

INTRODUCING THE EUROCONSULT GROUP SPACE TRAINING SERVICE OFFER

**TOPIC 1:
SPACE TECHNICAL & ENGINEERING FUNDAMENTALS**

2020 | 2021





CONTENTS

- Our Training Service Offer In A Nutshell
- Topic 1: Space technical & engineering fundamentals
- Contact Information
- Euroconsult Group Presentation



FROM STRUCTURING MARKET TRENDS TO TRAINING NEEDS

- Whatever their form or origin, **space infrastructure ambitions and related procurements follow less and less frequently « dry » or « blind » purchase rationales**, as:
 - They are increasingly part of a much broader picture, with related plans no longer limiting themselves to the sheer ownership — or even operational use — of the acquired capacity
 - Many national players from emerging countries — either established as space agencies, research centers or even satellite operators — have been mushrooming worldwide since the mid-2000s, translating into a flurry of “domsat” projects strongly hitting the market
- ...which increasingly places **capacity building issues at the center of related strategies**, as much powerful and efficient vehicles for:
 - Fostering inherent skills and a buildup of how-how
 - Gaining independence
 - Installing greater prominence, visibility and credibility amongst the international space community



GENERAL SERVICE APPROACH (1/2)

- Our training service offer provides **interdisciplinary knowledge transfer to governments, the private sector and not-for-profit organizations wishing to increase their expertise in the space sector**
- Fully adapted to customers' specific needs, it **customizes both the content and format** of associated training programs **to match customers' specific skill development goals**
- Delivered with an emphasis on **flexibility, accessibility** and **experiential learning**, this tailored service provides both **functional and executive-level training** with **defined outcomes**, among which:
 - Interdisciplinary training on all key aspects of the space industry: technical, markets, program management, etc.
 - Ability to benefit from prepackaged programs or create a customized program
 - Benchmarking, profiling, best practices and lessons learned from key players of the space sector
 - Possibility to organize tours of government and private industry facilities and meetings with international executives and officials
 - Flexibility in choosing a suitable training location, ranging from on-site training on customer premises, in our offices or in a prestigious third-party location
 - Exposure to training in a variety of mediums and formats, from videoconferences to face-to-face seminars, and hands-on exercises, over a few hours, days or week-long sessions



GENERAL SERVICE APPROACH (2/2)

TARGETED AUDIENCES

- Typical customers:
 - Satellite operators
 - Government organizations
 - Service providers
 - Financial institutions
 - Satellite manufacturers
 - Launch service providers
- Typical attendees:
 - Executives
 - Middle managers
 - Program managers
 - Operators
 - Technicians

KEY CUSTOMER BENEFITS

- Fully flexible content that can be either specifically designed or based upon standard packages
- Experiential learning enabling both demonstrable knowledge transfer and networking opportunities
- Access to a unique line-up of seasoned industry experts with extensive sectorial experience
- Combined access to a suitable selection of training venues, industry visits & customer care services

