Smart Chemistry Specialisation Strategy

"Report on recommendations for the Involvement of Stakeholders and Governance of Regional Innovation Strategies in Catalonia"

February 2017

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1. Description of RIS governance

1.1 General Description

The drafting process of the RIS3CAT was led by the Catalan Government through the Economy and Knowledge and Enterprise and Employment Ministries. It started in January 2013 and finalised in February 2014 when the RIS3CAT was approved by the Government.

The development of RIS3CAT was articulated around 6 axes:

- Application of the methodology of the European Commission (RIS3 Guide)
- Elaboration of the Strategy based on evidence and prior consensus
- Leadership of the Government and interdepartmental coordination
- Participation of RDI stakeholders
- Link with EU and State policies
- Collaboration with other EU regions

As stated in the EC RIS3 methodology the development of the RIS3CAT was done as a two-way iterative process that combined top-down and bottom up approaches in which stages often overlapped.

The RIS3CAT elaboration process of drafting the RIS3CAT had undergone three internal evaluations, which took place in April and July 2013 and January 2014.

Moreover, an external consultant, accredited by the European Commission on strategies RIS3, evaluated compliance with the requirements of the European Commission proposed tool this institution: wheel assessment.

Catalonia has a long tradition of consultation and participatory processes that contribute to the definition of policies and priorities of the country. The process preparation of RIS3CAT was based on evidence and existing challenges already identified in the numerous participatory processes carried out in recent years in order to achieve strategic consensus on public policies.

The RIS3CAT SWOT Analysis is an update of several SWOT analyses carried out in Catalonia in recent years, which have broad consensus among stakeholders:

- SWOT Analysis of the research and innovation system carried out under the Research and Innovation National Agreement in 2008.
- SWOT Analysis of the productive sector made under the Industrial Policy Plan 2010-2020 of the Catalan Government in 2009.
- SWOT Analysis of the research and innovation system carried out by the OECD in 2010.

The RIS3CAT SWOT Analysis was subjected to public consultation and the stakeholders valuation was very positive.

The contributions to the RIS3CAT were also articulated through the following ways:

- Expert Groups
- Public consultation
- Research Permanent Consultative bodies
- Dialogue with the stakeholders
- Coordination with the Local Administration

The implementation of RIS3CAT requires strong, multi-level governance to ensure the following:

- Government leadership and public policy coordination
- Effective and efficient use of public resources
- Active participation by the quadruple helix
- Permeability of RIS3CAT to determining factors in the environment and to the changing needs of society in general and to the quadruple helix stakeholders in particular. This is ensured by a system for monitoring and evaluating actions and their impact. The system provides information and qualified, consistent data to enable the review, if necessary, of RIS3Cat programmes, initiatives, instruments and investment. (source: RIS3CAT Document)

Based on the four RIS3CAT strategic objectives, the Action Plan establishes fourteen operational objectives and the targets to be achieved[1]. All measures in the Action Plan are cofinanced by the ERDF OP and the ESF OP in Catalonia for the 2014-2020 period. Accordingly, the actions, calendar and system of monitoring and evaluation are fully in line with the requirements, calendar and procedures of these two operational programmes.

The RIS3CAT governance system provides for continuous review of the Action Plan based on the results obtained from the monitoring indicators, factors affecting the context and the results obtained from evaluation.

Monitoring

The RIS3CAT Steering Committee, with the support of the Technical Committee, is responsible for monitoring the Action Plan. This monitoring consists of a continuous process of gathering and processing data on progress towards achieving the operational objectives and the degree to which the actions have been implemented.

