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The bridge from meteorological research to improved safety of air transport

Jaakko Nuottokari

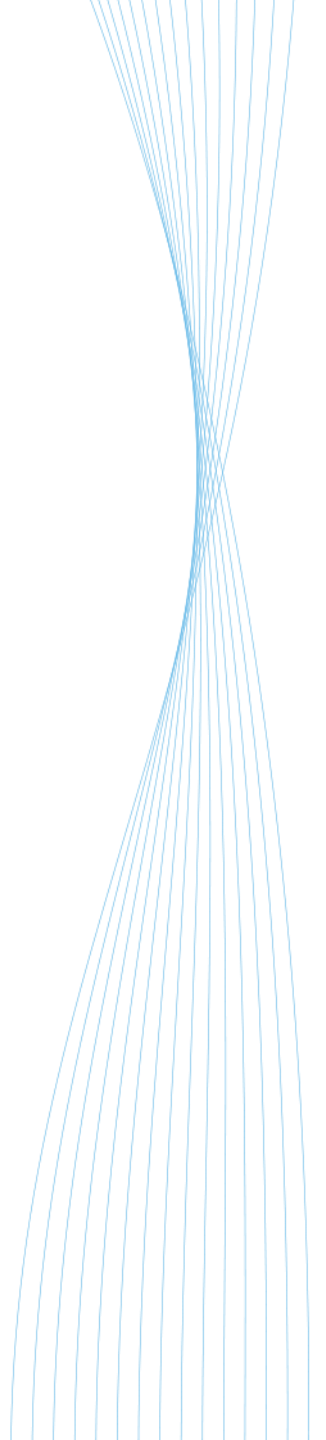
Finnish Meteorological Institute

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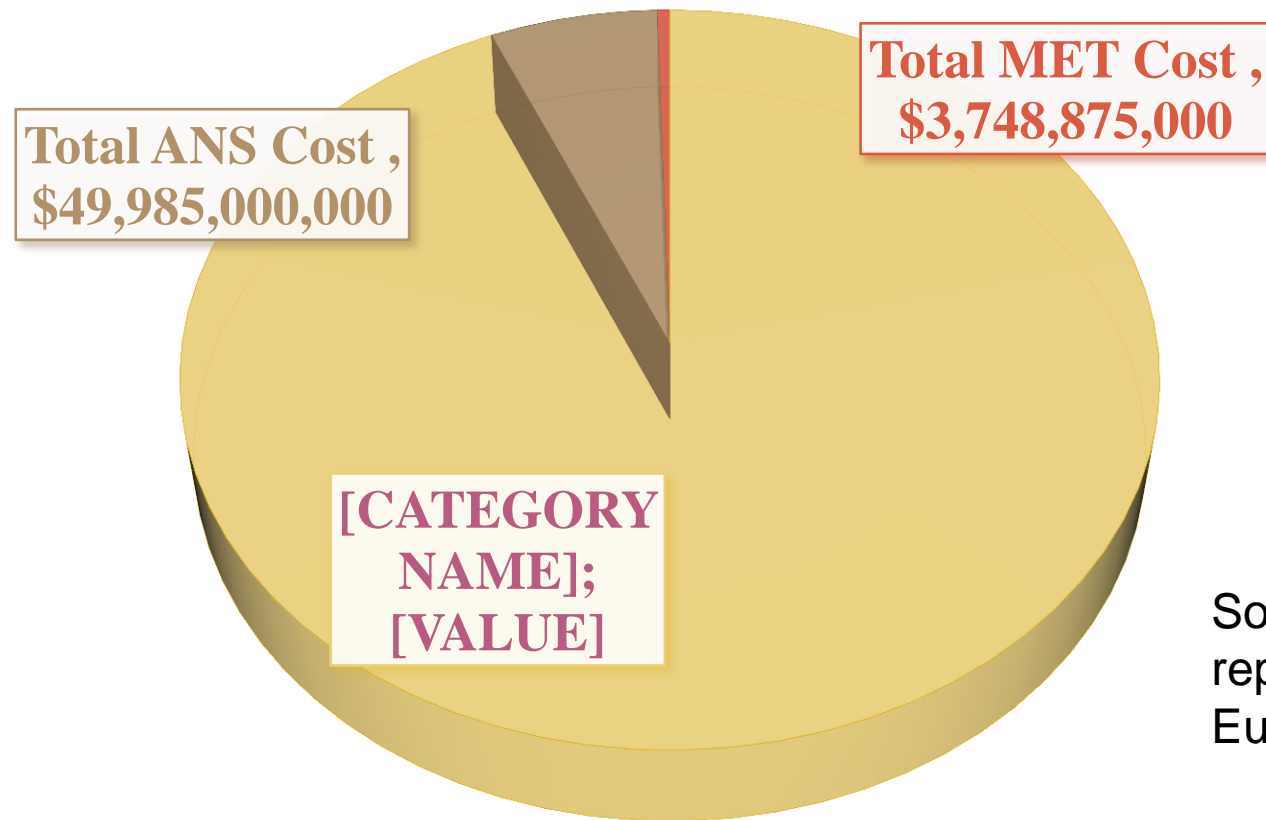
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Global view on MET