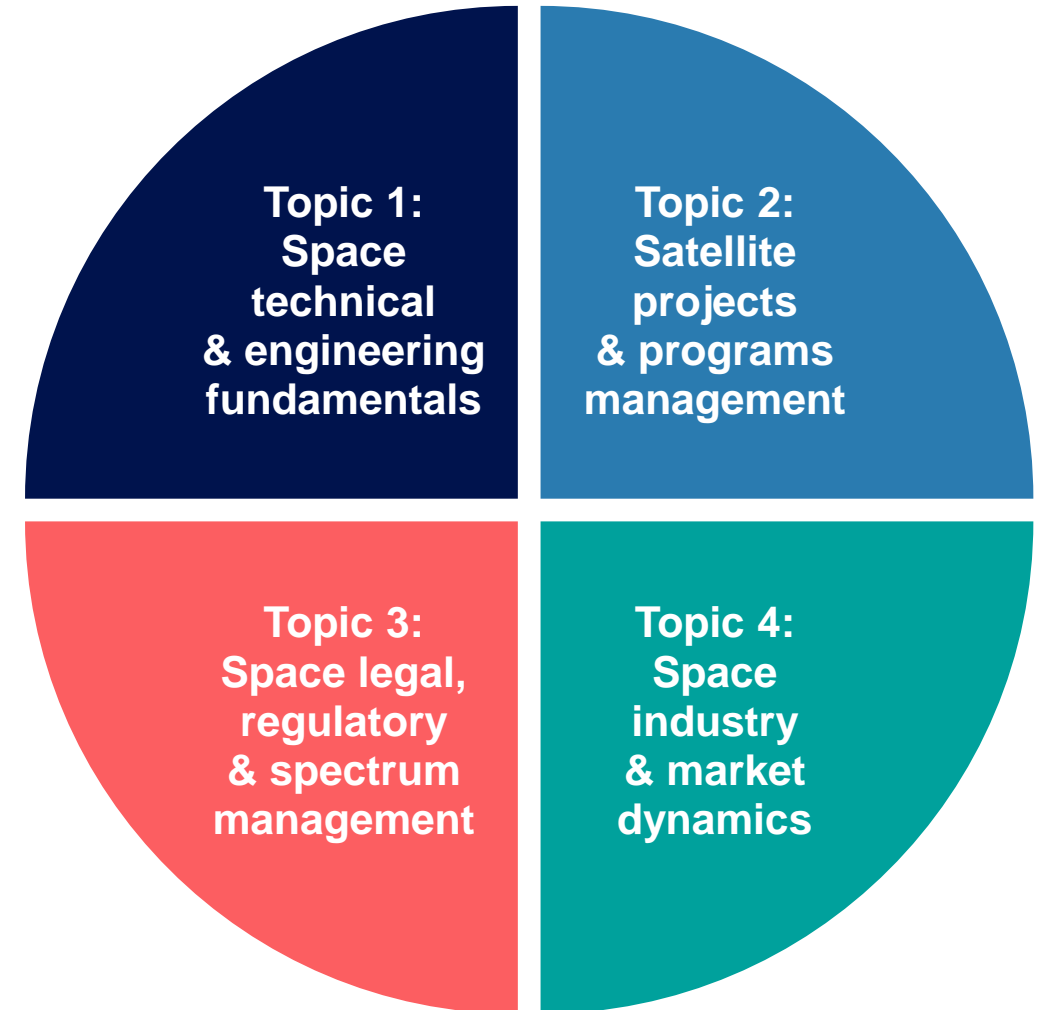
SUPPORT SERVICES

- Adaptation of training course language if required
- Great variety of delivery mediums and formats
- Industrial/cultural visits and networking opportunities
- Flexibility for the most suitable training location
- Customer care service and follow-up



FROM TRAINING TOPICS TO DELIVERY MODES

- Our training service offer is based upon **four main topics** covering, over a total of **38 individual training modules**, the **full spectrum of issues to be considered to operate in the space sector**, i.e.:
 - Space technical & engineering fundamentals
 - Satellite projects & programs management
 - Space legal, regulatory and spectrum management
 - Space industry & market dynamics
- ...available in **two alternative delivery modes** depending upon customer objectives, requirements, and constraints, i.e.:
 - Pre-packaged
 - Customized





TRAINING CATALOG OVERVIEW

	Topic 1: Space technical & engineering fundamentals	Topic 2: Satellite projects & programs management	Topic 3: Space legal, regulatory & spectrum management	Topic 4: Space industry & market dynamics
Nb. of training modules	17	7	5	9
Typical module duration range*	0.5 to 2 days	0.5 to 2 days	1 to 3 days	1 to 2 days
Typical contents	End-to-end technical and engineering space industry fundamentals	Space program management topics, from business planning to risk management assessment	Legal, regulatory and frequency challenges impacting business plans, investment and programs	Space industry policy and market perspectives and trends
Available delivery formats	Face-to-face or online	Face-to-face or online	Face-to-face or online	Face-to-face or online

* Depending upon customer objectives, requirements, and constraints.



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TRAINING CATALOG DETAILS

- Structured along a topic-by-topic basis, the following slides provide **an overview of each the 17 individual training modules** in terms of:
 - Objectives
 - Prerequisites
 - Related modules
 - Typical duration and delivery format
 - Topics covered
 - Course director
- None of the content presented in this catalogue shall be considered as contractual. Any interested customer is kindly invited to contact us for **a detailed technical and commercial proposal that will be derived from his specific objectives, requirements and constraints**



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

TRAINING MODULES LIST

- 1.1 General introduction to space missions
- 1.2 Space environment & associated constraints
- 1.3 Satellite system design, integration & tests
- 1.4 Satellite platform & subsystems
- 1.5 Quality control & assurance
- 1.6 Launch vehicles & satellite/launcher interfaces
- 1.7 Launch campaign & launch phase
- 1.8 Satellite control operations: From deployment to deorbitation
- 1.9 Satellite communications systems overview
- 1.10 Satellite communications systems: High Throughput Systems
- 1.11 Satellite communications systems: Flexible & reconfigurable systems
- 1.12 Satellite communications systems: Constellation systems
- 1.13 Telecom satellite mission operations
- 1.14 Satellite Earth observation systems overview
- 1.15 Satellite optical Earth observation systems
- 1.16 Satellite radar Earth observation systems
- 1.17 Professions & skills in the space sector



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.1: GENERAL INTRODUCTION TO SPACE MISSIONS

OBJECTIVE

- The objective of this course is to provide an overall summary of the engineering concepts required to understand the technical fundamentals of a space mission.
- Upon completion of this course, trainees will have learned the basics of the space environment, the main components of a space mission and the process for satellite system design.

