UAVIATION

UNMANNED SERVICES FOR A SUSTAINABLE MINING LIFE-CYCLE

Gestion del Ciclo de Vida de una Mina mediante el Uso de UAV

EU-LATAM DIALOGUE ON RAW MATERIALS

Unit of Raw Materials, DG GROW at EXPOMIN

Santiago de Chile
April 2016

ITRB GROUP

INDEX

1. UAVIATION
   1.1 THE COMPANY
   1.2 ITRB INNOVATION PROGRAM
2. UAVIATION SERVICES
   3.1 OVERVIEW
   3.2 GEO-X
   3.3 SAT
   3.4 POLITICAL AFFAIRS
   3.5 PRO-X
   3.6 SIT
   3.7 THE TEAM
3. PARTNERSHIP

1. UAVIATION
1.1 THE COMPANY
1.2 ITRB INNOVATION PROGRAM
2. UAVIATION SERVICES
3.1 OVERVIEW
3.2 GEO-X
3.3 SAT
3.4 POLITICAL AFFAIRS
3.5 PRO-X
3.6 SIT
3.7 THE TEAM
3. PARTNERSHIP

UAVIATION: a ITRB Group Company

ITRB SITES

HISTORY

2008 ITRB is founded by a group of engineers with an average of over 20 years of professional experience in Aerospace.

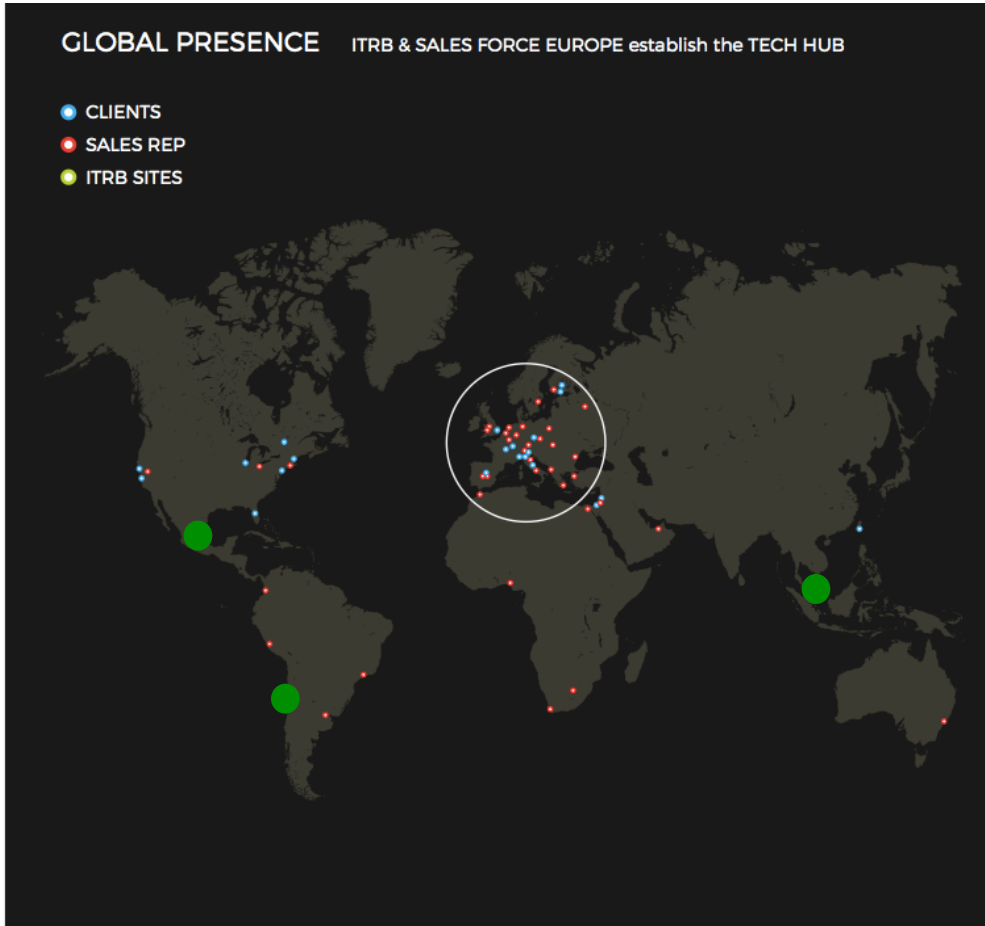
2012 ITRB 2.0 is launched with the target of boosting R&D content