Cost of aeronautical meteorological services are 0.5% of the total air transport cost



Source: IATA end-year report 2016 & Eurocontrol 2004



Weather a major problem in US, a smaller problem in Europe measured in delay

- In the US National Airspace System (NAS), 69% of delays are caused by weather according to the FAA
 - Impact mainly caused by few East Coast airports: EWR, LGA and JFK
- In Europe, weather is a large cause of delay, but the airspace is much less congested and risks can be mitigated
 - Major impact at LHR with wind and visibility
- European weather conditions are generally worse and more flights are operated in Instrument Meteorological Conditions (IMC) than in the US



Global research situation

- Research and development of meteorological services to aviation is not globally evenly distributed, operating under a unified strategy or adequately funded
- A global strategy and roadmap to encompass meteorological service provision can be only founded on the **defined needs and requirements** of the main air transport industries
- A global vision needs to include a position on **what** the most important research questions are and **where** the integration of meteorological information to decision support systems is **most needed**
- **Transparency** into planned and ongoing development activities with open access publishing standards of research results of meteorological applications will speed up development significantly



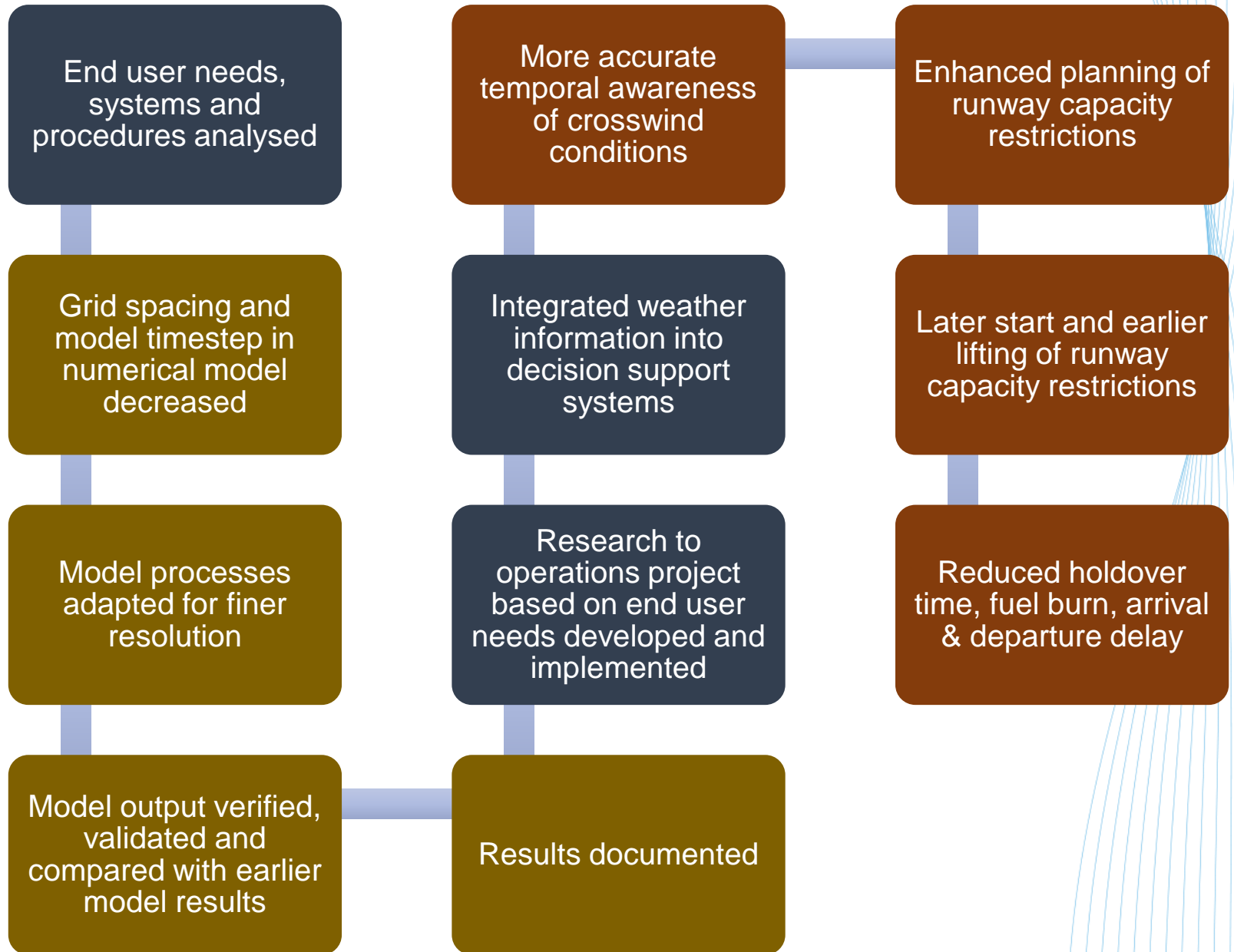
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Organizing research activities



