The Current State of the Pilot Population and What Can We Do to Save It?

Noel Duerksen, Ph.D., ATP, CFII, MEI
Garmin International

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SVO Comes Through Owner Flown Market

Pilot Qualifications for Commercial Operations are Driven by Politics not Technology:

Colgan Air Accident: FAR 121 requires copilots to have an ATP

Flytenow: Uber for airplanes is a FAR 135 operation

FAR 121 and 135 pilots are typically full time pilots and their employers don't feel the need to pay for simplified operations that don't directly affect safety.

e.g. Many 1900 airliners were delivered without an AP because the airline required two pilots.

The owner flown market will drive SVO because the person who makes the buying decision benefits from the technology.

The Pilot Population is Declining

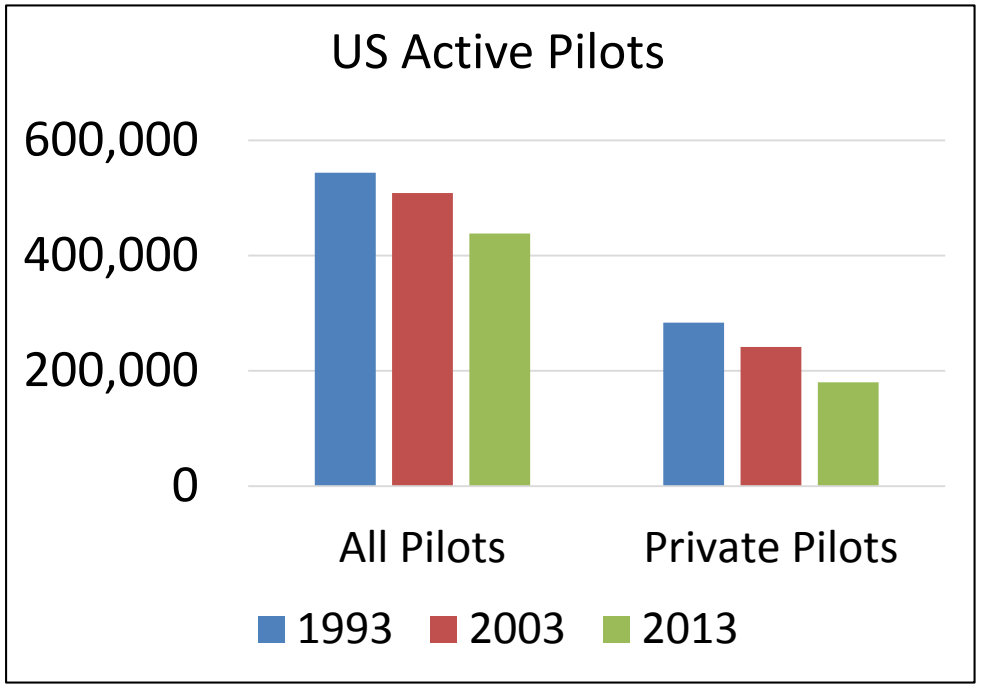
Private Pilots Represent the Market for Owner Flown Aircraft

All (Pvt, Com, ATP) Pilots
1993 to 2003: 6% decline
2003 to 2013: 14% decline
1993 to 2013: 19% decline

Private Pilots
1993 to 2003: 15% decline
2003 to 2013: 25% decline
1993 to 2013: 36% decline

US population that are pilots (2013):
All pilots: 0.14%
Private pilots: 0.06%
Driver's License: 67.1%

