



Technology by Fox2Space
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The Problem: Satellite Reliability

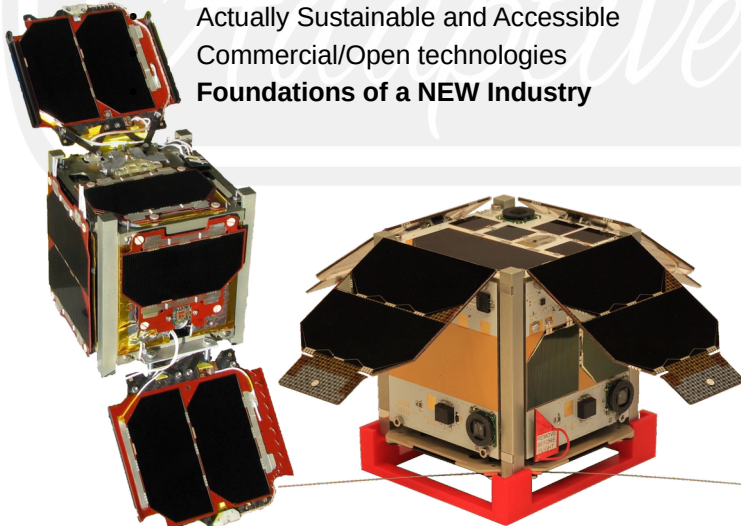
NewSpace and Small Satellites

- Built from Cutting Edge Technology
- Excellent Capabilities
- Highly Efficient
- Low Energy Usage
- Low Complexity
- Rapid Deployment
- Fantastically Innovative
- “Infinite” Applications

Actually Sustainable and Accessible

Commercial/Open technologies

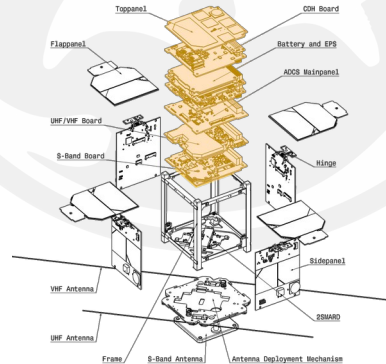
Foundations of a NEW Industry



Satellite Avionics Today:

- 90% of modern satellites are electronics, computers
- Most failures occur here
- Hazardous operating conditions destroy electronics over time, this is normal
- “Hardened” Satellite Electronics use 30-60 years old technology. **Unsuitable for modern satellites:**
 - Mass/Energy Cost/Size Constraints
 - Vintage, not widely available and arcane
 - Customers = Nations, not Companies

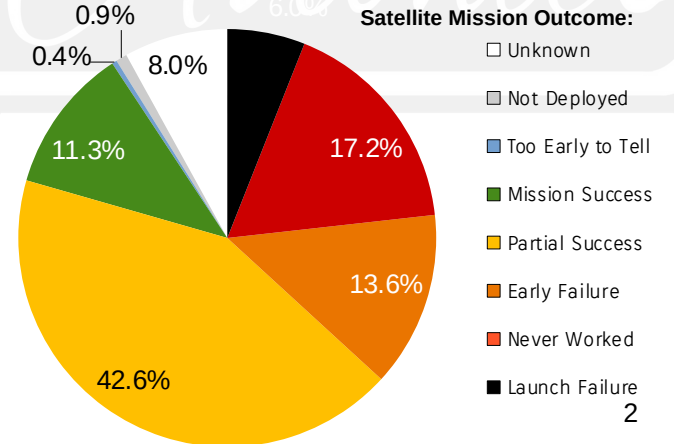
Result: NewSpace is prone to failure and we launch satellites en-masse to make up for that (Starlink, Megaconstellations...) not because we want to... amplifies space debris problems



Low NewSpace Mission Survivability:

- Most space missions end early
- Many missions do not achieve their objectives
- 0 to up-to-X-years of survivability is bad for business
- Bad for Insurance Institutions
- **Until now NO solutions were available**
- Today's Exclusive Choice:
 - build larger satellites using 80's tech
 - Or accept the risk!