PREREQUISITES

- No specific prerequisites. This course is an overview of space engineering for trainees with no technical background, or as a general introduction to more advanced courses in space engineering for trainees with a technical background.

RELATED MODULES

To be mastered

To go further

Connected with

1.2 to 1.17

2.1, 3.1, 4.1

TYPICAL DURATION & FORMAT

- 0.5 to 1 day (4-8 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **A unique environment to address specific requirements**
- **Orbits and space environment**
 - Orbital mechanics overview
 - Some specific orbits: geostationary orbit, sun-synchronous orbit etc.
 - Space environment and constraints
- **Key mission components**
 - Space segment architecture: platform and payload
 - Ground and launch segment
 - Mission operations
- **Key applications and system design**
 - Type of mission and objectives
 - System design drivers

COURSE DIRECTOR

- Mr. Olivier MURET, Senior Consultant and Satellite Systems Expert, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.2: SPACE ENVIRONMENT & ASSOCIATED CONSTRAINTS

OBJECTIVE

- The objective of this course is to outline the various specific characteristics of the space environment and related constraints.
- Upon completion of this course, trainees will have learned the key basics to be considered during the design and developmental phases of any space project.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a technical background (meaning either master level or an engineering degree).

RELATED MODULES

To be mastered	To go further	Connected with
1.1	1.3, 1.4, 1.8	3.5

TYPICAL DURATION & FORMAT

- 1 day (8 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Space environment**
 - Key space environment characteristics (vacuum, radiation, thermal cycles, etc.)
 - Orbital mechanics
- **Space constraints**
 - Launch constraints (mechanical loads, thermal and electromagnetic environment)
 - Effects of orbital perturbations on spacecraft
 - Effects of the space environment on materials and electrical components
- **Implications for spacecraft design**
 - On-board thermal regulation
 - Electronic hardening
 - Orbit determination and control
 - Mechanical testing

COURSE DIRECTOR

- Mr. Vincent ASTIER, Senior Project Manager and Platform/Launch Systems Expert, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.3: SATELLITE SYSTEM DESIGN, INTEGRATION & TESTS

OBJECTIVE

- The objective of this course is to describe and explain the sequence and logic of the design, integration and test of a satellite system, outlining the various specific characteristics and related constraints of each phase.
- Upon completion of this course, trainees will have learned the key basics of satellite system design, integration and test sequence.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a technical background (meaning either master level or an engineering degree).

RELATED MODULES

To be mastered	To go further	Connected with
1.1	1.4 to 1.8	2.1, 2.6, 4.3

TYPICAL DURATION & FORMAT

- 2 days (16 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Program phase breakdown**
 - Phase A: Conceptual design
 - Phase B: Definition
 - Phase C: Design
 - Phase D: Development, integration and verification
 - Phase E: Operation
- **Design phase**
 - Design phase
 - Mission definition
 - Payload/platform sizing
 - Satellite definition/satellite budgets
 - Ground control segment definition
 - Conclusion
- **Integration & test phases**
 - Foreword and general rules
 - Verification program, method and techniques
 - Verification phases
 - Integration and test sequence
 - Typical test sequence (unit/spacecraft, system)

COURSE DIRECTOR

- Mr. Vincent ASTIER, Senior Project Manager and Platform/Launch Systems Expert, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.4: SATELLITE PLATFORM & SUBSYSTEMS

OBJECTIVE

- The objective of this course is to present what constitutes a satellite platform and outline the main characteristics of the various constitutive subsystems.
- Upon completion of this course, trainees will have learned the key basics of what constitutes and drives a satellite platform.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a technical background (meaning either master level or an engineering degree).

RELATED MODULES

To be mastered	To go further	Connected with
1.1, 1.3	1.5 to 1.8	4.3

TYPICAL DURATION & FORMAT

- 2 days (16 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Platform system overview**
 - Platform purpose
 - From mission requirements to platform requirements
- **Constitutive subsystems**
 - Structure subsystem
 - Thermal subsystem
 - Mechanisms
 - Attitude & orbit determination & control subsystem
 - Propulsion subsystem
 - Electrical power subsystem
 - Telemetry & telecommand subsystem
- **Platform products typology**
 - Type of orbits
 - Mass and power range

COURSE DIRECTOR

- Mr. Vincent ASTIER, Senior Project Manager and Platform/Launch Systems Expert, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.5: QUALITY CONTROL & ASSURANCE

OBJECTIVE

- The objective of this course is to outline the fundamentals of the product assurance in the framework of a satellite manufacturing project
- Upon completion of this course, trainees will have learned about the best practices and typical requirements in dealing with product assurance activities in a satellite program.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a technical background (meaning either master level or engineering degree)

