

# ALLEN

ENGINEERING AND TECHNOLOGY CONSULTING

## AERONAUTICS SECTOR

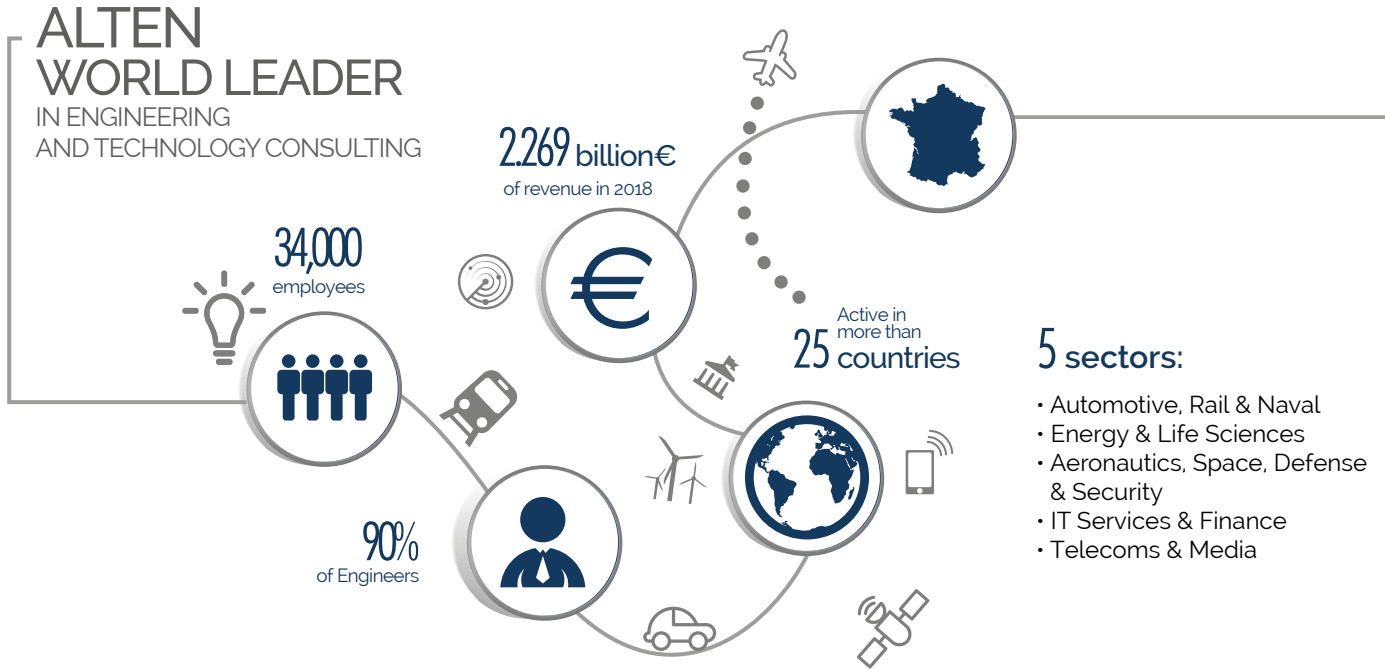


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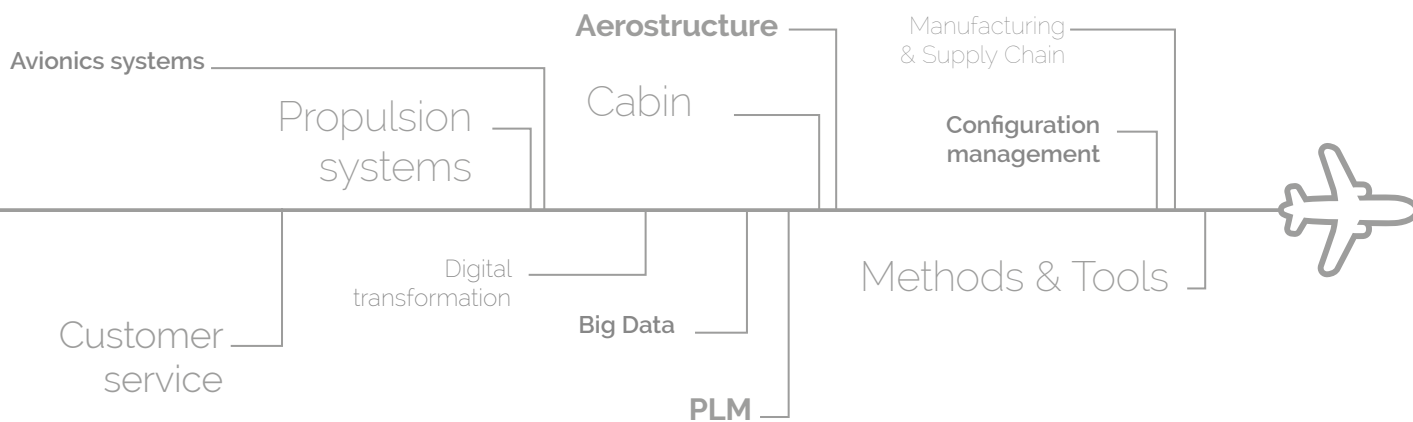
# ALTEN GROUP