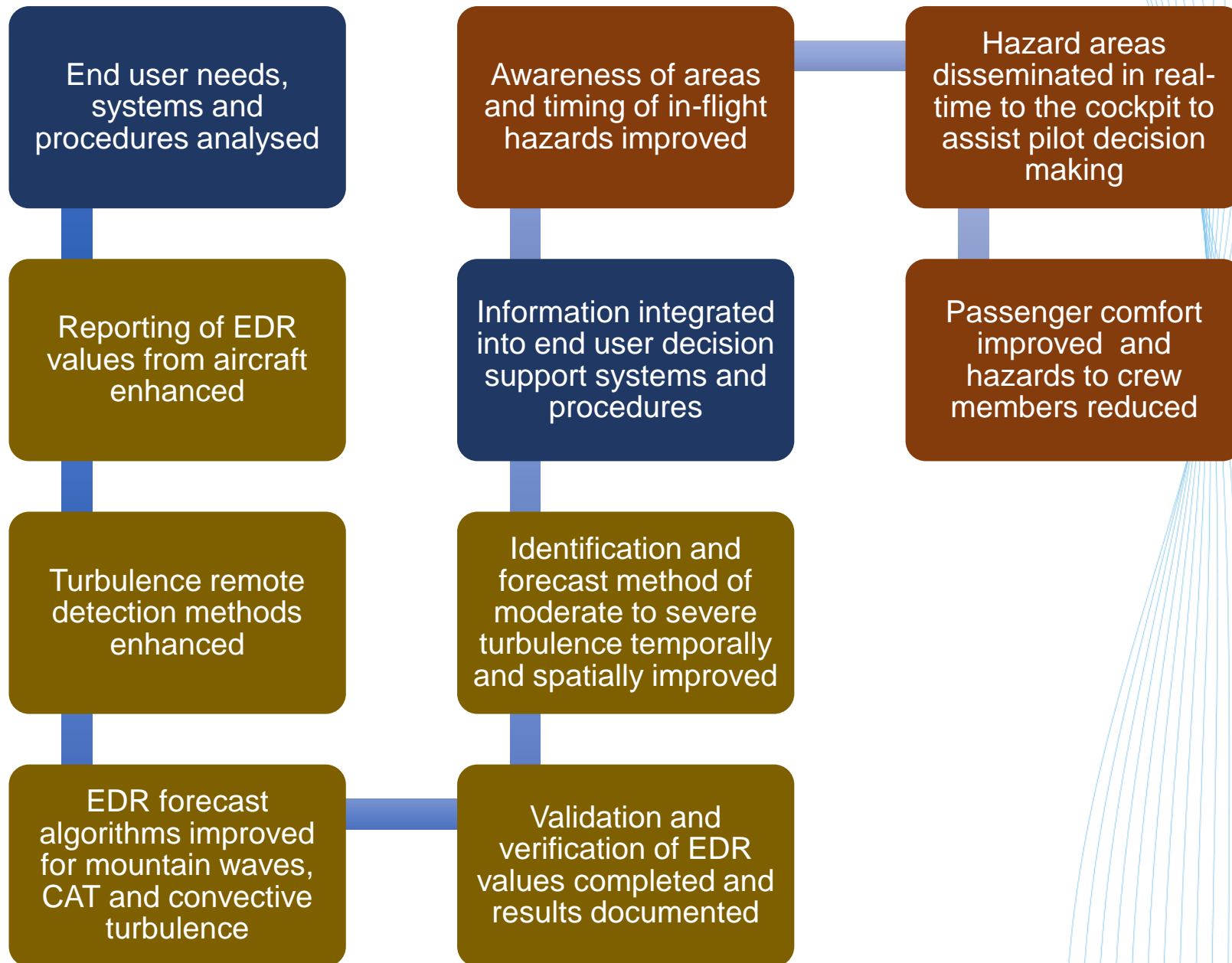


Increasing model resolution is key to improving terminal area wind information to users



