

RepartiЯ

Andalucía, Aquitaine, Catalunya, Galicia, Illes Balears, Região Lisboa e Vale do Tejo,
Midi-Pyrénées, Região Norte de Portugal et País Vasco

Aquitaine

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Conseil Régional Aquitaine

Aquitaine

The region of Aquitaine is composed of five Départments: Gironde, Périgord, Lot-et-Garonne, Pyrénées Atlantiques and Landes, which together generate GDP of 64.5 billion euros (2001).

Agriculture (including wine) and forestry have a dominant position in the economy of Aquitaine. In the industrial domain, leading-edge sectors with high technological integration (electronics, aeronautical engineering, chemical and automobile industries) exist side by side with more traditional activities (agri-food, wood, energy, clothing, shoes).

Aquitaine is France's leading exporter of agricultural products (over ¼ of exports) thanks to wine and corn. It is acknowledged as the leading producer worldwide of fine wines and is one of Europe's principal regions for tobacco, corn, strawberries, poultry, aquaculture, oyster farming and cheese.

Particularly well-represented by the wood/paper/cardboard, fine chemicals, organic chemicals and healthcare sectors, Aquitaine is also an important centre for the European aerospace industry, with all of the players involved located in the region and increasingly associated with their opposite numbers in Midi-Pyrénées. Finally, the automobile, electric and electronic equipment industries are also sectors of excellence in Aquitaine.

Aquitaine devotes 1.6% of the region's GDP (2001) to R&D and combines several approaches in order to highlight its various sectors of excellence: recourse to science and technology statistics indicators, the search for similarities with sectors of competence set up by institutions with economic resources. The following domains where Aquitaine is particularly strong have been determined from this study, to which a few significant domains should be added. Note that, in all domains, Aquitaine has well-structured transfer of technology thanks to the various specific organisms aimed at reinforcing the competitiveness of its domains of excellence.

The **Materials and Mechanical** engineering domain is dominated by major industrial groups, in the aerospace, defence and automobile sectors in particular, which are major sectors in Aquitaine. This specialisation is backed by extensive subcontracting facilities that foster the development of high skills, in machining and laser techniques in particular: the CEA's MegaJoule Laser (LMJ) programme has made Aquitaine the region in Europe with the highest scientific laser potential and the commissioning of the LIL (Laser Integration Line) in 2002 gave Aquitaine the most powerful laser in Europe, which can be used for fundamental research experiments. The region therefore has a wide range of skills and covers the entire domain.

Aquitaine's **health** domain is part of a long-term development orientation; it has extensive resources in terms of both infrastructures and scientific personnel. The region promotes partnerships with companies and creates links with other sectors (agri-food, for example), sharing closely-related problems. Another two strong sectors in Aquitaine are bio and medical engineering and the drug sector. In R&D, there are strong sub-sections in this sector: biomaterials and functional compensation, where Bordeaux is the leader in France, medical imaging and functional exploration, biomolecule technologies, neuroscience (one of the most active in France) and infectious diseases.

The **agri-food** sector where the field is vast and heterogeneous, comprising a wide range of skills and scientific domains. The key problems are organised in four areas: human nutrition and healthy foodstuffs, where Aquitaine can boast of having the only channel of research into neuroscience and nutrition; food safety, a research domain oriented more to agricultural production (earth/plant transfer of chemical contaminants, mycotoxins); athermic or mild conservation technologies to replace old ones (pasteurisation, sterilisation) and, finally, dispersed-medium foods where researchers are studying product characterisation and formulation.

Like the agri-food sector, the electronics, IT/IS and **Information and Communications Technology** domain touches on almost all industrial sectors. Moreover, this domain is based on skills that have long been acquired by Aquitaine, making it a highly competitive region in this sphere. The principal sub-domains are sound and image, where a few regional companies are among the leaders worldwide. It should also be noted that the region helps companies by providing them with access to virtual imaging research platforms. New services linked to mobile telephony are a domain where the region has extensive competence. Similarly, the reliability and analysis of electronic system malfunctions is also a strong point: the Bordeaux IXL research laboratory enjoys international renown in this domain. Finally, the last sphere of excellence is represented by organic display units (flat screens in preparation for the new generation of technology).

