

Session 4: Future Visions New Directions for Aviation

NRC Committee on Aeronautics Research and Technology for Vision 2050

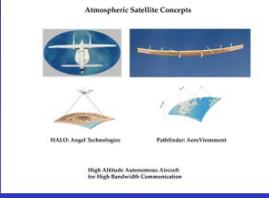
**Advanced Aircraft
Systems and Technologies**

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ns Workshop, Santa Clara, May 21, 2002

Non-Passenger Aircraft Considerations

- UAV's
 - Information
 - Cargo
 - Passengers
 - Integration with NAS
- Cargo



Advanced Aircraft Systems and Technologies

Conclusions

- Future aerospace vehicles will exploit a variety of emerging technologies making for an exciting second century of aeronautics.
- Development presents new challenges and will require sustained work in basic disciplines and integrated systems.
- We are unlikely to predict the priorities and requirements that will exist in 2050, and research plans should reflect this.





Piloted Vehicle Autonomy

Autonomous Aircraft Older Than Stanley



Why Autonomous Aircraft Now?

Autonomous delivery



Personal mobility



Societal
Needs

Urbanization, traffic, time, housing, environment, economics, communications, ~~commercial funding~~

Regulatory
Issues

Safety (ATM, airworthiness), noise, air quality, security, global climate, privacy