Status Quo: risk acceptance, Insurance bails out, space debris problems due to thousands of derelict satellites and launcher leftovers, negative press coverage



Our Competition

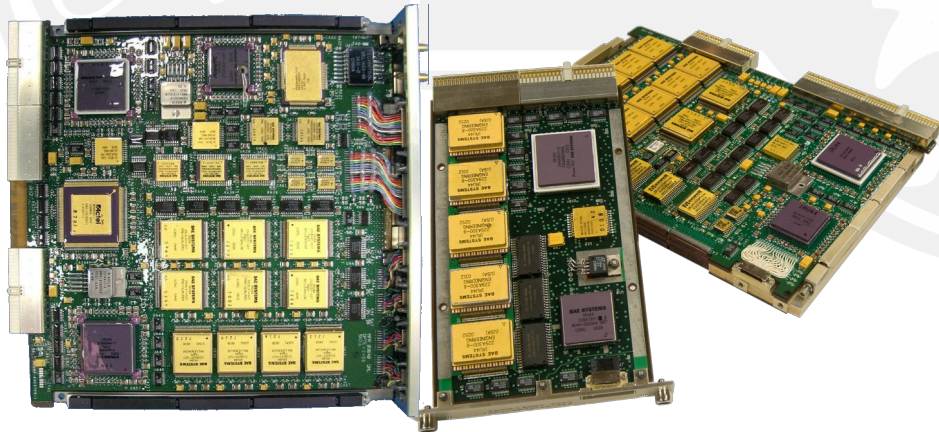


Traditional Avionics

- x 30-60 Year old Vintage Technology
- x Horrible Performance/Weight/Watt Results
- x Solutions designed for Nation States, major Space Agencies
- x Requires International and Inter-Agency agreements to access
- x By design very expensive, slow to develop, difficult to test
- x Legacy: developers retired decades ago, 3 generations of traditions and lost experience, 2 decades of arcane workarounds
- x In practice, can not be used for NewSpace
- x If still used, Small Satellites are no longer "Small"

NewSpace Avionics

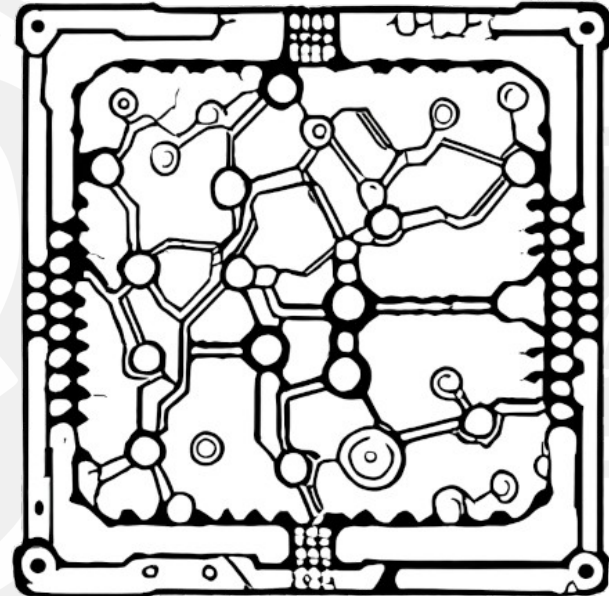
- x Unreliable, unpredictable
- x Based on IoT, Mobile Market, Medical, and Embedded Industrial Solutions
- x Designs based on **Hope** and **Optimism**
- x Impossible risk management, mitigate as much as possible
- x **BUT before Adaptive Avionics the ONLY solution:**
 - x Low Cost, Low Power Consumption
 - x Low Complexity
 - x Accessible Technology
 - x Built from modern parts that we all understand and love
 - x Fits the Bill, but everything becomes fragile



