

EASA Low Level Weather

Garmin Aviation Presentation



Garmin Introductions

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GARMIN

History, Culture, and Vision

Innovation as a Cornerstone

Garmin was founded in 1989 and is committed to designing products that fuel people's passions.

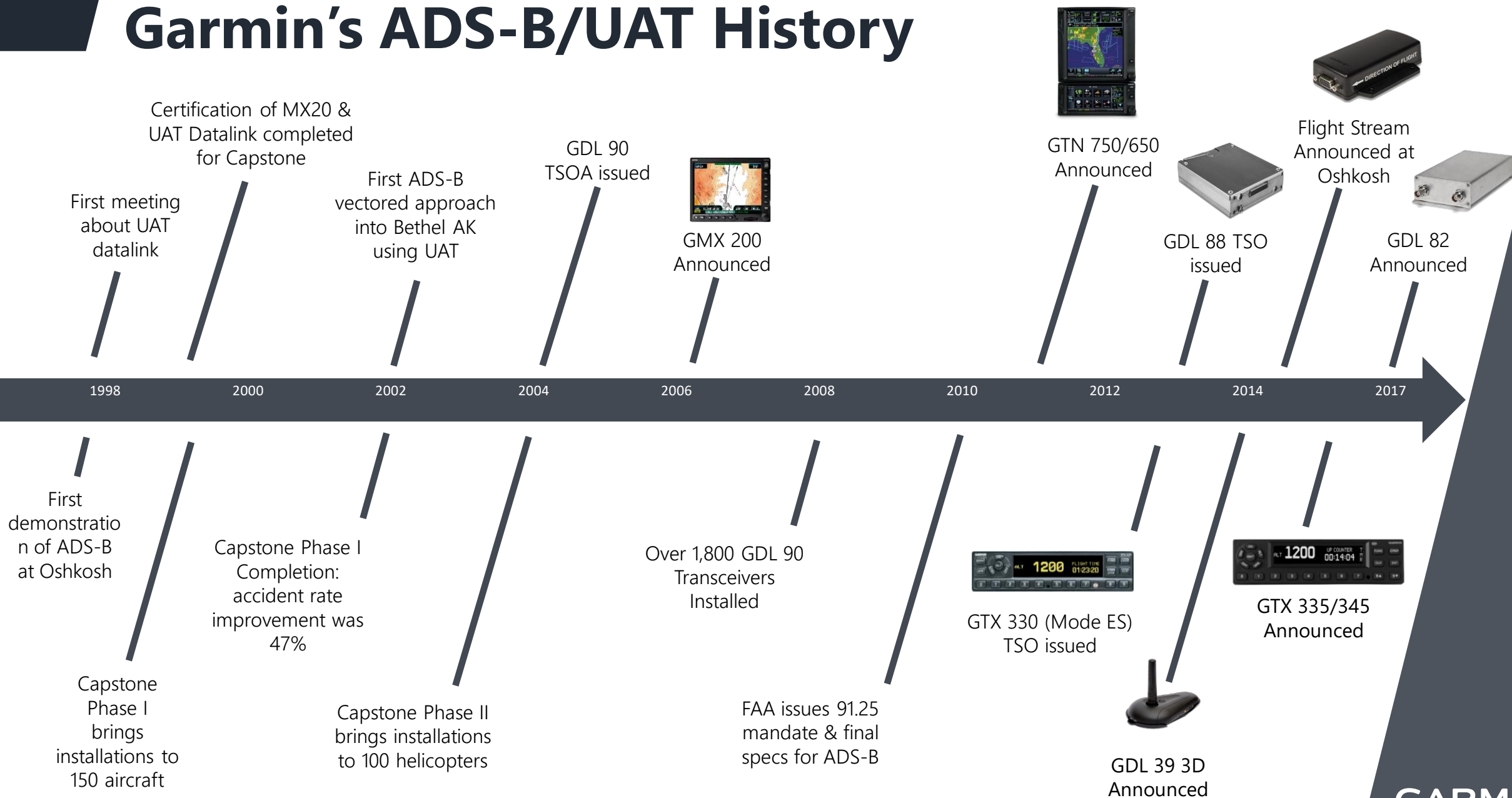
- We are **innovators** creating technology and utility that enriches the lives of our customers
- We are **pioneers** developing new markets for location and communications technology
- We are a **multi-national** company employing over 11,600 associates in over 30 countries
- We are a **multi-faceted** company serving five key market segments of Automotive, Aviation, Fitness, Marine, and Outdoor