Dropout rates for student pilots are as high as 80 percent.*



Piston Aircraft deliveries declined 51% from 2003 to 2013

Source: GAMA 2013 Databook

* Source: AOPA's Growing the Pilot Population Initiatives

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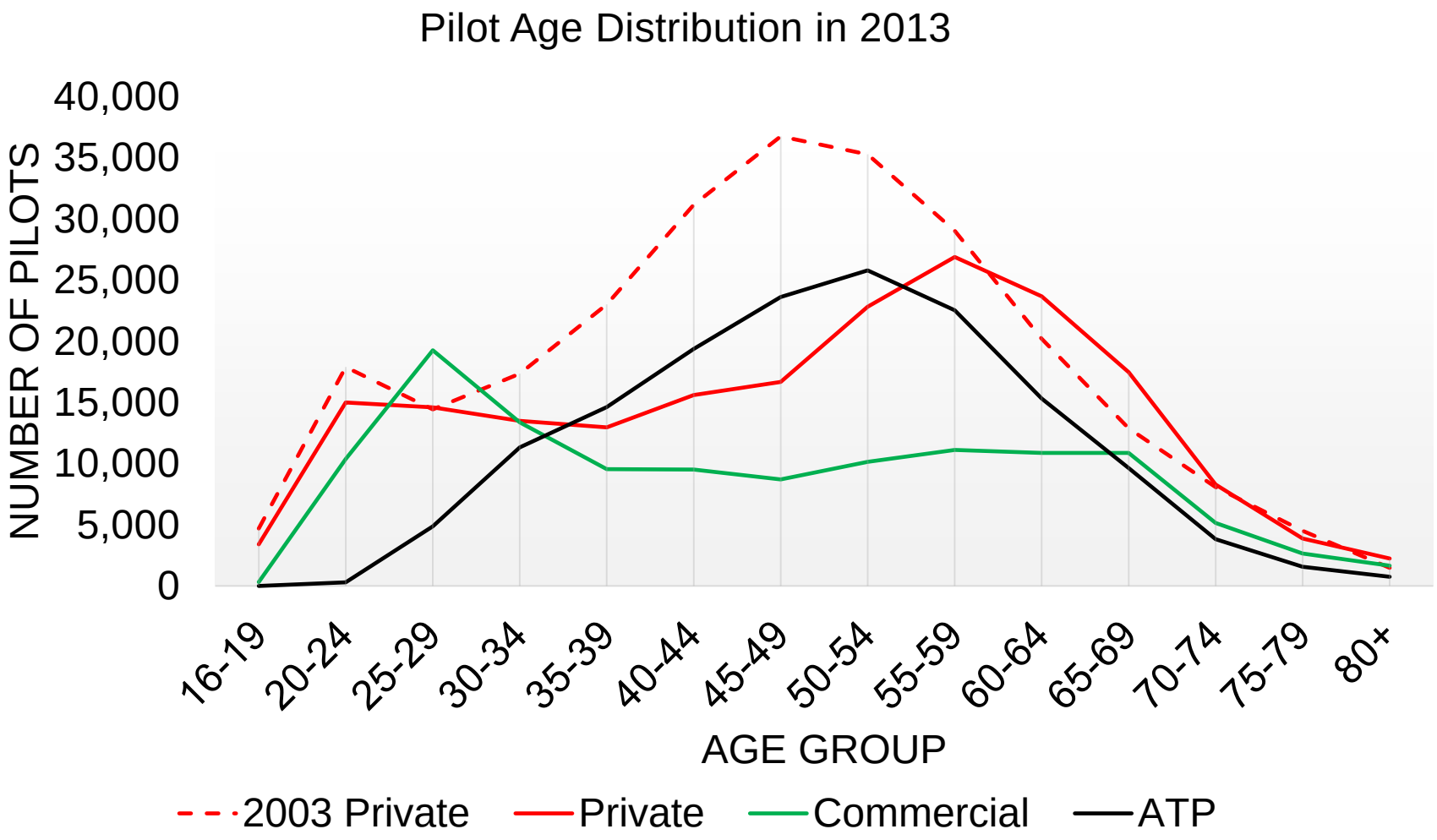
Pilot Demographics Predict it will Get Worse

The Private Pilot Population Will Continue to Decline Rapidly



Source: GAMA 2013 Databook

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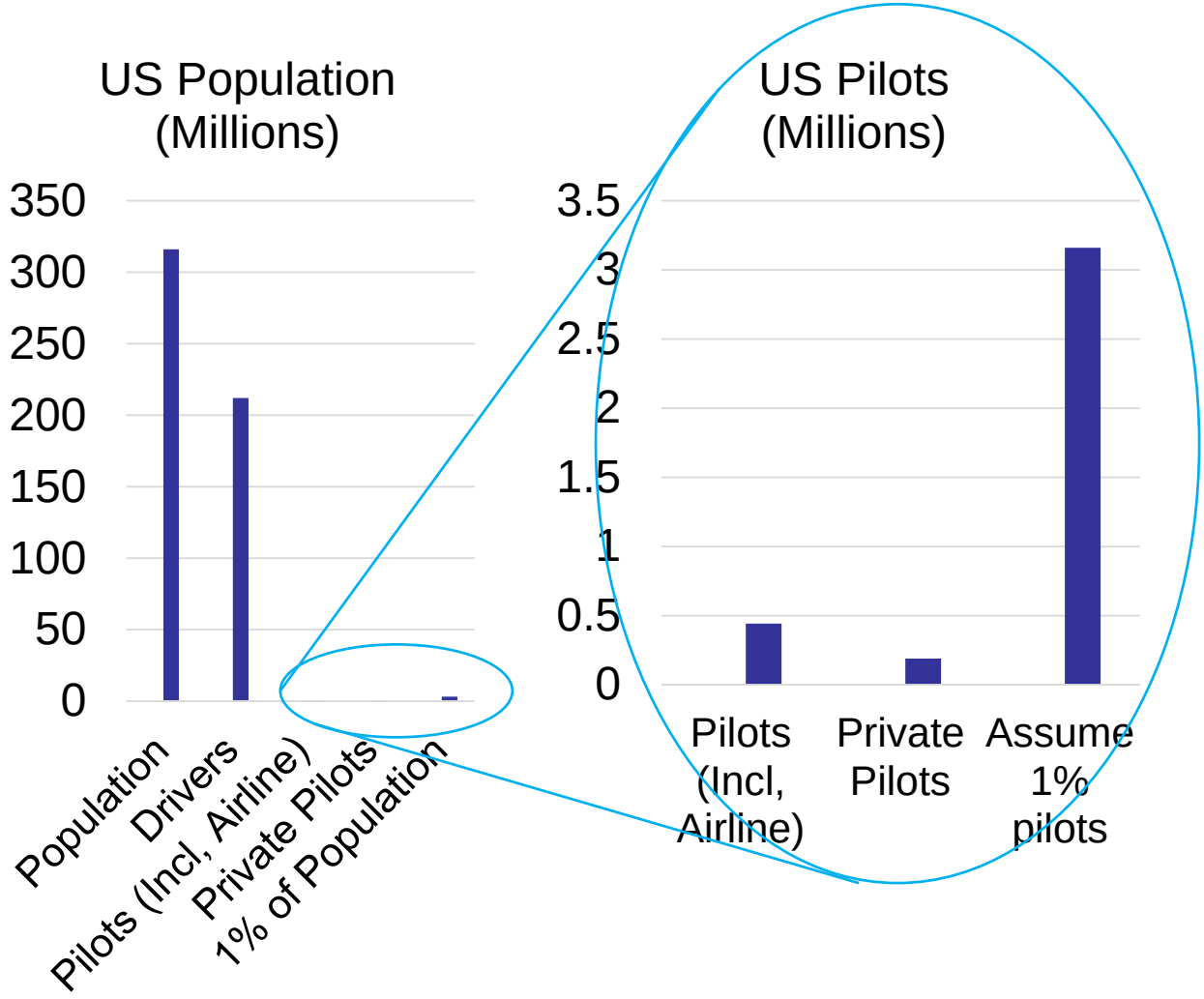
A Marketing / Engineering Paradigm Shift