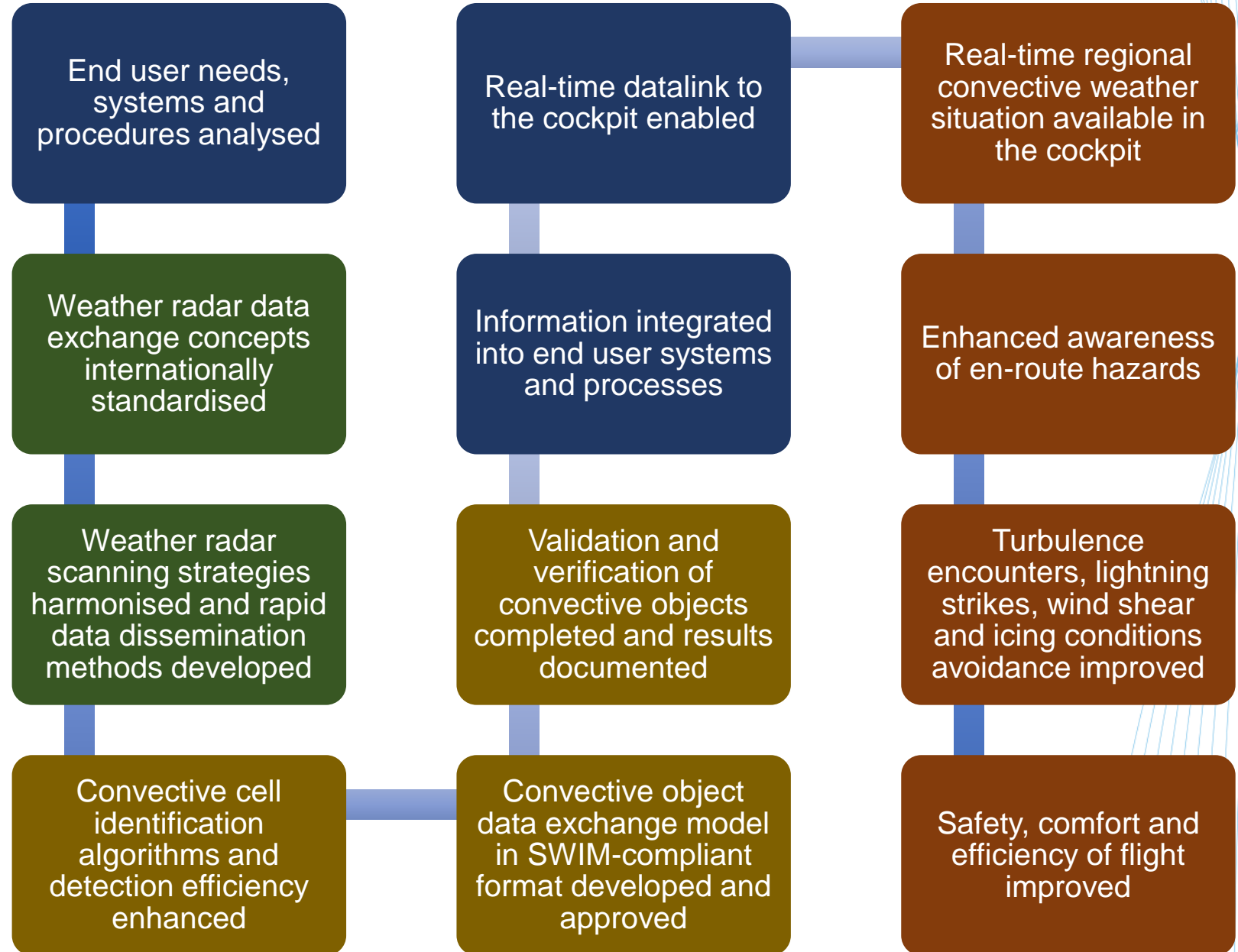


Improving Eddy Dissipation Rate (EDR) observations and forecast algorithms leads to safer flights



