GXS Value Assessment

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The Value of Information

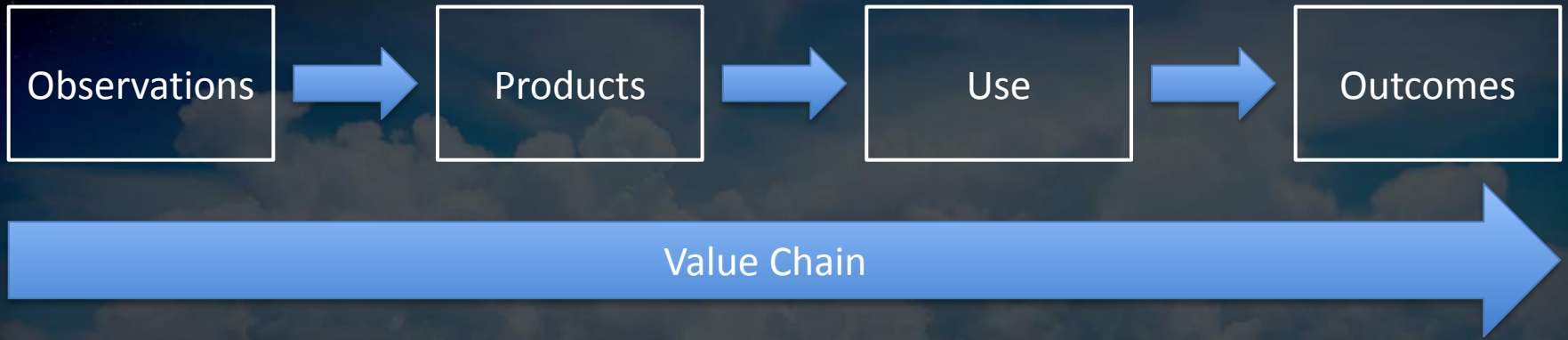
"…[weather] forecasts possess no intrinsic value. They acquire value through their ability to influence the decisions made by users of the forecasts."

Murphy, A.H., 1993. What is a good forecast? An essay on the nature of goodness in weather forecasting. Weather and forecasting, 8(2), pp.281-293.

"We don't make a lot of the products you buy. We make a lot of the products you buy better"

