



United Nations  
Global Geodetic Centre of Excellence

## **Hidden risk to critical Infrastructure and the economy**

Nicholas Brown  
UN-GGCE Head of Office



# Reliance on satellites

- We have an ever-increasing reliance on satellites
- ‘A single point of failure’ for some national economies and operation of critical infrastructure
- **Critical Infrastructure operation:**
  - A 2012 report from the U.S. Department of Homeland Security found that 15 of 18 critical infrastructure and key resources sectors relied on the global positioning system (GPS).
- **Economic benefits:**
  - Over the next decade, revenue from GNSS, Earth Observation and satellite telecommunications (80% of the space industry market revenue) has growth rate of ~9%
  - Reaching a total of almost €800 billion.
- This is why countries are investing in GNSS, Earth Observation and satellite telecommunications and want sovereign capability

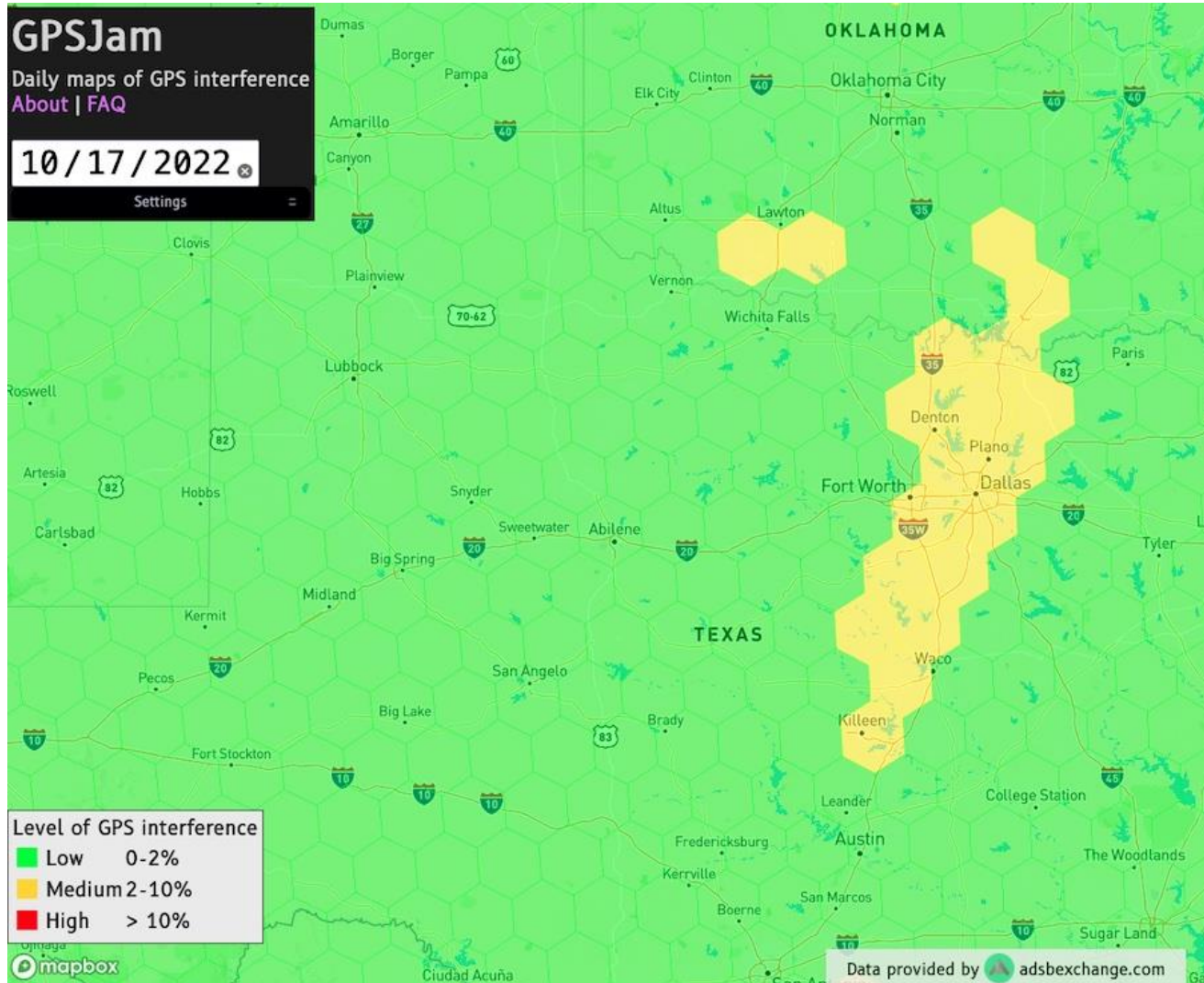


# Back to our scenario – could it happen?

- Yes – but it's unlikely (Likelihood – Extremely Rare; Consequence - Catastrophic)
  - solar storm; a coordinated cyber-attack; space debris ('Gravity').
- Space agencies and satellite operators implement rigorous safety measures and redundancy systems to minimize the impact of potential failures.