2015 TRB 4.0 is set to cover the entire Product Life-Cycle

Uaviation was founded in Sept. 2015 as spin off of ITRB Group and acquired Sydrone a Spanish company certified with AESA

- ITRB/SFE CURRENT SITES
- FOCUS 2016
- SFE TECHNICAL REPRESENTATIVES

ITRB CONSULTING



OUR CLIENTS

…some of our Clients

COAST COMPOSITES INC
HAMPSON

BURNHAM
COMPOSITES

FOKKER
AEROSTRUCTURES

asco

MICAM

iVC
INTERNATIONAL
VENTURE
CONSULTANTS

PREMIUM
AEROTEC

ALESTIS
AEROSPACE

MPB
AEROSPACE

GREEN AVIATION

TechBA
Programa de la Secretaría de Economía Operado por FUMEC

Knowledge Valley S.L.

Universidad
Europea
de Madrid
Laureate International Universities

AVCORP

IDEC

novalti

ACATEC
AERONAUTICAL PRECISION AND TECHNOLOGY

protomgroup

MEMEX
AUTOMATION

OFFICIAL PARTNERSHIP

SFE has helped over 100 technology companies expand to international markets.

With over 60 active Sales and Marketing professionals, SFE's mission is to help high-tech companies rapidly and profitably launch, develop and expand their business – without the costs, risks and delays associated with opening foreign offices and hiring local employees.

Target: working as on-demand sales professionals who represent your brand in-country, blend into your company culture, and use our local market knowledge and sales contacts to make revenues manifest quickly. We work in 27 countries and 14 languages throughout Europe and beyond.

INNOVATION

ITRB shows an impressive record of **41% of Success** Rate in Innovation Projects thanks to 3 pillars:

- **Consortium Members Balance**
- **KIM** (Knowledge & Innovation Management)
- **Program Management** in Feasibility and Execution Phase

Following examples of Successful Projects

www.remartproject.com

http://nemesisproject.org

www.remaghic-project.eu

http://plitproject.org

ITRB, together with its partners, decided to launch 3 Spin Off Companies in late 2015:

CYCLEFIBER **UAVIATION** **HYPERAVIO**

OFFICIAL PARTNERSHIP

Established in Spain in 1879, the Group is composed byover 450 professionals, in 10 Companies and 32 branches worldwide

Clarke, Modet & Cº
ESTABLISHED IN 1879

INTELLECTUAL PROPERTY

Over 200 IP specialists provide a *comprehensive range of IP legal and consultancy services* covering Latin America, Spain and Portugal

An additional 250 professionals include legal assistants, research specialists and support staff

Compliance with Good Corporate Governance Standards

Global standards for accounting, tax and labour law compliance.

INDEX

1. UAVIATION
   1.1 THE COMPANY
   1.2 ITRB INNOVATION PROGRAM
2. UAVIATION SERVICES
   3.1 OVERVIEW
   3.2 GEO-X
   3.3 SAT
   3.4 POLITICAL AFFAIRS
   3.5 PRO-X
   3.6 SIT
   3.7 THE TEAM
3. PARTNERSHIP

UAVIATION provides Operations of Inspection, Monitoring, Rescue and Prevention, replacing conventional human Operations with Unmanned and Remotely Operated Air Vehicles, hence reducing operating costs, time and, most important, risk for human operators (i.e. fire-fighting, mines, chemical plant).

Vehicles, selected from a wide range of manufacturers and chosen depending the specific mission, perform the Operations.
The final client can select the specific mission (operation) via an App, available on all the main platforms.

In order to perform operation beyond the State of the Art, UAVIATION defined a precise strategy of Hardware/Software and Systems Development and Integration to perform such operation with competitive edge in terms of cost, time and safety.

The services available are focused on 7 main sectors:

B2B

1. MAINTAINANCE & INSPECTION
    - MINING
    - ENERGY
    - INFRASTRUCTURE
2. AGRICULTURE
    - FIRE-FIGHTING
    - CROP DUSTING & GROWTH MONITORING
3. HEALTH & SAFETY
4. ENVIRONMENT PROTECTION
5. PATROLLING AND CONTROL

B2C

6. AUDIOVISUAL
7. UTRACKER

UAVIATION SERVICES COMPETITIVE ADVANTAGES in drones operations resides in the ability to perform customized operations depending on customer needs, thanks to effective technological developments that reduce the time and ensure safety in operations.