How would it affect the market if the barrier to becoming a pilot were reduced such that 1% of the US population would learn to fly?



How would our user interface be different if we invited this new customer base to our design reviews?

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Proposed Basic Functional Characteristics

Assumed Requirements:

- The target market desires safe and reliable transportation
- The target market does not like flying for the sake of flying
- The target market can't afford the time to learn to fly
- Economical operation and maintenance are important
- On demand schedule
- Renting a vehicle is a viable option
- Universal operating characteristics
- Convenient to destination (all existing airports or special STOL)

Derived Requirements:

- Minimum cruise speed for airport based aircraft is about 200 mph
- Minimum cruise speed for VSTOL aircraft is about 100 mph
- Owner or renter as the operator
- Near all weather capability (avoid T-storms, light ice ok)
- Operates in current IFR system
- From Ab-initio to competent takes about 40 hours of training time

We Need To Develop A Unified SVO Vision

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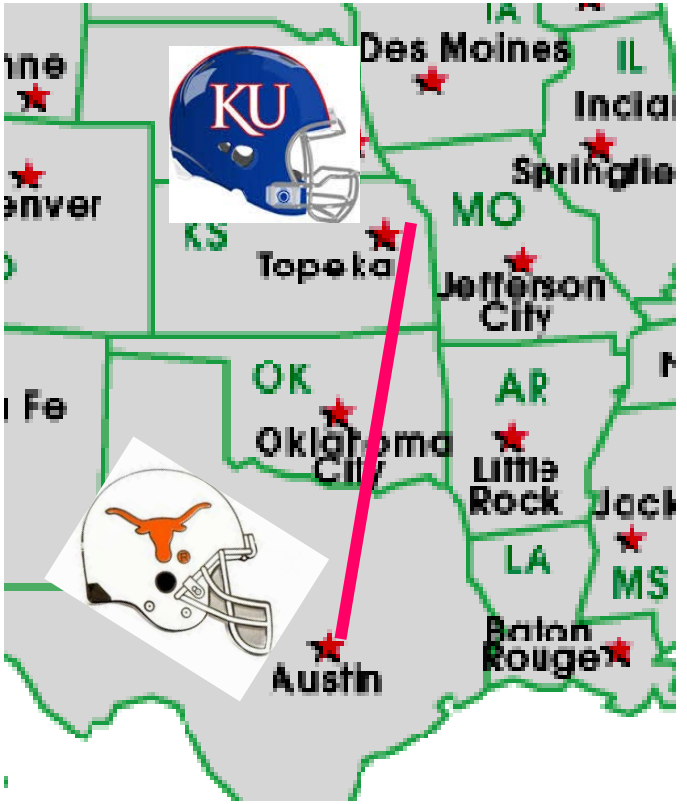
A Trip to Illustrate An SVO Vision



Some University of Kansas fans in Lawrence Kansas want to see the Big 12 championship football game between the University of Kansas and the University of Texas in Austin.

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An SVO Vision

How can I get to the KU, Texas ball game with four friends?

You can drive at a cost of $383 and it will take 12.6 hours one way assuming two one hour breaks.

You can rent an SVO aircraft at a cost of $813 and it will take 3.8 hours one way including one fuel stop.

You can fly airlines at a cost of $1810 for the five of you and it will take 3.2 hours one way including security checks.

The trip starts with a phone inquiry that compares modes of transportation and provides information concerning available alternatives.

An SVO Vision

Plan the trip using the SVO aircraft.

You can go non-stop if you take 3 friends.

With 4 friends the best fuel stop is in Ardmore Oklahoma. There is a restaurant at the airport. This will increase the travel time by 45 minutes.

Plan the trip with five people to arrive by 11:00am Saturday.

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An SVO Vision

The app calculates weight and balance given typical passenger weights and plans the trip based on the payload and available fuel.

The app plans the flight considering weather and NOTAMS.

The app creates and files the IFR flight plan. All flights conducted as described here are conducted using Instrument Flight Rules.