RELATED MODULES

To be mastered	To go further	Connected with
1.1	n/a	n/a

TYPICAL DURATION & FORMAT

- 1 day (8 hours)
- Face-to-face or online delivery

TOPICS COVERED

- Objectives and commitments of product assurance
- Space product assurance major requirements: System, environment, lifetime
- Reliability considerations: reliability, FMECA, safety
- Product assurance domains: parts; materials and processes; quality control
- Space product assurance programmatic aspects: Development and manufacturing control, subcontractor product assurance
- Space product assurance within program management organization: product assurance plan, audit, progress report
- Risk and nonconformance management

COURSE DIRECTOR

- Mr. Vincent ASTIER, Senior Project Manager and Platform/Launch Systems Expert, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.6: LAUNCH VEHICLES & SATELLITE/LAUNCHER INTERFACES

OBJECTIVE

- The objective of this course is to present the basics of a launch vehicle and outline the various specific characteristics of the related constraints imposed to interface with the satellite.
- Upon completion of this course, trainees will have learned the basics of a launch vehicle and the keys items to be considered regarding the launcher/satellite interface.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a technical background (meaning either master level or an engineering degree)

RELATED MODULES

To be mastered	To go further	Connected with
1.1 to 1.3	1.7, 1.8	4.3

TYPICAL DURATION & FORMAT

- 1 to 2 days (8-16 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Introduction to launch vehicles**
 - Objectives & principles
 - Space transportation
 - Rocket principles & some physics (action reaction, jet engine, staging)
 - Overview of the design & key features
 - Propulsion (types, performances)
 - Guidance/piloting
 - Other services (telemetry, pyro system)
 - Safety, flight termination
 - Launch pad and launch preparation
 - Effect on the satellite: launch environment
- **Launcher mission analysis: interface design and verification**
 - Electrical, EMC
 - Thermal
 - Mechanical (clearance, static and dynamic loads etc.)
 - Trajectory, separation, collision avoidance

COURSE DIRECTOR

- Mr. Vincent ASTIER, Senior Project Manager and Platform/Launch Systems Expert, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.7: LAUNCH CAMPAIGN & LAUNCH PHASE

OBJECTIVE

- The objective of this course is to describe the various phases of a satellite launch campaign outlining its characteristics and related constraints.
- Upon completion of this course, trainees will have learned the key basics of a satellite launch campaign.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a technical background (meaning either master level or an engineering degree).

RELATED MODULES

To be mastered	To go further	Connected with
1.1, 1.6	1.8	3.5

TYPICAL DURATION & FORMAT

- 0.5 day (4 hours)
- Face-to-face or online delivery

TOPICS COVERED

• Introduction

- Objectives: Why a launch campaign?
- Organization: a challenge of synchronization

• Launch campaign

- Preparation (operations, logistics, safety submission)
- Transportation to launch site
- Autonomous preparation to launch (satellite, launch pad, launcher)
- Combined operations
- Dress rehearsal

• Launch

- Launch countdown
- From lift-off to separation

COURSE DIRECTOR

- Mr. Vincent ASTIER, Senior Project Manager and Platform/Launch Systems Expert, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.8: SATELLITE CONTROL OPERATIONS: FROM DEPLOYMENT TO DEORBITATION

OBJECTIVE

- The objective of this course is to review the various phases of a satellite launch campaign outlining its characteristics and related constraints.
- Upon completion of this course, trainees will have learned the key basics of a satellite launch campaign.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a technical background (meaning either master level or an engineering degree)

RELATED MODULES

To be mastered

1.1

To go further

Connected with

3.5

TYPICAL DURATION & FORMAT

- 1 day (8 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Orbit-Raising and insertion operations**
 - Possible Orbit-Raising mission overview and strategy
 - Control instances, coordination and separation
 - Orbit-Raising & insertion phase
- **In-orbit testing**
 - Platform testing (attitude, currents and temperature monitoring)
 - Payload testing (telecom and EO illustrations)
- **On-station operations**
 - Orbit control operations (AOCS, maneuvers, etc.)
 - Resource-oriented operations & Mission Oriented Operations
 - Contingency operations (collision avoidance, degraded modes)
- **Disposal operations**
 - LEO, MEO, GEO strategies

COURSE DIRECTOR

- Mr. Yann LE DU, Technical Adviser, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.9: SATELLITE COMMUNICATIONS SYSTEMS OVERVIEW

OBJECTIVE

- The objective of this course is to help trainees identify the role and definition of each component of a satellite communications system.
- Upon completion of this course, trainees will have a first-level knowledge on the necessary operational functions in a satellite communications system.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a technical background (meaning either master level or an engineering degree). Some experience in the satellite sector is obviously a plus.