Overview UAT Weather Trial by Garmin

Garmin's ADS-B/UAT History



Garmin's ADS-B/UAT History



July 2017
GDL5052
Launched

April 2019 – Garmin
conducts trial of UAT
Weather at EDNY



History of UAT Weather Datalink

- ADS-B Mandate for all aircraft in the United States 1-Jan-2020.
- Mandate uses dual frequency ADS-B,
 - 1090 MHz (standard transponder frequency); required above 18,000 ft
 - 978 MHz (UAT-universal access transceiver). Used below 18,000 ft
- UAT protocol allows a higher bandwidth availability on 978 MHz. The US have installed a network of ground stations that rebroadcast ADS-B data from 1090 and also uplinks Flight Information Services (FIS-B) data including weather information on the 978 MHz frequency.
- Due to this initiative from the FAA, there has been wide-scale adoption of UAT low cost Weather Receivers.

Garmin Products for Mandate Approval

Retain exiting XPDR

- GTL82 - Low cost ADS-B OUT on UAT. Installed inline with a previous XPDR (no additional antenna). Limited wiring/install. Customer retains existing XPDR
- GDL84 – ADS-B OUT on UAT. Requires additional antenna, compatible with iPads/portables. Dual ADS-B IN (1090/978)
- GDL88 – ADS-B OUT on 1090 MHz, Requires additional antenna, compatible with Garmin Certified displays. Dual ADS-B IN (1090/978).

New XPDR

- GTX335 (D). ADS-B OUT 1090.
- GTX345 (D). ADS-B OUT 1090. ADS-B IN 978/1090. Compatible with iPads, Potables, & Garmin certified displays.
- GTX3000. TCASII/ACASS compatible XPDR. ADS-B Out 1090

High volumes, & consistent clear mandate = innovation, development, and low cost high quality products available on the market.

Garmin's UAT Trials in Europe

Official Trail stated in April 2019

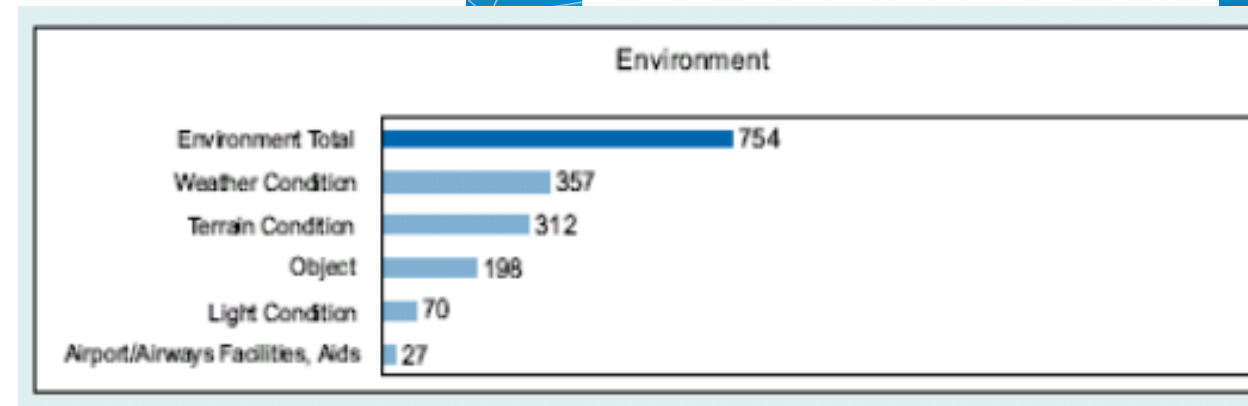
- EASA GA roadmap supports new developments to enable the introduction of new technologies, aligned with industry standards.
- Purpose of the trial: demonstrate the use of UAT protocol to broadcast data for General Aviation in Europe to increase safety and awareness
- Weather condition is still a significant factor in General Aviation Accidents.
- No general solution for in-flight weather available in Europe today
- Easy implementation and low cost technology available
- Existing Garmin products to support display of WX