The region also has considerable forestry resources combined, in the domain of **forest-wood-paper** science and techniques, with unique research potential that includes laboratories of international repute. Scientific orientations are multi-discipline: they cover protection, sustainable management, forest improvement and enhancement, wood as a material and its derivatives. They are consolidated by a very dense network of technology transfer organisms.

In the **environment and energy** domain, Aquitaine is one of the most active regions in France. The important sectors in this domain are expertise, measurement and analysis of the quality of the environment, with researchers

working on new methods of analysis, likely to bring about changes in environmental regulatory standards on a nationwide and international level (toxicology, pollutants, instrumentation, microbiology, setup of databanks, etc.). The knowledge and analysis of renewable and non-renewable natural resources (research into biomass and photovoltaic energy) are also important spheres of research, water management in particular, which is giving rise to considerable research work. The optimisation of own processes, i.e. control over energy consumption and the design of less pollutive equipment (optimisation of consumption, waster processing, etc.) is another significant channel of research. Finally, the last channel of research covers the development of tools for studies and management in the domains of the environment and includes action of various kinds relative to environmental projects (acceptability, for example); the quality of atmospheres (quality of the air, ventilation, etc.) and the collection of waste.

The production of wine accounts for 4% of the region's GDP and is a major factor of regional development; winegrowing research has developed over the past few years to become a major sector in Aquitaine. This is of course possible thanks to the highly-structured nature of R&D and the considerable skills available in vine and wine sciences. Aquitaine's desire to maintain its renown in this domain involves various spheres of research. As far as the quality of grapes and wine is concerned (oenological and agronomical approach), there are four sub-groups aimed at furthering knowledge of the nature of flavours, the metabolism of the microorganisms involved in winemaking, defining descriptors for the milieu, for vines and grapes and, finally, improving the choice of root stock. Research is also carried out in Aquitaine on molecular approaches to grape biology and its relations with the ecophysiology of the vine, on polyphenols, health of the vine (disease prevention, protection of the vine, etc.), winegrowing and the environment (improving vines but protecting nature), winegrowing management and economics (strategies, efficiency of production structures, etc.) and, finally on law, wine, vines and civilisation, that is to say the status of producers and their estates, protection of the consumer and the role of wine in culture, etc.

The last sphere of excellence, **human and social science**, constitutes a vast domain encompassing a number of disciplines split between the various universities. Going beyond this segmentation, the Maison des Sciences de l'Homme d'Aquitaine (Human Science Centre) meets the need to federate (interdisciplinarity and development of new programmes), structure and boost research into human and social science.

Research and Innovation Strategy of the Aquitaine Region

The strategic positioning of the Aquitaine Region in relation to European Research Area issues is based on the priority development orientation of its sectors of excellence, that is to say the areas where the region has a competitive edge from an international standpoint: AeroSpace Defence (ASD) and laser optics. In addition, the Region strives to implement policies to consolidate its most significant centres of competence in terms of research, training and innovation. The Region's aim is to extend its scope on a European level – a key factor for its development in the long term – by the enhancement of Aquitaine's scientific and industrial expertise. These strategic objectives are associated with a concern to ensure that Aquitaine's research and innovation path leads all the areas of which it is composed in the direction of balanced development of their skills, both in terms of research and higher education and in the transfer of technology or implementation of industrial activities.

Orientation in favour of competitiveness nuclei a priority

Aquitaine's strategy can be assessed in terms of competitiveness nuclei within sectors of excellence, research and training activities and leading-edge industrial activities. By selecting the most prominent research sectors from a wide palette of skills, backed by high-powered industrial potential, regional decision-makers are seeking to reinforce European and international visibility with widely-recognised potential in research and innovation on a national level, essential to the future development of the region as a whole.

Aquitaine's strategy for the next few years is focussed on two competitiveness nuclei:

- **ASD** (AeroSpace Defence) and its environment, notably materials and systems, coupled with a transfer mechanism, that is to say, with the support of major industrial groups and partnership with regional research structures;
- **laser optics**, an emerging domain from an industrial and scientific standpoint, with tremendous potential.