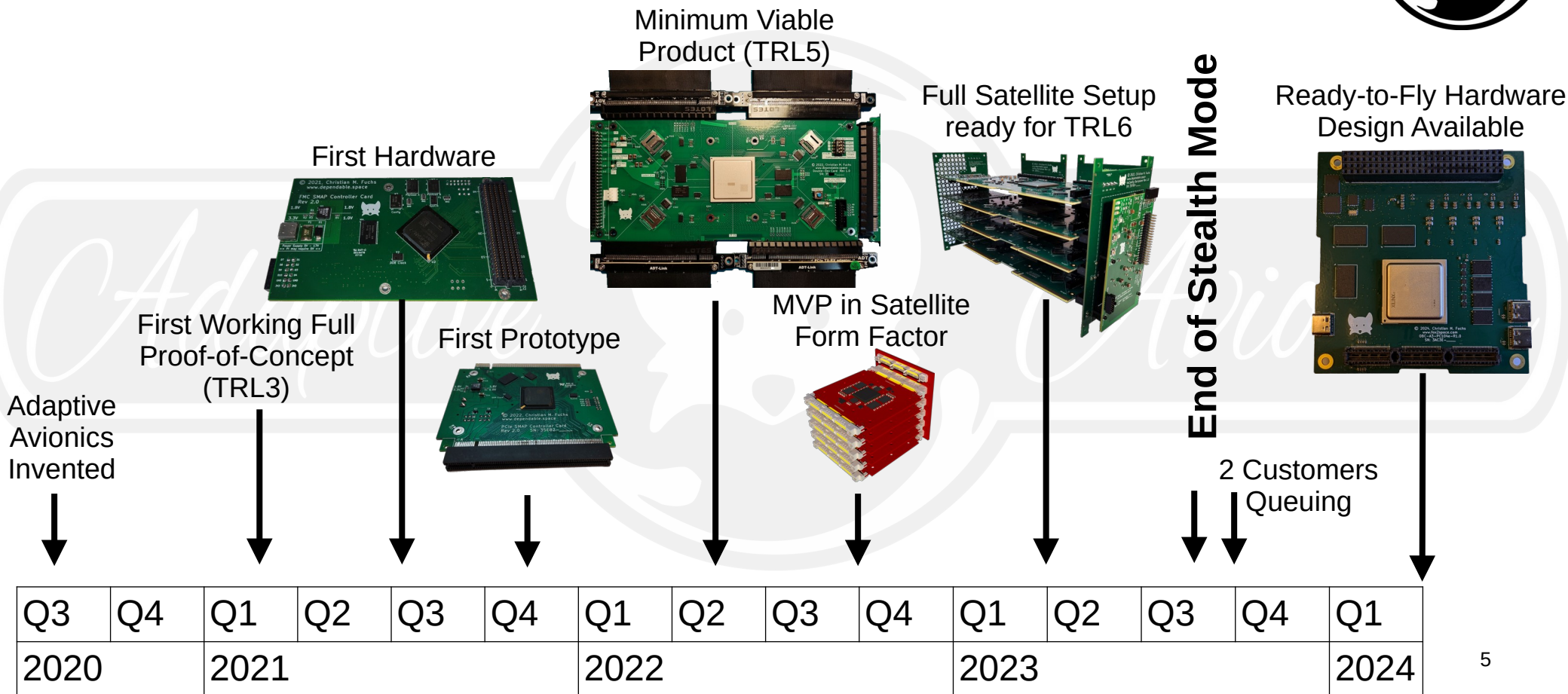
Adaptive Avionics



- **Organic behavior:** Neurons, Tissue
- **Self checking, Self-correcting**
- **Intelligently** handles failure, wear, and loss of functionality, beyond AI
- **Adaptive:** Adapts to changing mission requirements, docking, etc...
- **Ages and Degrades:** Damage does not cause failure but degrades performance and capabilities
- **Hardened to Failure**, not just radiation-hard
- **Can survive partial destruction**



Development Progress



Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
2020		2021				2022				2023				2024

Our Team and Collaborators



**Dr. Christian M. Fuchs
(your's truly)**



- 25+ years of Industry Experience in CyberSecurity, Embedded Electronics, Space Engineering, serves as Auditor/Evaluator, 3 Launched Satellites, Successfully ran and exited own business in 2010

- Started as Electronics Technician in 2001, BSc in Engineering (2011), MSc in Computer Science and Space Engineering (2015), PhD cross-disciplinary (2019)

- Held ESA Research Grants; worked in 5 Countries on 2 Continents: Austria, Germany, Netherlands, Taiwan, Japan and lived in 2 more

**Frederik Wenigwieser
(Engineer)**



- 10+ years of experience and degree in electronics engineering and software development for system automation and robot appliances

- Senior Embedded Software Engineer, his robots now cruise in the homes of hundreds of thousands of home owners.

- Has a deep interest in solid state lasers, diode emitter technology and optics, as well of control and optimization for scientific applications

**Gabriel Eckertsberger
(Engineer/Scientist)**



- 5+ years of experience in network service architecture, software design, data science, and web technologies

- Expert in rapid prototyping of network-connected systems, architectures, and services, real-time data visualization and automation

- Can bootstrap new service setups and interface concepts within hours.