The safety of operations is fulfilled by
a) **Certified human operators** in the ground control station with previous **experience as pilots**
b) **Procedure for vehicle maintenance**
c) **Team experience in aircraft design and operations**

The above factors allow to operate large vehicles **up to 12 hours endurance**.

The need for "custom" inspections and customized as per client requirements is one of the advantages Uaviation is able to carry out thanks to the expertise in system installations and collaboration with specialized technological centers.

UAVIATION introduces into MINING LIFE-CYCLE, from EXPLORATION to POST-CLOSURE

the EXPERIENCE resulting from PROGRAM MANAGEMENT in AEROSPACE and MATERIALS SCIENCE

with the SUPPORT of 3 pillars

UNMANNED AERIAL SERVICES for MONITORING & CONTROL (UAVIATION)
INTEGRATED MATERIALS LIFE-CYCLE IMPLEMENTATION (CYCLEFIBER)
and AUGMENTED REALITY ATM (HYPERAVIO)

TARGETS FOR MINING OPERATIONS

1. **SUSTAINABILITY**
2. **COST REDUCTION**
3. **PROCESS OPTIMIZATION**
4. **SAFETY**

Mine Phase	Primary Objectives	Typical Activities
Exploration	Discovery and mapping of the extents of an economic ore deposit	Review existing geologic information. Detailed surface reconnaissance (e.g., geologic mapping, geochemical sampling, geophysics) Subsurface investigations (i.e., drilling; exploration pits, adits or shafts)
Mine Planning, Feasibility and Design (Development)	Assess the economic viability of mining and processing	Development of the mine plan and waste management plan Characterization of baseline site conditions Completion of the Environmental and Social Impact Assessment Completion of the Feasibility Assessment Design of mine layout and facilities Mine permitting
Construction and Commissioning	Construction of facilities and infrastructure for operational mine	Construction of mine infrastructure (e.g., power, roads, water) Construction of metallurgical processing , waste containment and water treatment facilities
Operation	Extraction and processing of ore deposit	Mineral extraction and processing Ore body dewatering Development of waste facilities (waste rock, tailings)
Decommissioning	Site closure - to the extent possible, re-establishment of pre-mining conditions or conditions suitable for post-mining land use	Site reclamation (e.g., regrading, covers) Dismantling of buildings and road decommissioning Ongoing water treatment
Post-Closure	Land use commensurate with owner's desire and adjacent land uses Management of long-term environmental impacts	Environmental monitoring Site redevelopment Possible water treatment Long-term maintenance of waste storage facilities

GEO-X

UNMANNED AERIAL
GEOLOGICAL EXPLORATION & MAPPING

SAT

SUSTAINABILITY ASSESMENT TOOL &
MINING LCA (LIFE-CYCLE-ANALYSIS)

POLITICAL AFFAIRS

POLITICAL AFFAIRS & INTELLIGENCE at
EUROPEAN, SPANISH & ITALIAN LEVEL

PRO-X

RE-DESIGN OF MINING PROCESSES

SIT

SAFETY IMPLEMENTATION TOOL &
MINING OPERATION ENVIRONMENTAL
MONITORING

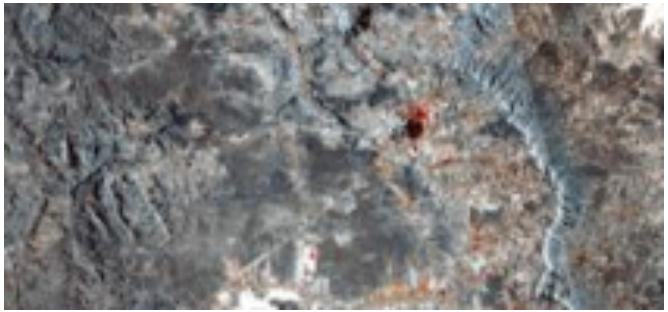
MINING OPERATIONS
EXTRACTION
PROCESS

TAILINGS
PIPELINES
DAMS

GEOLOGICAL EXPLORATION

PHASE 1 GEO EXPLORATION
PHASE 2 DETAILED GEO EXPLORATION

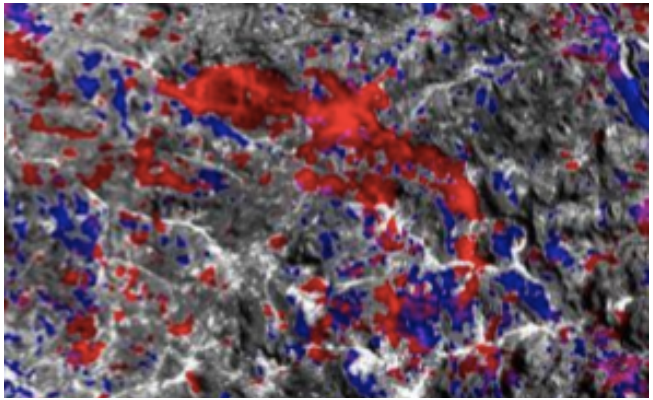
with UNMANNED AIR VEHICLES via
HYPERSPECTRUM
RADAR
LIDAR
HD CAMERA