Monitoring is based, in the main, on two types of indicators:

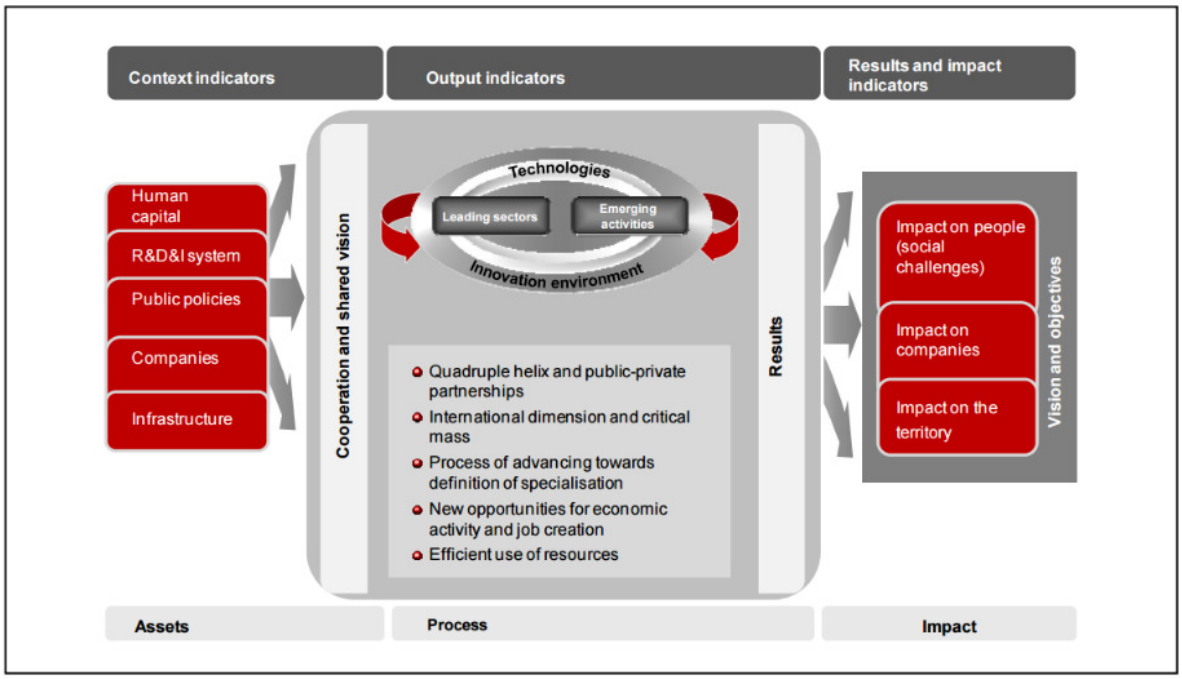
- Outcome indicators, which measure progress towards the operational objectives established in the Action Plan; and

- Output indicators, which provide information about the contribution of measures established in the Action Plan towards accomplishing ECAT 2020, the Europe 2020 strategy and the strategy for smart specialisation.

This quantitative information is complemented by qualitative data, obtained from questionnaires or from working groups in which the stakeholders involved and external experts take part.

[1] The RIS3CAT strategic objectives are described in the "Report on current status of implementation of Regional Innovation Strategies in Chemical Regions" and the Actions in part 1.b Involvement of Regional Stakeholders of this document.

