



UNMANNED AIRCRAFT SYSTEMS (UAS) INDUSTRY SYMPOSIUM

AMIT GANJOO
CEO



ABOUT US

- FOUNDED IN 2015
- OPERATIONS IN NORTH AMERICA AND ASIA
- AWARD WINNING TECHNOLOGY
- CORE TEAM WITH 50+ YEARS OF AVIATION, DoD, COMMUNICATIONS AND ROBOTICS EXPERIENCE
- OFFICIAL NASA COLLABORATOR
- FEATURED IN

FORTUNE

AVIATION WEEK

BISNOW
(ALMOST) NEVER BORING

Tandem NSI

DEFENSE
SYSTEMS

DCInno

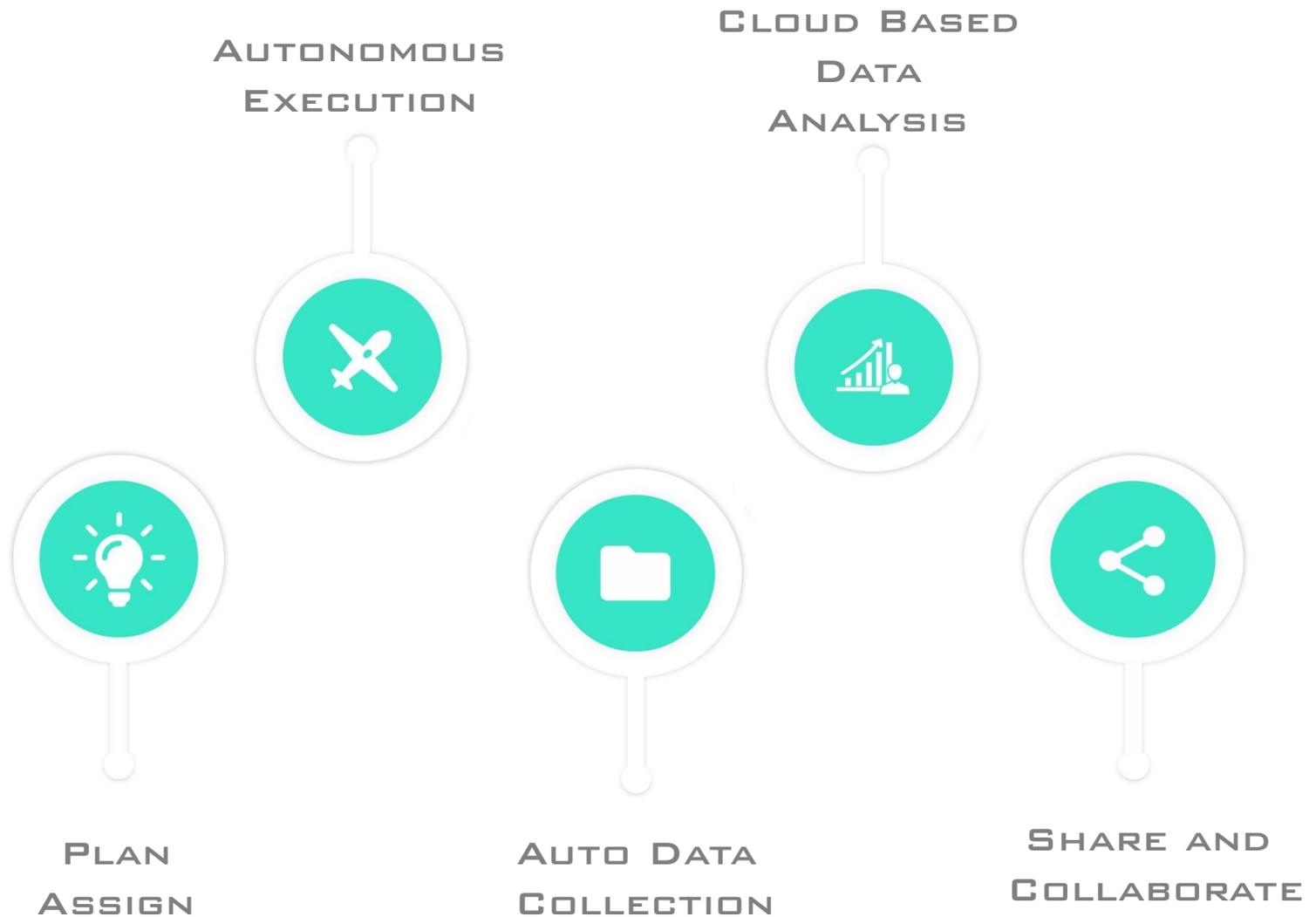
VALUE
PROPOSITION

DRONE AGNOSTIC, LOW COST, OPEN, SCALABLE AND ADAPTABLE TO FUTURE REQUIREMENTS AND REGULATION CHANGES



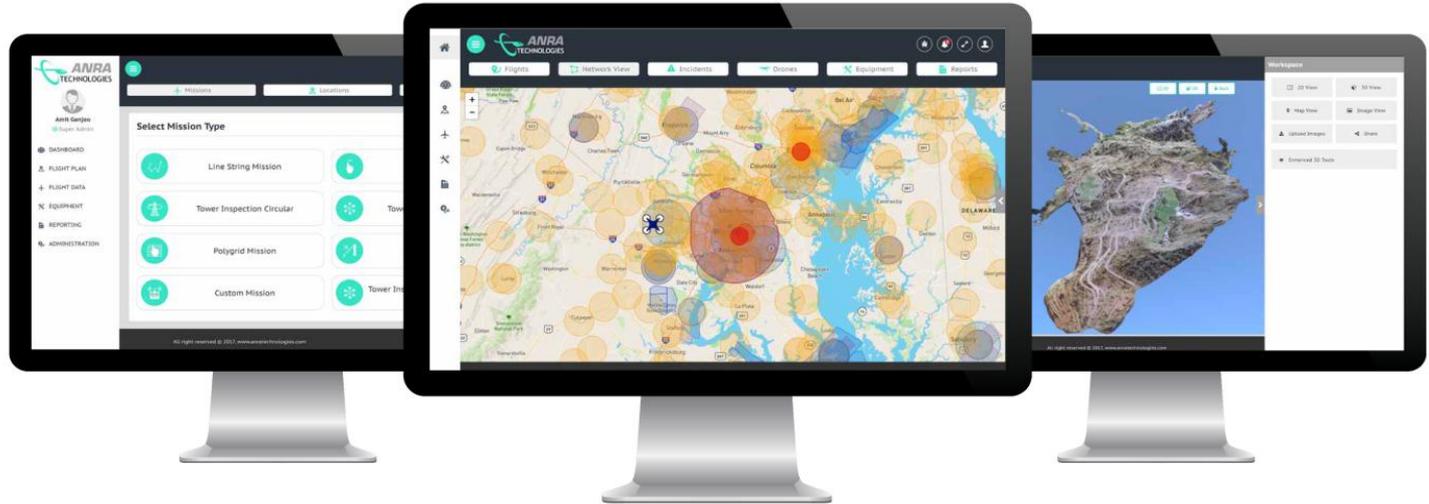