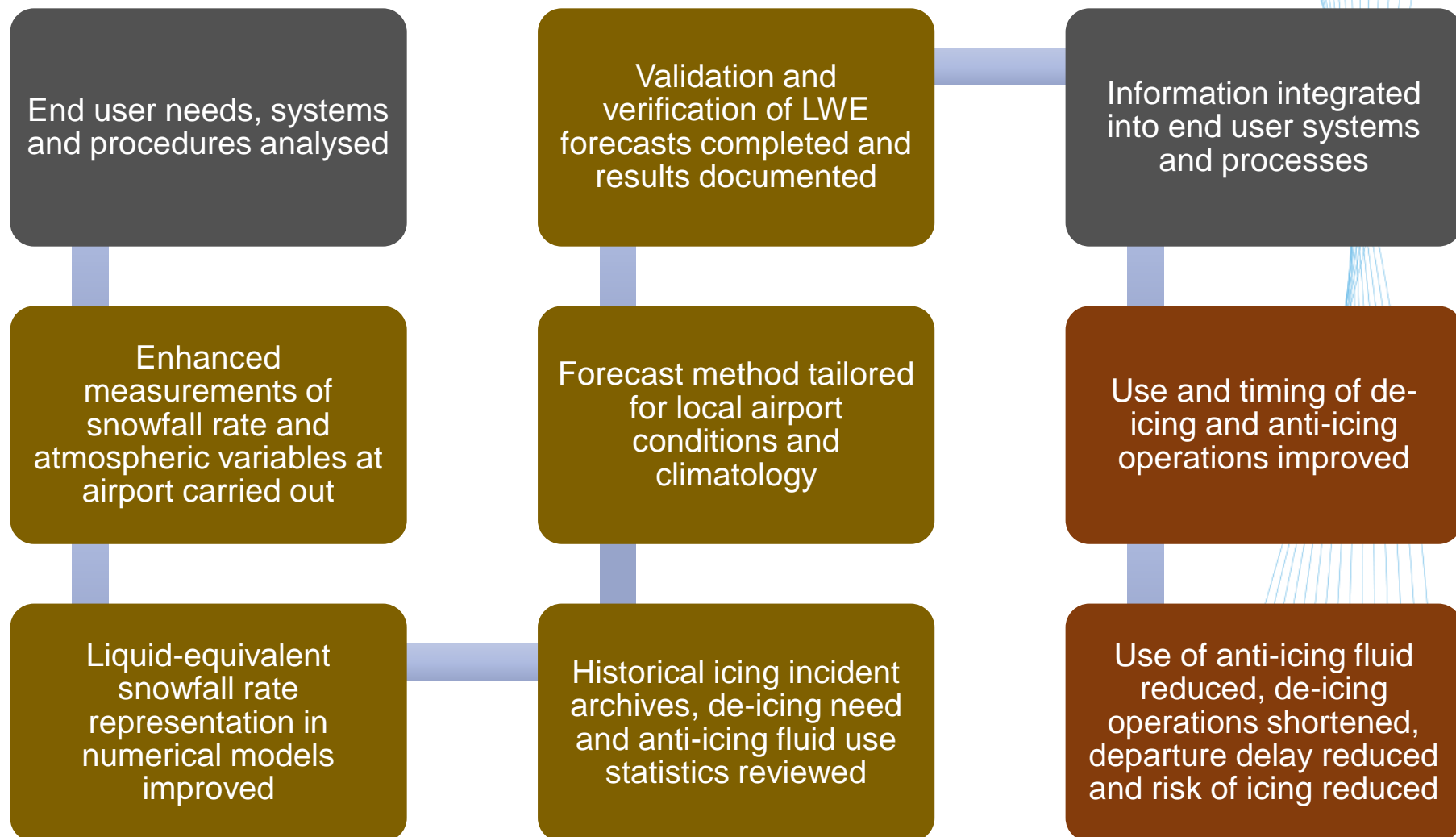


Convective weather in-flight situational awareness leading to optimal route and fuel burn