An SVO Vision

FAA Clearance - Lawrence to Ardmore
Flight Plan Terrain and Wx check – OK
Propulsion Battery – 100%
Range Ext Fuel – To Ardmore + 1.2 hr
All Aircraft Systems – OK
Check for External Damage – Pilot
Chocks – Pilot
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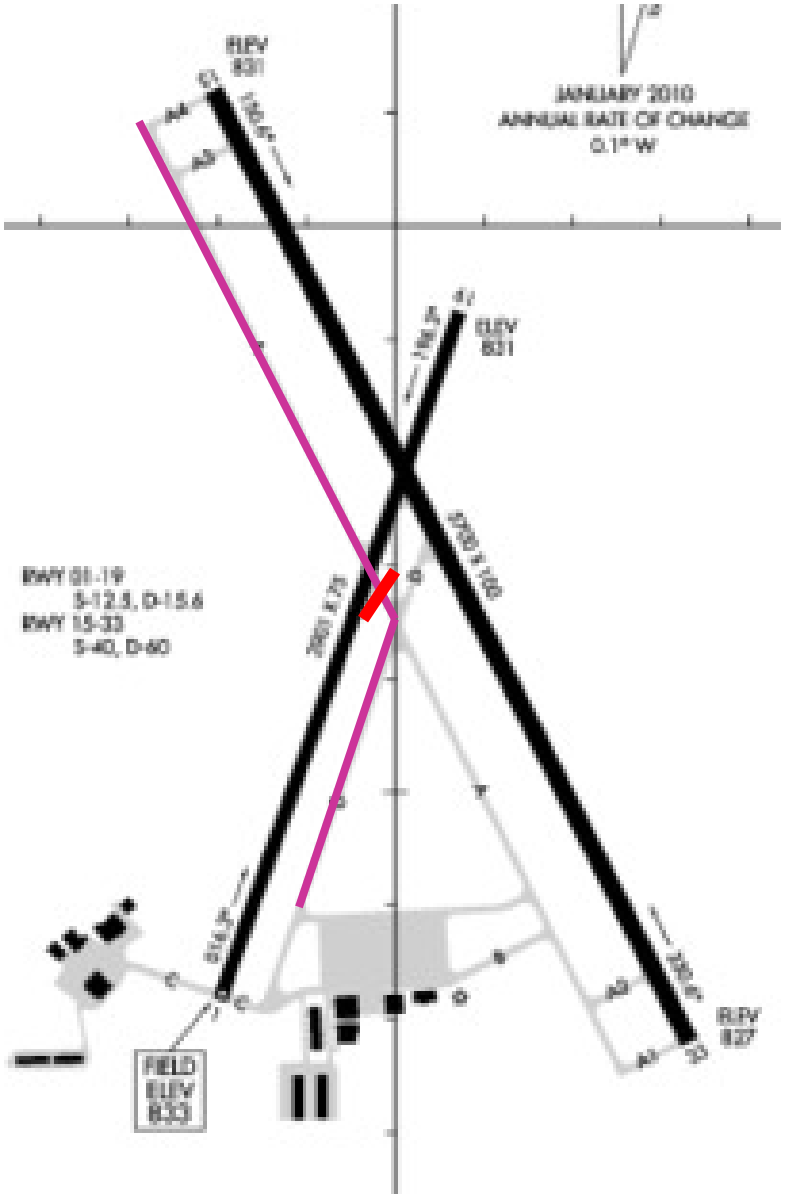
The operator then starts the airplane. The avionics automatically requests the clearance, receives and loads it into the flight plan then checks the systems for operational safety.

The aircraft prompts the operator as needed if there are any checks that are not automated.

An SVO Vision



The airplane recognizes that Lawrence airport is an uncontrolled field. It uses the METAR to determine that 15 is the preferred runway and plots a path to the runway on a map.

If at a controlled airport, when the operator indicates ready to taxi, the airplane electronically requests taxi clearance and when received decodes it for the operator and plots the path.

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An SVO Vision

When ready for takeoff, the operator requests a takeoff clearance which is transmitted and received electronically.

He then taxis onto the runway and engages the flight mode.

The airplane autonomously takes off and flies the cleared path.

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An SVO Vision

The airplane senses ADS-B equipped and non-equipped aircraft that conflict with the flight path and self generates avoidance paths while communicating these to Air Traffic Control.

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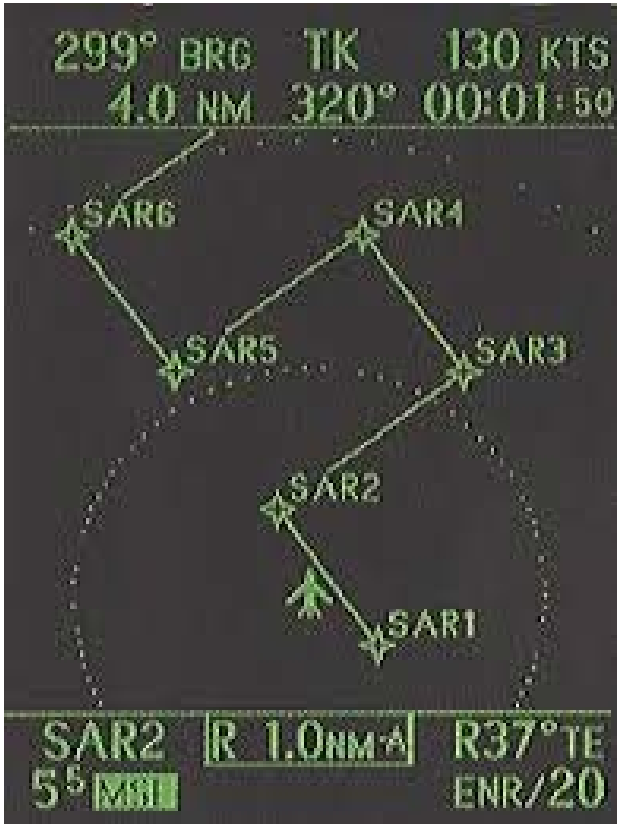
Changes to the clearance from Air Traffic Control are provided digitally to the airplane (or via voice and decoded into digital format).