--BASF

Value Chains

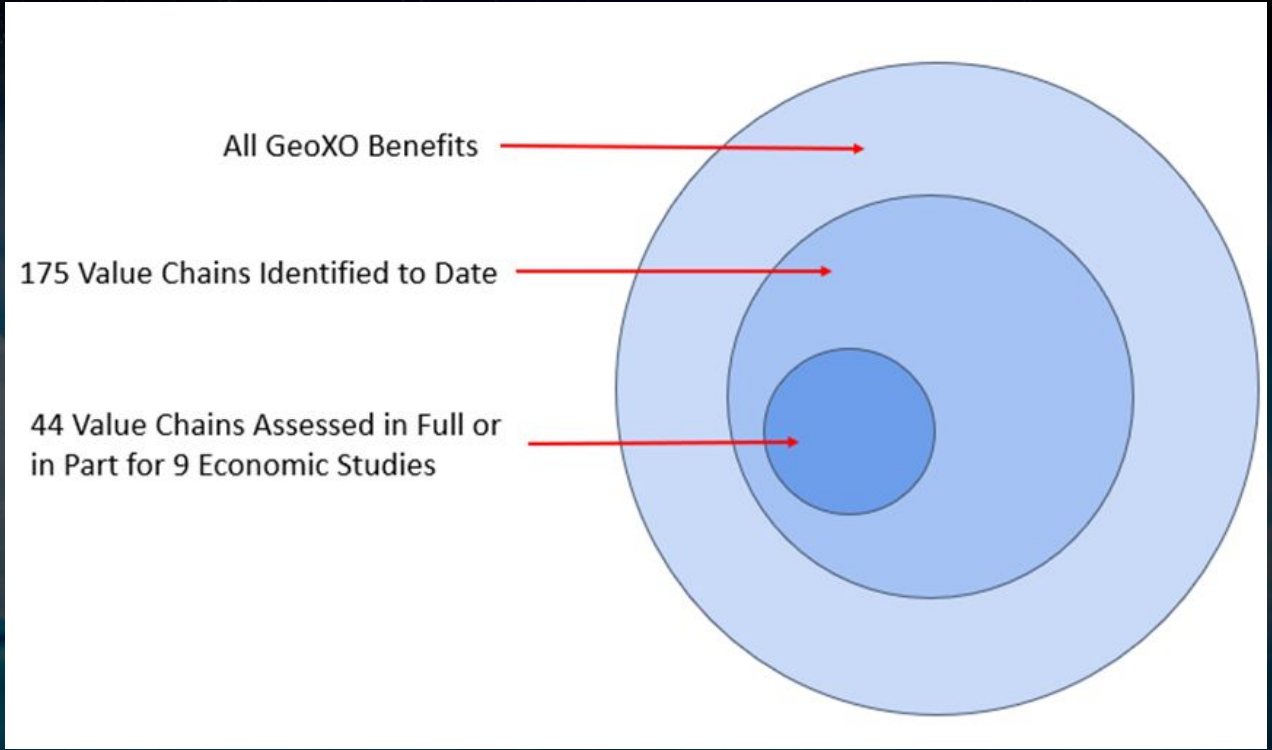


Outcome A (with new observations) – Outcome B (without new observations) = Benefit

Value Chains in the 2022 GeoXO Study

Highlights

- 175 value chains identified
- 44 with quantified benefits
- Most of the 44 are only partial assessments



Key Questions for Value of Information Studies

- What decisions are being influenced by the information?
- Who is making those decisions?
- What outcomes are being improved?
- To what degree are those outcomes improved?
- How many people are affected by these outcomes?

Measurable Decision Outcomes

- Reduced production costs
- Increased profits
- Reduced disruption of economic activities
- Reduced mortality and injuries
- Reduced damage to properties and natural resources




Overview of Three Benefit Assessments Linked to GXS

1. Reducing Aviation Delays
2. Reducing the Cost of Electric Power Generation
3. Reducing Damage to Wine Grapes

Reducing Aviation Delays

- Weather-related aviation delays cost just over $20 billion annually
- About $2.5 billion of those costs are associated with weather forecast error
- GXS observations will improve forecasts of thunderstorms, low clouds, and fog
- A 6 percent reduction in aviation delays associated with weather forecast error equates to $152 million annually
- Related benefits not quantified:
  - avoiding flight rerouting
  - reduced cancellations
  - reducing impacts of volcanic eruptions (ash and SO_2)

Reducing Cost of Electric Power Generation

- Load forecasting relies on weather forecasts (e.g., temperature and moisture)
- The annual cost of load forecasting error is ~$2.5 billion annually in the US
  - Producing power that can't be sold
  - Underproduction, filling the gap at a higher cost
- 40 percent of load forecasting error is attributable to error in weather forecasts
- GXS will improve the weather forecasts that improve load forecasts

Reducing Damage to Wine Grapes

- Smoke from wildfires damages wine grapes, reducing the quality and value of wine
- With advance warning, grapes can often be harvested before they are damaged by smoke
- In California, wildfires caused damages averaging $32 million annually between 2014 and 2021
- GXS-enhanced forecasts will allow winegrowers to better anticipate the presence and movement of smoke from wildfires
- This analysis did not include:
  - Improved containment of wildfires
  - Impacts on wine grapes grown outside of California
  - Impacts of smoke on other agricultural products

Other Value Chains Linked to GXS

- Increased agricultural productivity (e.g., precision agriculture)
- Reduced cost of responding to hurricanes (e.g., deploying recovery assets)
- Reduced delays to ground transportation during dust storms
- Reduced business loss and interruption from wildfires

Takeaways

- Benefits are linked to the use of GXS-enhanced products to inform decisions to improve outcomes.
- We rely on industry and other stakeholders to provide us with information needed to understand and quantify benefits
  - Which GXS-enhanced products are used to make decisions?
  - What decisions are informed by these products?
  - What outcomes are affected by these decisions?
  - To what degree with these outcomes be improved using GXS-enhanced products?