TWO COMPLEMENTARY PLATFORMS FOR LOS AND BVLOS OPERATIONS
DRONEOSS™ & DRONEUSS™

DRONEOSS(TM) WORKFLOW MANAGEMENT



AN OFF THE SHELF, REAL-TIME, FIELD PROVEN, CLOUD BASED REGULATION COMPLIANT END TO END DRONE OPERATIONS PLATFORM

DRONESS(TM) WORKFLOW MANAGEMENT



MULTIPLE DRONE CONTROL, REAL TIME MEDIA AND DATA

AIRSPACE AND TRAFFIC MANAGEMENT

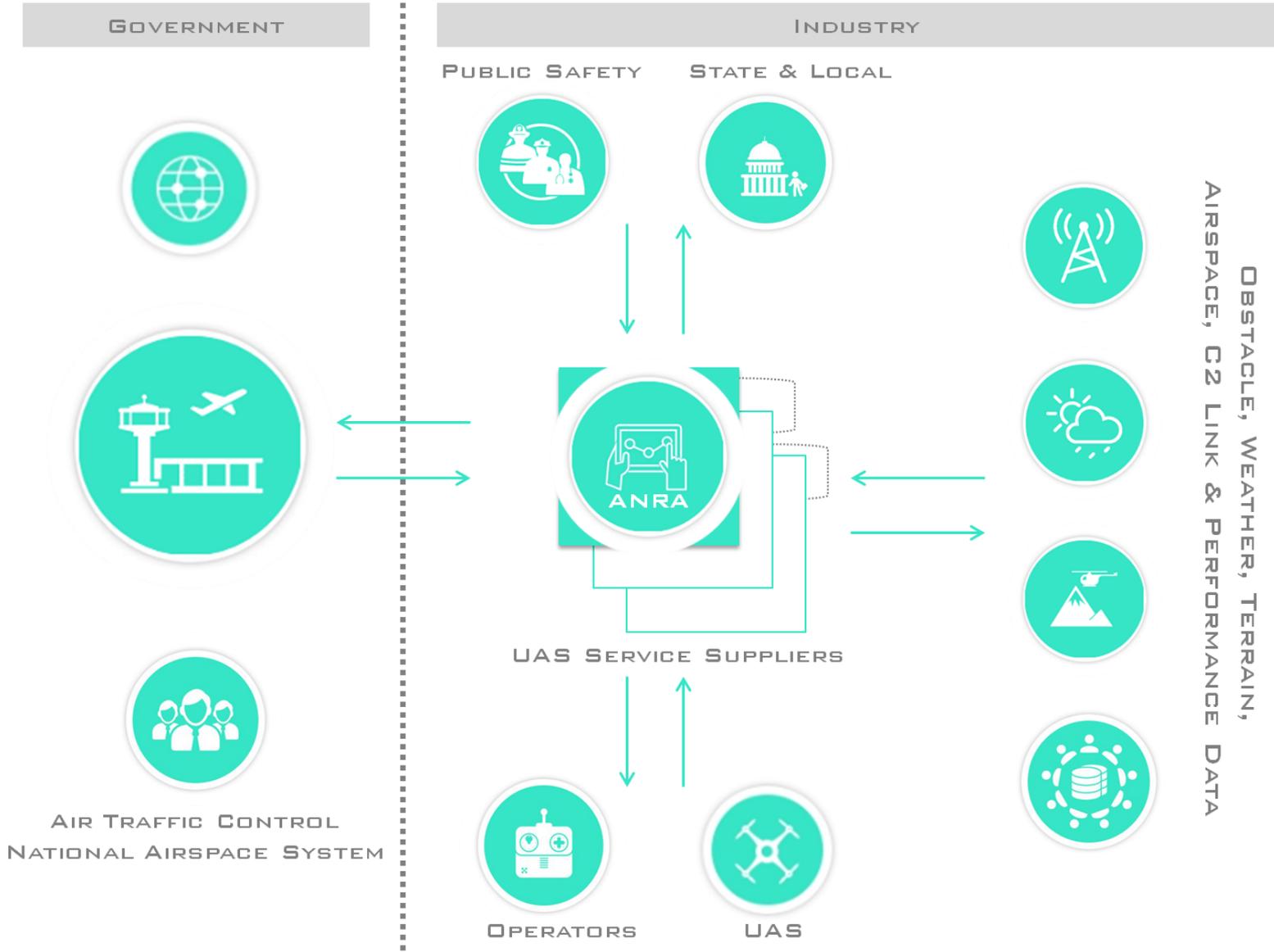
SEPARATION ASSURANCE, FLIGHT DATA MANAGEMENT

INCIDENT MANAGEMENT, FLEET MANAGEMENT

COMPLIANCE AND REPORTING



DRONEUSS(TM) UTM SYSTEM



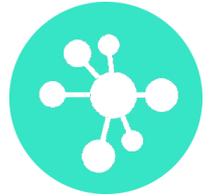
- WHAT IS NEEDED FOR UTM?
 - PLANNING OF UAS OPERATIONS
 - DECONFLICTION OF THE UTM AIRSPACE
 - PROVIDING SUPPLEMENTARY DATA TO UAS OPERATORS DURING OPERATIONS
 - BRIDGING COMMUNICATION BETWEEN UAS OPERATORS AND ANSPs
 - AUTHENTICATION & AUTHORIZATION
 - REGISTRATION AND REMOTE IDENTIFICATION
 - LIFE CYCLE MANAGEMENT

REGISTRATION AND REMOTE ID

- **WHY?**
 - HOW DOES IT HELP
- **MANAGING AUTHORITY**
 - ALLOCATION AND COLOR LIST MANAGEMENT
- **POTENTIAL IDS**
 - LEVERAGE KNOWN CONCEPTS
- **IDENTIFICATION CHANNELS**
 - LOCAL AND NETWORK
- **SECURITY**
 - MULTIPLE ISSUES

WHY?