## KEY FIGURES

Over the past 30 years, ALTEN has established itself as a leader by supporting its customers' development strategies in the areas of innovation, R&D and information systems.



# ALLEN IN AERONAUTICS



 **4,200**  
aeronautics engineers

## OUR CLIENTS

AIRBUS | ATR | COLLINS AEROSPACE | DASSAULT AVIATION | LEONARDO | ROLLS-ROYCE | SAFRAN GROUP |  
THALES GROUP | LIEBHERR | STELIA

# ENGINEERING

Aircraft manufacturers are preparing for the aircraft of the future: more economical, less noisy, less polluting and connected.

With a multi-specialist approach, ALTEN is taking part in its clients' incremental innovation strategies to support the development of new features and the design of new systems.



## Defining the cockpit of the future

ALTEN is supporting a European aeronautical manufacturer in defining the new functions to introduce in current airliners by 2025.

Based on feedback from pilots, a multi-disciplinary team of ALTEN consultant engineers (systems engineers, UX/UI designers) is designing:

- New key functions to be developed in the cockpit
- The best possible use of these functions by pilots (ergonomics, display, controls and information)

In order to quickly validate the new HMI (Human Machine Interface) concepts among test pilots, ALTEN has developed its own immersive environment creation platform, based on Virtual Reality technology.

This digital revolution greatly reduces cost and design times by replacing physical simulation models.

## Design of new-generation turbojets

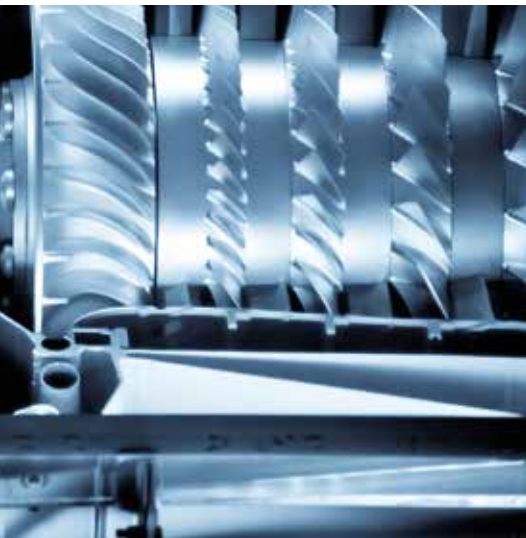
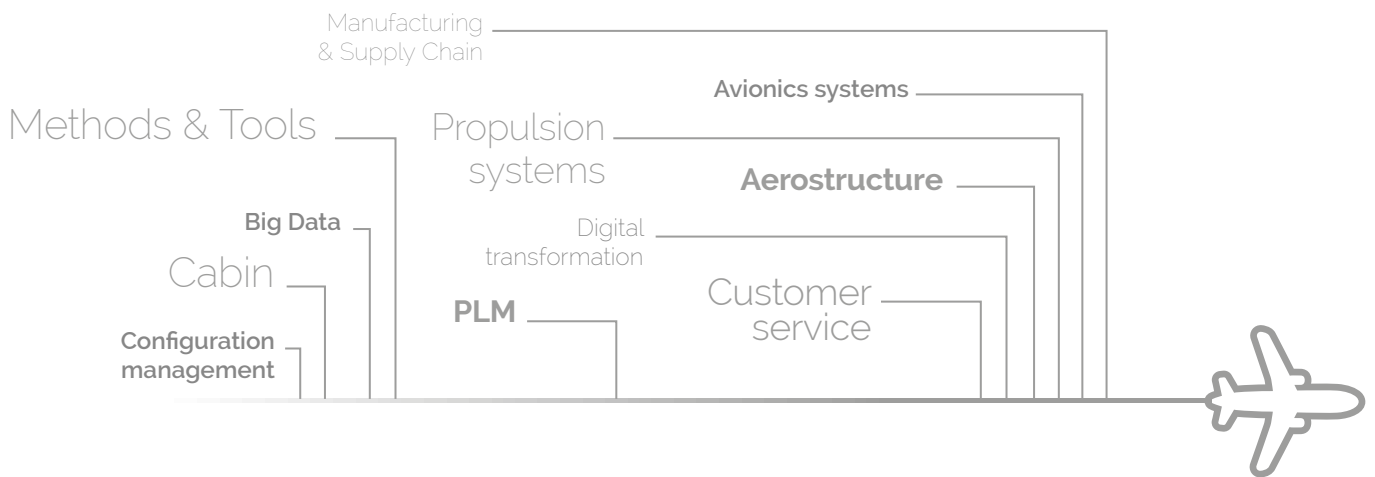
A British engine manufacturer chose ALTEN to support it with the simultaneous commissioning of several new civilian aircraft engines. In record time, 90 ALTEN engineers were mobilised in the United Kingdom.