Thank you

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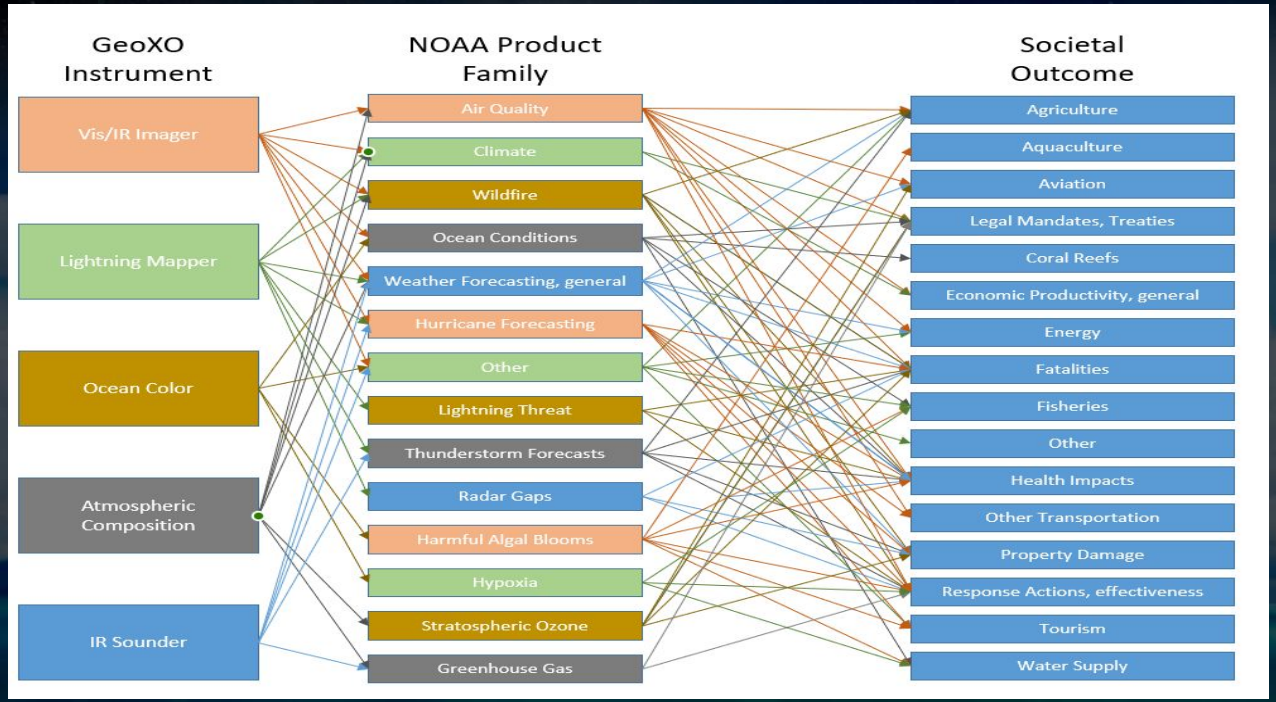
Extra Slides

A “Value of Information” Approach

…Applied to a Complex System



Reducing the Incidence of Extreme Fires

- Since 1991, eighteen $1 billion^{+} wildfires, losses totaling $104 billion
- Losses averaging $3.5 billion annually since 1991
- GXS will provide enhanced hot spot detection, imagery, atmospheric moisture, winds
- A 5 percent reduction equates to $173 million annual benefit
- Related benefits not quantified:
  - similar reductions for less destructive fires would increase benefits
  - reducing loss of life
  - reducing mudslides in burn scar areas
  - increased hazard associated with climate change

Reducing the Cost of Wildfire Suppression

- 97 percent suppressed before exceeding 300 acres
- Average suppression cost to federal agencies: $1.9 billion annually over the past 20 years
- GXS will provide enhanced hot spot detection, imagery, atmospheric moisture, winds
- A 3 percent reduction equates to $56.1 million annually
- Related benefits not quantified:
  - costs to non-federal agencies and homeowners
  - reduced costs of evacuations