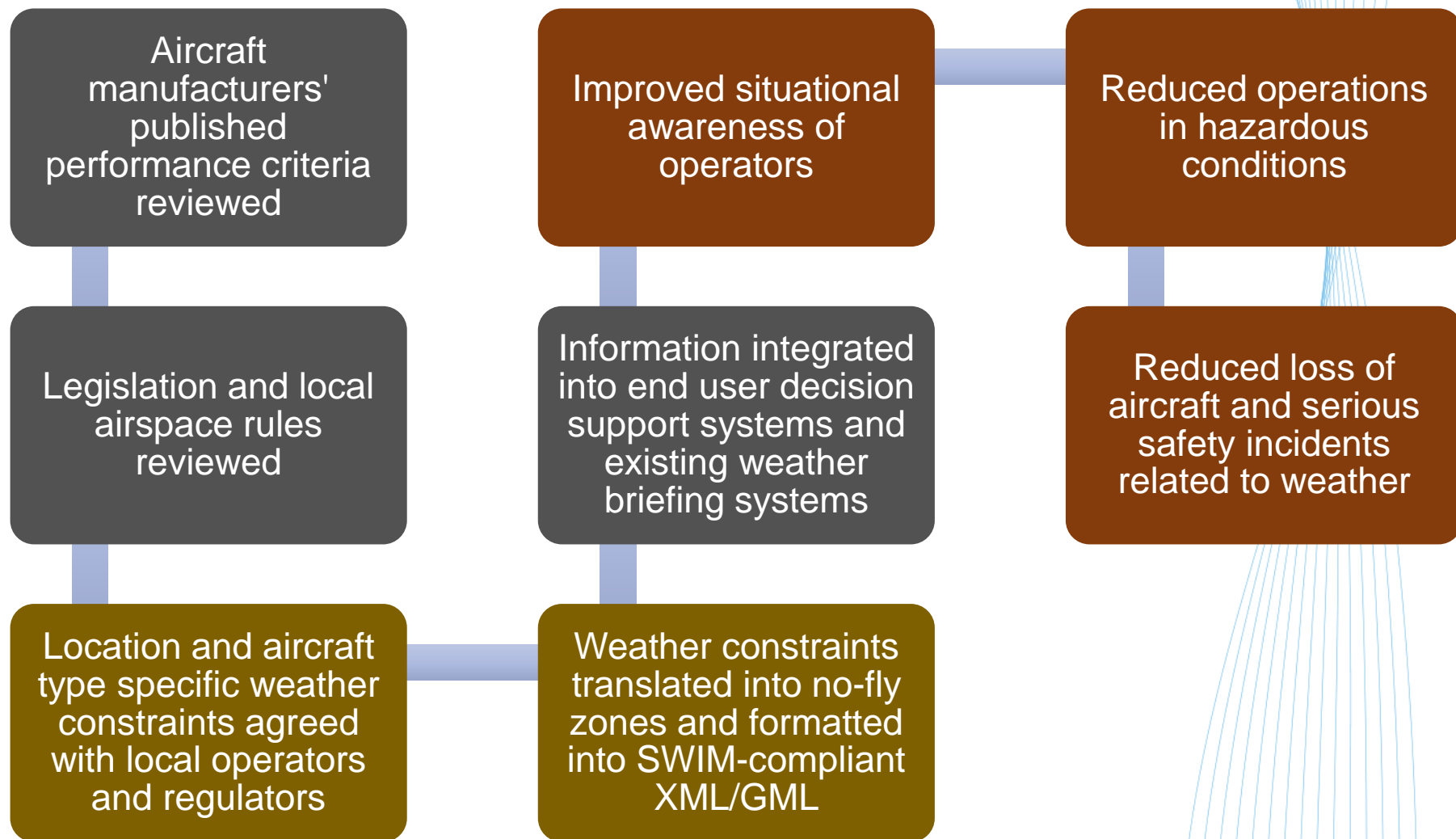


Improved de- and anti- icing forecasting reduces departure delay at airport



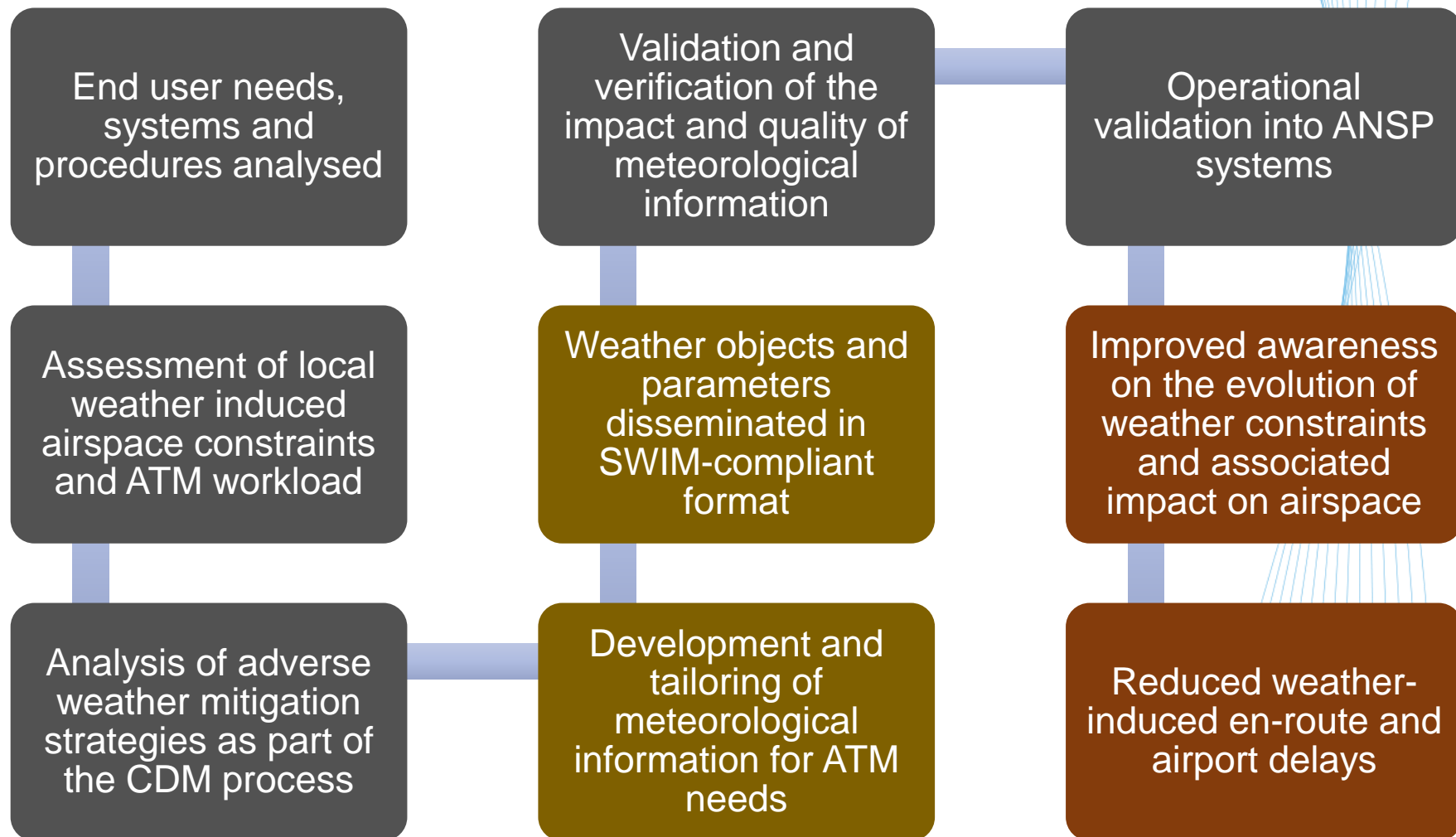


