



Tunisian Capacity Building Experience in Space Technology Engineering Tunisia/North Africa



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October 30 –November 2, 2017 Samara, Russian Federation

INTRODUCTION

- Tomorrow's society will be more closely linked to space activities.
- African and MENA countries have to catch-up faster their technological backward.
- For that, our activities in recent years revolve around: the promotion, the collaboration and the development of **education and research activities** in space technology and mainly in small satellite fields.
- We have to attract industries and help train future socio-economic actors and **new professions** at the challenges of the 21st century,

HIGHER INSTANCE OF COORDINATION



INTERNATIONAL CENTRES INSTALLED IN TUNISIA

CRTEAN: North African Center for Remote Sensing

(Mauritania, Morocco, Algeria, Tunisia, Libya, Egypt, Sudan)
Regional collaboration (north Africa)



AICTO: Arab ICT Organisation

(All arab countries: Arab League)
With Project of : GNSS training Centre



African Association for Geospatial Development

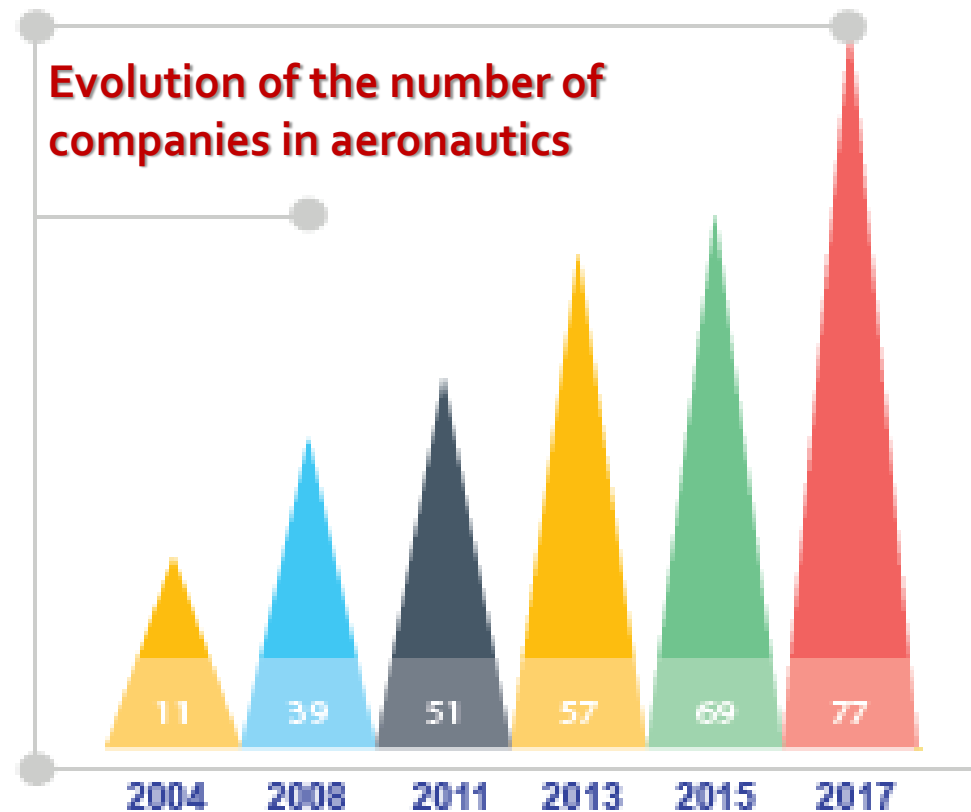


Tunisian Association for Communication and spatial sciences

ATUCOM

AERO & SPACE INDUSTRIES IN TUNISIA

- **Grouping of Tunisian Aeronautics and Space Industries (GITAS)**
- ZODIAC,
- LATELEC
- SABENA TECHNICS
- STELIA AEROSPACE
- *MECAHERS AEROSPACE*
-



Source : Enquête CEP/AFPI-Avril 2017



TUNISIAN UNIVERSITIES



- 1st Rank African Research Production per capita
- 11 millions population
- 13 universities
- 37 Centres for research
- 23000 permanent Higher Education Teachers
- 320 000 students
- 1/3 in Fundamental sciences, engineering, Informatics, multimedia,...



Open to new opportunities
Space technology is an attractive discipline
when it becomes available



WORKING GROUP: UNISEC TUNISIA



- **Promotion of National and International projects:**
 - Prototypes, experiments and launch operations, imaging, Monitoring, ground station, safety methods, Cansat....
- **Working on Fundraising and Project Support:**
 - design satellites, water monitoring, ground station, devices and antennas ..
- **Promotion of the alliance:**
 - Research-Education-Business-Industry-Government-Agencies
- **Organization of events:**
 - conferences, competitions, calls for mobilizing actors collaboration
- **Communication and dissemination:**
 - Training supports and academic activities in the field.
- **Promotion of International Cooperation:**
 - (IAA, UNOOSA, BSTI, UNISEC, other organization and universities...)