**Gary M. Swift
(Engineer/Scientist)**



- 32+ years of experience in space and nuclear engineering and radiation testing

- BSc. In Engineering Physics, Msc. In Nuclear Engineering

- Worked at AMD/Xilinx, NASA's JPL Engineer; Co-Developed Radiation Hard Space-Grade Chips, Retired as Principal Engineer and founded his own company marketing his expertise

- CEO/Founder of Swift Engineering and Radiation Services, LLC, Moderator of the Xilinx Radiation Testing Consortium

**Prof. Dr. Nadia Murillo
(Scientist)**



- Scientific Collaborator for 10 years, Countless Joint Projects and Publications on Aerospace, Electronics and Particle Physics, Failure Analysis including Infrared, Radio, X-ray science and Scanning Electron Microscopy

- Bsc. in Physics, Msc. In Astronomy, PhD in Astrochemistry, worked on and with the James Webb Space Telescope, Hubble, and many other Space and ground based Observatories

- Held positions at National Tsing Hua University (Hsinchu, Taiwan), Max Planck Society (Germany), Leiden Observatory (Netherlands), RIKEN (Japan), UNAM (Mexico)

**Jay Lewis
(Engineer/Scientist)**



- 20+ years systems engineering experience, Specializes in reliability engineering and risk optimization; Expert in statistics, design, and complex system interfaces for manufacturing

- BSc. In Electrical Engineering

- Developed systems for aerospace, medical, and renewable energy while working at Viasat, Honeywell, Stirling Energy Systems, and others

- CEO/Founder of Ideal Frontiers, LLC

**Dr. Christoph Hintermüller
(Scientist)**



- 20+ years of experience in biomedical electronics development and processing for life-critical devices (ECG, pacemakers) and for irradiated environments (X-ray, MRT). 10y+ experience in turning new technologies into commercial ventures

- BSc, MSc, PhD in computer science

- Held leadership positions and worked in industry in Austria, Switzerland, and Germany; currently focused on data reduction for medical and medical science applications

Several other Collaborators, Advisers, and Colleagues were involved in Fox2Space over the past 3 years, who are not listed here, some to safeguard their visa status

Adaptive Avionics Advantages



- More Adaptive
- More Flexible
- More Resilient
- More Scalable
- Lower Complexity
- Easier Development
- Highly Redundant
- Superior Robustness
- **COMMODITY PARTS**

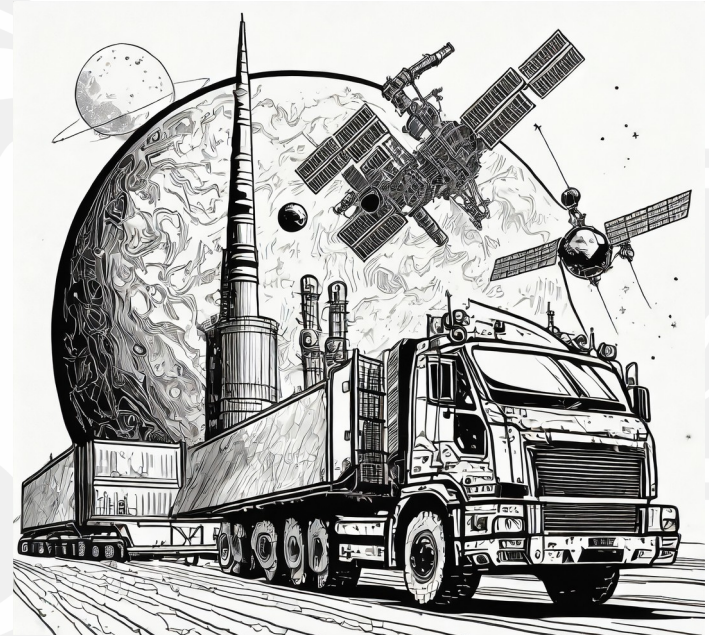


2 Year Market Strategy

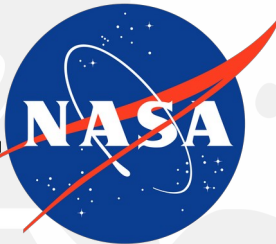


- Focus on the NewSpace Market, SmallSat Ventures, and Subsystem Vendors
- Act as Solution Provider and OEM
- Medium Term Objectives:
 - Build up heritage, generate cash flow using our available products
 - Prepare IP for licensing and co-develop for customers in space & defense
 - Gradually shift to IP licensing to 3rd parties in space and other industries