RELATED MODULES

To be mastered	To go further	Connected with
1.1	1.10 to 1.13	3.1, 3.2, 3.4, 4.6

TYPICAL DURATION & FORMAT

- 1 day (8 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Inventory and definition of satellite-based communications services**
 - Raw capacity
 - Managed services
 - Managed capacity
 - End-to-end solutions
- **The space segment**
 - The satellite
 - Satellite control center
 - The frequency resource
- **The mission ground segment**
 - User terminals and RF gateways
 - The resource manager
 - Communication hubs
 - Network monitoring instances: The NMS and the CSM.

COURSE DIRECTOR

- Mr. Yann LE DU, Technical Advisor, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.10: SATELLITE COMMUNICATIONS SYSTEMS: HIGH THROUGHPUT SYSTEMS

OBJECTIVE

- The objective of this course is to provide trainees with sufficient support to allow a global level of understanding of how a HTS or VHTS system operates.
- Upon completion of this course, trainees will have a good basis for further developing their skills in High Throughput communication systems.

PREREQUISITES

- In order to take full advantage of this course, trainees should have completed modules 1.1 and 1.9.
- Some experience in the satellite sector will obviously be a plus.

RELATED MODULES

To be mastered	To go further	Connected with
1.1, 1.9	1.11, 1.12, 1.13	3.1, 3.2, 3.4, 4.6

TYPICAL DURATION & FORMAT

- 1 to 1.5 day (8-12 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **HTS/VHTS technology basics**
 - Frequency reuse principles
 - Multispot coverages
 - Connectivity principles and network topologies
 - Gateways: number, sizing, location, redundancy, diversity
 - Bent pipe vs. digital HTS
 - Resource access techniques
 - Frequency resources specificities
- **HTS and VHTS systems examples**
 - Anik F2
 - Eutelsat Ka
 - VIASAT 3
 - O3B m-Power

COURSE DIRECTOR

- Mr. Yann LE DU, Technical Advisor, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.11: SATELLITE COMMUNICATIONS SYSTEMS: FLEXIBLE & RECONFIGURABLE

OBJECTIVE

- The objective of this course is to give the trainees the key principles of this new generation of satellites. It will briefly cover the design details (still under development/protected data) of the solutions but will go more into detail of the pros and cons of the operations of such systems.
- Upon completion of this course, trainees will have a good knowledge of the advantages and constraints of such emerging solutions.

PREREQUISITES

- In order to take full advantage of this course, trainees should have some background in procurement and/or mission operation on satellite communications systems.

RELATED MODULES

To be mastered	To go further	Connected with
1.1, 1.9	1.10, 1.12, 1.13	3.1, 3.2, 3.4, 4.6

TYPICAL DURATION & FORMAT

- 1 to 1.5 day (8-12 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Standard flexible satellite development**
 - General principles
 - Procurement and development principles
 - High level design principles
- **Standard flexible satellite operations**
 - Ground infrastructure
 - Beam forming and transmission planning
 - Centralized resource and forecast scenarios
- **Standard flexible satellite benchmarking**
 - Standard flexible vs. conventional bent-pipe systems
 - Standard flexible vs. HTS/VHTS systems

COURSE DIRECTOR

- Mr. Yann LE DU, Technical Advisor, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.12: SATELLITE COMMUNICATIONS SYSTEMS: CONSTELLATION SYSTEMS

OBJECTIVE

- The objective of this course is to assist trainees in understanding the logic of design and principles of operations of a communication satellite constellation.
- Upon completion of this course, trainees will have reviewed the top-level characteristics of a satellite constellation, allowing a reasonable understanding of the inputs in such development trade-offs.

PREREQUISITES

- In order to take full advantage of this course, trainees should have some background in procurement and/or mission operations on Satcom systems
- Some experience in the satellite sector will obviously be a plus.

RELATED MODULES

To be mastered	To go further	Connected with
1.1, 1.9	1.10, 1.11, 1.13	3.1, 3.2, 3.4, 4.6

TYPICAL DURATION & FORMAT

- 1 to 1.5 day (8-12 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **LEO constellation system parameters**
 - Main parameters (orbit, number of satellites, user terminals, size of satellites, gateways, inter-satellite links, frequency resources, launch concept...)
 - Frequency resource for a non-GSO system
 - Key principles to develop a high-level design addressing a telecommunication service
- **Various constellation systems panorama**
 - Globalstar/Iridium (telephony)
 - O3B (access)
 - Starlink
 - OneWeb
 - Telesat Vantage
 - LEO constellations benchmarking

COURSE DIRECTOR

- Mr. Yann LE DU, Technical Advisor, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.13: TELECOM SATELLITE MISSIONS OPERATIONS

OBJECTIVE

- The objective of this course is to provide trainees with the various operational concepts that are in place for each of the main satcom business models, from raw capacity delivery to end-to-end services.
- Upon completion of this course, trainees will have a first-level understanding of the way a satcom system is operated, through the communication flows between each component.