Mission projects
& Architecture



University
of Monastir
UEI Lab



University
of Sousse
VSEE

UAV, Recognition
Embedded systems



Univ. Tunis El
Manar
CSEHF

Antennas, RF
communication

University Space Engineering Consortium **TUNISIA**
UNISEC

Sup'Com, Univ
Carthage,
URISA

SUP'COM
Teledetection
& SAR - IP

INAT, Univ
Carthage
Green Team



Teledetection
Analysis & modelling

ENIT, MH E
Lab

Modelling on Hydrology
and Environment

Mapping and
infrastructure



CNCT, MDN

CERT Tunis,
MT



Ground station
Regulation



CRMN
Sousse

Cubesat
developing

Sfax Univ.
REGIM Lab



Sat Design
EPS – ADC Systems



BECAUSE SPACE IS SPECIFIC AND MULTIDISCIPLINARY ...

We introduce courses in several graduate levels for Basic approaches:

- Astrophysics ...
- Based knowledge in space physics and technologies
- Satellite Telecommunication
- GNSS
- Signal and image processing
- Small satellite design
- Mechatronics & Microelectronics
- Computer Technology (Space & Ground Segments)
- Space System Engineering (based on NASA model)
- Msc and PhD Thesis related to space applications



1ST AND 2ND MAGHREB INTERNATIONAL COURSES IN **SPATIAL TECHNOLOGY (NANO-SATELLITES)**

University of Monastir April 2012 and Mars 2014

Scientific Program

SCIENTIFIC PROGRAM

Day I:

9h: Opening

9h15: Building a Tunisian University Space Engineering Consortium,
Pr Kamel Besbes

10h30: Nano satellite mission design
Pr Fernando Aguiar Aguiar

14h: Space craft design
Pr Alim Rustem Aslan

16h: Introduction to RFPast project
Pr Mohamed Adel ALIMI

17h: Young Original experience CarthageCat
Karim HAMID

Day II:

9h: Humanitary Sat program: HUMSAT Case
Pr Fernando Aguiar Aguiar

11h: Mission Idea Contest 3, for Micro, Nano satellite utilization
Pr Kamel Besbes

14h: System engineering Program and Testing
Pr Alim Rustem Aslan

16h: closing

Organizers



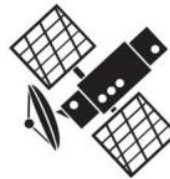
2nd MICST

March, 1, 2014, Begin of 2nd MICST Registration
 March 13, 2014 End of regularization of registration fees
 March, 27-28, 2014 Seminar

Registration fees to: Club Jeunes Sciences Conférenciers

UID MONASTIR-Tunisie
 IBAN : TN0912 002 00094067900997 90

THE 2ND MAGHREB INTERNATIONAL COURSES IN SPATIAL TECHNOLOGY



NANO-SATELLITES DESIGN

2nd MIC-ST
 Monastir—Tunisia
 27-28 March 2014



Pr Aguelet

Pr Aslan

Pr Alimi

Mr Hmaied Pr Besbes



Mic 2, Mic 3, Mic4 Maghreb coordinator (since 2012)

NATIONAL CONFERENCE ON STRATEGIES FOR DEVELOPMENT SPACE TECHNOLOGIES, DEC 2016



White Paper for Space Technology in Tunisia

STRATEGIC RECOMMENDATION'S

SPACE Capacities development

- Building better technology capacities.
- Acquisition of equipment for ground station infrastructures
- Organize of experimental work meeting as CanSat and cubesat workshop to demonstrate feasibility and accessibility of space engineering.
- Develop new educational issues to space technology and application
- Cooperation with industrial companies
- Developing economical and societal applications (Transport, Agriculture, Frontier Survey)

MENA and Africa activities expansion

- Consortium of North African universities
- New research subjects related to regional development

Policy for better space development ?

- In Africa Only 3 space agencies:
- Nigeria (1998), Algeria (2002), SouthAfrica in 2010



ACTUAL PROJECTS

Development of new missions with high regional and international interest

1. **WAQAS: Water Quality Awareness Space System**

- Telemetry for water resources (Dams, Rivers, laks...)
- Climate change observations
- Water/flood/drought/sewage mapping
- Risk analysis and security survey

2. **FACT: Fabrication and Applications of Cubesat in Tunisia**

- Project submitted for national financing
- Building capacities in CUBESAT developments and Tests