Immediate Space Market Size: \$35bln – \$81bln



Our 5 Waiting Major Industrial Customers, Our Existing Industry Collaborations and Our Future Customers



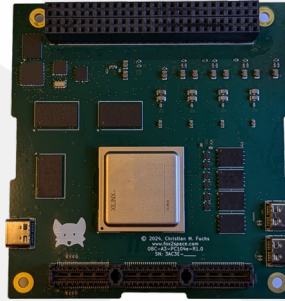
Logos are property of their respective owners, we are and have in the past actively collaborated with the organizations listed here, 2 of them are waiting for us to deliver our solutions already, one if a major defense company, the other a well funded and well known newspace venture

How We Generate Cashflow (1)



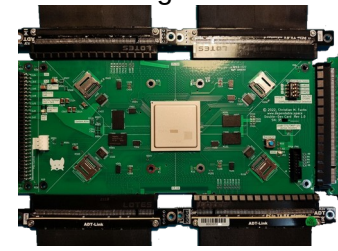
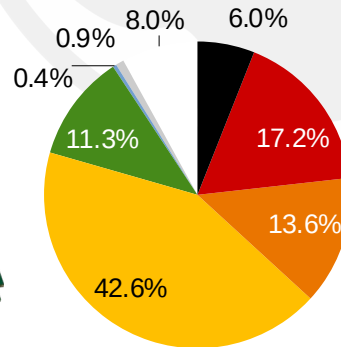
Fox2Space as a Satellite Component Manufacturer

- Act as Solution Provider
 - On-Board Computers, CDH/PDH, Storage Units
 - Custom Tailored Solutions to Customer Needs
 - Support Equipment and Tools
 - Auxiliary Firmware+Logicware Module Sales
- Recurring Revenue:
 - Development Systems Rental
 - Development Support for Customers (Software, Satellite-Level)
 - Customer Engineer Training
 - Testing and Validation Support
 - On-Orbit Anomaly Analysis as-a-service



Value for Customer

- Actual Truly Fault-Tolerant Protection
- More Energy Efficient than Rad-Hard
- Easier Development & Usability
- Longer and Assured Lifetime
- Guarantee-able Minimum System Lifetime
- Reduce need for Vehicle Upscaling
- Increase Sustainability, Reduce the use of Proquals
- Faster Development times and easier Quality Assurance
- Access to Solutions available even during Crisis



How We Generate Cashflow (2)



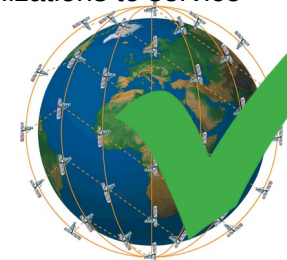
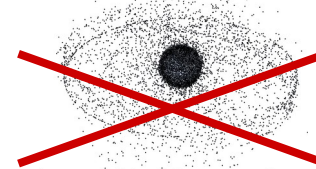
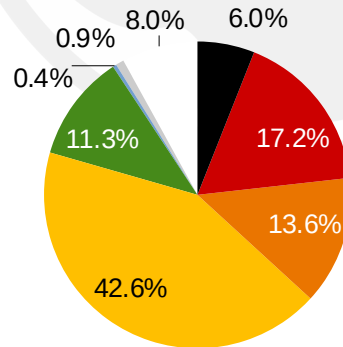
Design House Services and OEM/ODM Work

- Adaptive Avionics Auxiliary Modules for Customer-Proprietary Applications design-to-order
- Guide and Accompany Customer's Space Projects
- Design Work for Customer Projects within our Domain of Expertise
- OEM/ODM/Whitelabel Design of Adaptive Avionics
- Development of High-Rel Systems and Subsystems for Customers
- End-of-Life legacy System Re-engineering and Substitution through modern technology



Value for Customer

- Enable high Degree of Product Customization for specialized Missions and Proprietary Applications.
- Customer can retain Ownership of Product, does not buy 3rd Party Product
- Enables compliance to Regulatory Restrictions without tainting or changing Supplychain to accommodate a new unvetted 3rd party supplier
- Whitelabeling possibility for very large Traditional Aerospace Organization lacking expertise
- Drastic increase in Manufacturing Capacity for Space Systems Manufacturers
- Enables Traditional Aerospace Organizations to service currently inaccessible Markets



How We Generate Cashflow (3)