PREREQUISITES

- In order to take full advantage of this course, trainees should have some background in procurement and/or mission operation of satcom systems.
- Some experience in the satellite sector will obviously be a plus.

RELATED MODULES

To be mastered	To go further	Connected with
1.1, 1.9	1.10, 1.11, 1.12	3.1, 3.2, 3.4, 4.6

TYPICAL DURATION & FORMAT

- 1 day (8 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Planning process**
 - Operator roadmap
 - RF planning
- **Deployment process**
 - Terminals and hub procurement
 - Terminals logistic chain: from factory to field operations
- **The network operation process**
 - RF operations surveyance
 - QoS monitoring
 - Service level agreement
- **Mission operation versus business models**
 - Raw capacity services operations
 - Managed services operations
 - Managed capacity operations
 - End-to-end solutions operations

COURSE DIRECTOR

- Mr. Yann LE DU, Technical Advisor, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.14: SATELLITE EARTH OBSERVATION SYSTEMS OVERVIEW

OBJECTIVE

- The objective of this course is to outline the purpose of satellite Earth observation from an end-user's perspective and requirements achieved through dedicated technical solutions.
- Upon completion of this course, trainees will have learned what constitutes the overall philosophy and means for satellite Earth observation.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a background in engineering (optical, radio communications, electronics, software, etc.) and/or Geographic Information Systems.

RELATED MODULES

To be mastered	To go further	Connected with
1.1	1.15, 1.16	3.1, 3.3, 4.7

TYPICAL DURATION & FORMAT

- 1.5 to 2 days (12-16 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Missions**
 - Environment (meteorology, agriculture, forestry, etc.)
 - Intelligence (economic, security, defense)
- **Main parameters/drivers**
 - Main characteristics of the observation targets (size, frequency of occurrence, wavelength of observability)
 - Design drivers (revisit, resolution, wavelength, day/night, all weather, local, global, tasking cycle)
 - Going from requirements to launch and operations
- **System architecture**
 - Space segment (number of satellites, orbits, agility, ...)
 - Ground segment (stations, ISL, processing, dissemination)
- **Technologies**
 - Optical (MSI, HSI), radar (imagery, altimetry), lidar,
 - Connected systems: GeoInt, Sigint

COURSE DIRECTOR

- Mr. Olivier THEPAUT or Mr. Jérôme COLINAS, Senior Project Managers and Earth Observation Experts, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.15: SATELLITE OPTICAL EARTH OBSERVATION SYSTEMS

OBJECTIVE

- The objective of this course is to outline the optical imager principles, techniques and technologies.
- Upon completion of this course, trainees will have learned general optical image concepts and specific applications and associated technologies.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a background in engineering (optical, radio communications, electronics, software, etc.) and/or Geographic Information Systems.

RELATED MODULES

To be mastered

1.1, 1.14

To go further

1.16

Connected with

3.1, 3.3, 4.7

TYPICAL DURATION & FORMAT

- 1 to 1.5 day (8-12 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Optical image principles**
 - Image geometry
 - Radiometric aspects
 - Image acquisition and processing
- **Key sizing parameters**
 - Agility, swath, on-board storage
 - Frequency bands (visible, NIR, SWIR, ...), spatial resolution
 - Modulation Transfer Function, Signal-to-Noise Ratio
 - Other key sizing parameters (data rate, tasking cycle, onboard processing)
- **System architecture**
 - From users' requirements/parameters to system design (space and ground segment) design
 - Illustrations with operated missions or future concepts

COURSE DIRECTOR

- Mr. Olivier THEPAUT or Mr. Jérôme COLINAS, Senior Project Managers and Earth Observation Experts, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.16: SATELLITE RADAR EARTH OBSERVATION SYSTEMS

OBJECTIVE

- The objective of this course is to outline the radar (or SAR) imager principles, techniques and technologies.
- Upon completion of this course, trainees will have a general knowledge of radar (or SAR) image concepts and specific applications and associated technologies.

PREREQUISITES

- In order to take full advantage of this course, trainees should have a background in engineering (optical, radio communications, electronics, software, etc.) and/or Geographic Information Systems.

