

***DeCAS***  
**Debris Collision Alert System**

***by***  
***Aviosonic Space Tech srls***

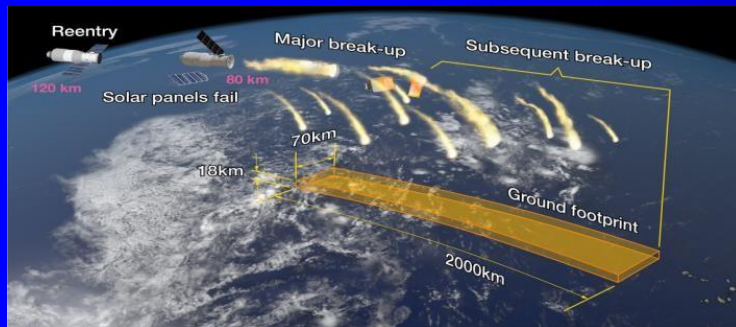
**Aerospace and Safety**



## The company

*Aviosonic Space Tech is an innovative start up constituted in 2015.*

*Aviosonic's **mission** is to solve the problem posed by the re-entry of space debris*



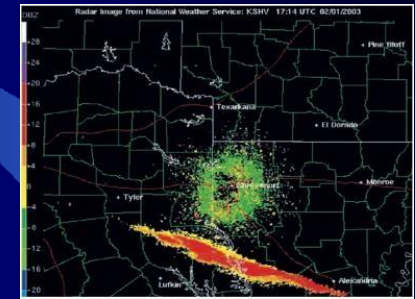
*The core activity is the development and market placement of the DeCAS, an innovative security system for satellites and space vehicles*

- **29k** objects larger than 10cm orbiting the earth that will re-enter the atmosphere
- 10 to 40% of total mass of a spacecraft survives re-entry
- Debris area is unpredictable with precision
- Serious danger for population and aviation
- Related issues: costs for closing aerospace, non compliance with regulations