The current flight path is always displayed.



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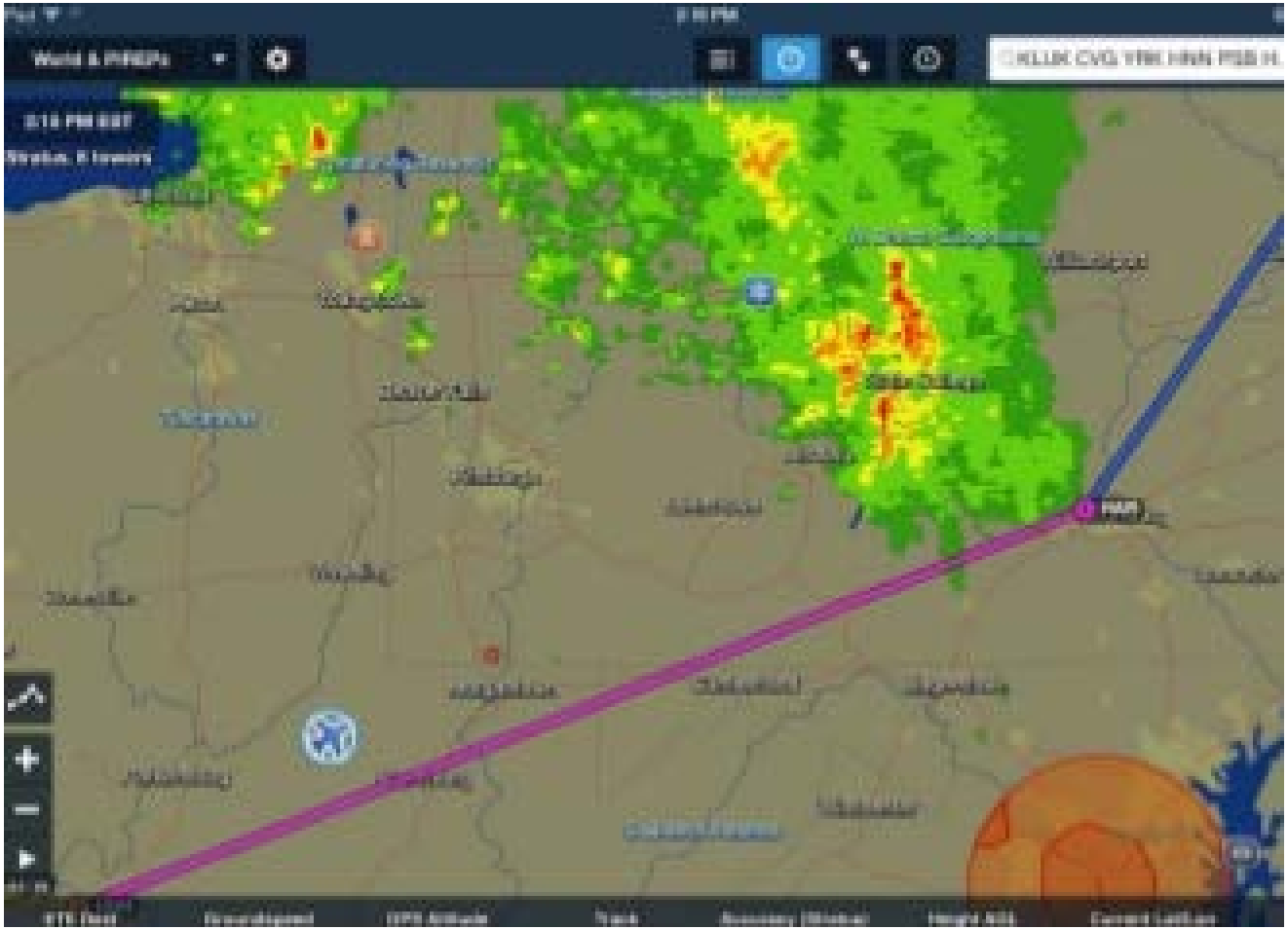
If the airplane encounters convective weather enroute, the avionics proposes a route change to avoid the weather and presents it to the operator for approval. On approval the avionics transmits the request to ATC.