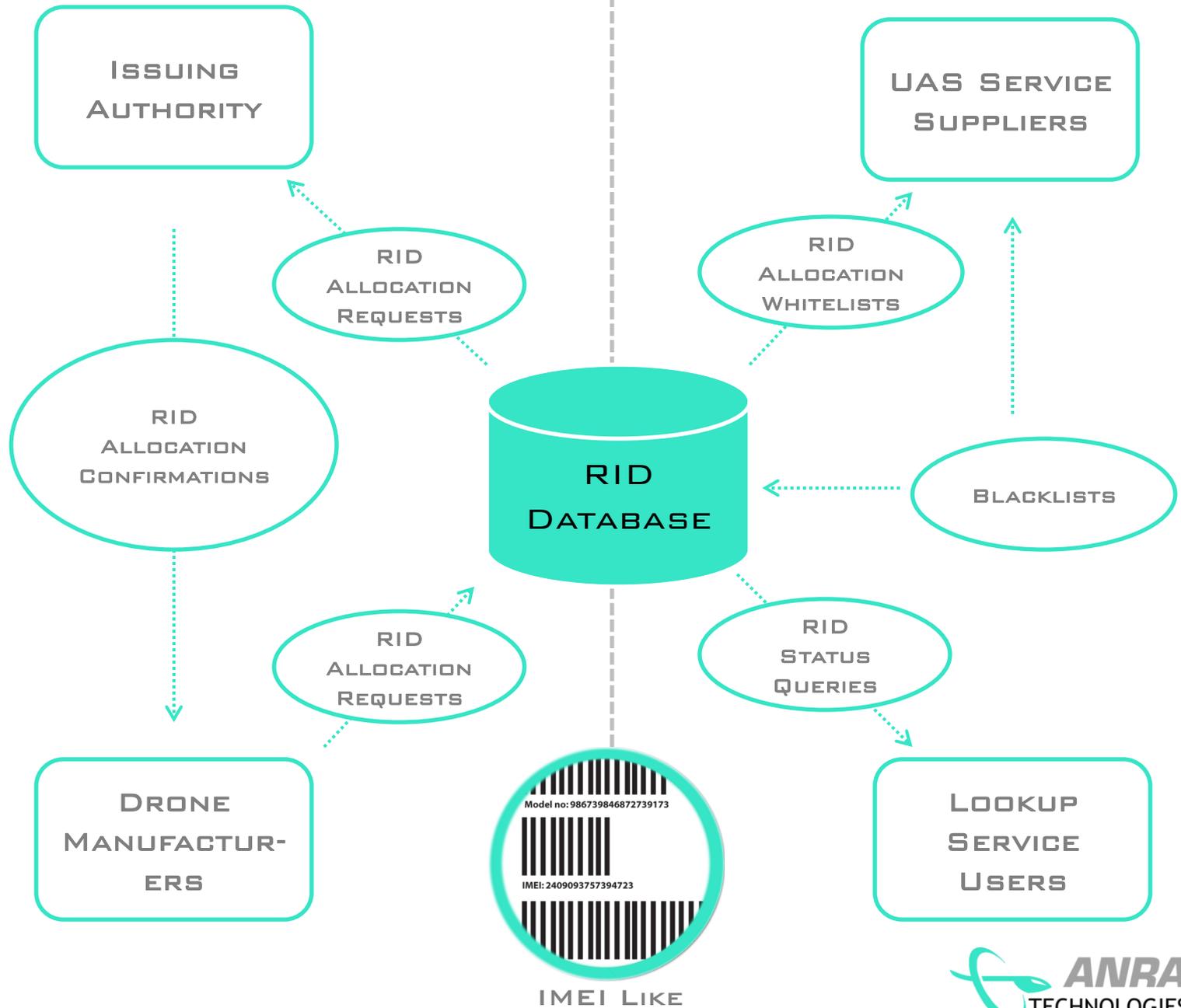
- **REQUIRED FOR THE HUMAN STAKEHOLDERS**
 - LAW ENFORCEMENT AND PUBLIC
- **TO MAKE STRATEGIC DECISIONS RELATED TO MISSION MANAGEMENT**
 - LAUNCH, EXECUTION, AND/OR TERMINATION OF AIRSPACE OPERATIONS.
- **ENSURE AUTHENTICITY**
 - ONLY AUTHENTICATED AND APPROVED UAS CAN OPERATE IN THE GIVEN AIRSPACE.