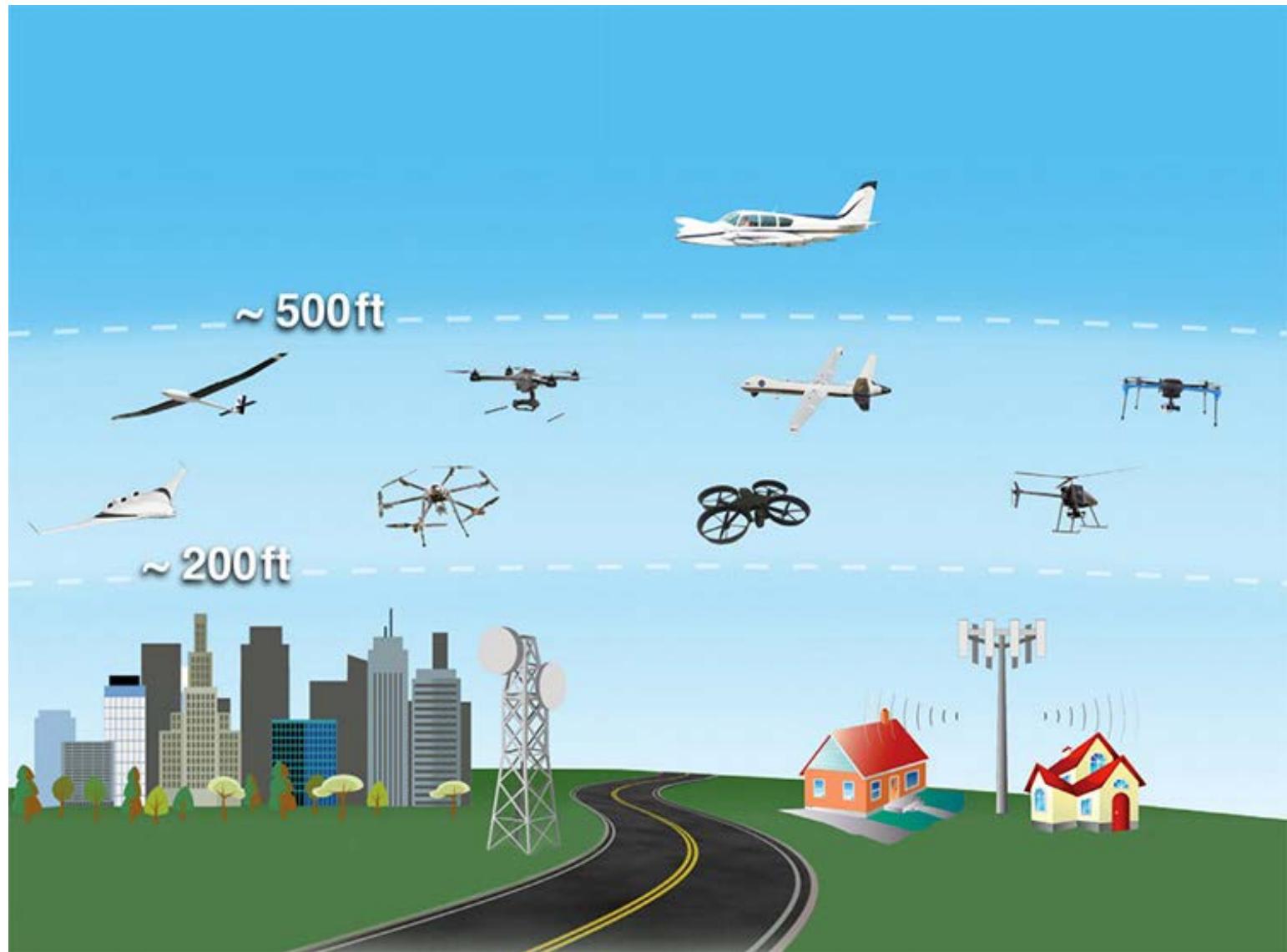
Technological
Advances

Electric infrastructure, power systems, energy storage, simulation, sensors, precision nav, deep learning, structures tec

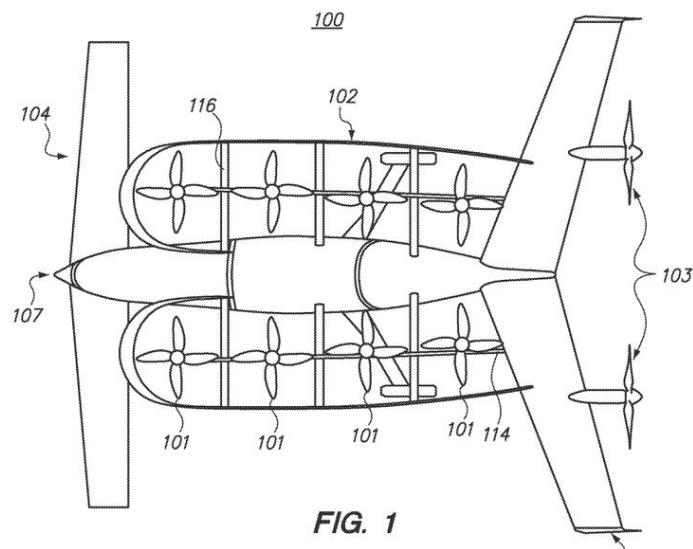
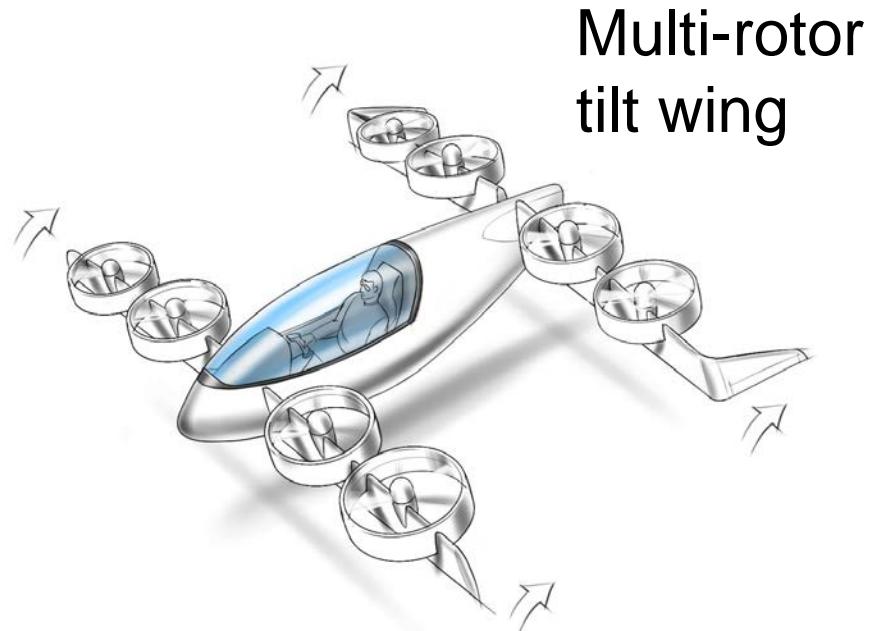
Autonomous Aircraft Evolution



Multiple Vehicle Challenges to ATM/ATC/UTM



Personal Air Mobility



Questions and Issues

- How close is this vision of the future?
- What are the technical/regulatory/social barriers?
- What infrastructure is needed?
- How will flight vehicles interact with ground transport?
- Is the technology scalable to large payloads and high speeds?
- How might this form of air transport change society?
- What should we do now to make this happen?

Critical Technologies

- Vehicle autonomy and augmentation
- Revolutionary propulsion
- (Even more) safety critical software
- Machine learning and adaptive systems
- Aero modeling in more challenging domains
- Scalable structures and manufacturing
- Non-evolutionary design (flexible, fast, believable)
- Low cost avionics