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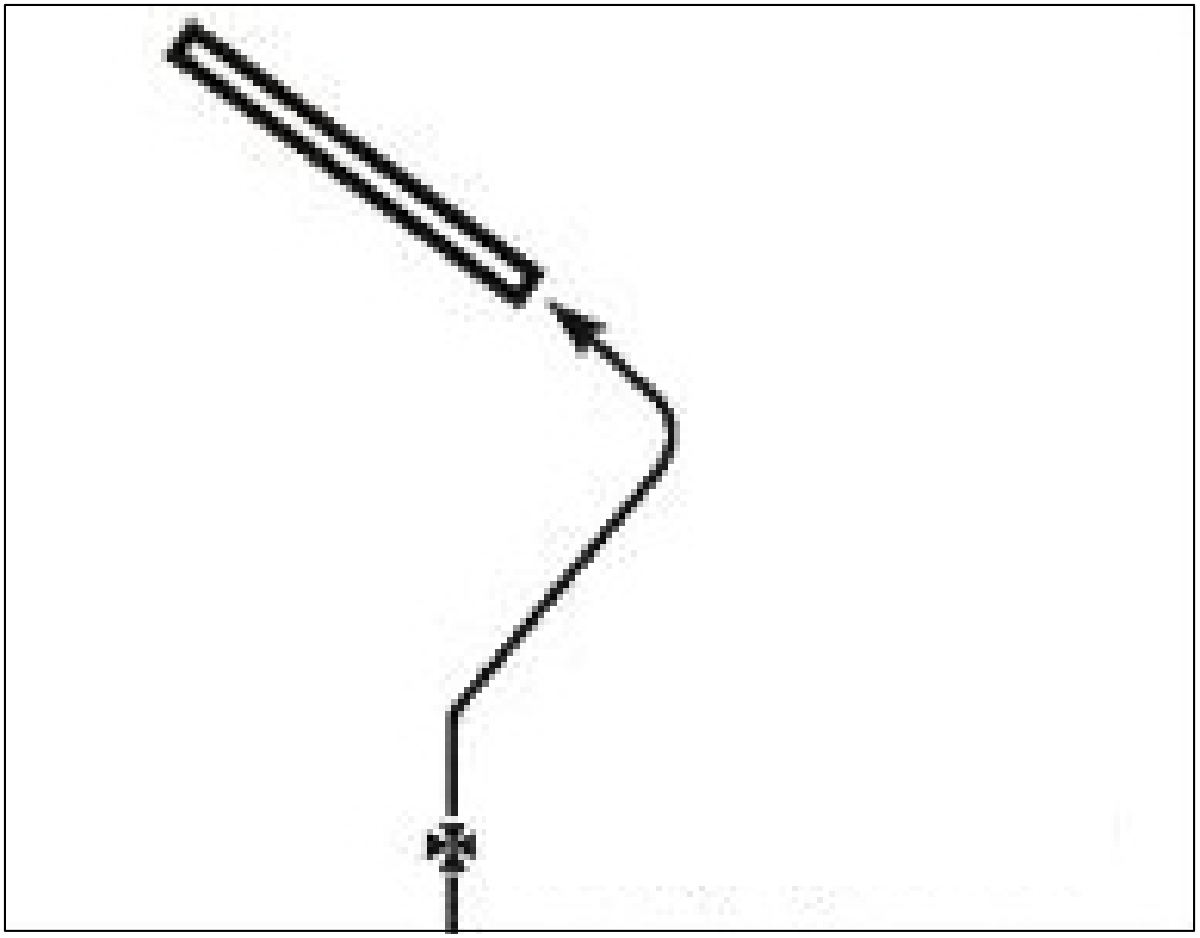
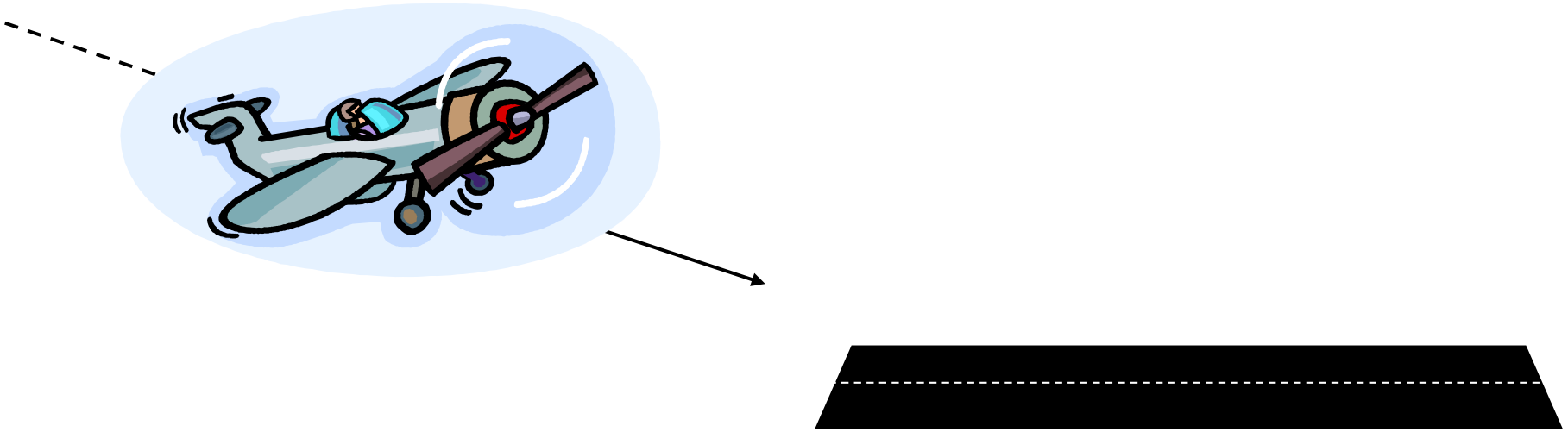
An SVO Vision

On arriving at Austin, the airplane flies the cleared approach. In this case, the airplane is cleared for a visual approach to 17L and enter left base. There is no published visual approach so the avionics generates the flight path to the runway considering terrain and obstacles.



