



**AutoModality**



***Putting the Unmanned Back in Unmanned Vehicles™***

Proprietary



***Autonomous Robotic Inspection on  
Critical Infrastructure  
WiSEE Conference  
Ottawa 2019***

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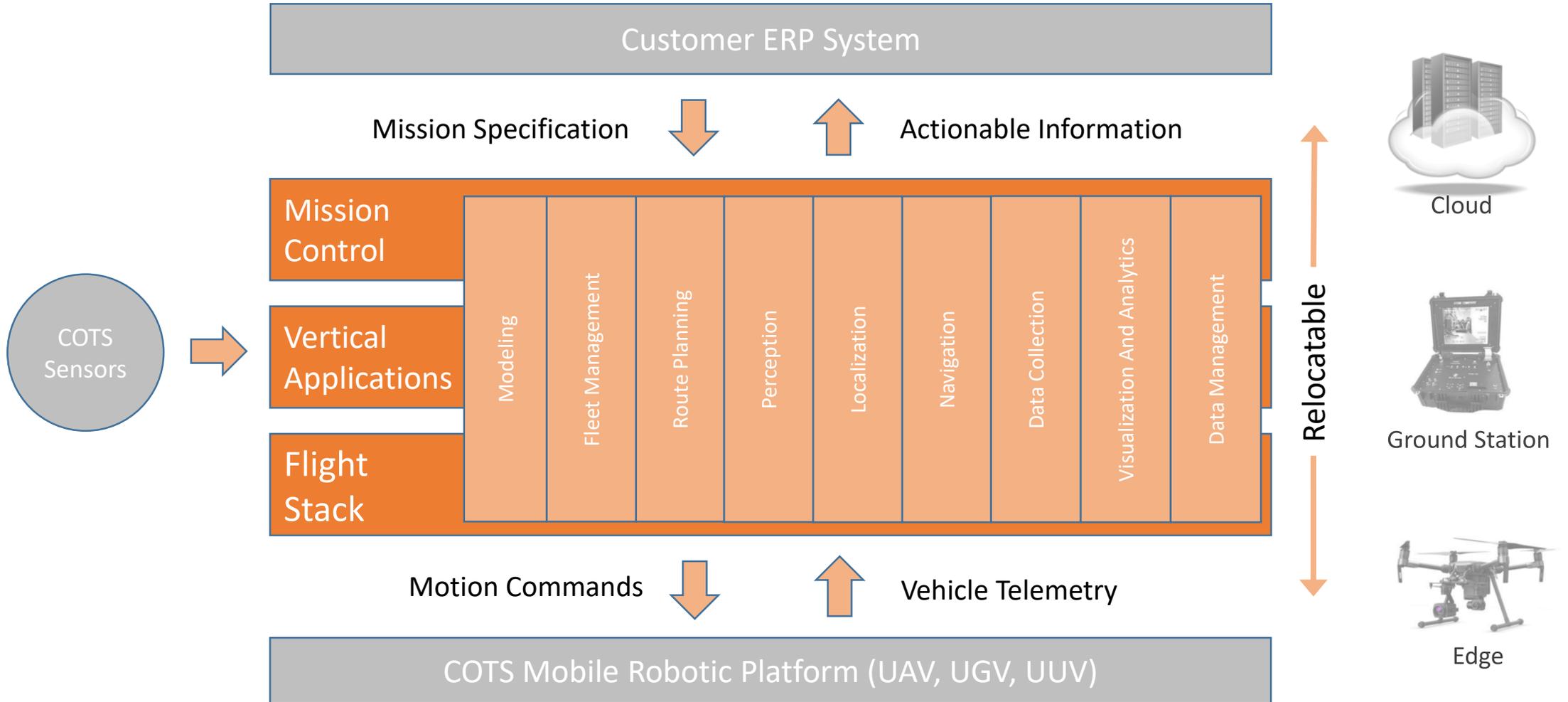
# Perceptive Navigation<sup>®</sup> = **2 : 1 : 0**

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- We can get inside, under, in between, UP CLOSE!
- Precisely navigate and collect data
- **Fully autonomous** GPS/RF-denied
- **One-button** mission operation
- AI & machine-learning
- Platform-agnostic
- Patented



# Autonomous Mobile Robotic Operating Suite (AMROS™)



# Enterprise Customers



# UAVs in Industrial Inspection

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- Industrial Asset Inspection is Costly
  - Capital equipment
  - Labor
  - Insurance
- And dangerous
  - Accidents
  - Injuries
  - Liability
- And time-intensive
  - Manual process
  - Assets closed during inspection
  - Data takes time to become actionable



# UAVs in Industrial Inspection

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- Advanced sensing for perception
  - Stereo-cameras
  - Structural IR
  - LIDAR
- Artificial intelligence for recognition
  - Asset-relative features
  - Defect & anomaly detection
- Perceptive navigation for actionable data
  - Precision localization using AI
  - Machine-learning for asset-relative navigation
  - Fully-autonomous capability





# AUTOMODALITY INSPECTION WORKFLOW

Confidential

# UAVs in Industrial Inspection

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- UAVs being used to inspect many industrial assets in multiple industry verticals
  - Transportation (Bridges, railways, tunnels)
  - Construction (hi-rise exteriors, sites)
  - Energy (oil platforms, pipelines)
  - Electricity (substations, power-lines)
  - Aerospace (aircraft, manufacturing)
  - Warehousing
  - Communications
  - Mining

# From Earth to Space

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- Moving from bridge inspection to satellite inspection is not such a giant leap

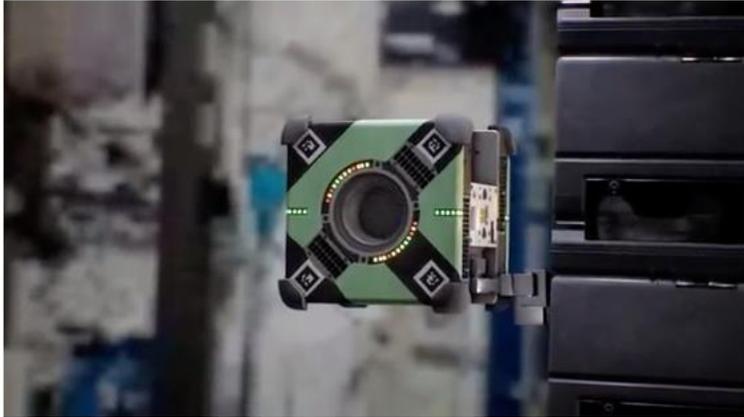


# EVA's Expensive & Risky

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- Extra-Vehicular Activity in space requires vast resources & risk to astronauts
  - Cost space suit - \$2 million
  - Carrying cargo to ISS - \$80,000/kg
  - Weight space suit – 140 kg
    - \$11.2 million transport fee
  - Cost to get AN astronaut to ISS - \$81 million
  - # of astronauts/EVA - 2
  - Support services/EVA - \$1.5 million/astronaut
    - Oxygen, nitrogen fuel, CO2 scrubbing, etc.
- **TOTAL COST 1 EVA - \$191.5 MILLION**





# USVs in Space Inspection

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- Technologies like AMROS & Perceptive Navigation adapted for space
  - Ported to small cubesats
  - Replace expensive, risky EVAs
  - Fully autonomous
  - Low-cost
  - Advanced sensing
  - Actionable data
  - Repeatable



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