AeroSpace Defence (ASD)

ASD is one of Aquitaine's major industrial sectors since it makes a considerable contribution to employment in the region (a total of 37,000 jobs are linked to the ASD sector in the Region), placing Aquitaine in third place in France behind the leader, Ile-de-France, and practically on equal footing with the second

region, Midi-Pyrénées. Aquitaine is associated with major military programmes in particular: Rafale, Mirage, M51, Tigre, NH90, Laser Mégajoule, etc. ASD, an activity that stimulates innovation and generates qualified jobs, continually proves its capacity to share its know-how in other industrial sectors, composites and electronics in particular.

The ASD sector in Aquitaine maintains a primarily industrial partnership with the Midi-Pyrénées region: the Centre National de Recherche Technologique (CNRT) «Aéronautique et Espace» (National Aerospace Research Centre) is located in Midi-Pyrénées, while the CNRT «Matériaux et Procédés» (Materials and Processes Research Centre), which has a strong aerospace orientation, is located in Aquitaine. The two regions have decided to combine their forces and skills in order to foster interregional co-operation and create an «Aerospace Valley». This Aerospace Valley on the banks of the River Garonne is Europe's leading aerospace sector. The world-ranking area along the River Garonne reflects Aquitaine's excellent industrial situation and is the location for major firms, such as: Messier Dowty, world leader in undercarriage construction; Dassault Aviation, which creates, builds and assembles Rafales, Mirage 2000s and Falcons; Turbomeca, which is the world's leading helicopter engine manufacturer. The ASD sector is, therefore, the veritable driving force of the Aquitaine Region.

Aquitaine decision-makers, in their endeavour to achieve efficiency and performance, have therefore fostered the objective to assist and support this crucial domain of activity in the best possible manner by giving strategic priority to their action in the areas of research and training as well as to industry and the transfer of technology.

This orientation is backed by the desire to extend the potential of the Gironde area by the mobilisation of all areas of competence geographically located in Aquitaine. As a result, additional potential is also called upon, in the form of scientific, technological and technical skills in the metalworking and plastics industries in the south of Aquitaine; these domains possess extensive experience and veritable know-how in the aeronautical field (study, design, prototyping, project management and design-aid for mechanical and electronics projects).

The main objectives are to:

- support innovation, research and the transfer of technology;
- improve the competitive edge of SMEs/SMIs;
- set the industrial fabric on an international level;
- provide the sector with an operational industrial engineering tool;
- facilitate the creation of company groupings;

- defend and promote industrial interests;
- make the region attractive to foreign investors.

Thanks to massive investment, Aquitaine is now able to take on the major technological challenges confronting aerospace in the future: new civil and military aircraft, materials for space, re-entry into the atmosphere, planet exploration, recoverable launchers and other space transportation vehicles.

Laser optics

With the arrival of the Megajoule Laser, the world's largest laser, the construction of which has already started at the Centre de l'Energie Atomique (CEA) in Barp, south of Bordeaux, Aquitaine will have an exceptional piece of scientific research equipment in 2010. The CEA's MegaJoule Laser (LMJ) programme makes Aquitaine one of the regions of Europe with the highest scientific potential in the sector of lasers. With the development of the MegaJoule Laser, Aquitaine's aim is to become a veritable world research centre in the laser optics domain. The research players are already in place, in particular within the framework of the creation of the Laser Plasma Institute in 2003 – a combined effort between the CEA, Université Bordeaux I, CNRS and the Ecole Polytechnique.

Since a set of additional lasers exists in Aquitaine, a «Petawatt» laser project (decided in 2003 with the support of the Region), scheduled to be coupled to the prototype of the future MegaJoule Laser, has entered the design phase. From 2008 on, it will offer researchers unsurpassed potential worldwide in many domains: extreme physics, imaging, biotechnologies.

In terms of education and training, the development of a laser optics stream is required to assist current scientific and industrial needs and also to anticipate the requirements of companies and laboratories in the future. Various initiatives have started in terms of professional training, the «PYLA» project in particular, with the aim of implementing a laser training platform in a controlled environment. This action will then need to be consolidated and further action taken in order to propose an education and training offering consistent and in line with the objectives sought.

Moreover, if laser optics in Aquitaine are to develop and continue on a long-term basis, it is crucial to attract companies and create sustainable employment in the region. The size and duration of construction/production, assembly and maintenance contracts for the MegJoule Laser (LMJ) offer the promise of creating several hundreds of direct jobs. In addition to the companies directly linked to the LMJ project, the innovation dynamic generated in the region will

be very favourable to companies already operating in the domain (major group establishments or SMEs), at the same time helping to attract new companies.