In eight months, ALTEN deployed several aeronautical engineering service centres in various strategic environments:

- Systems engineering
- Structural calculations
- Thermodynamic/aerothermal studies
- Embedded systems (electronics and software)

At the end of this initial phase, ALTEN was selected as one of the client's strategic engineering suppliers for the next five years.





## Cabin layout: development of an automated configurator

Air companies use cabin layout more and more to set themselves apart from their competitors but this need for customisation must not delay serial production.

In Germany, ALTEN is developing an automated tool for the creation of 3D digital cabin models for an aircraft manufacturer. This project led in Agile mode involves:

- Collecting and processing existing data
- Programming the automatic implementation of 2D plans
- Verifying 3D integration

The tool optimises the design lead times for customised cabins. Knowledge of the cabin product and client processes, combined with the mastery of IT skills, enables ALTEN to proactively support the client's digital transformation.

## Development of aircraft electrical systems

ALTEN is supporting a first-class aeronautical equipment manufacturer in the development of:

- System controls (cockpit)
- The windscreen wiper
- Energy distribution
- The cabin and cockpit lighting

With strong knowledge of its client's environment, a team of ALTEN multi-disciplinary engineers covers a broad spectrum of skills and is providing its support throughout the V-model: systems engineering, electrics, embedded system (electronic and software), information systems and digital (UX design), industrialisation and supply chain.

The engineers are also contributing to client innovation projects such as experimentation with new generation batteries, and the integration of tactile control systems.

# MANUFACTURING ENGINEERING AND SUPPLY CHAIN

Aircraft manufacturers and subcontractors must increase the pace of production to meet the rise in air traffic and the modernisation of existing fleets.

ALTEN is supporting industrial companies in the implementation of Ramp-up methods and the deployment of new technologies (Big Data, IoT, augmented reality, etc.) in manufacturing and supply chain.



## “Run at Rate”: improvement of industrial performance

To be able to accelerate the production pace, without investing in new industrial means, an aeronautical manufacturer has entrusted ALTEN with implementation of the “Run at Rate” protocol, to reach the goal of a strong industrial Ramp-up.

The method consists in:

- Setting an accelerated production pace for a period
- Performing the chrono-analysis to determine operating times
- Determining corrective actions (re-balancing loads)

ALTEN engineers (specialising in project management, quality and industrial methods) are supporting both the aircraft assembly lines, and the aerostructure part manufacturing suppliers.