RIS3CAT monitoring system



Source: Generalitat de Catalunya. The RIS3CAT Monitoring System. January 2017

Evaluation and review

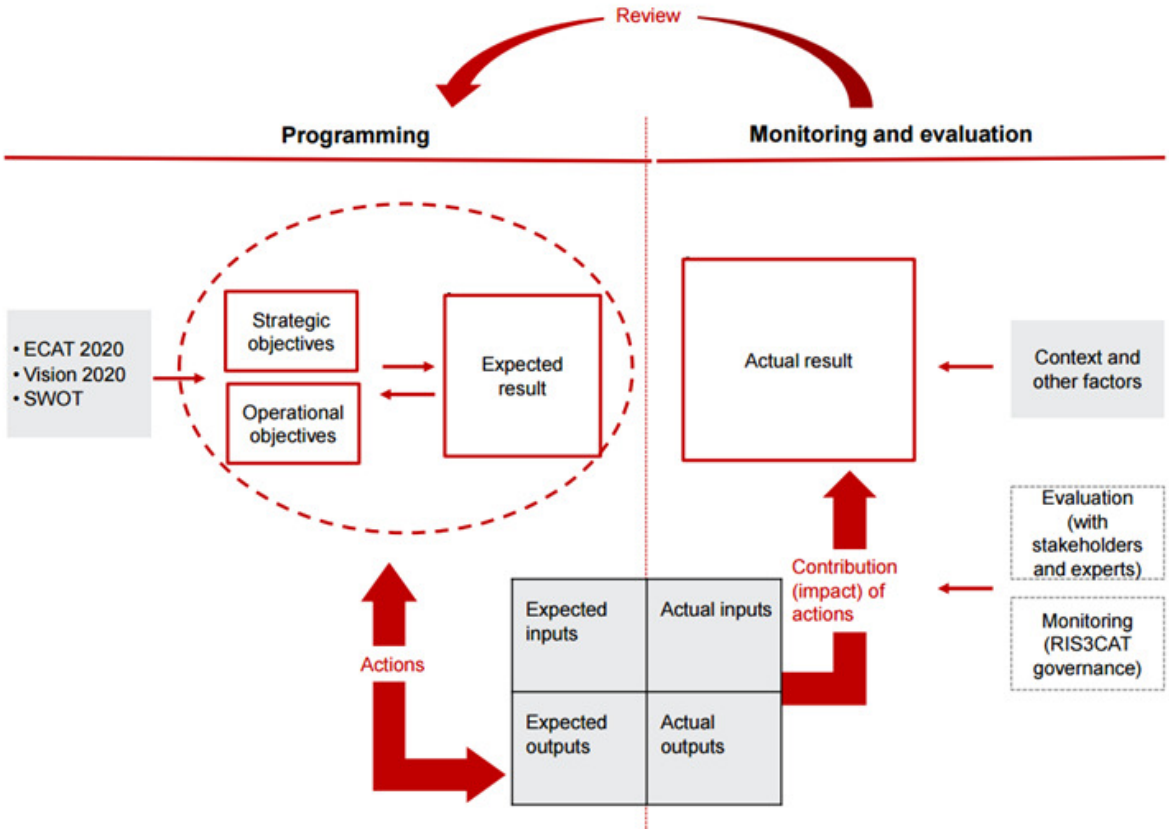
The management bodies of Action Plan measures are responsible for drawing up the evaluation plan for each action.

The evaluation plans for actions must meet certain minimum requirements, established by the RIS3CAT Steering Committee. In all cases, the stakeholders involved in implementing projects and external experts must take part in this process.

At the behest of the RIS3CAT Steering Committee and with the support of external experts, the RIS3CAT Technical Committee makes an overall evaluation of the Action Plan, based on analysis of data collected during the monitoring process and from the evaluation of each individual action.

The results from monitoring and evaluating the different actions and the Action Plan as a whole are key to redesigning the actions established under the Action Plan and improving its efficiency and economic and social impact.

RIS3CAT monitoring and governance



Source: Generalitat de Catalunya. The RIS3CAT Monitoring System. January 2017

Scorecard

The scorecard[2] is an essential tool for monitoring the RIS3CAT actions and in the decision-making processes of bodies responsible for managing actions and the RIS3CAT Steering Committee.

This scorecard is created by a computer application, SIFECAT, which is linked to the ERDF OP and which will allow access to the relevant information about the implementation of the Action Plan measures, presented graphically.

The objectives of the indicators are established for the end of the ERDF OP programming period in 2023.

[2] See Annex 3

1.2 Involvement of Regional Stakeholders

Regional stakeholders are involved in the implementation of RIS3CAT through its different measures. There follows a description of the measures included in the RIS3CAT Action Plan at November 2015:

1. **RIS3CAT communities:** These communities, which are formed by at least eight members, including both companies and stakeholders in the research and innovation system, submit R&D&I action plans affecting a leading sector.

   Instrument: Competitive calls for proposals for grants to finance RIS3CAT communities' action plans

2. **Specialisation and Territorial Competitiveness Projects (PECTs)**: PECTs are initiatives promoted by stakeholders in the territory and led by local public bodies. PECTs are projects with a high degree of innovation, aimed at transforming the territory's economy.

   Instrument: Calls for competitive proposals for grants for PECTs action plans.