TARGET

- ❑ AIRBORNE HYPERSPECTRAL SURVEYS
- ❑ MINERAL DISTRIBUTION MAP
- ❑ MONITORING OF MASS MOVEMENTS

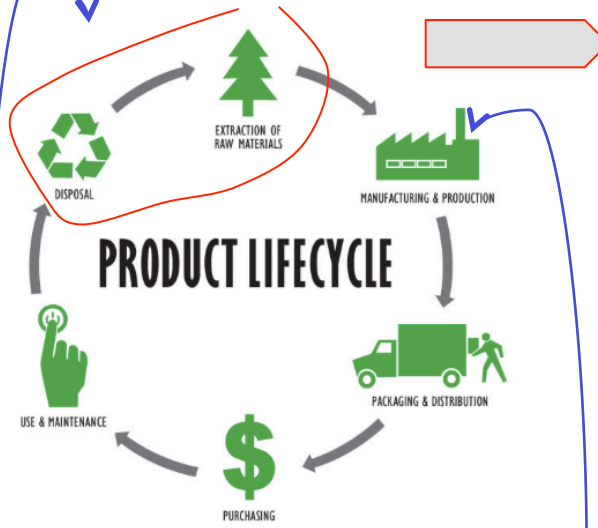
for MINING INDUSTRY and OIL&GAS INDUSTRY



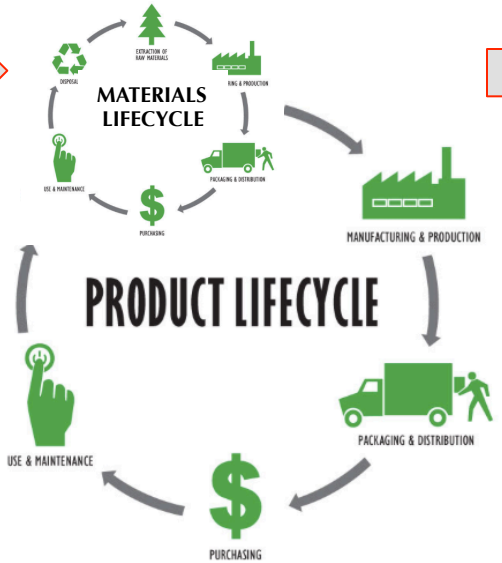
POLITICAL AFFAIRS SERVICES

- Monitoring of the EU institutional legislative and non-legislative activities.
- Consultancy on defining a strategy for the political and institutional communication of the Client both at the Italian, Spanish and EU level.
- Implementation of the above strategy through:
  - Organization of bilateral or multilateral meetings;
  - Organization of public events;
  - Regular daily liaising with all institutional stakeholders (especially the European Parliament, the Council of the EU and the relatives national Permanent Representations, and the European Commission);
  - Regular daily liaising with all non-institutional stakeholders on behalf of the Client, including trade associations, think tanks, and other pertinent forum;
  - Participation to public events which are relevant for the Client;
  - Drafting position papers, work documents, suggestions for amendments, press releases, and other documents pertinent to the dossiers.
- The Client will have access to all offices of ITRB in Brussels, and will have the opportunity to use its meeting rooms and facilities for all meetings.
- Monthly debriefing of the activities performed, including an analysis of the status political debate andan update on the strategy to be implemented.

TRANSITION from PRODUCT LIFE-CYCLE to MATERIALS LIFE-CYCLE



DESIGN FOR LIFE-CYCLE



RESOURCE EFFICIENCY APPROACH
FULL-CIRCULAR ECONOMY

DevOp
DEVELOPMENT OPERATIONS

NEW APPROACH

for Mining Process LifeCycle
based on
Knowledge Transfer from
Aerospace Product LifeCycle and
ICT DevOp (Development Operations)