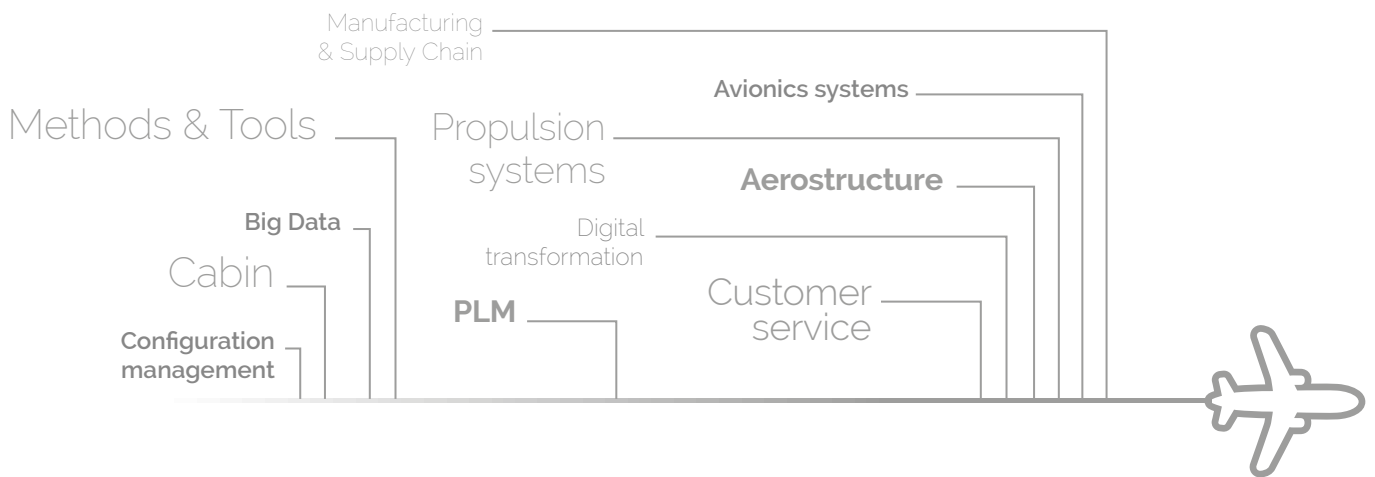
## De-risking the supply chain

The global airliner fleet will more than double over the next 20 years. To be able to deliver more aircrafts on time to clients, one has to reduce the risks of part supply stock depletion.

For 3 years, in collaboration with the aircraft manufacturer and the suppliers at the four corners of the earth, the ALTEN service centre has been working on:

- Data analysis: identifying the parts and components at risk
- Supply studies: determining the risk reduction programmes to be put in place
- Implementation of risk reduction projects: qualification of suppliers, calculation of stock level.

With its understanding of the specific features of each product family and supplier, ALTEN deployed the “de-risking” programme with aircraft manufacturer suppliers. The team is now a source of proposals for ways to incorporate the method in the company’s procedures, such as creating an e-learning module.



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## Helicopters: The lean supply chain management centre

ALTEN is in charge of supply management for all the mechanical and structural parts for a global leader in civilian and military helicopters in France and Germany.

More than 65 ALTEN engineers are working on Supply Chain management for structural parts (sheet metal, composite, thermoplastics and elastomers) and all the mechanical parts (prototype, machined parts, equipment and fastenings) for all civilian and military programmes for:

- Management of stock, missing parts and procurements
- Mechanical studies (handling production non-conformities and returns)
- Improvement of supplier performance

By deploying a multi-specialist organisation (mechanical and Supply Chain) and an innovative approach, ALTEN has managed to reduce the cost of supply management.

## Quality of final assembly line operations

To guarantee air safety and improve the quality of aircrafts delivered to air companies, an ALTEN service centre is in charge of several final assembly line (FAL) quality activities for a new generation long-range aircraft. It is working on:

- Integration and handling of the non-conformities detected: analysing the nature of quality issues, identifying the potential causes and coordinating the different departments to improve the quality of assembly operations.
- Management of aircraft quality: supporting air companies' quality inspections and analysing dissatisfaction and the quality issues escalated.
- Digitalisation of quality control approaches: developing customised "Data-Visualisation" tools with a multi-skill team (developers, UX/UI designers and quality engineers).

# CUSTOMER SERVICES

With the increase in airliners, the entire aeronautical line is working to optimise the availability of aircraft and the air companies' satisfaction.

From predictive maintenance to collaborative customer service platforms, ALTEN combines its knowledge of business processes with its digital expertise, in an aim to provide innovative solutions to its clients.