RELATED MODULES

To be mastered	To go further	Connected with
1.1, 1.14	1.15	3.1, 3.3, 4.7

TYPICAL DURATION & FORMAT

- 1 to 1.5 day (8-12 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **SAR image principles**
 - SLAR and SAR geometry
 - SAR azimuth and range ambiguities
- **Key sizing parameters**
 - Minimum antenna area and maximum merit factor
 - Radar equation and power sizing
 - Other key sizing parameters (datarate, tasking cycle)
- **Advanced modes and architectures**
 - ScanSAR, spotlight, multibeam, reflector
 - Monostatic, bistatic (single sat, dual sat), multistatic (sat train)
- **Program approach**
 - From users' requirements/parameters to system design (space and ground segment) design
 - Illustrations with operated missions or future concepts

COURSE DIRECTOR

- Mr. Olivier THEPAUT or Mr. Jérôme COLINAS, Senior Project Managers and Earth Observation Experts, Satconsult



TOPIC 1: SPACE TECHNICAL & ENGINEERING FUNDAMENTALS

MODULE 1.17: SPACE SECTOR'S PROFESSIONS & SKILLS

OBJECTIVE

- The objective of this course is to outline the various professions found in the space sector and associated skills.
- Upon completion of this course, trainees will have acquired a high-level of understanding of typical training paths to follow in the space sector, be it to consolidate, refresh or create related capacity building programs.

PREREQUISITES

- No higher education degree (neither technical nor business) required.

RELATED MODULES

To be mastered

1.1, 1.2, 2.1

To go further

Connected with

2.2 to 2.7, 3.1, 3.4, 4.1

TYPICAL DURATION & FORMAT

- 0.5 day (4 hours)
- Face-to-face or online delivery

TOPICS COVERED

- **Reminder of the space sector's value chain**
 - Upstream activities and players
 - Downstream activities and players
 - **Professions in the space sector**
 - Technical & engineering professions
 - Business planning & development professions
 - Program management professions
 - Other professions
 - **Required skills in the space sector**
 - Technical & engineering skills
 - Business planning & development
 - Program management skills
 - Other skills
 - **Examples of typical capacity building programs**
- ### COURSE DIRECTOR
- Mr. Pierre VALENTI, Senior Affiliate, Euroconsult



CONTENTS

- Our Training Service Offer In A Nutshell
- Topic 1: Space technical & engineering fundamentals
- Contact Information
- Euroconsult Group Presentation



CONTACT INFORMATION

YOUR CONTACT POINT

Mr. Pierre VALENTI
Senior Affiliate
Euroconsult



CONTACT DETAILS

✉ training@euroconsult-ec.com

☎ +33 6 27 69 73 82 (mobile)

CAREER ABSTRACT

Pierre VALENTI has spent most of his 25-year career in the space sector, leveraging a proven track record and practical knowledge of all key functions associated with marketing and sales at large including business planning and development, business intelligence and market research.

His previous experience includes a ten-year tenure (1999-2009) as Marketing & Sales Manager with the Telecommunications Satellites business unit of Airbus Defense & Space, Space Systems. He also acted as Arianespace's Marketing Director from 2009 to 2011.

In addition to this solid industrial experience, Mr. VALENTI also worked for such renowned consultancies as Accenture (1994-1996), Euroconsult (1996-1998) and Satconsult (2011-2012). More recently, he served as Deputy Managing Director (2012-2013), then Managing Director (2014-2019) of the Institut Aéronautique & Spatial (IAS), a training agency operating under the French Aerospace Industries Association. In 2020, he decided to join forces with Euroconsult to develop a dedicated training service offer.

Mr. VALENTI is a French national born in Paris in 1968. He has been based and working in Toulouse since 2001.



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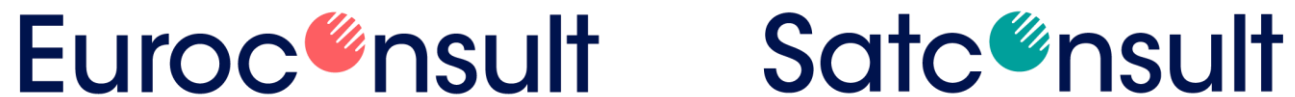
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LEADING INDEPENDENT GROUP

Euroconsult Group is the **leading global consulting group** specializing in the **space sector** and **satellite enabled verticals**.

Euroconsult Group



- Privately owned
- Fully independent
- 40 years of experience
- 5 global locations
- 600 clients
- A team of over 100 multidisciplinary experts



FOUR COMPLEMENTARY ACTIVITIES



**TAILORED
CONSULTING
SERVICES**



**THEMATIC
TRAINING**



**THEMATIC
RESEARCH
PRODUCTS**



**EXECUTIVE
SUMMITS**

- Unique model with synergies and complementarity of our four activities
- End-to-end capability in support of our partners and clients
- Strict separation of information and respect of confidential client information.



EUROCONSULT IN A NUTSHELL

~80 consulting missions
in **>20** countries every year

15 market studies
every year

600 clients for the range of our
products and services

>1000 participants to
the *World Satellite
Business Week*

3 million
data point collected and maintained
on the market

85% of our activity
dedicated to export

100 experts
in **5** countries

100%
independent

100%
dedicated to the
space sector

Euroconsult



EXPERTISE

Our **expertise and skills** enable us to focus on the unique requirements of each of our projects.