China Space station Tiangong-1



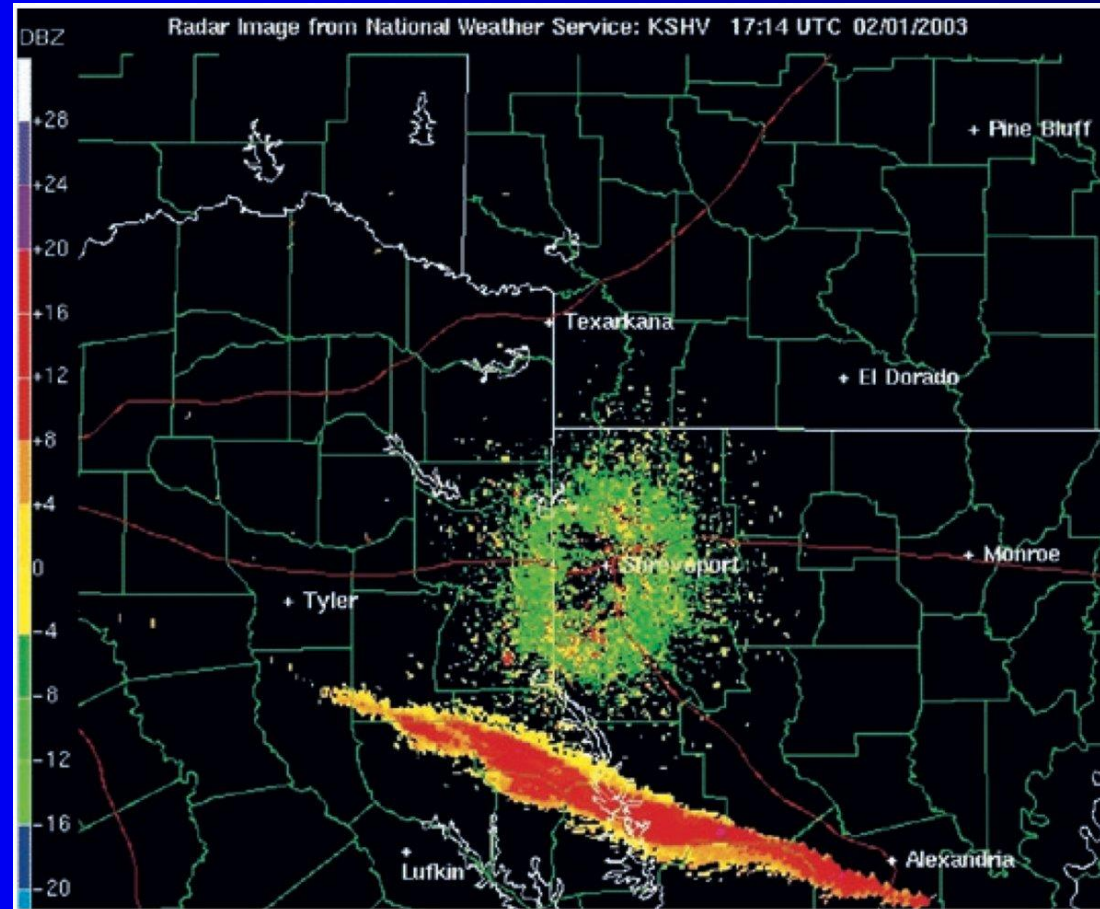
Columbia debris footprint on NAS



# RISK FOR AVIATION

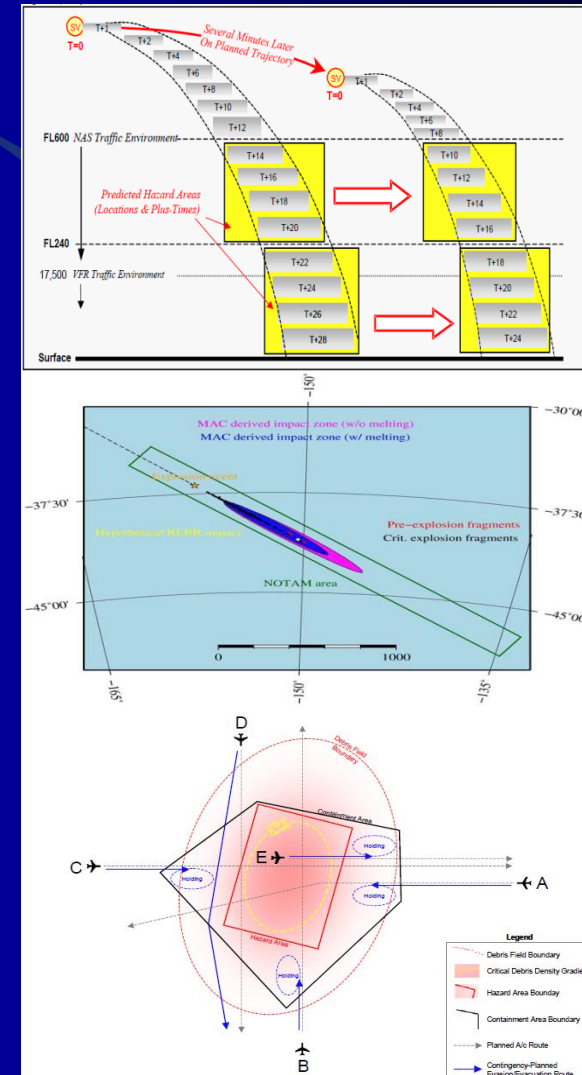


## COLUMBIA DEBRIS FOOTPRINT on NAS



# Examples: RISK FOR AVIATION

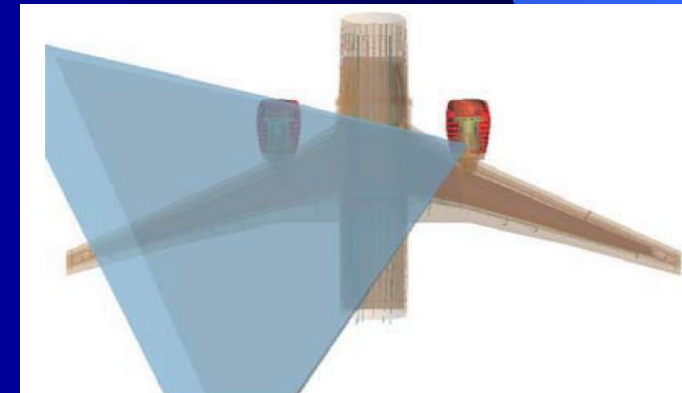
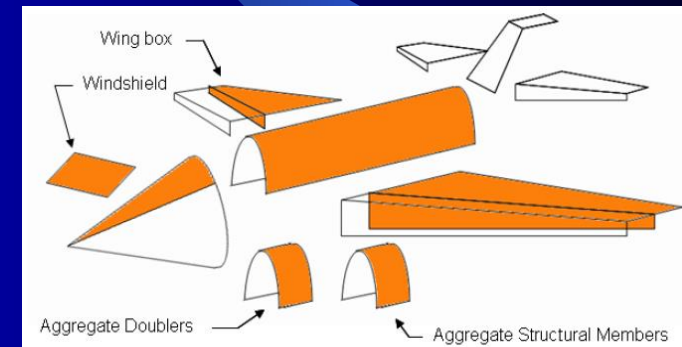
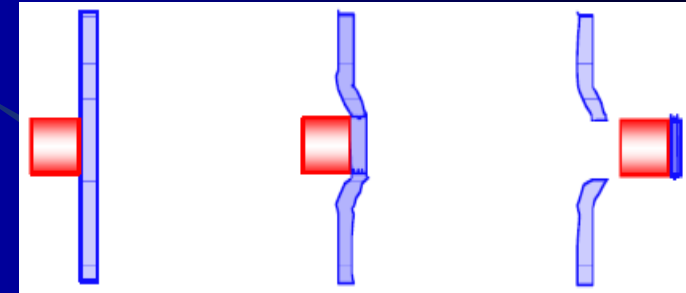
- On December 19, 1996, a Chinese passenger plane was forced to make an emergency landing after the exterior glass of the cockpit window was cracked by an unidentified flying object at an altitude of 9,600m
- On March 27, 2007, an Airbus A340 of LAN Airlines spotted wreckage from what was thought to be the Russian Progress 23P cargo spacecraft reentering the atmosphere. The aircraft was carrying 270 passengers
- According to some estimation the risk for aircraft from a typical flux of space debris with a realistic distribution of inclinations, in 2014 the annual risk of collision for all US aviation traffic due to space debris was  $3 \times 10^{-4}$  (generally acceptable risk in aviation being  $1 \times 10^{-7}$ )