3. **TUNISIA 2020**
ROAD TO INCLUSION SUSTAINABILITY AND EFFICIENCY

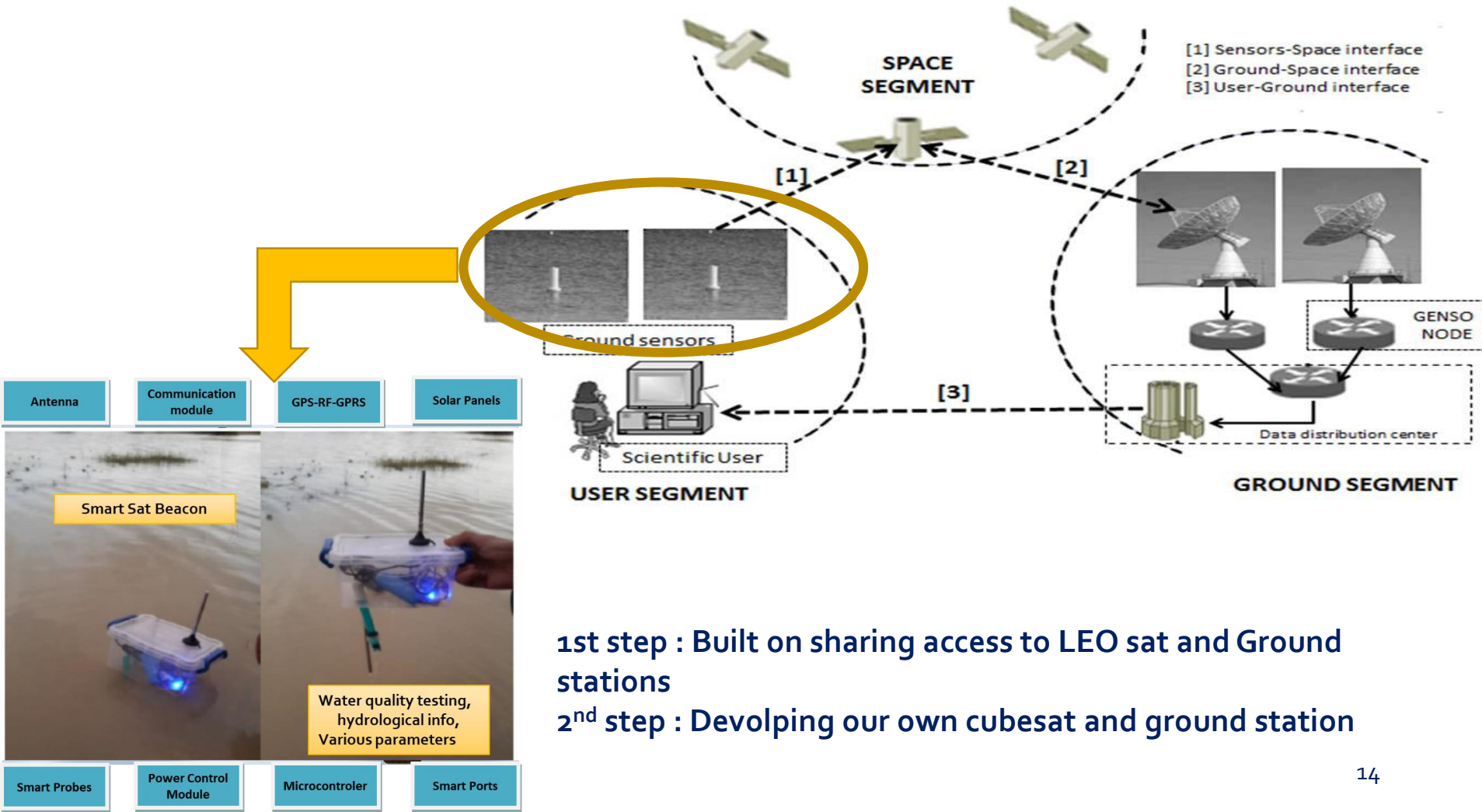
- **New Industrial project: TELNET Compagny** in alliance with **Airbus SAFRAN**
- (experts committee)
- Mounting and testing Microsatellites
- Building Launchers





WATER QUALITY AWARENESS SPACE SYSTEM

WAQAS



- 1st step : Built on sharing access to LEO sat and Ground stations
- 2nd step : Developing our own cubesat and ground station

INTERNATIONAL COLLABORATION



UNIVERSIDADE
DE VIGO



- Bilateral collaboration
- Conference organization
- Visiting Professor
- Internship for Young Researchers
- Workgroup and networking
- Participation on Cansat...



OFFICIAL INTERNATIONAL COOPERATION

- **UNOOSA** : Participation on several symposiums
- **Member of COPUOS** since **2010**
- **H2020** Associated country with **SPACE NCP** since 2017
- **Tunisia China Declaration of Intent** July 2017
- **Member of several associations** as :International Academy of Astronautics



中国航天

中国空间技术研究院
China Academy of Space Technology



.... ESA, DLR, CNES, ISA, JAXA, NASA, ROSCOSMOS, ..