An SVO Vision



The airplane requests landing clearance. If clearance is denied, a missed approach is executed. If cleared to land the airplane lands autonomously.

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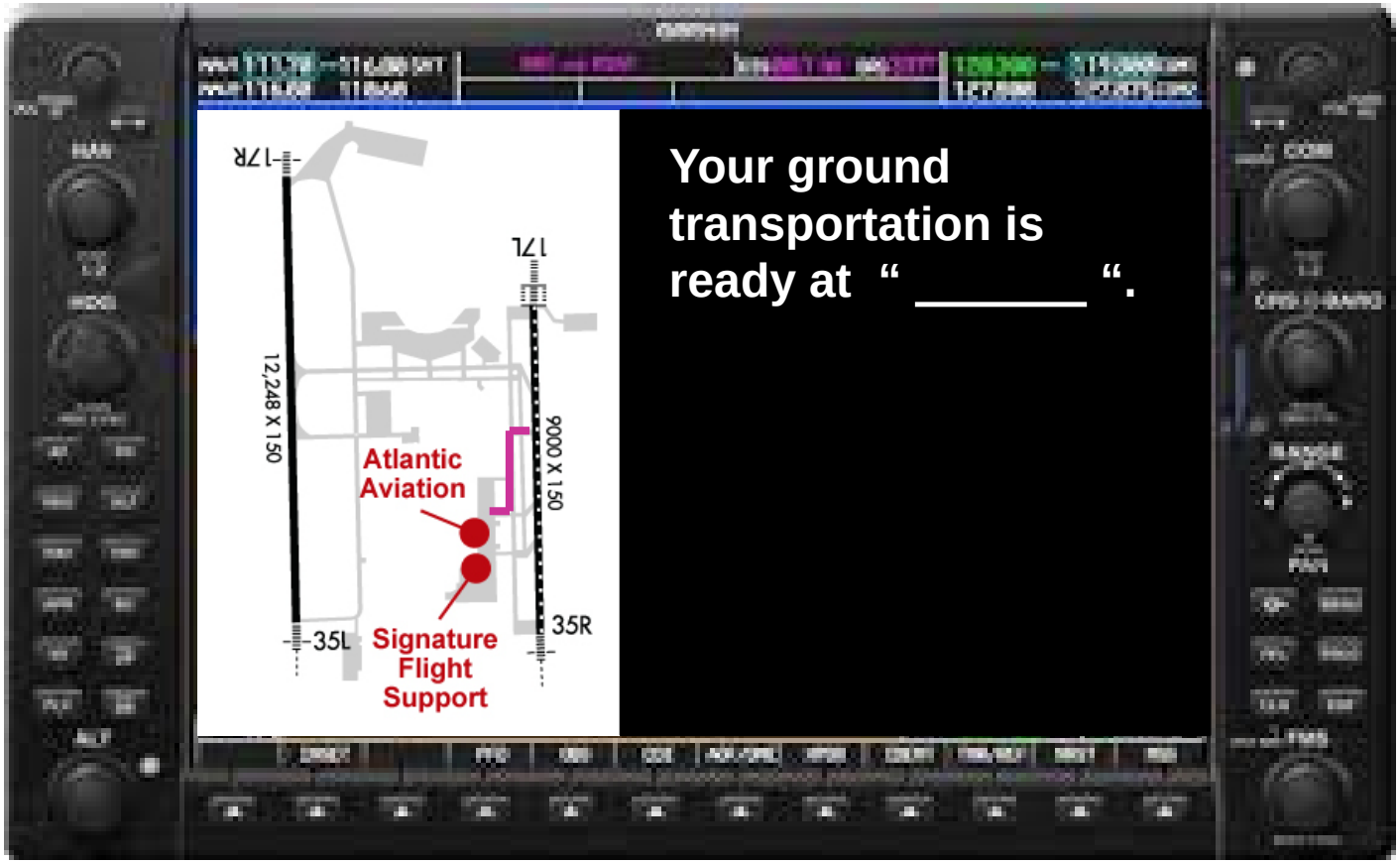
An SVO Vision



At about 20 MPH, taxi mode is entered. A map of the airport with a magenta line showing the taxi clearance to the FBO is displayed. The app transmits appropriate messages to the avionics concerning the rest of the trip.

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Successful Arrival

The app also arranged for ground transportation and accommodations in Austin.

Our heroes arrive in plenty of time to prepare for the big game.