Our **independence** guarantees our **commitment** to optimize value creation for our clients.

Euroconsult

Corporate strategy

Strategic assessments

Government programs & policies

Market assessment

Due diligence

Training

Feasibility studies

RFI/RFP process

Satellite & ground segment construction monitoring

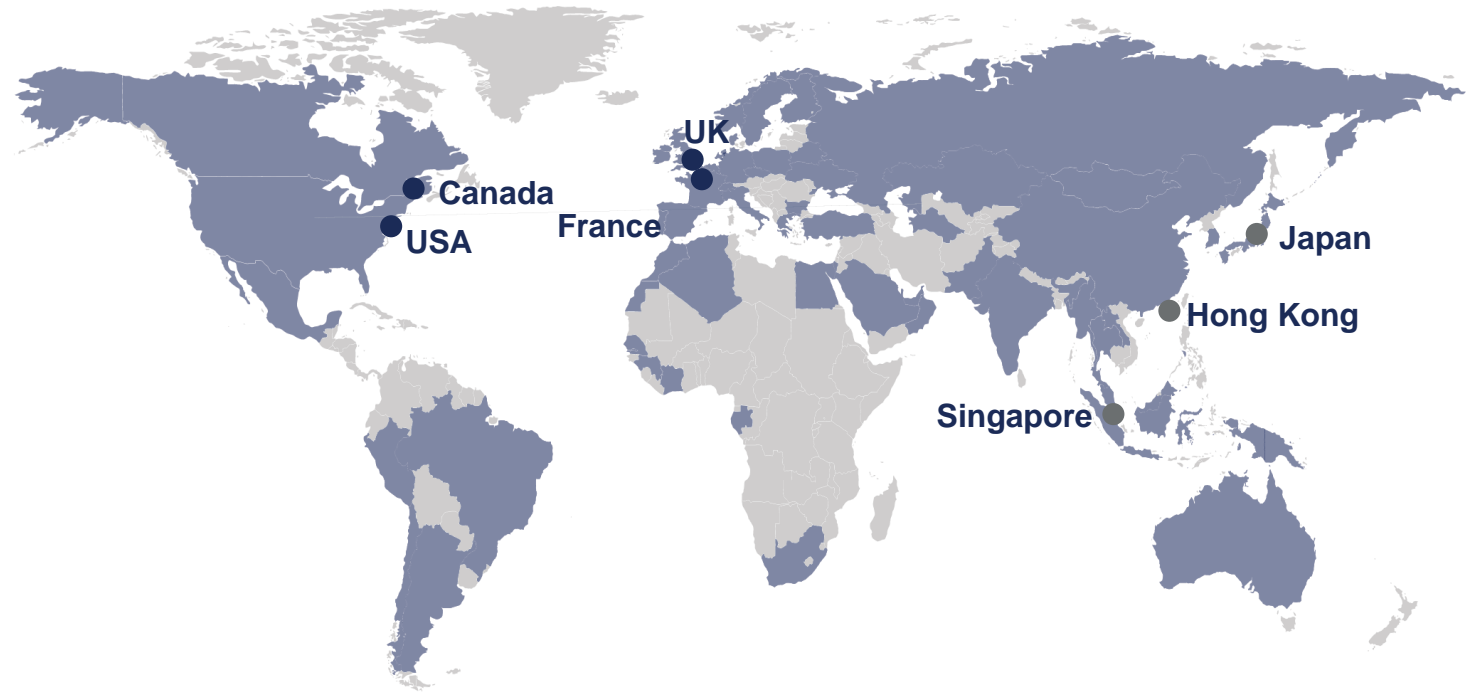
Program management & operations support

Sateconsult
Member of Euroconsult Group



OUR CLIENTS

600 clients in 50 countries – 5 global locations



- Countries in which clients are based
- Office locations
- Representatives



OUR LEADERSHIP

Pacôme Révillon
CEO

Euroconsult CEO since 2004
20 years of experience in strategic and financial oriented process in the space industry



Steve Bochinger
COO

Part of EC Executive team since 2004
20 years of experience ; lead role for institutional and industrial affairs



David Chégnion
Managing Director, Satconsult

Satconsult MD since 2018
25 years of experience in the space industry, with executive positions in leading aerospace groups



Lorraine Whitfield
Chief Events & Marketing Officer

Part of EC Executive team since 2008
20 years of experience in events organization, marketing and sales



Experienced
& international
management team

Nathan de Ruiter
Managing Director, Canada

Part of EC Executive team since 2008
15 years of experience in strategic and financial oriented process



Susan Irwin
Managing Director, USA

Part of EC Executive team since 2010, 35 years of experience in the telecom and space industry



Laurent Valignon
VP Business Development, Satconsult

Part of SATC Executive team since 2008
20 years of experience in the space sector