STUDENT AND YOUNG SCIENTIST ACTIVITIES

Permanent exposition in City of Sciences



8th edition
TuniSpace Days
18th to 20th of March 2017
24 180 449
Registration at : www.tunispacedays.com

Association Jeunes Sciences de TUNISIE
L'Association Jeunes Sciences de TUNISIE
L'Association Jeunes Sciences de TUNISIE
LA NUIT DES ÉTOILES
SAMEDI 06 AOÛT À PARTIR DE 20H
OBSERVATIONS GRATUITES
CONFÉRENCES ■ ATELIERS ■ EXPOS ■ PLANÉTIARIUM
EN PARTENARIAT AVEC LA CITÉ DES SCIENCES
WWW.JEUNESSCIENCE.TN / CITÉ DES SCIENCES
US RUE ALIEN SAHABY, CITÉ EL KANDOUKI

NASA
SPACE APPS
LA MARSA
28TH, 29TH & 30TH 2016
POLYTECHNIC SCHOOL
HAM TPS JUNIOR CHAMPION

60+
EARTH HOUR
ساعة الأرض
EARTH HOUR
21:30 - 20:30
مارس 2017
برج حمامات

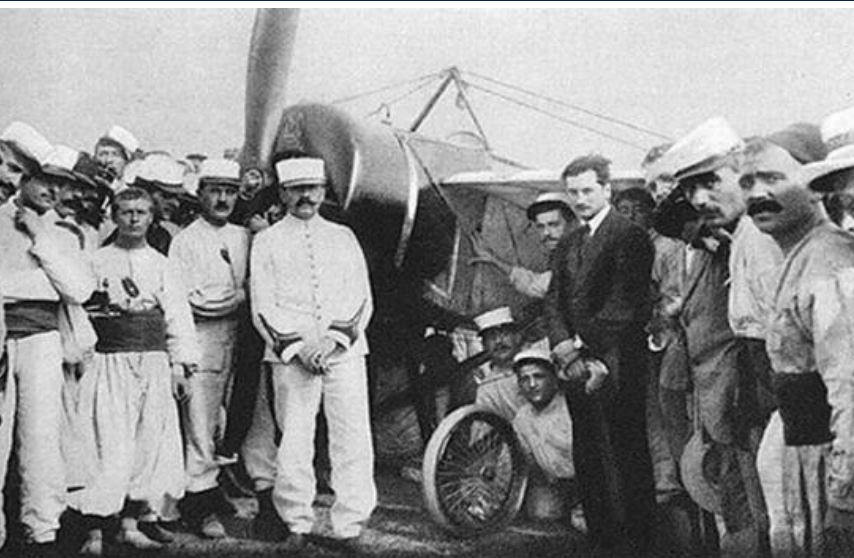
JEUNES SCIENCES
KERKENNAH
ORGANISE
LA NUIT DES ÉTOILES
LE 26 AOÛT 2017
À L'AGORA OULED-EZZEDIN
À PARTIR DE 21H

TEK-UP
Private Higher School
of Technologies & Engineering
Elgazala
Technopark
23rd - 24th APRIL 2016
INTERNATIONAL SPACE APPS CHALLENGE
2nd Edition
NASA'S
SPACE APPS
CHALLENGE
seek knowledge...
Improve life on earth, enable solutions to global problems join the second edition of SAC

CONCLUSION: CAPACITY BUILDING IN EMERGING COUNTRY (TUNISIA)

- **Space economy** (*Space is beneficiary*)
 - Develop with official institutions a collaborative programs for economic benefits :
 - Ministry of Agriculture , Ministry of Transport, Ministry of Environment
 - Water management agencies
- **Space society** (*space is amazing*)
 - Encourage Young curiosity about space activities
 - Encourage university networking (UNISEC_Tunisia)
 - Present opportunities of Space Tech. in media and social medias
 - Explain how space can be a driver for socio-economic sustainable development
- **Space accessibility** – (*Demystify Space technology*)
 - Introduce of new curricula in undergraduate and graduate levels
 - Organize Workshops about accessibility and strategies for space capacity building
 - Build real capacities in technology and applications (ex: CUBESAT developments and Tests)
 - Collaborate in National and Regional context linked to real needs (Water, Environment, ...)
- **Space diplomacy** – (*Space for peace and humanitarian applications*)
 - International collaborative network (Tokyo Univ.- Wursburg Univ.- Istanbul Univ., Vigo Univ...)
 - Associated member in H2020 with SPACE NCP
 - Declaration of Intent between Chinese Academy of Space and Technology / MESRS Tunisia
 - Participating in UNOOSA Activities ..more and more

First crossing of the Mediterranean
23 september 1913, Roland Garros
From South of France to Bizerte - Tunisia
780KM in 13 h 40



23 septembre après-midi : Garros à son arrivée à Bizerte

