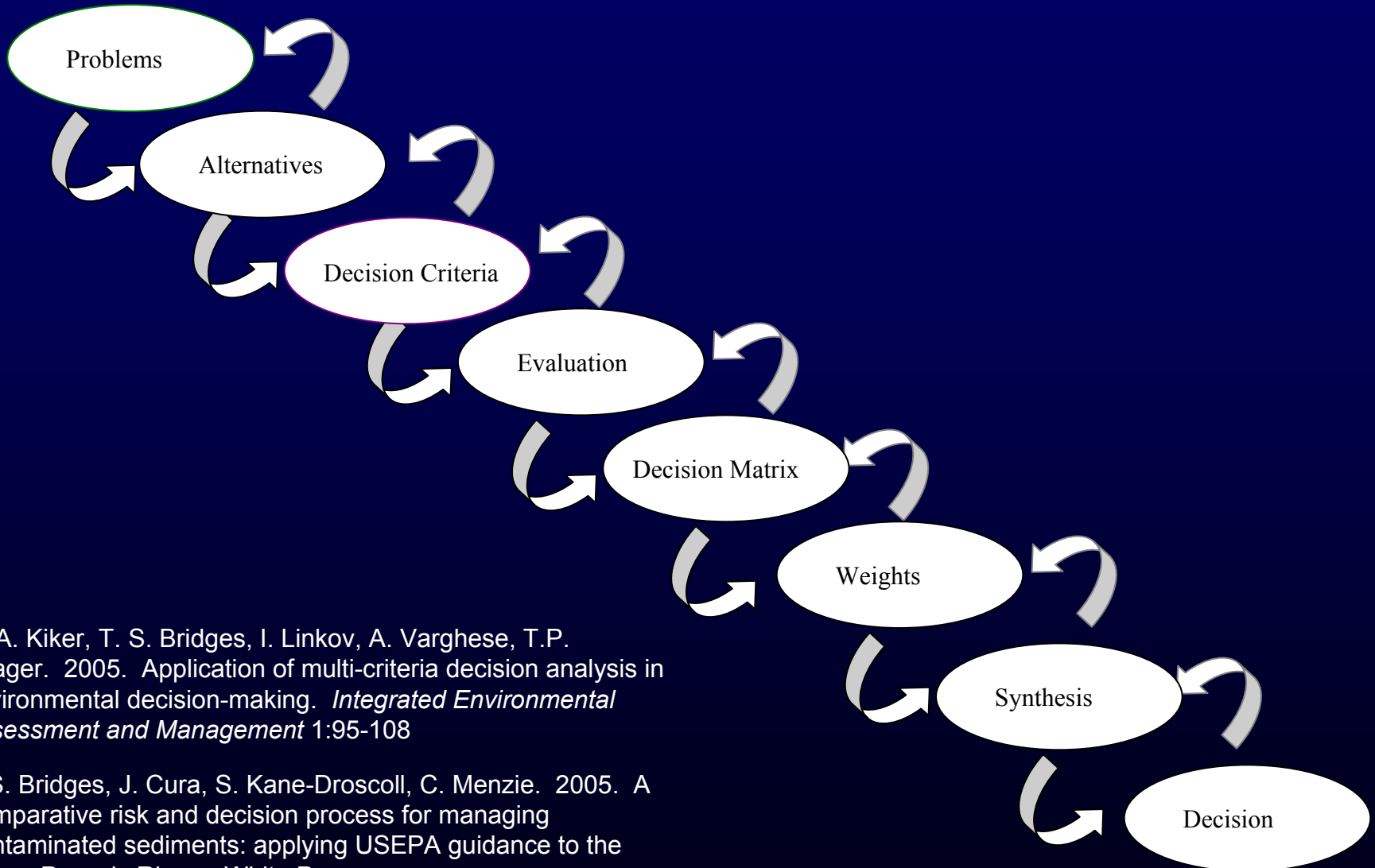
- Value in integrating Risk Assessment/Management concepts with Strategic Planning
 - SWOT Analysis
 - Strengths-Weakness-Opportunities-Threats

Making Sensible Decisions When Opinions Differ

“We think very few people sensible, except those who are of our opinion.” Francois De La Rochefoucauld

- The decision-making environment for port management is large, diverse, and complex
 - Federal, state, tribes, local gov't, local residents, responsible parties, NGOs, meddlers, etc.
- How do we structure the decision-making process to make more informed, credible, and defensible decisions?

A Comparative Risk and Decision Analysis Process



G. A. Kiker, T. S. Bridges, I. Linkov, A. Varghese, T.P. Seager. 2005. Application of multi-criteria decision analysis in environmental decision-making. *Integrated Environmental Assessment and Management* 1:95-108

T.S. Bridges, J. Cura, S. Kane-Droscoll, C. Menzie. 2005. A comparative risk and decision process for managing contaminated sediments: applying USEPA guidance to the Lower Passaic River . White Paper

Conclusion

- *Port Security Management*, A systematic process for managing risks to sustain port operations and functions
 - Systems approach emphasizes the connections among diverse components of a system, i.e., a port
 - “Managing risks” is an acknowledgement that risks will always exist
 - Sustainability introduces concepts of strategic planning and growth into the decision process