# Risk



Stronger. Together.

<https://arstechnica.com/information-technology/2022/10/cause-is-unknown-for-mysterious-gps-outage-that-rerouted-texas-air-traffic/>

## More likely scenario? Subset of localized impacts

- Outages, degradation of satellite services for a period of time, or in a specific region
- Jamming, Spoofing, space weather events (e.g. intense solar activity) or satellite malfunction.

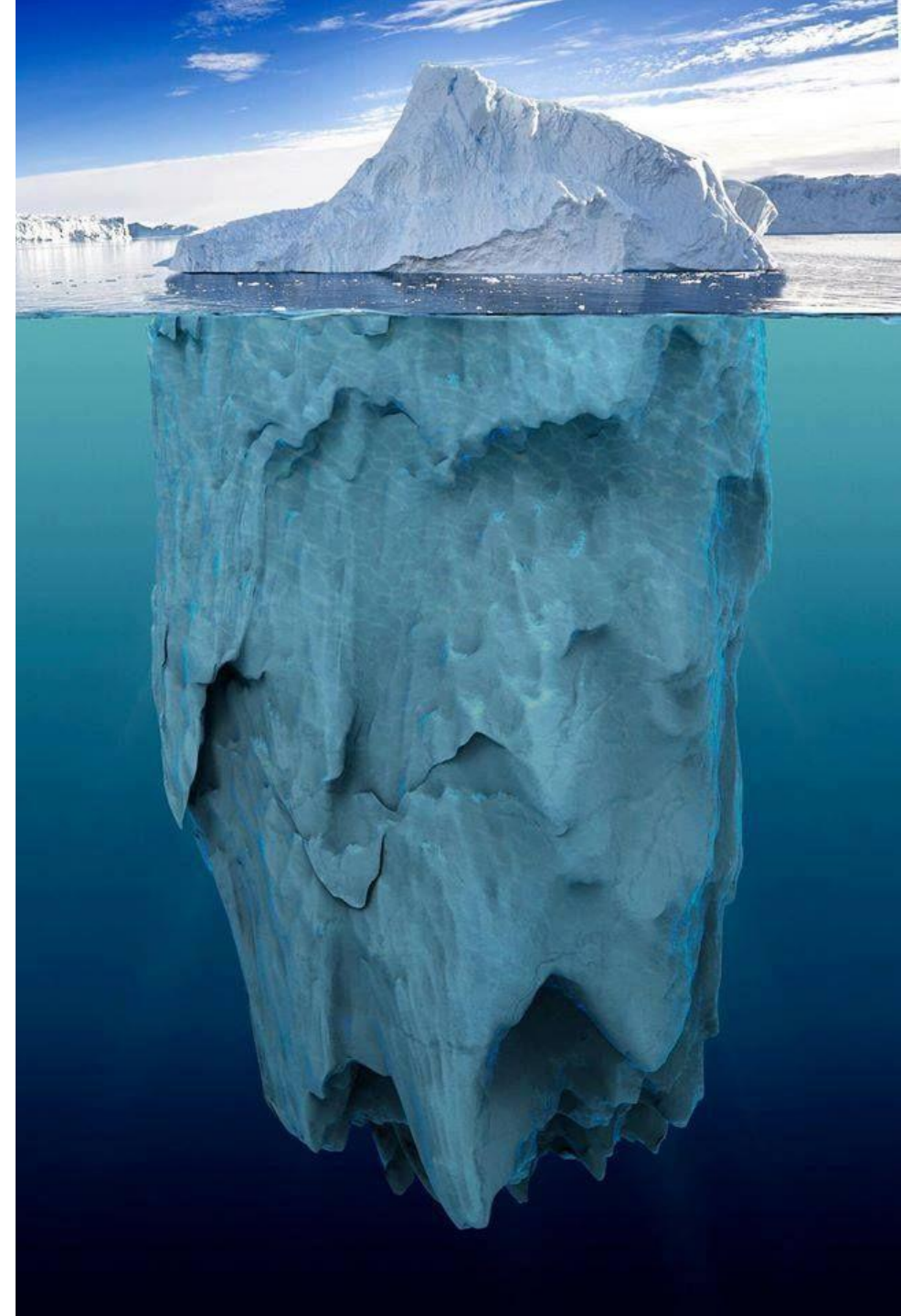
## These risks are known by Member State governments

- Dallas Fort Worth airport (OCT 2022): “ATTN ALL AIRCRAFT. GPS REPORTED UNRELIABLE WITHIN 40 NM OF DFW.”
- Numerous reports recommend improve resilience.

