Aviation Forum Austria 2017

"Future Trends in Aviation"

Session 1: Autonomous Aviation

Introductory Presentation

- UAV DACH e.V. is the Association for Unmanned Aircraft with members in Germany, Austria, Netherlands and Switzerland

- Dr. Norbert Lohl worked from 1983 thru 2003 for the German Civil Aviation Authority (LBA) and from 2004 thru 2015 for the European Aviation Safety Agency (EASA) as Certification Director. Today he is Chairman of the Board of the German Unmanned Aviation Association UAV DACH e.V., Consultant on Safety and Airworthiness, Adjunct Professor for International Aviation at Embry-Riddle Aeronautical University Berlin and Lecturer for Aviation Safety and Airworthiness at the Technical University Braunschweig

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- Definitions (Source: EASA)
  - '**automatic operation**' means an operation following preprogrammed instructions that the UAS executes while the remote pilot is able to intervene at any time
  - '**autonomous operation**' means an operation during which a UAS operates without the possibility for remote-pilot intervention in the management of the flight

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- Today
  - pilots are taking advantage of autopilot and flight control/flight management systems
  - a survey quoted by the NY Times shows that airline pilots flying Boeing 777s spend seven minutes manually controlling a plane during a typical flight – and even this is double that of a pilot flying an Airbus plane

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- Yesterday
  - Since the 1980s, planes could be flown with just two pilots, as opposed to the previous standard of three crew members
  - Forward Facing Cockpit: example Airbus A 310
  - Equivalent introduction of new technologies:
    - ETOPS: Extended Range Twin Engine Operation
    - Fly-By-Wire: example Airbus A 320

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- Outlook
  - According to Boeing some freighter customers are already showing demand for autonomous airplanes
  - such technologies are readily available, and implementing them is just a question of regulatory requirements, certification, and whether customers would actually board a plane with no pilots

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- Projects
  - Airbus Urban Air Mobility Division has revealed their urban air-transport project *Vahana*, intending to open up urban airways by developing the first certified electric, self-piloted vertical take-off and landing (VTOL) passenger aircraft
  - Airbus Helicopters is involved in the Skyways project with the Civil Aviation Authority of Singapore focusing on an autonomous drone delivery service, to help shape the regulations for unmanned aircraft in Singapore extending the testing to passenger transport

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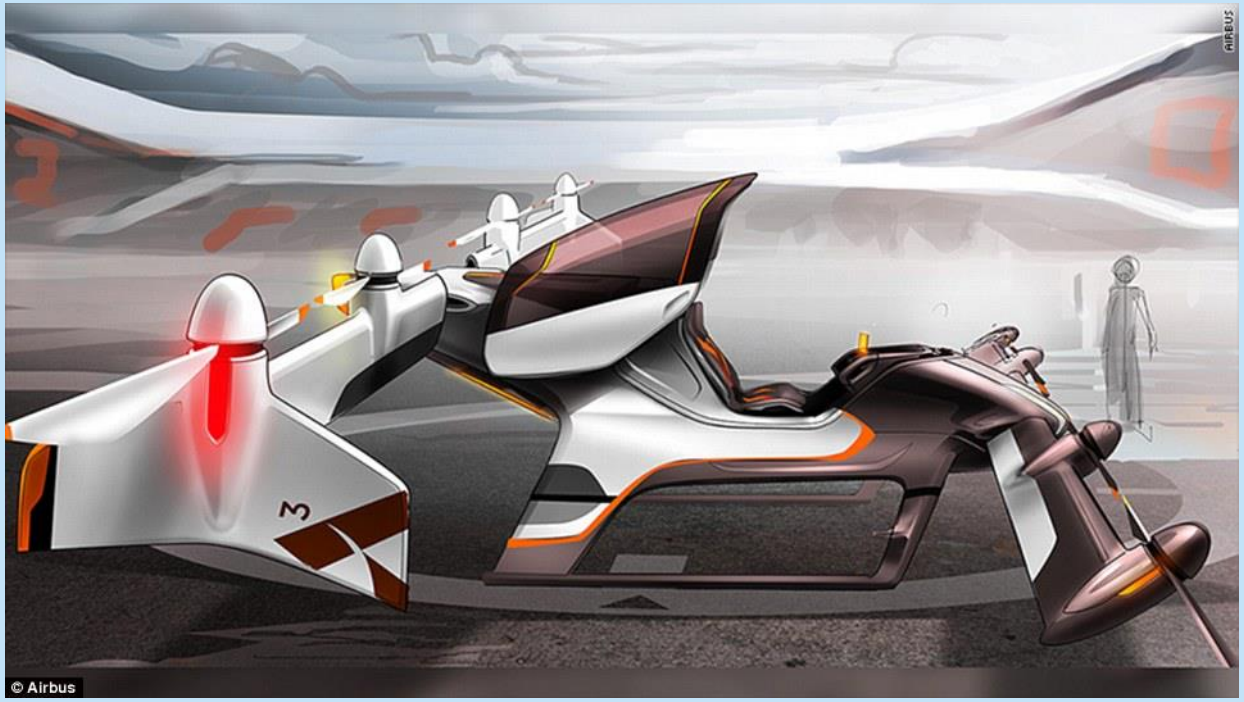
- Project *Vahana*