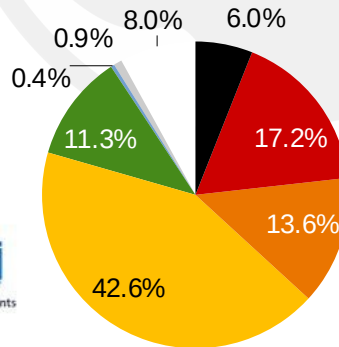


Adaptive Avionics IP Licensing (Mid Term)

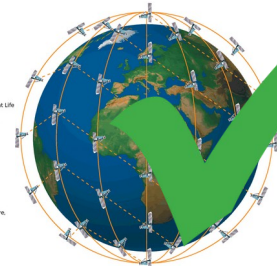
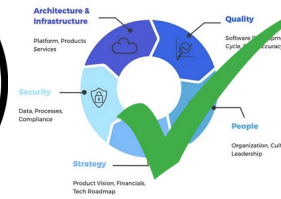
- Enable Customers to develop their own, proprietary Solutions based on Adaptive Avionics themselves
- Customer Receives IP Package
 - Example Designs, Drivers, Software, Test Software, Conceptional Papers and Documentation for Proprietary Technology Core
 - Limited Amount of Development Support Time and Training Time for Employees
- Exponential Cashflow Model:
 - Licensing Fees:
 - Fee per Subsystems Manufactured
 - Share of Mission Value Generated
 - Employee Training and Retraining
 - Development and Testing Support
 - On-Orbit Anomaly Analysis Support

Value for Customer

- Assure Proofably Reliable Mission Lifetimes of Subsystems & Buses
- Unlock NewSpace Manufacturers to serve Class-A Missions
- De-riskify and de-politicize usage of COTS for Traditional Space Companies
- Allow drastic increase in Manufacturing Capacity and Turnover Speed for Space Systems Manufacturers
- Unlock simplified Recruiting & Address Software Development Capability Crisis
- Due Diligence, Liability Coverage and Insurance Enablement for Future Space Missions
- Comply with Future Space Debris Mitigations Laws/Agreements for Future Constellations



Technical Due Diligence



How We Generate Cashflow (4)

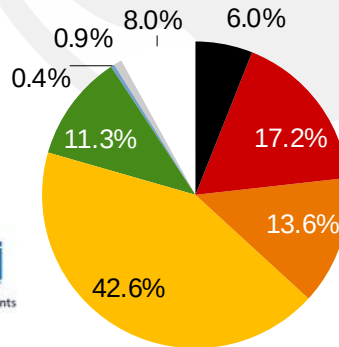


Certification & Validation (Long Term)

- Fox2Space becomes a Certification Authority
 - Independent Authority for Proofing Subsystem Lifetime Assurance
 - Certification of Subsystem Implementation Correctness
 - Authority for Insurance Liability Assessment and Legal Compliance
- Support Services Offered
 - Red-Teaming/Blue-Teaming for Space Projects
 - Development Support for Customers
 - Customer Employee Training and Retraining
 - Testing and Validation Support
 - On-Orbit Anomaly Analysis Support

Value for Customer

- Verification and Certification of Measures taken to assure Reliability, and Missions Lifetime Objectives can be met
- Comply with Future Space Debris Mitigation Laws/Agreements for Future Constellations
- Proofable Due Diligence, Liability Coverage and Insurance Enablement for Space Missions
- Enable Customers to de-riskify Space Missions to assure Funding
- Certification of Correctness of Fault-Tolerance Implementation
- Certification of ability to meet lifetime requirements by independent, non-competing 3rd Party Authority