## Agile at Scale: Customer Service digital transformation

Recognised for its knowledge of the aeronautical profession and its technological & digital expertise, ALTEN has deployed a service centre of more than 180 consultants dedicated to the design and deployment of digital applications in Customer Service, in collaboration with air companies.

ALTEN's engineers are dedicated to managing and assisting with new digitalisation project by providing their support with the following:

- Digital transformation consulting (e.g. Scale Agile Framework SAFe Coaching)
- Digital project owner assistance (definition of application functional architecture)
- DevOps for business applications
- Application deployment
- Operational support (helping departments improve their operational performance)

Having worked with its partner for 5 years, ALTEN has been able to support it in building an Agile organisation, demonstrating its ability to manage the development of large digital platforms (used by around 7,000 employees, 3,000 suppliers and five times more external stakeholders).

## Aeronautical maintenance: design and development of innovative training solutions

ATEXIS, an ALTEN Group subsidiary, develops comprehensive innovative training solutions for an aircraft manufacturer.

ATEXIS has set up a transnational team of 250 people, with 4 complementary expertises:

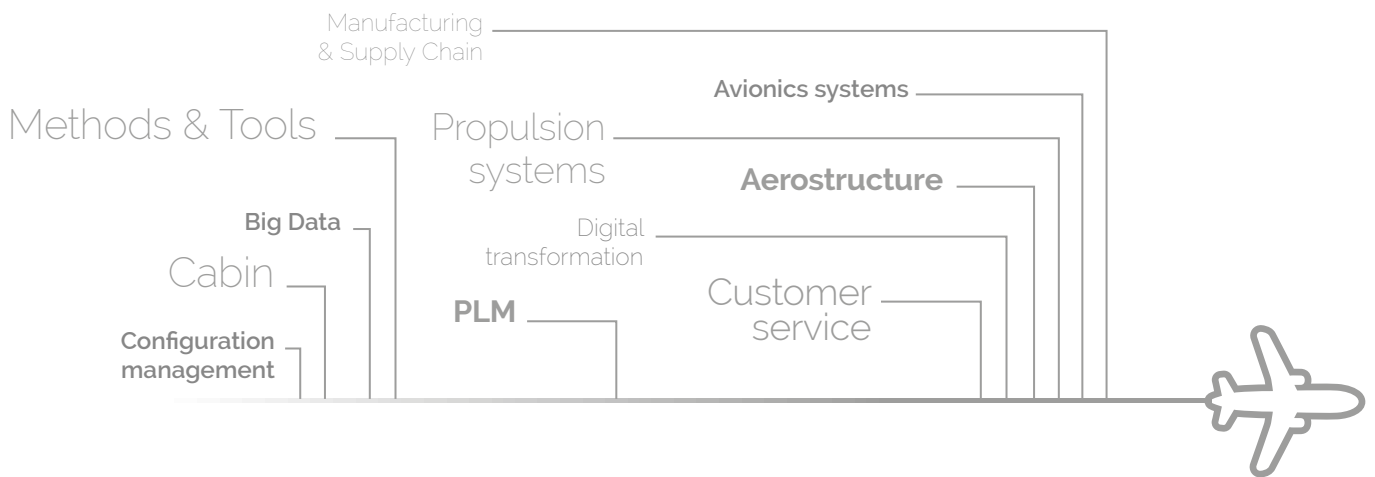
- Pedagogical engineering
- Production of state-of-the-art digital solutions (eLearning, eTour, 360° interactive video, 3D animation, virtual trainer, interactive, virtual and augmented reality modules)
- Expertise in the maintenance and operation of highly complex systems («subject matter expertise»), with experienced instructors deployed worldwide.
- Management & support services (maintenance of simulators, scheduling, planning, etc.)

Today, ATEXIS has training capabilities in Spain, France, Germany and India in order to provide its customers with large, flexible and cost competitive capabilities.

ATEXIS oversees training in more than 50 countries and delivers 3,500 training days per year.

An R&D laboratory, located in Sevilla, is dedicated to developing new technologies for the future of training.





## Drafting maintenance manuals

ATEXIS, an ALTEN Group subsidiary, is responsible for creating and updating OEM maintenance manuals.