# Vulnerability of the aircraft



- **Range Commanders Council 321-10**  
Defines standard criteria for the protection of aircraft
- **Modeling** of the aircraft
- **Analysis** of the consequences from perforation
  - Fragments < 300gr/10cm
    - Tank
    - Cockpit
    - Engine





# A need for aerospace safety



## A system able to:

- **Determine** the exact condition of **explosion** / fragmentation of Space Vehicle
- **Early warn** the users potentially affected
- **Timely broadcast** the dynamics of Danger Area to all interested users
- Provide the elements to "suggest" to **pilots** a initial escape heading to **avoid** danger area



## **DeCAS** PATENTED Debris Collision Alert System

- ❑ **DeCAS** is a patented system allowing for the gathering of data, trajectory tracking and analysis of space vehicles/satellites during re-entry
- ❑ It represents the heart of an alert system for the safety of people and things on the Earth's surface and for the safety of aircrafts and space vehicles in flight







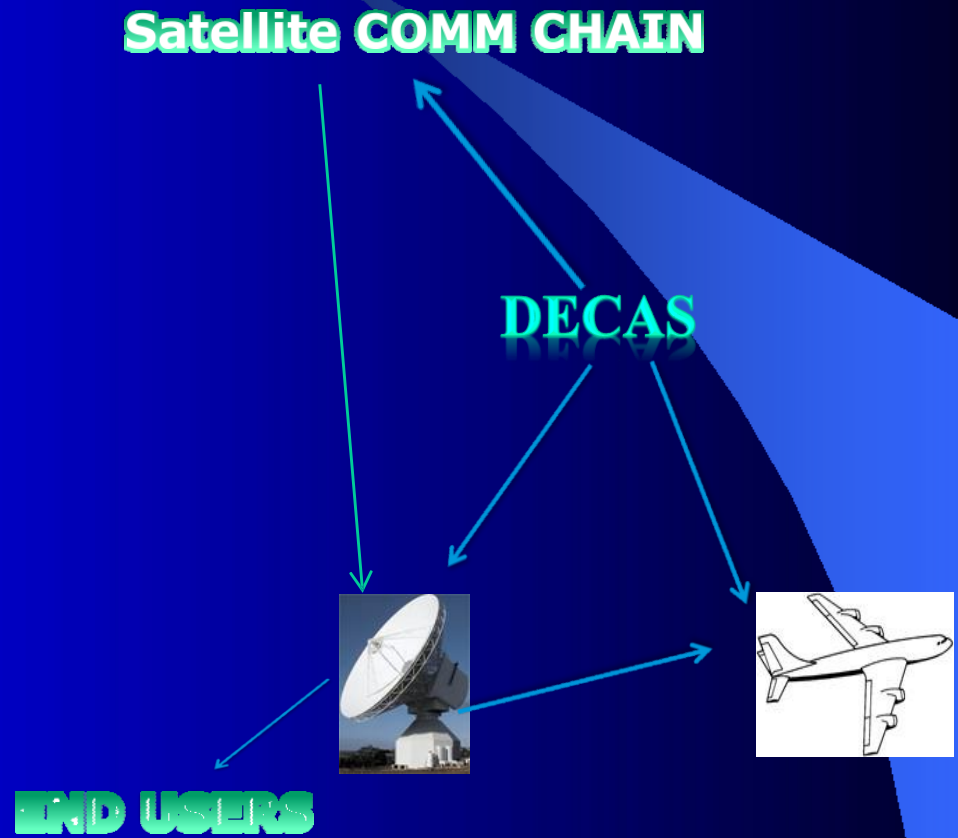
# DeCAS – Debris Collision Alert System (*patented*)