TARGETS

- ❑ MONITORING
  - MINING OPS
  - TAILING PIPELINE & DAMS

MONITORING of TAILINGS PIPELINES & DAMS

Support to Mining
Sustainable and Safe Operations
and Disaster Relief

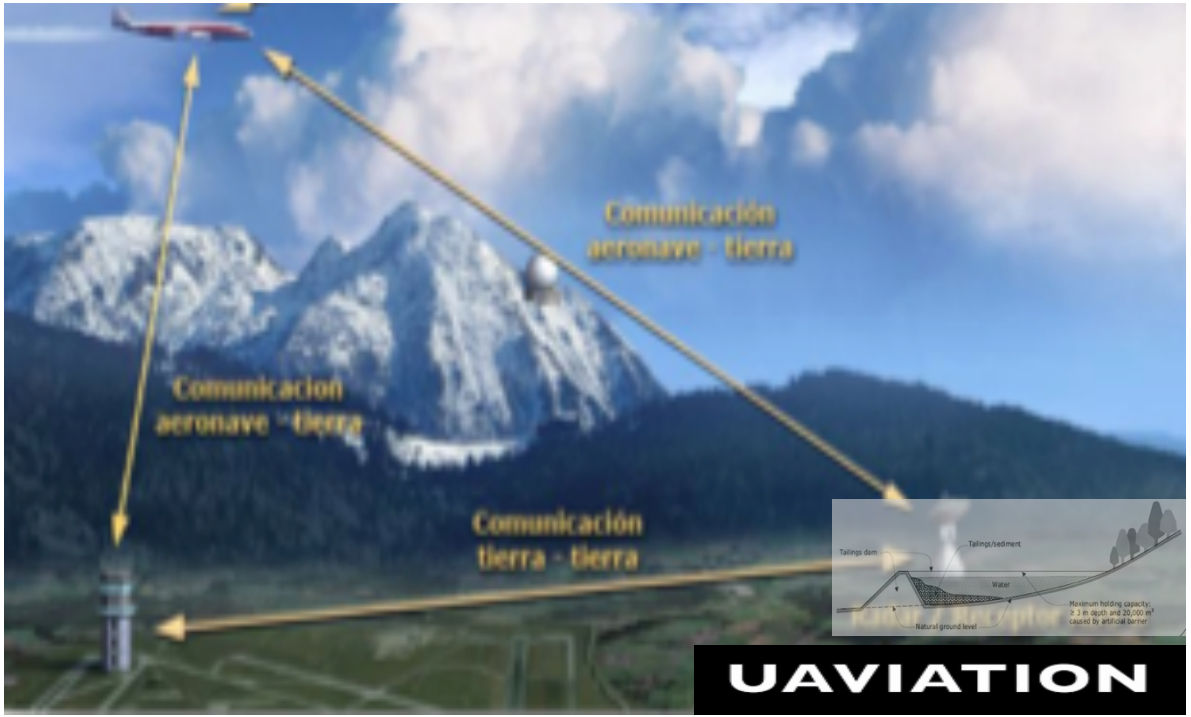
TARGET

- MONITORING
  - MINING OPS
  - TAILING PIPELINE & DAMS
- DISASTER RELIEF

proposed IMPLEMENTATION TOOL of

Towards Sustainable Mining
Vers le développement minier durable

The Mining Association of Canada | L'association minière du Canada



MONITORING of TAILINGS PIPELINES & DAMS

1. MINING OPERATIONS
    - EXTRACTION
    - PROCESSING
2. TAILINGS PIPELINES & DAMS
    - EXISTING MINES
        - ✓ INTERNAL AUDIT
        - ✓ INSPECTION ON THE GROUND
        - ✓ MONITORING
        - ✓ PIPELINES
            - FIBEROPTICS
            - UNMANNED AIR SERVICES
        - ✓ DAMS
            - TAILINGS STRATIFICATION ANALYSIS
            - TAILINGS STRATIFICATION MATHEMATICAL PREDICTION
            - UNMANNED AIR SERVICES
    - NEW MINES
        - ✓ INSPECTION DURING ENTRY IN SERVICE
        - ✓ ADDITIONAL SERVICES
        - ✓ PROTOCOL for EXISTING MINES

UAVIATION

MONITORING of TAILINGS PIPELINES & DAMS

- Defects in tailings are to be analyzed by means of:

  - ❑ Pressure distribution along the wet wall.
    Parameter to be controlled: Stratification
    by means of superimposed optical measurement: color thermographic spectrographic measurement

  - ❑ Minor movements conductive to fluid leakage (iniciator of material washout).
    Fluid leakage will lead to humidity at the dry wall, that with sun will lower temperature.
    Parameter to be controlled: Temperature distribution along the dry wall.

