We have limited funds to enhance services. How do we prioritise investments?
Special Services Projects (SSP)

Goal 1: Assess the Value of Antarctic Weather Services to inform investment

+ 

Goal 2: Facilitate the transition of Science findings into Services

Talk Outline

Part 1: SSP context
Part 2: SSP methodology
SSP goals

(1) Assess the Value of Antarctic Weather Services

(2) Facilitate the transition of Science into Services

<table>
<thead>
<tr>
<th>Study</th>
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<th>Sectors</th>
<th>Benefits methods/measures</th>
<th>Benefit cost ratio</th>
</tr>
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<tbody>
<tr>
<td>A Study of the Economic Impact of the Services provided by the Bureau of Meteorology (London Economics, 2016)</td>
<td>Australia</td>
<td>Benefits to the public, damage mitigation from severe weather, health benefits of extreme temperature warnings, agriculture, aviation, electricity, coal mining, construction, offshore oil and gas, water sector, retail trade, financial services and insurance, tourism</td>
<td>Willingness to pay survey of households, avoided cost approach, market-based estimates</td>
<td>11.6:1</td>
</tr>
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**SSP goals**

1. **Assess the Value and Impact of Polar Weather Services**
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2. **Facilitate the transition of Science into Services**

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<tr>
<td>Forecast improvements. Lazo and Chestnut 2002</td>
<td>USA</td>
<td>Households</td>
<td>Willingness to pay</td>
<td>4.4:1</td>
</tr>
<tr>
<td>Drought Early warning Law 2012</td>
<td>Ethiopia</td>
<td>Households</td>
<td>Avoided livelihood losses and assistance costs</td>
<td>3:1 to 6:1</td>
</tr>
<tr>
<td>Chinese Public Weather Service Yuan et al 2015</td>
<td>China</td>
<td>Households</td>
<td>Willingness to pay</td>
<td>26:1</td>
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<td>ENSO early warning Adams et al 2013</td>
<td>Mexico</td>
<td>agriculture</td>
<td>Change in social welfare based on increased crop production</td>
<td>2:1 to 9:1</td>
</tr>
<tr>
<td>Hurricane forecasts to oil and gas producers Considine et al. 2004</td>
<td>Gulf of Mexico</td>
<td>Oil Drilling</td>
<td>Avoided evacuation costs and reduced foregone drilling time</td>
<td>2:1 to 3:1</td>
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<td>World Bank 2008</td>
<td>11 European and Central Asian Countries</td>
<td>Weather dependant sectors</td>
<td>2:1 to 14:1</td>
</tr>
<tr>
<td>Hallegate 2012</td>
<td>Developing Countries</td>
<td>National level and weather sensitive sectors</td>
<td>4:1 to 36:1</td>
</tr>
<tr>
<td>Leviakangas and Hautala 2009</td>
<td>Finland</td>
<td>Key economic sectors</td>
<td>5:1 to 10:1</td>
</tr>
<tr>
<td>Perrels 2011</td>
<td>Nepal</td>
<td>Agriculture, transport and hydropower</td>
<td>10:1</td>
</tr>
<tr>
<td>Frei 2009</td>
<td>Switzerland</td>
<td>Transport, Energy, aviation, agriculture</td>
<td>5:1 to 10:1</td>
</tr>
<tr>
<td>Pili-Sihvola et al. 2014</td>
<td>Bhutan</td>
<td>National level</td>
<td>3:1</td>
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SSP goals

(1) Assess the Value and Impact of Polar Weather Services

(2) Facilitate the transition of Science findings into Services

Describes the 4 stages of a continuous, cyclic process for developing and delivering services:
PPP SERA and EC PHORS partner to facilitate service provider engagement with Research and User communities at National Level

**1) Develop Partnerships** (now-July 2020)
- Socialise SSP concept
- PPP SERA, EC PHORS and interested stakeholders design SSP framework
- Expressions of interest sought

**2) Nations Design their Projects**
- With WMO support, National programs (researchers, service agencies and WWIC information users) design their SSP:
  - NWP or satellite imagery, and/or
  - Seasonal outlooks,
  - in person briefings,
  - New graphics;
  - User education;
  - International cooperation, etc

**3) Undertake SSP's** (summer 2020-21)
- benchmark evaluation of current service value (time, $, risk).
- Follow up evaluation after SSP.

**4) Evaluate Outcomes** (2021)
- National leads compile their SSP findings.
- Summary report presented to PPP outlining quantifiable service benefits.
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What is quantifiable and what metrics do we use?

- We can't quantify all the socio-economic benefits. We rather quantify only what we skilfully can;

- Efficiency, $ and Risk are all quantifiable to some degree (perceived and/or actual).

- Themes include: Avoided cost approach, Perception of value estimation
Measuring Efficiency for Aviation

Across the season, how effective is the total aviation service (ie. TAF, face-to-face briefings, route forecasts etc) in avoiding:

a) weather related delays?

We can define the same for other activities: e.g. shipping, small boats, field travel, station ops, resupply etc.
Developing the efficiency function:

<table>
<thead>
<tr>
<th>Missed flying days</th>
<th>=</th>
<th>Season length</th>
<th>x</th>
<th>Ratio of days where weather precludes flying</th>
<th>x</th>
<th>Effectiveness of forecast in avoiding wx delays</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 days</td>
<td>=</td>
<td>100 days</td>
<td>x</td>
<td>0.5</td>
<td>x</td>
<td>(1 - 0.8)</td>
</tr>
</tbody>
</table>

10 days of lost science opportunities….= ??

Additionally, if season aviation costs $1M and we only take advantage of 80% of weather windows, then there's been $200k wasted in aircraft expense.
Re-evaluation after SSP to 90% efficiency:

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<th>=</th>
<th>Season length</th>
<th>\times</th>
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<tr>
<td>5 days</td>
<td>=</td>
<td>100 days</td>
<td>\times</td>
<td>0.5</td>
<td>\times</td>
<td>(1 - 0.9)</td>
</tr>
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</table>

5 days gained in science opportunities…

$100k saved in aircraft expense…

We can now start measuring impact and value
References

- A study of the economic impact of the services provided by the Bureau of Meteorology

- WMO Strategy for Service Delivery and it's implementation plan
  https://library.wmo.int/pmb_ged/wmo_1129_en.pdf
Thank you
Merci