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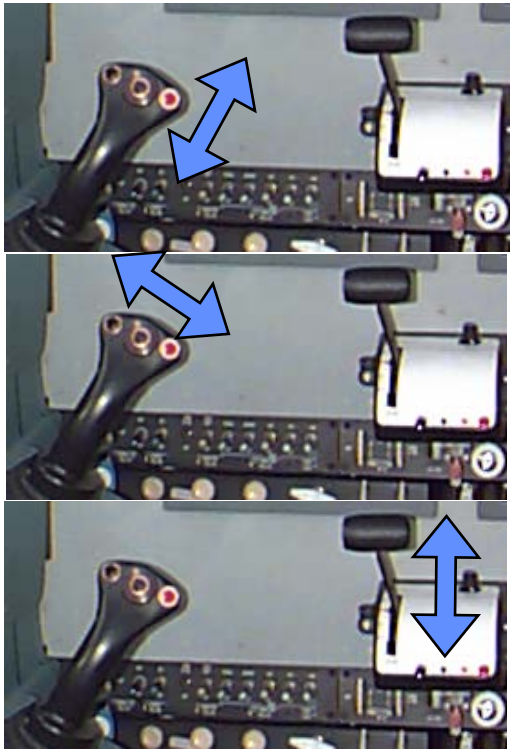
Manual Operation of an SVO Aircraft

The operator can take direct control at any time to command the flight path.

Moving the stick disables automatic control and gives the operator direct control of the flight path vector and speed.



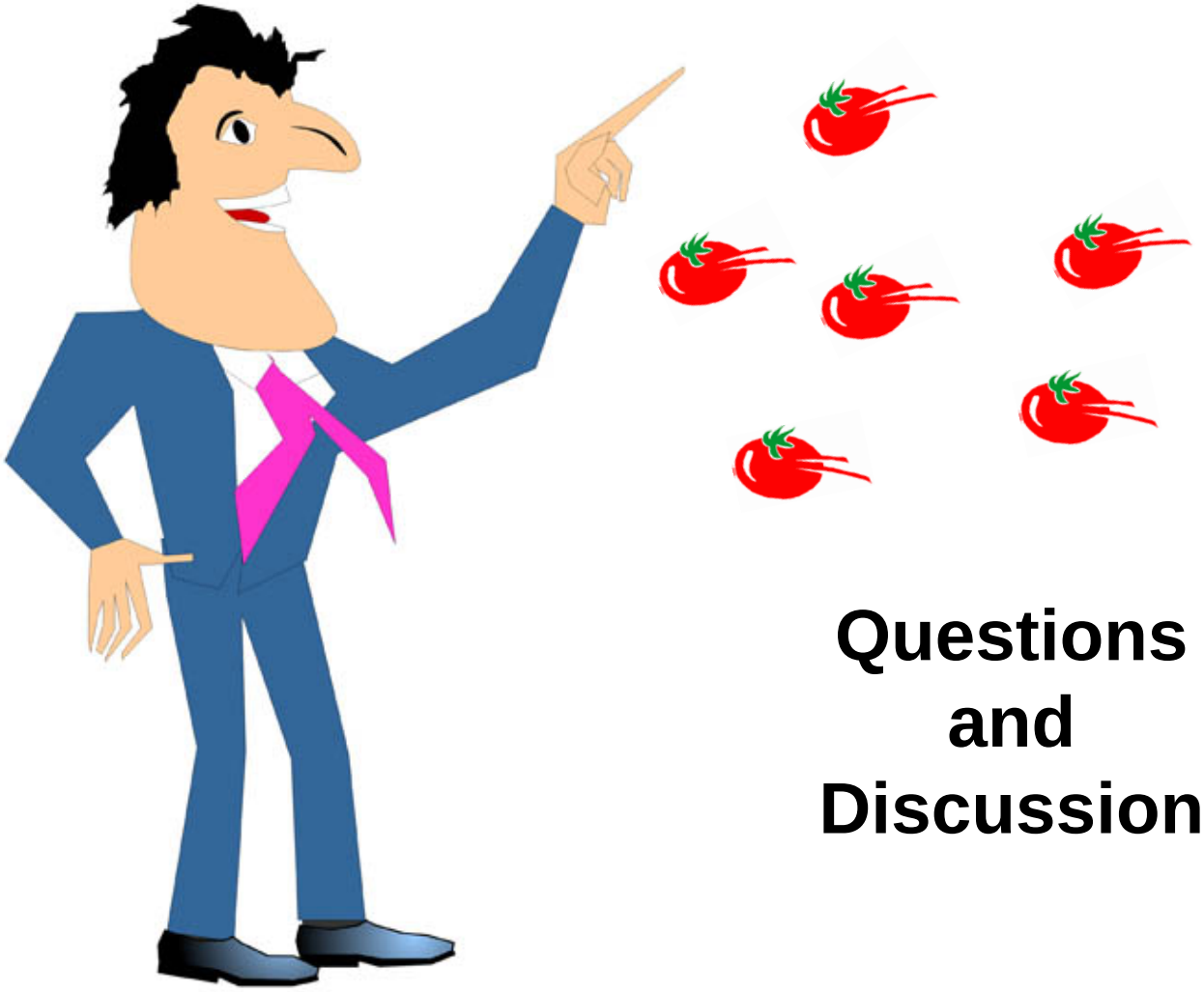
Fore and aft motion of the stick commands vertical flight path angle.

Left and right motion of the stick commands bank angle or turn rate.

Position of the speed command lever commands airspeed.

Protections Incorporated in the SVO Aircraft

The End



Questions and Discussion

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