Improvement in weather services for RPAS operators leads to increase safety in drone flight



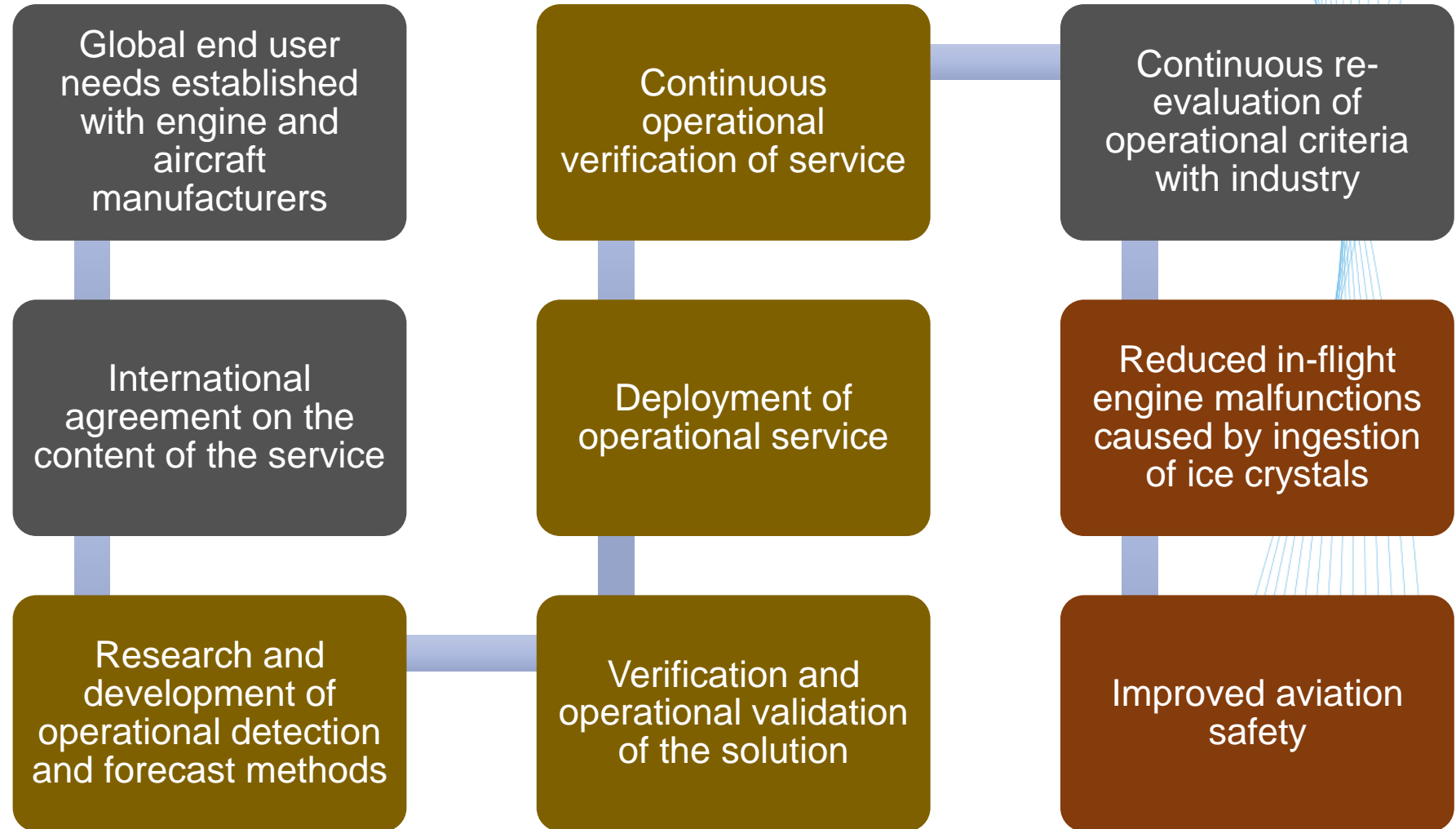


Weather in ATM decision support can result in reduced en- route and weather delay