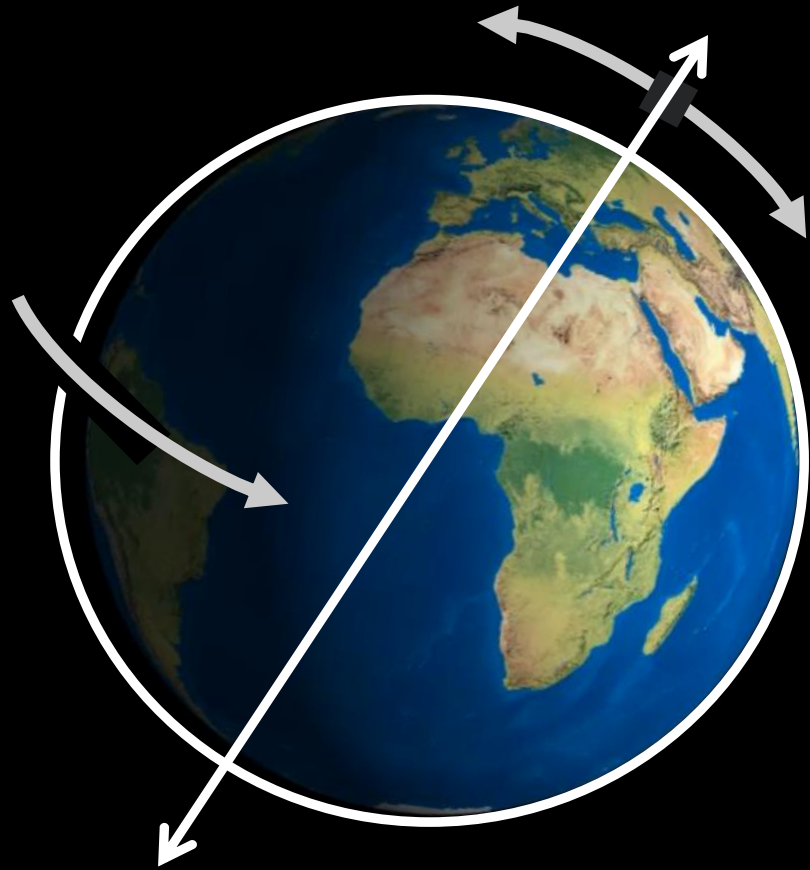


# Hidden Risk

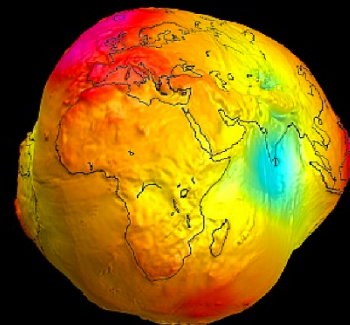
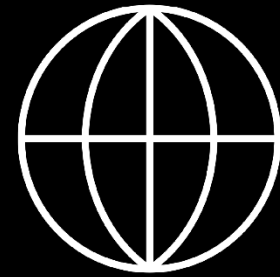
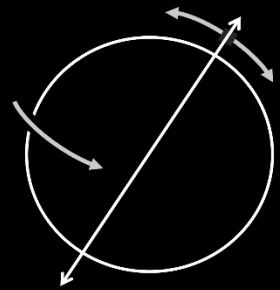
- What if I told you however that there is a risk that these reports don't consider? A hidden risk.
- What if I told you representatives from Member States, space agencies and most satellite operators know about this risk which impacts the resilience and reliability of satellite services?
- What if I also told you these people are concerned about it, but it still isn't being mitigated?



# Geodesy Ground Stations Observations



# Data Collection and Analysis



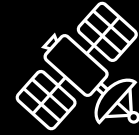
+

+

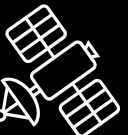
+

# Satellite Intelligence

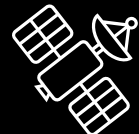
GNSS



Safety of life



Communications



EO



# Space Based Delivery



# Foundation

- The global geodesy supply chain is the foundation for national geospatial data integration and analysis
- Without the global coordinate reference frame:
  - You can't integrate. This limits analysis capability
- Without accuracy and reliable satellite information:
  - You can't collect data or monitor change using Earth observations, systems which use GNSS for data collection





# Weaknesses

- **Evidence**
  - Little to no evidence which is written in a form decision makers can understand
  - Why it deserves investment of time, people, or money
  - Reports which describe the economic, environmental, and societal benefits don't mention geodesy
- **Resources** dedicated people and funding
  - Reliance on old and aging infrastructure (and people)
  - Lack of observatories in some parts of world
  - Lack of analysis centres for some techniques



# Weaknesses

- **Governance**
  - Lack of formal commitments
  - Reliance on in-kind contribution
  - Lack of global cooperation and coordination
- **Capacity**
  - Decrease in formal training options
  - Decreasing number of geodesists ('Geodesy Crisis')
- **Awareness**
  - No-one knows what geodesy is



# Call to Action

**Action 1: Raise awareness**

**Action 2: Joint Development Plan**

**Action 3: Contribute**