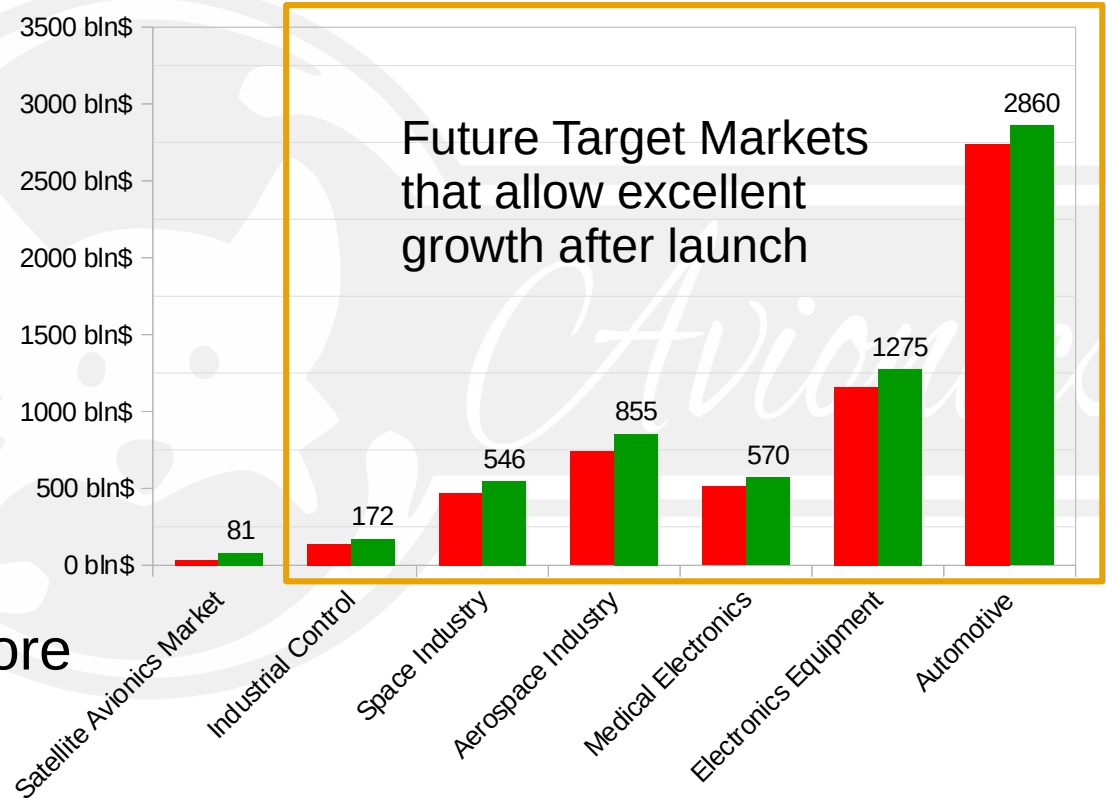


Funding Enables Market Expansion



Target Markets

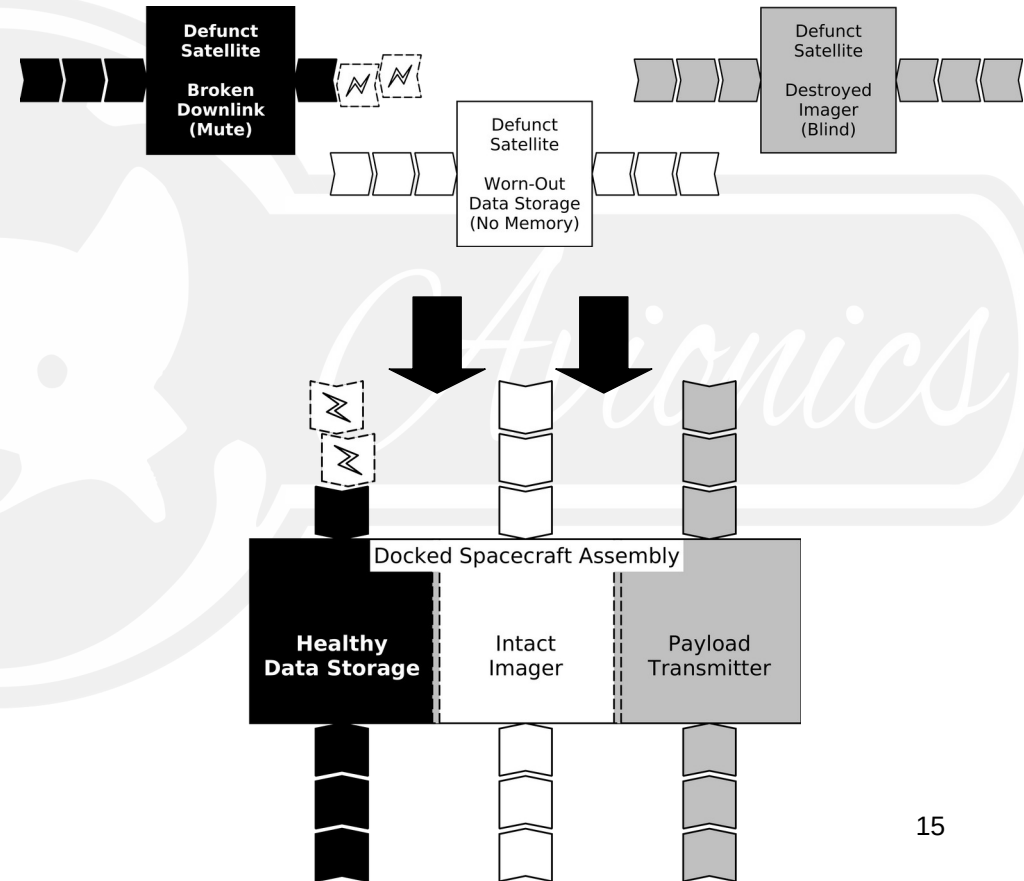
- Automotive
- Aerospace
- Industrial Control
- Biomedical
- Security, Trust, ...
- Marine, Submarine & Offshore