**DeCAS** is a **small, lightweight** device, based on the principle of **black box** in aircrafts, and avails of **standard space technologies** for data broadcasting.

**DeCAS** is the the first high-precision monitoring system for **tracking space debris** during the re-entry phase, **directly from Space Vehicle**.

- It precisely determines the area interested by fragmentation
- It **notifies Safety Agencies** about danger for air traffic, people and property (at least, **25 minutes before impact**)

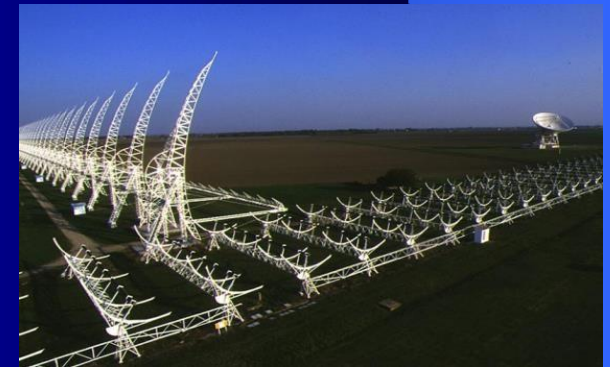


1. Radar systems
2. Optical passive trackers
3. Lasers
4. Design for Demise (D4D)

Main issues with the above systems are that:

- They do not cover the whole of the global airspace
- They need to be linked in a seamless network across many jurisdictions
- They are expensive to build, run and maintain
- D4D still in early development stage and data still subject to high inaccuracy and response unpredictability due to everchanging re-entry conditions

**DeCAS** is the only system able to track in real time the position and fragment footprint of a re-entering vehicle





# DeCAS Final Users



**National Space Agencies**



Government Requirements  
National and International  
Space Law



**Space Launchers**



Launching Liabilities  
Safety Requirements



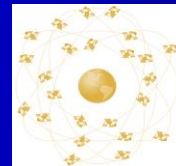
**Satellite Manufacturers**



Technical requirements  
International Standards  
Space insurance



**Satellite Operators**



Big satellite  
constellations



# DeCAS services reference



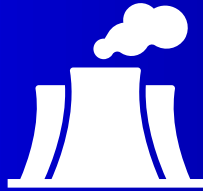
## Alert Message



Safety Institutions Centers around the World  
People's safety on the surface



## Sensitive installations Safety



Energy Plants  
Sensitive and Strategic Sites



## Airspace Traffic Management



Air and Space Traffic Control  
Collision Avoidance



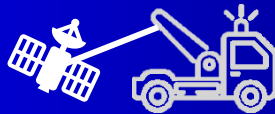
## Worldwide Traffic Control coverage



Long intercontinental flight coverage  
Contingency procedures for internal flights (Long Haul)



## Scientific and ADR Missions



ADR and atmospheric re-entry mission  
Science, Research and Data collection Missions

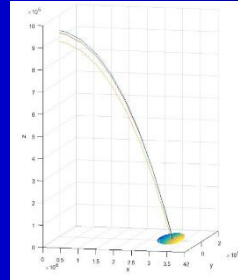


# Steps of development



## ➤ June - September 2017 D-SAT mission

- 83 real-time break-up simulation and impact footprint predictions.
- Calculations on the ground



## ➤ 2020- ION mission (in progress)

- Calculations on board
- ION platform will be enhanced with DeCAS footprint calculation



## ➤ Q1 2021 FEES - UNISAT 7

- In orbit validation of DeCAS MB capabilities.



# Contacts



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