General Aviation

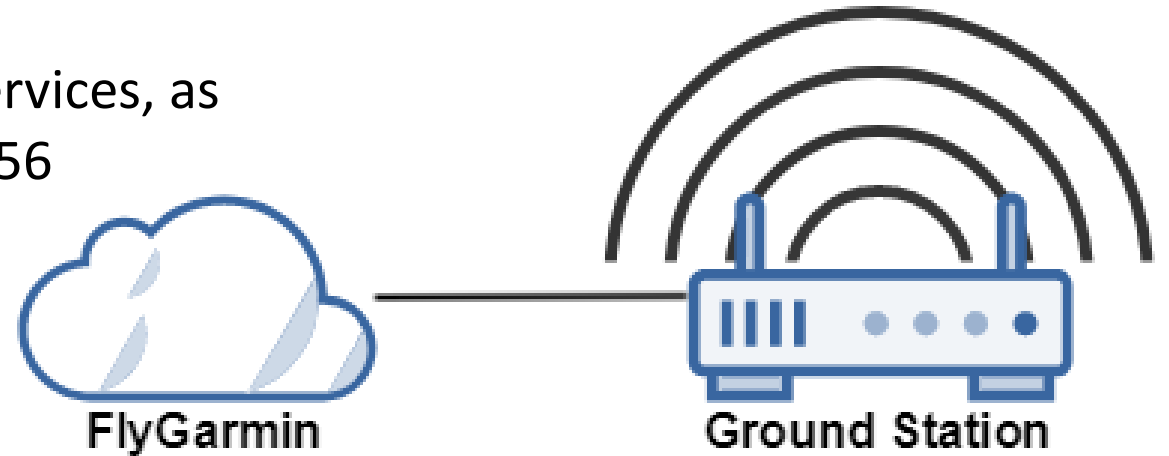
6 Objectives we are committed

- IFR Flying**
Easier access of GA pilots to IFR rating, as a concrete measure that will improve safety.
- Training**
By end of 2018 the 3rd option for licensing will be fully developed providing a simple system for pilot training outside ATO.
- Part-M 'Light'**
Work towards a simpler and more proportionate framework for aircraft maintenance and license: a Part-M 'Light'.
- Technology**
Continue development of CS-STAN and other similar tools to enable the introduction of new technologies which contribute to safety.
- Simpler Certification**
Towards a simpler framework for certifying LSA aircraft in the short term by increasing the support to applicants e.g. workshops, document templates etc. in the long term by amending applicable regulations in order to bring a radical simplification.
- Industry standards**
Build on the improvements of CS-23/Part-23 on other CS or regulations in order for EASA to focus on its safety objectives and to delegate the preparation of associated standards to industry groups (ASTM, ASD etc.)