Finally, the development of the laser optic sector around the MegaJoule Laser cannot be undertaken without special efforts being dedicated to the transfer of technology. Lasers are veritable breeding grounds for technology that is potentially transferable to a wide variety of domains, ranging from medical imaging to laser metrology or information technology. Research based on optic technologies is being structured in Bordeaux and the outskirts in order to foster the transfer of knowledge and technology (bioimaging with the platform, laser metrology and instrumentation, materials for optics) and an Industrial Technology Centre is being set up to ensure the diffusion of knowledge. The Aquitaine Region, a member of the Comité National d'Optique et de Photonique (National Optics and Photonics Committee), is also home to the ALPHA association, responsible for developing and co-ordinating laser optic sector operators.

Set up in the spring of 2004 by various public and private partners, the Société d'Economie Mixte Locale «Route des Lasers» is responsible for acquisition, development or construction operations for companies linked to the optic, laser and plasma sectors.

In the logic of the centres of competitiveness nuclei governing the strategic choices made in Aquitaine, the sectors of competence chosen necessarily have an immediate international scope. However, the many domains of excellence in the Region of Aquitaine have not been forgotten and, as a result, have been the subject of particular attention, commensurate with their importance in research or technology as well as in relation to their industrial and social impact.

Assistance and support to institutional sectors of competence

In addition to the previous competitiveness nuclei, the institutional sectors of competence in Aquitaine represent groupings of competence that was *defined as experience was gained*: their analytical pertinence (they enable Aquitaine's plus points to be visualised) and strategic pertinence (they are the principal tools used to transfer technology) were gradually consolidated during the Nineties. We can differentiate between the sectors linked to traditional resources from «emerging» domains.

For sectors of competence based upon recourse to traditional resources, regional strategy consists of helping players to advertise their skills and improve the co-ordination of knowledge and know-how. As a result, an **Institut des Sciences de la Vigne et du Vin** (Vine and Wine Scientific Institute) meets the

requirement to specifically promote and federate research needed in a domain where winegrowing expertise is renowned on a worldwide scale. In the **Agri-food industry**, priority is given to the Nutrition and Food Safety sphere of excellence – a grouping has been formed between the universities concerned in order to develop a CNR «Human Nutrition» label of approval. In the **Forest – Wood – Paper** sector, the strategy is visible via the desire to group researchers together, notably with the development of the CAP FOREST project, given that considerable efforts still need to be made to obtain wide-scale involvement by industrial companies in innovation and transfer of technology mechanisms.

For **IS - Electronics - ICT**, since the software and multimedia industries provided many services to industry, priority was given to technology relating to their use by the ASD, materials and laser optics industries.

In the **Environment – Energy** domain, efforts at promotion already implemented need to be stepped up, since Aquitaine has several competent research teams, in the region of Pau in particular, where the setup of a CNRT «Environnement» (Environment) is shortly envisaged. Two channels are emerging as priorities: first of all, *biomass recycling* – since this topic is characterised by extensive pre-structuring work and the development of industrial partnerships (CEA and IFP), the approach developed must be on a national level; secondly, the *photovoltaic domain* where research is carried out both by photovoltaic, polymer and materials researchers, with the support of industrial companies.

Aquitaine has a high level of skills in **chemicals**, from a scientific, technological and technical standpoint, via the development of major land projects such as the reconversion of the Lacq basin and the mobilisation of industrial players.

In the **Biotechnologies** domain, Aquitaine has come up against a lack of industrial applications. Since competent researchers are finding it difficult to achieve recognition within the region and without being prejudicial to the improvement of the attractiveness of Aquitaine for these industries, the Region has entered into the development of a bio-sector, in partnership with the Midi-Pyrénées and Languedoc-Roussillon regions, the aim of which is to intensify the potential for research and innovation in these regions.

Finally, the **Social and Human Science** domain, which has a particularly transversal dimension in relation to other domains of competence, has three major priority themes: *Identity and citizenship; Governance; Archaeology and Heritage*, which form the structure of regional research activity.