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- Visions
  - Airbus's CityAirbus concept, involving multi-passenger vertical-takeoff-and-landing (VTOL) vehicles developing an "urban taxi" multirotor for short commuting trips in dense urban environments
  - zenAirCity, an all-round transportation business and mobility concept for megacities that involves the use of quiet unmanned electrical aircraft such as Vahana and CityAirbus

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- Project *CityAirbus*

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- Project Volocopter 2x
  - Volocopter, a German aviation startup conducted on 25 September 2017, together with the state transport authority „Roads and Transport Authority“ (RTA) in Dubai, initial demonstrations of an autonomous air taxi
  - The test period is scheduled for 5 years
  - Dubai estimates to organize one quarter of all passenger transport in 2030 by autonomous aerial vehicles
  - The Volocopter 2x is electrically powered by 9 high capacity batteries and can take two passengers on board

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- Volocopter 2x

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- Way forward
  - Aviation Developers are working to overcome challenges of safety, regulation & certification, and public perception
  - NASA is currently studying the concept of single-pilot airline cockpits, where a first officer on the ground is monitoring several flights at once
  - In emergencies or unusual circumstances, the ground first officer could transfer responsibilities for other flights and focus solely on the flight that needed attention; if the sole pilot becomes incapacitated, the plane could be controlled from the ground

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- Drones evolution
  - Undoubtedly the number of unmanned aircraft will continue to dramatically increase in the coming years
  - Conventional air traffic management cannot be applied to unmanned aircraft; it relies on voice communication between air traffic controllers and pilots, and on radar detection
  - Current airspace management and air traffic flow management systems are not predicted to have the capabilities to handle the type of operations relevant to drones

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- UTM or U-Space
  - The anticipated traffic density of drones is far beyond the capabilities of current air traffic management systems
  - UAS traffic management (UTM) systems are needed to enable the safe, orderly, and expeditious flow of traffic
  - The European Commission introduced an initiative called "U-Space" making denser traffic of **automated UAS operations** over longer distances possible, including over cities, and so open the door to a UAS service market

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- Active Health and Usage Monitoring Systems (HUMS)
  - Will be part of the future design criteria for autonomous aviation
  - Implementation of pro-active on-line Continuing Airworthiness
  - Already today HUMS (e.g. for helicopters) provide diagnostic information required for optimum performance
  - HUMS sensors and embedded diagnostic software monitor and communicate the health and maintenance needs of critical components; the system monitors critical vibration analysis and reports any issues

Source: Honeywell

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- The Challenge of introducing new technologies
  - Looking back:
    - First automobiles were considered as a dangerous risk...

Source: auto motor und sport

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- The Effects of introducing new technologies
  - Post Scriptum:
    - Available statistical results demonstrate that in Germany out of 100 car accidents 90 are due to human errors, 10 % of the accidents are due to technical errors
    - Insurance companies are consequently already considering today to potentially reduce the insurance premiums for automonous cars

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Thank you!

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