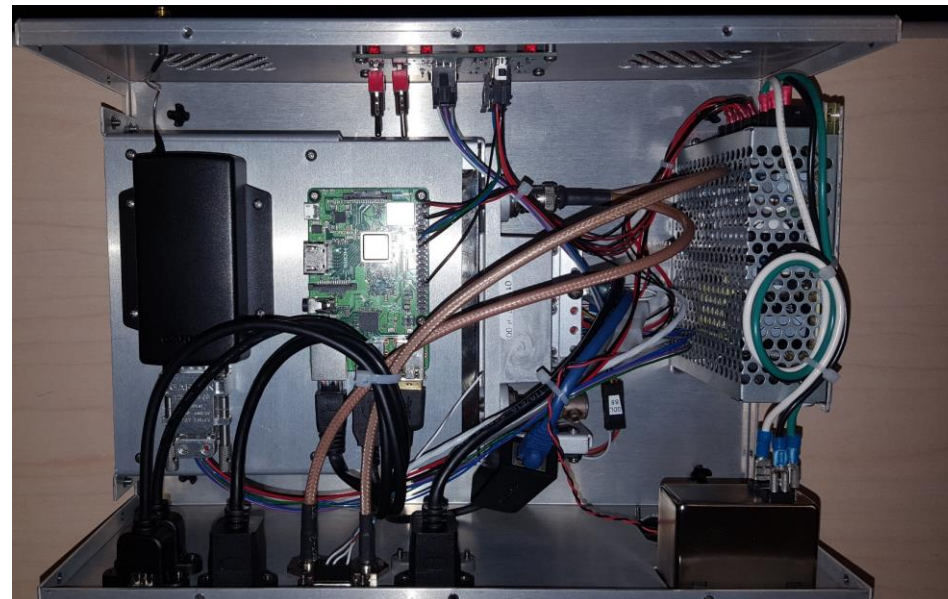
Garmin's Concept for Trial of Weather Datalink

- Garmin already has aviation specific Weather services, as it's offered today through Garmin Pilot and GSR56 SATCOM
- Garmin already has the necessary hardware and knowledge to build a UAT transmitter
- Garmin already produces and sells UAT receivers in larger volumes (for use in the US)
- Garmin applied for temporary use of 978 MHz frequency to support a trial for broadcasting weather data via UAT protocol for use by general aviation



What does the Hardware look like

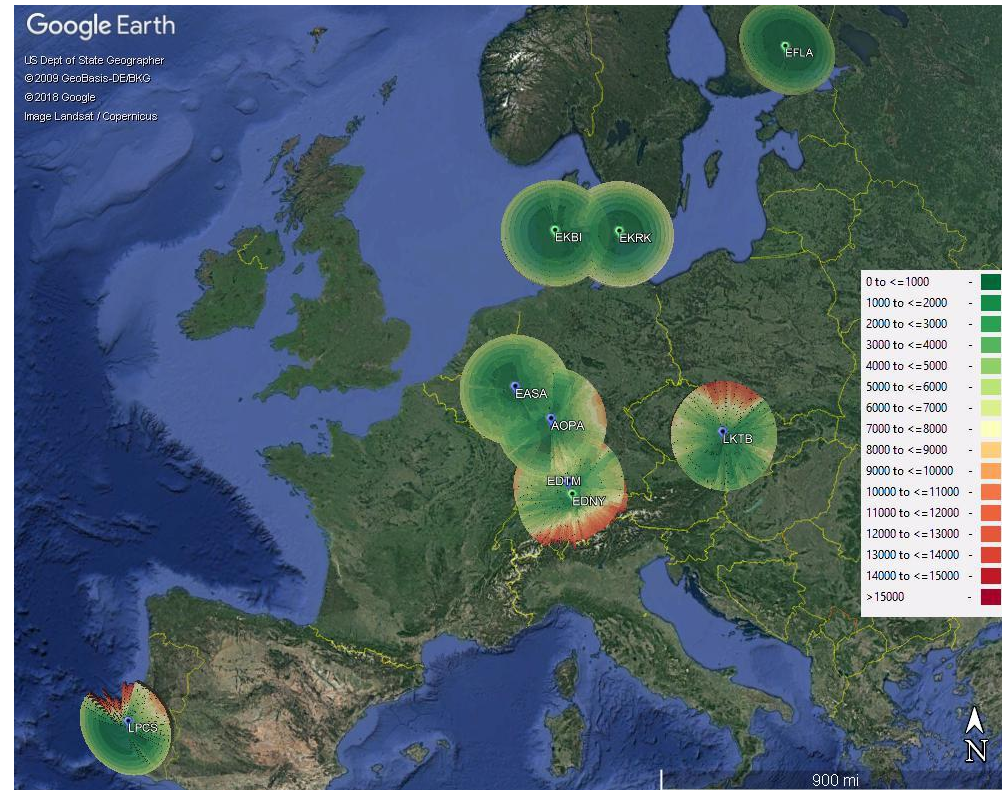
- Goal was to create a product that is easy to scale, using existing Garmin hardware/tools
- Hardware uses existing Garmin in-house developed hardware, technology, tools, and expertise.
- Transmitter output power can be scaled in accordance with license approval
- Remote control/access to network via specialised software



