Commercial use of small UAVs in transportation and infrastructure
The problem...the UAV solution

• Potential users across many industries want to employ UAS into their operations, however, technology, certification, and knowhow doesn’t exist for them, with any one supplier...until now!
• Unmanned aircraft systems serve niche purposes in many diverse markets
• Navigation of US regulatory environment critical for domestic market growth
• Customers seeking capable products, knowledgeable people, and dynamic operational guidance
• World-class operations and training experts on staff
UAS Opportunity

**Scope / Size**
- Global market $6B-$14B annually
- $80B in a decade!
- US market $4-$8.4B annually
- Civil and commercial markets expanding exponentially
- Military seeking cost-effective UAS solutions

**Target Markets**
- US Civil / Commercial
  - Oil and Gas
  - Power Infrastructure
  - Training
  - Agriculture
- US Government Agencies
- US Military
- International Markets
Early Adopter Landscape

**Oil & Gas**
- Exploration
- Geophysical Survey
- Drilling
- Transit / Pipeline
- Refinement
- Security

**Critical Infrastructure**
- Power lines
- Power plants
- Ports
- EMS
- Fire / Police / CST

**Training**
- FAA Test Ranges
- Universities with Aviation Degree (UAS)
- Other flight schools
- Flight Safety / initial / recurrent training companies

**ENG / Film Industry**
- Aerial footage
- Replace Helo
- Dash & Loiter
- Big Data
Competitive Snapshot

• Marketplace stratifying
• Differentiators
  – Programs of record
  – Sales
  – Domestic and international presence
  – FAA Special Airworthiness Certificate, COAs, and broad 333 exemption
• Top Tier (Aerovironment, Boeing, Etc.)
• Pushing the top tier – Sensurion
  – Certification traction
  – OPA and UAS
• Middle – product development, sales, no certification
• Bottom – “mom and pop” and hobbyists
Sensurion Vision

To be a leading supplier of special-use small Unmanned Aircraft Systems, operational services and management to civil, commercial and military customers, worldwide.
Sensurion Traction

• Founders/ investment and A-Round capital raised for product development and market readiness
• First class of companies to certify UAS in the US
  – Special Airworthiness Certificate (SAC)
  – Certificates of Authorization (COA)
  – Sec. 333 waiver application via Channel Partner (BlueChip UAS)
• Sensurion MAGPIE UAS in operation with US customers
• Significant investment by the State of Nevada (Sensurion’s partner) in UAS operation and certification
• One of a few known sUAS companies to design and manufacture aircraft, autoflight, and sensor package
• Created scalable manufacturing process
• Significant margins allow us major competitive edge vs. big aero
OUR TECHNOLOGY

Magpie™ sUAS

sUAS storage in standard rifle case

Sensurion’s RSU – (Remote Sensor Unit), configured for manned vehicle or building application

Chlorine Gas Alert via - Sensurion Threat Alert and Reporting System (STARS) graphic display used in MGM Grand Casino prototype / demo installation
MAGPIE™ UAS (STATUS)

- 4th generation Sensurion sUAS platform (family of sUAS)
- Received FAA Special Airworthiness Certificate (SAC) December, 2014
  - Multiple FAA Certificates of Authorization in place
  - N106MP FAA registration
- Sensor Capabilities
  - EO/IR camera system
  - Chemical Aerosols
  - Flammable Gases (ex: wellhead “Sour Gas”)
  - Power line fault detection
  - Atmospheric Monitoring
- Hand-launched, small-area recovery
- Highly portable
- Electric propulsion
- 2 hour flight duration
KEY DIFFERENTIATORS

- Highly experienced leadership team with good FAA credibility
  - Approval/certification experience and focus
  - FAA-compliant operations experience
  - Broad, successful business experience from startups to global companies
  - *FAA airworthiness and operational authorizations in place*
- Very adaptable platform design
- Internal Sensor development, manufacturing, capabilities, and focus
- Internal Mission Computer technology (autopilot/FMS), development, manufacturing, and certification capability
- Strong alliances & relationships with key players
STARS™ SENSOR SYSTEMS

• Fully operational detection and network system for airborne threats including toxic gases, explosive gases, and radiation
  – Fixed and mobile operations

• Graphic display system with monitoring, alert, and user interface for ground-based applications such as buildings, campuses, and vehicles

• Broad spectrum of interchangeable sensors helps users tailor sensors for mission specific needs

• sUAS sensor system adapted from ground-based system

• Sensor system is coupled into autoflight system to aid in adaptive flight regimes (i.e. tracking aerosol plumes)
SENSOR OPTIONS

- Fixed point and mobile sensors
- Configurable sensor complement
- Networked communications

- Toxic chemicals
- Flammable gases
- Petroleum products
- Radioactive materials
AERIAL & GROUND SENSOR INPUT TO PLUME MODELING

- Atmospheric modeling provides detail of hazard motion
- Hazard plume track and concentration data
- Expanded sensor network (ground-based and aerial)

Plume Modeling and Hazard Alert

Hazard Release Point

Sensors on other buildings & vehicles provide early warning
1. Provides authorized users 24/7 wind field displays across an “Area of Interest” (AOI); includes building and local terrain features.

2. Produces a quick hazard threat-zone estimate associated with a chemical spill, CBRNE threat event or any airborne hazard.

3. Provides real-time Quality Control data assessment tool.

4. Provides Data Archive for post-incident analysis.
Early Warning System Integration

**Emergency Response / Law Enforcement**

- Sensors on vehicles and fixed locations detect airborne hazards
- Mobile system alerts operator of immediate danger
- Sensor data sent to Emergency Operations Center for broad notification and response
- All mobile sensor data mapped together for “big-picture”
- sUAS aircraft and fleet available as “stand-off” sensor probes and networked communications relay platforms
PROTECTING CRITICAL INFRASTRUCTURE AND LIVES

PLUME DETECTION, MODELING AND EARLY WARNING

Protection
Early Warning
Rail Yard
Shared Tracks
Safety & Security

SENSORS IN CRITICAL LOCATIONS AND ON UAS AERIAL PLATFORMS
Critical Infrastructure Monitoring

- Fixed and Mobile Applications
- Ground and UAS deployment
- Configurable Sensor Systems
- Visual and infrared imaging
- Transportation assets and right of way monitoring
- Police / Fire / EMS, CST (Civil Support Teams)
- Communication Relay
Powerline Transmission

- Overheating components
- Foliage intrusion
- Transmission line fault detection
- Aerial sensing and security
Oil & Gas

Exploration and Transportation
• Seismic monitoring
• US / Canada / global
• Enormous global potential
• Pipeline
• ROI for leak detection – even a small leak or break can cost $MM
• Gas sensors and standoff detection
• Currently using manned aircraft for survey
Oil & Gas

• Additional Opportunities
  – Gas meter data collection in remote areas
  – Security patrol
  – Data collection from well heads / critical / remote
  – Chemical sensing
  – Ports
Training

- Forecasts for thousands of pilots and observers
- FAA will require some sort of licensing or endorsements – from examination thru ATP
- Many universities offer new B.S. – Unmanned Systems degree, but little “flying”
- MAGPIE as primary trainer
ENG / Aerial Filming

Replace / Reduce News Helicopter Operations

- Cost effectively replace helicopter-based filming
- Access to many more aerial news opportunities than Helos
- UAS may provide additional “Big Data” opportunities - multitasking
- Certification path for flights above populated areas (manned / OPV / UAS)
ACTIONABLE INFORMATION ON CRITICAL INFRASTRUCTURE
Thank you!

Captain Joe Burns

C.E.O.

joe.burns@sensurion.com