- General procedure:
  - ✓ Review of the piling calculations
  - ✓ Material samplings
  - ✓ Stratification inspection (recurring)
  - ✓ Wall temp distribution (recurring)
  - ✓ Monitoring of waste material (recurring)
  - ✓ Visual inspection (monthly)

STATUS ASSESSMENT REPORT

UAVIATION

INTEGRITY OF TAILINGS PIPELINES

- Use of Bragg networks (Structural Health Monitoring).

  Parameter: Minor diSplacements of the structure.
  Method: Bonding of optical fibers along the pipeline spaced 120º along all the length.
  Periodical measurement of displacements

THE TEAM ...just some of us

ROCCO LAGIOIA

CEO UAVIATION
COO and founder of ITRB Group
Professor of Structural Analysis

20 Years Aerospace and Aviation experience in 7 European Countries. His experience has been developed with all the main Aerospace Companies such as British Aerospace, Airbus in all its main sites (Bremen, Bristol, Hamburg, Toulouse), Fokker, Dassault, Alestis and Embraer.

JUSTINA DEVOTO

PRESIDENT & CHIEF STRATEGY OFFICER UAVIATION

Senior Manager at Chairman's and COO's Office at Telefonica
22 years of experience in telco and technology companies. Justina served as Managing Director of Sales & Marketing and Business Development at Minorplanet Systems (UK based startup) and she holds a B.A. degree in Economics & Biz Administration at CUNEF.

RICK PIZZOLI

CHIEF COMMERCIAL OFFICER UAVIATION
Managing Director and founder of SalesForceEurope

Rick has grown SFE to successfully introduce over 100 Tech Companies to the EMEA and Latin American markets managing a team of 60 Partners. Rick launched Maple Optical Systems in Europe, a $100M funded Silicon Valley startup. Rick ran Nortel's European Business Development, which resulted in over $75M of incremental business for the company.

HELI RODRIGUEZ

UTRACKER PROJECT TECHNICAL LEADER
CTO UAVIATION

Over 25 years' experience in Software development, computer systems engineering, telecommunications, computers.
Extensive knowledge of computers, telecommunications, radio, networks, software. Extensive knowledge of physics, chemistry, ceramics, energy.
Degree Industrial Engineer by university of León.

RAFA MILLAN

CHIEF LEGAL OFFICER (CLO) UAVIATION
CEO Lomana Investment

20 years' experience as M&A lawyer, **Venture Capital** and as legal and financial advisor in Spain, Latin America, East Europe and West Africa.
PDD (MBA) from IESE.
Master in International Law from UCL (Louvain, Belgium).

FERNANDO MUÑOZ

CFO UAVIATION

21 years' experience more than 12 years as a CFO.
Huge experience in assisting more than 31 start up companies to develop their financial structure, as external consultant, and 3 successful start ups on his own.

INDEX

1. UAVIATION
   1.1 THE COMPANY
   1.2 ITRB INNOVATION PROGRAM
2. UAVIATION SERVICES
   3.1 OVERVIEW
   3.2 GEO-X
   3.3 SAT
   3.4 POLITICAL AFFAIRS
   3.5 PRO-X
   3.6 SIT
   3.7 THE TEAM
3. PARTNERSHIP

MARKET ADOPTION

PARTNERSHIPS

UAVIATION is in conversation with following potential Partners.

TECHNOLOGICAL

Fraunhofer Institute	Germany
IGME	Spain
Fundacion Cidaut	Spain

VEHICLE MANUFACTURERS

AIRBUS	France
Everis	Spain
Novadrone	Spain
Confidential	Austria

SYSTEMS MANUFACTURERS & INTEGRATORS

Confidential	Spain
Confidential	Italy

A **MoU has been already signed with SALESFORCE EUROPE** as a Launch Client and negotiations have been started with Target Clients and Partners.

EVENTS 2016

1. GLOBAL AEROSPACE SUMMIT 2016 http://aerospacesummit.com
2. UMEX 2016 ABU DHABI http://umexabudhabi.ae/
3. UNVEX AMERICA 2016 www.unvexamerica.com
4. EXPOMIN 2016 www.expomin.cl
5. UNVEX SPAIN www.unvex16.com
6. FARNBOROUGH AIR SHOW 2016 www.farnborough.com
7. MAKER FAIR ROMA www.makerfairerome.eu/eN
8. SOUTH SUMMIT www.southsummit.co

THANK YOU

Rocco Lagioia
r.lagioia @ itrb.net