UAT Weather Trial Expans

Ground Station Locations

- Active broadcasts in 4 locations
 - Friedrichshafen, Germany
 - Billund, Denmark
 - Copenhagen, Denmark
 - Lahti, Finland
- Trial license approved in 1 location
 - Brno, Czech Republic
- Pursuing trial license in 3 locations
 - Mengen, Germany
 - Frankfurt, Germany
 - Lisbon, Portugal
- Garmin will continue to pursue additional locations based on local support and ability to receive license approval

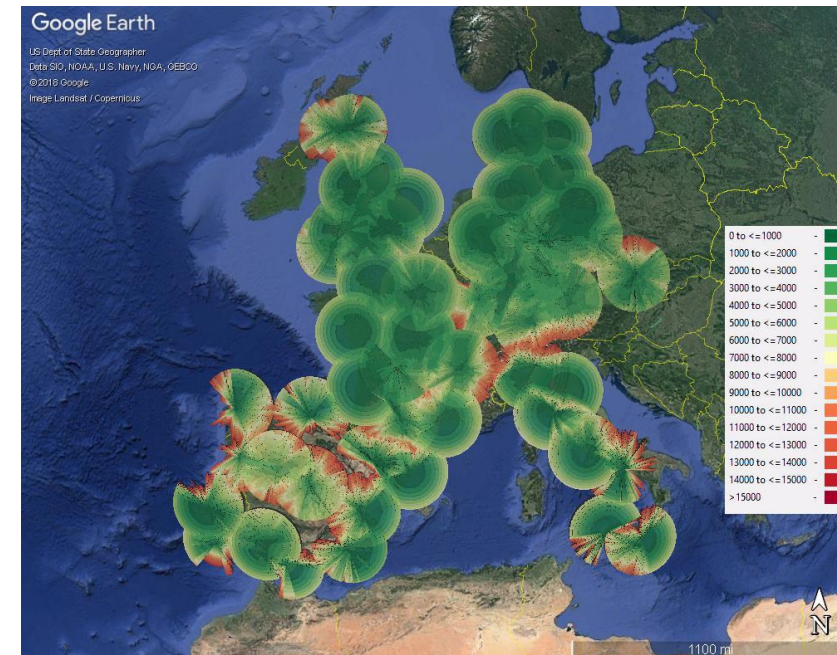


Future of a UAT Network in Europe

How do we get to this level of coverage?

~60 Stations required to cover Europe

- Items to consider
 - Hardware acquisition costs
 - Installation & Infrastructure support
 - Permits/licenses
 - Back-end support (monitoring, technical support, etc)
 - Ongoing site & hardware maintenance
- Other items include, professional setup or “Crowd funded”, having other partners/airports support the installation. Or covering the cost with an ongoing license fee
 - Note – Covering the cost with hardware sales alone is not viable longer term



Future of a Garmin UAT Network in Europe

- Garmin plans to continue our trial and expand in certain locations where the approval process is clear, and we receive industry support
- Plan to continue our trial service until 2021
- Garmin will continue to work with industry bodies, and regulatory agencies to help promote UAT Weather as safety enhancing solution for General Aviation