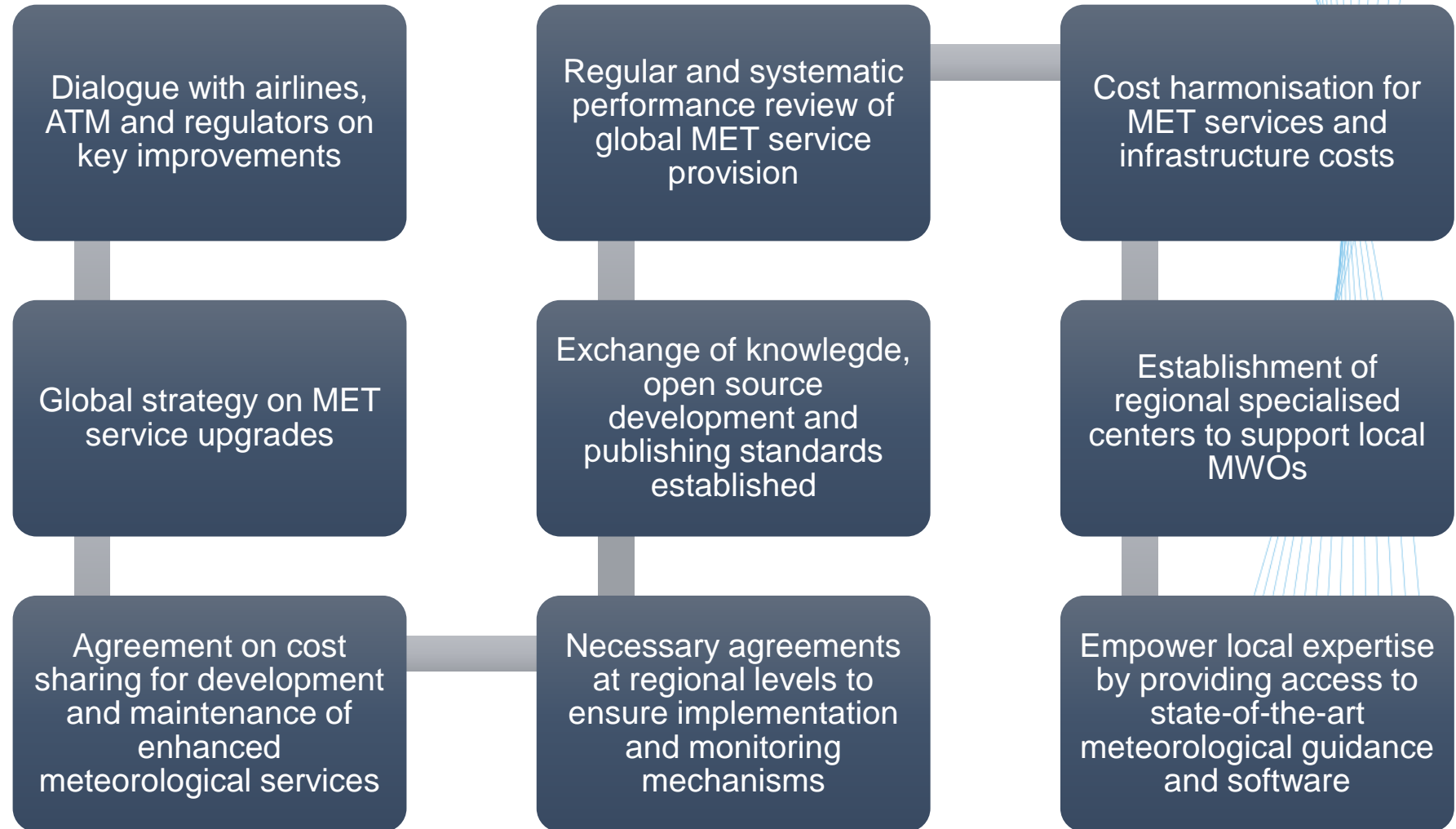


Forecasting **HIWC/HAIC** at high altitudes enhances aviation safety





Proposed steps to improve global meteorological service provision for air transport





Conclusions

- Research and development of meteorological services, products and information to support air transport need to be user-driven and tailored to specific needs and constraints
- Meteorological research is only one important component of such a project
- Projects should be motivated by clear improvements in aviation safety and capacity of the airspace and benefits quantified whenever possible