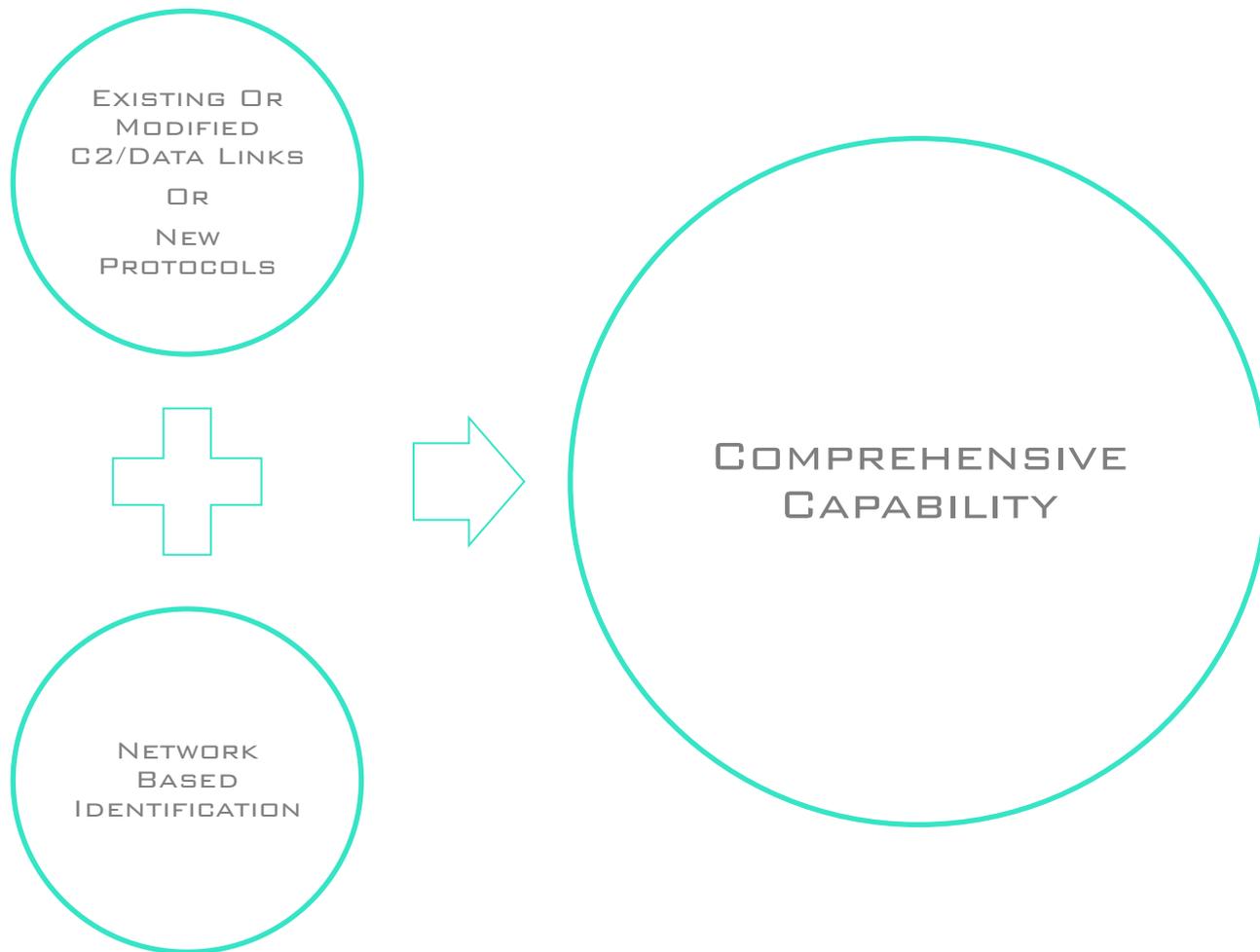
MANAGING AUTHORITY

RID ALLOCATION MANAGEMENT

RID COLOR LIST MANAGEMENT



IDENTIFICATION CHANNELS



NO ONE SOLUTION FITS ALL – NEED MULTI
PRONGED APPROACH

LOCALIZED SOLUTION

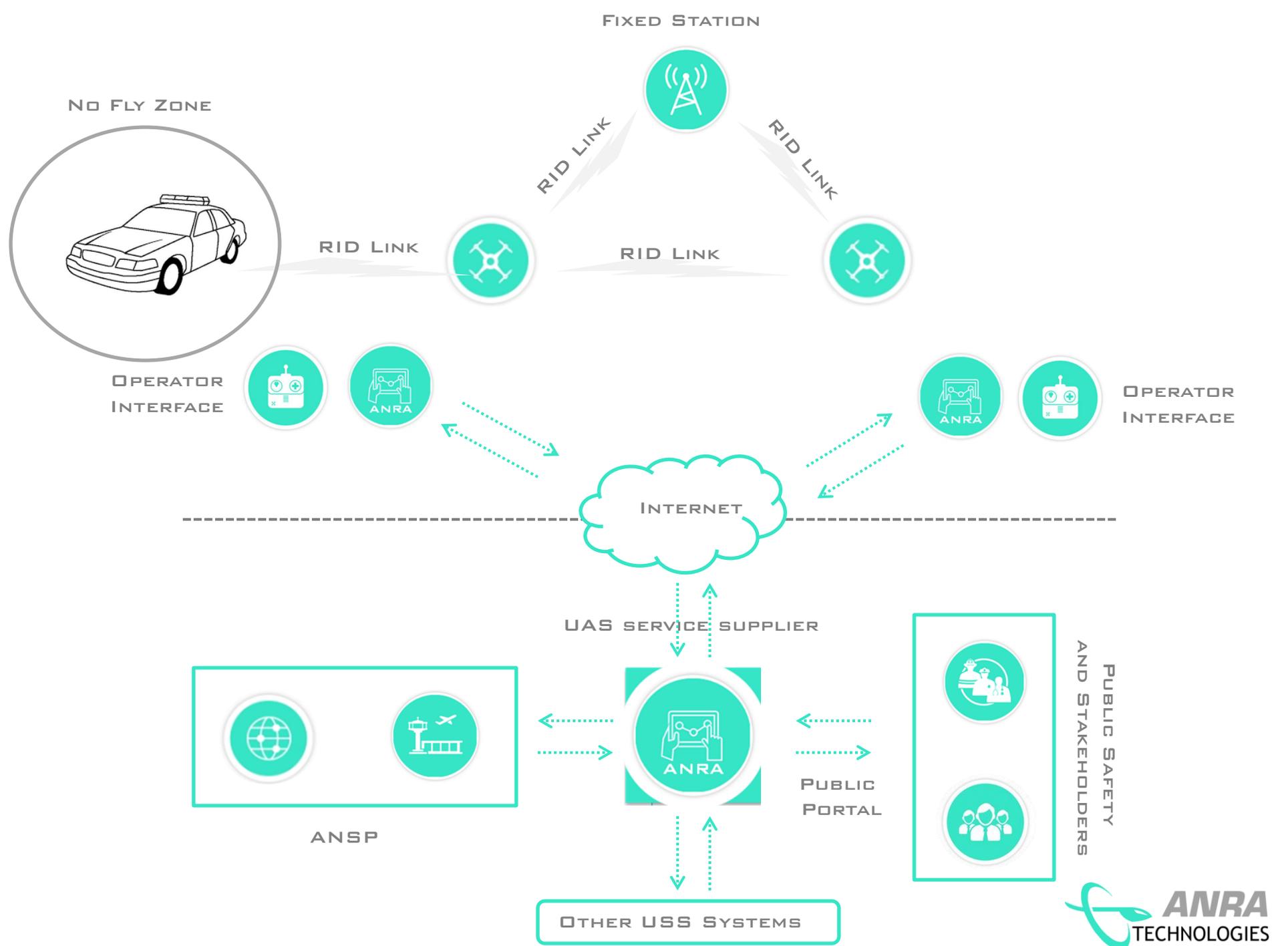
- **TRADITIONAL G2 AND DATA LINK TECHNOLOGIES**
 - IN ADDITION TO LONG AND MEDIUM RANGE RF LINKS, LOW POWER AND RANGE TECHNOLOGIES SUCH AS DSRC AND CLASS 1 BLUETOOTH NEED BE CONSIDERED.
- **MORE DETERMINISTIC MECHANISM FOR DISCOVERING OTHER DEVICES**
 - AN ACTIVE LOW COST SNIFFER TO ISSUE FREQUENT INQUIRY PACKETS ON ALL CHANNELS.
 - BLUETOOTH OPERATES IN PUBLIC SPECTRUM, SO ACTIVE SNIFFERS WOULD VIOLATE NO FCC RULES OR LAWS.