Today, the design and definition of components may change very quickly. We must be able to incorporate these many changes in the documentation delivered to the operator, within a very short time frame. ATEXIS has put in place a transnational organisation to meet this cost and responsiveness challenge:

- Front office: A team of authors, technical experts and technical focal points close to the customer to facilitate communication.
- Offshore Back Office (India and Romania): team of experienced aeronautical engineers (equipment, maintenance and operations)

To support digital continuity in customer support activities, a team of methods and tools engineers is constantly working on the automation and digitalisation of technical documentation processes (data source gathering, preparation, authoring, publishing).

## Big Data: development of predictive maintenance systems

Recognised for its technological and digital expertise, ALTEN delivers predictive maintenance algorithms in cost units. This transnational project (Germany, Spain, France and United Kingdom) enables the Zero-AOG (zero aircraft on ground) target set by the client to be reached.

As a historic partner of the aircraft manufacturer in the specification of maintenance support information systems (CMS, DLCS, ACMS), ALTEN has very strong experience in the design of avionic systems. By combining it with its Data Science skills, the ALTEN service centre compares the data gathered to define:

- Algorithms to predict different system failures
- Maintenance actions to be carried out by air companies

With the synergy of these two activities, ALTEN was also a source of proposal to implement agile procedures which strongly reduced the cost of systems development.

# DIGITAL TRANSFORMATION

The aeronautics sector intends to take advantage of the digital revolution in order to optimise its internal processes with an End-to-End approach (engineering, manufacturing, maintenance, decision-making, etc.) and create new services and additional sources of revenue.

By combining its technological expertise and digital skills, today, ALTEN is a preferred partner to industries in the digital transformation of products and processes (e.g. digital continuity).



## Industry 4.0: Digital Twin and digitalisation of instructions

To offer more configuration choice to air companies, while maintaining competitive industrial performance, the aeronautical sector is incorporating the digital continuity approach more and more in its industrial tool.

- ALTEN carries out the following for its client:  
Digitalisation of instructions (in SAP/3DEXPERIENCE): instead of work instructions on paper, operators can access this information contextualised by the virtual 3D environment.
- Creating a plant digital twin (in 3DEXPERIENCE): after having modelled the assembly line, ALTEN engineers can simulate processes and logistics flows virtually, to offer solutions for improvement.

## Bill of Material using Big Data

ALTEN delivers for its customer a Big Data project aiming to give access to a common Bill of Material all along the aircraft life cycle from design to delivery and support. This BoM provides a trusted source to many departments: Customer Services, Finance, Manufacturing, Procurement, Engineering.

With a team of 20 people, ALTEN is involved in all Big Data aspects of the solution:

- Data gathering: with an extensive knowledge of business data, identify data sources (PLM, SAP, specific databases) and feed the data lake.
- Data transformation: cleaning data to ensure consistency and data quality
- Data Analytics: propose analytics on the past BoM to predict and optimize future costs and support aircraft production ramp up and standardization
- Data Visualization: through meaningful dashboard, present the data to the end user accordingly to their specific needs.



# ALTEN LABS

ALTEN Labs provide an environment to develop our expertise on cutting-edge technologies and test their applicability on our industrial projects.

True source of inspiration and learning, the ALTEN Labs foster digital innovation by implementing multi-functional teams mixing our digital engineers and our business engineers.

ALTEN Labs experiment with the capabilities of new digital tools in the aerospace industry: visualising the impacts of design modifications on rollout in virtually real time, quickly analysing the ergonomics of the workstation designed, etc.



## RENNES

- Smart Systems Security (Blockchain, Cybersecurity, AI Safety)
- Network and connected objects (IoT, Multimedia, Calculation System)
- Advanced testing (Robotisation, Automation, Artificial Intelligence)

## PARIS REGION

- Smart & autonomous systems (Physical and Algorithmic Modelling, Onboard Systems, Artificial Intelligence, Image Processing, Sensors and Signal Processing)
- Testing and Robotic process automation (RPA)
- Connected objects (IoT)

## TOULOUSE

- Big Data and Business intelligence (Industry 4.0, Predictive Maintenance)
- Digital UX/UI (AR/VR, Definition of new Product Functionality)
- Digital continuity (Experimenting with new uses for 3DEXPERIENCE PLM)

## SOPHIA ANTIPOLIS

- Big Data and AI (Automated Processing of Heterogeneous Data, Behavioural Prediction)





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