3. **Emerging activities:** Through the Horizon 2020 programme, the European Commission promotes the transformation of economic, social and production sectors that are key for maintaining the global competitiveness of the European economy in the long term: scientific research, technological advances and knowledge. The RIS3CAT strategy for dynamic development provides for the introduction of emerging activities into the production system in a process of anticipation and adaptation to technological changes and new competitive scenarios.

   Instrument: Agreements with groups of R&D&I stakeholders and companies, particularly start-ups, that take part in major European R&D&I projects in their field of activity.

4. **R&D cooperation projects:** Research and development projects with high technological challenges and great capacity to generate externalities in Catalonia, and which are unlikely to be developed exclusively in the private sector due to their high technological risk.

   Instrument: Competitive calls for proposals

5. **R&D&I public-private partnerships:** This programme revolves around the concept of open innovation, which is based on eliminating barriers between the scientific and industrial sectors, fostering the transfer of knowledge and

technology and creating environments and models of relation, and enabling these two sectors to enjoy fluid, dynamic cooperation.
Instrument: Competitive calls for proposals for the creation of mixed units and programme contracts for thematic reference networks

6. **Industry of knowledge:** The knowledge industry programme fosters two kinds of actions: (1) Actions to enable the valorisation and transfer of results from research conducted by universities and research and innovation centres; (2) Actions to encourage entrepreneurism by providing support for technology-based companies generated within the environment of these institutions.

   Instruments: Annual competitive calls for proposals for subsidies in the lines of industrial seed and industrial product; Non-competitive public calls for proposals in the case of financial instruments aimed at start-up companies.

7. **Technology transfer:** Through this programme, the Catalan Government provides financial support for actions that improve and optimise processes for the valorisation of knowledge, technology transfer and the protection of knowledge generated, as well as for actions to provide support and advisory services for the creation of companies.

   Instrument: Agreements with universities and research centres (lines of action 1 and 2) and competitive calls for proposals (line 3)

8. **Innovative public procurement:** This programme promotes strategic planning and the introduction of innovative public procurement in purchases by the Catalan Government Administration and its public sector.

   Instrument: Cofinancing of innovative public procurement by the Catalan Government and its public sector.

9. **Strengthening the technological capabilities of research and innovation infrastructures:** Actions to develop the scientific and technological capabilities of research and innovation infrastructure in order to make it more competitive from the standpoint of science, innovation and technology transfer. Priority is given to projects with the greatest potential to generate competitive advantage and impact on socio-economic development in the country.

   Instrument: Competitive calls for proposals

10. **International cooperation:** R&D&I processes are opening up more and more: different stakeholders (companies, technology centres, universities

and R&D centres) take part in them, and they often have a global dimension. In such a context, it is vital to strengthen international cooperation ties between research and innovation stakeholders and businesses.

Instrument: Cooperation agreements

11. **Industrial PhDs**: Industrial PhDs act as bridges for knowledge transfer. Recruitment of talent and highly qualified people by companies helps to strengthen relations between the industrial system and the universities and research centres and to make the economy more competitive.

    Instrument: Public calls for proposals

12. **Development of RIS3CAT in Barcelona:** The cooperation agreement between the Government of Catalonia and Barcelona City Council for the development of RIS3CAT within the framework of the ERDF OP establishes three programmes of actions: (1) Entrepreneurial and innovative ecosystem for economic development; (2) Smart City Initiative for the development of urban public services; (3) Innovative public procurement.

    Instrument: Actions promoted by Barcelona City Council under the cooperation agreement with the Government of Catalonia for the development of RIS3CAT within the framework of the ERDF OP.

1.3 Participation Challenges

The challenges for RIS governance and involvement of regional stakeholders are currently analysed by the Ministry of Economy and Knowledge of the Government of Catalonia. The level and quality of the participation of regional stakeholders (science, industry (SME vs. Large Companies) and its expectations will be explained as soon as the analysis is finished.

2. Networks and Clusters: Chemical Ecosystem

The chemical industry is one of the key global industries, with complex value chain structures.

Industries can be classified as mainly process, discrete or service industries between natural resources and the final end consumer needs.