Long-Term Vision



- Adaptive Avionics enables complete systemic modularization:
 - Functionality of Subsystems can be evacuated from partially destroyed vehicles
 - Failure prediction and preparation for faults before they occur
 - Mid-mission reconfiguration to meet new mission requirements
 - Adaptive Avionics Domains can span multiple vehicles, swarms, or constellations in space, in the air, in the ocean, and on the ground.
 - Docking or recombination of partial defunct spacecraft module assemblies into larger structures
 - Partially defunct Adaptive Avionics domains can be joined, thereby yielding one or multiple fully functional spacecraft.
 - Mimics organic behavior of multi-cellular lifeforms cooperating schools of single-cell organisms

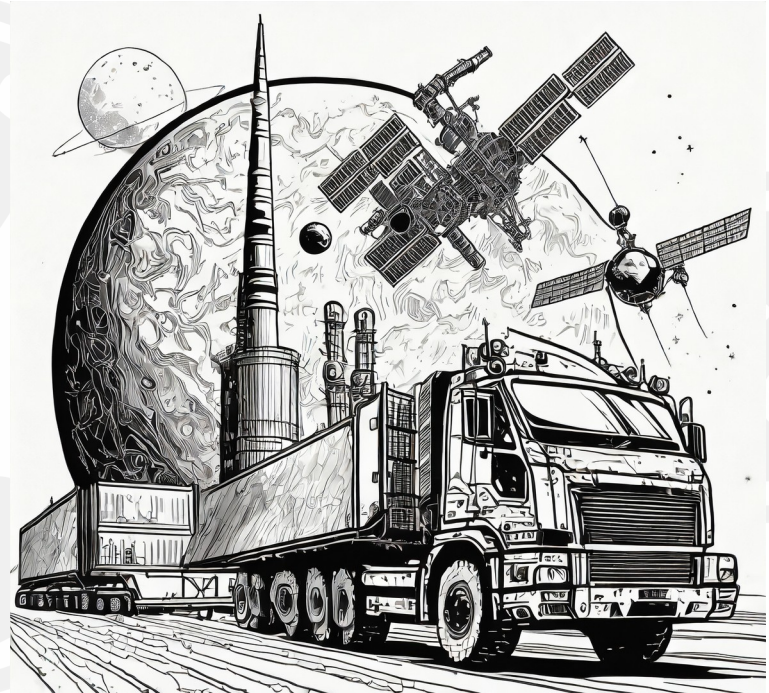


\$2m Uses of Funding



Use over 2 Years

- 600k: Salaries 2 Engineers, 1 Management/Sales
- 500k: Business Development and Travel
 - Conferences, Business Fairs, Booths + Equipment
 - Customer Care and Sales
 - Software, Documentation and Review
- 400k: Overhead Expenses
 - TRL6/7 + Radiation Testing Fees
 - Facility Rental
 - Contractors: Marketing, Legal, Taxes, Writer
- 500k: Manufacturing in House



\$4m Uses of Funding



Use over 2 Years

- 1.7m: Salaries 2 Engineers, 2 Technicians, 2 Management/Sales/Admin
- 750k: Business Development and Travel
 - Conferences, Business Fairs, Booths + Equipment
 - Customer Care and Sales
 - Software, Documentation and Review
- 800k: Overhead Expenses
 - TRL6/7 + Radiation Testing Fees
 - Facility Rental
 - Contractors: Marketing, Legal, Taxes, Writer
- 750k: Better/Faster Manufacturing in House