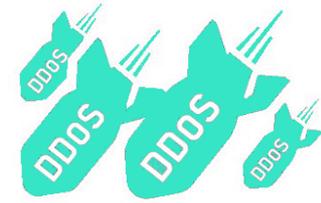
NETWORKED SOLUTION

- **CELLULAR**
 - LEVERAGE COMMERCIAL WIRELESS BROADBAND SOLUTIONS FOR C2, REAL TIME SENSOR DATA AND DRONE ID TRANSFER.
 - NEED TO SUPPORT A HIGHLY DIVERSE RANGE OF NEW APPLICATIONS, USER REQUIREMENTS, AND CONNECTED DEVICES
- **HETEROGENEOUS NETWORKS**
 - THESE NEXT GENERATION NETWORKS WILL BE HETEROGENEOUS NETWORKS USING A MYRIAD OF WIRELESS TECHNOLOGIES SUCH AS CELLULAR, MILLIMETER WAVE, WIFI ETC.



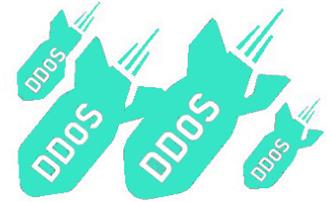


SECURITY KEY MANAGEMENT



- **HETNET**
 - DRONE SOLUTION DEVELOPERS WILL BE ABLE TO DESIGN THEIR PRODUCTS WITH DIRECT ACCESS TO THE CLOUD & CAPABILITIES FOR PEER TO PEER COMMUNICATIONS.
- **ALTERNATE TRUST MODELS**
 - ALTERNATIVE TRUST MODELS ARE REQUIRED THAT ALLOW FLEXIBILITY IN ESTABLISHING TRUST MODELS ACROSS HETEROGENEOUS DEVICES, ACCESS TECHNOLOGIES, NETWORK DOMAINS AND COMMUNICATION MODES.
- **ASYMMETRIC KEYS**
 - GOING FORWARD USING ASYMMETRIC KEYS SHOULD ALSO BE CONSIDERED.

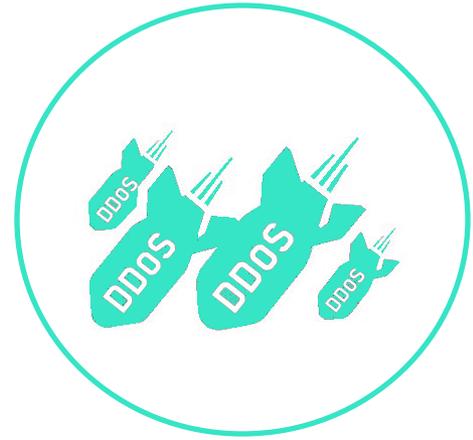
SECURITY IDENTITY MGMT



- **POLICY BASED ACCESS**
 - THE ESTABLISHED IDENTITY CAN BE THE BASIS TO ACCOMPLISH FURTHER SECURITY GOALS, SUCH AS POLICY-BASED ACCESS CONTROL DECISIONS TO RESOURCES
- **HARDWARE TRUST POINTS**
 - DRONES NEED TO BE IDENTIFIED AS HARDWARE TRUST ANCHORS
- **PROVISIONING, VALIDATION AND REVOCATION**
 - IDENTITIES NEED TO BE DEFINED, PROVISIONED, MAINTAINED, VALIDATED, REVOKED,

SECURITY

DENIAL OF SERVICE



- **BOTNET**

- DRONE NETWORKS WILL BE EXPOSED TO DoS TARGETING THE LIMITED RESOURCES OF SPECIFIC SERVICES, MUCH LIKE BOTNET-DRIVEN DISTRIBUTED DENIAL OF SERVICE ATTACKS IN THE INTERNET.

- **MULTIPLE INTERFACES**

- PLAN FOR MITIGATION OF SUCH ATTACKS BY HAVING REDUNDANT INTERFACES AS WELL AS EXTENSIVE FAIL-SAFES INTEGRATED IN THE SOLUTION.

CONTACT US

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