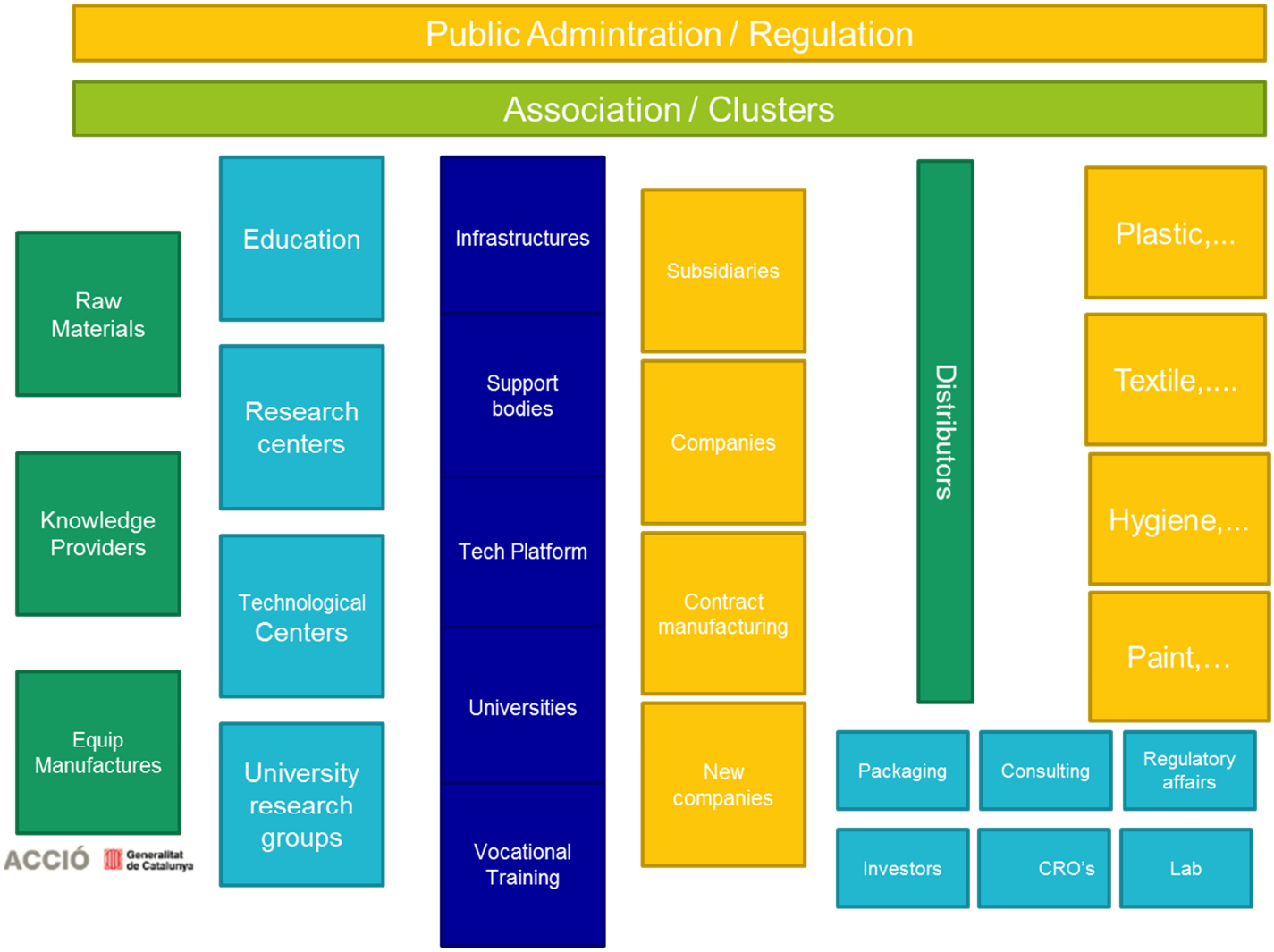


Fig. 1.- Chemical Sector

The process industry is characterized by companies that add value by mixing, separating, forming and/or chemical reactions by either batch or continuous mode. Products can be intermediates and finished products at the same time sold or used for other products.

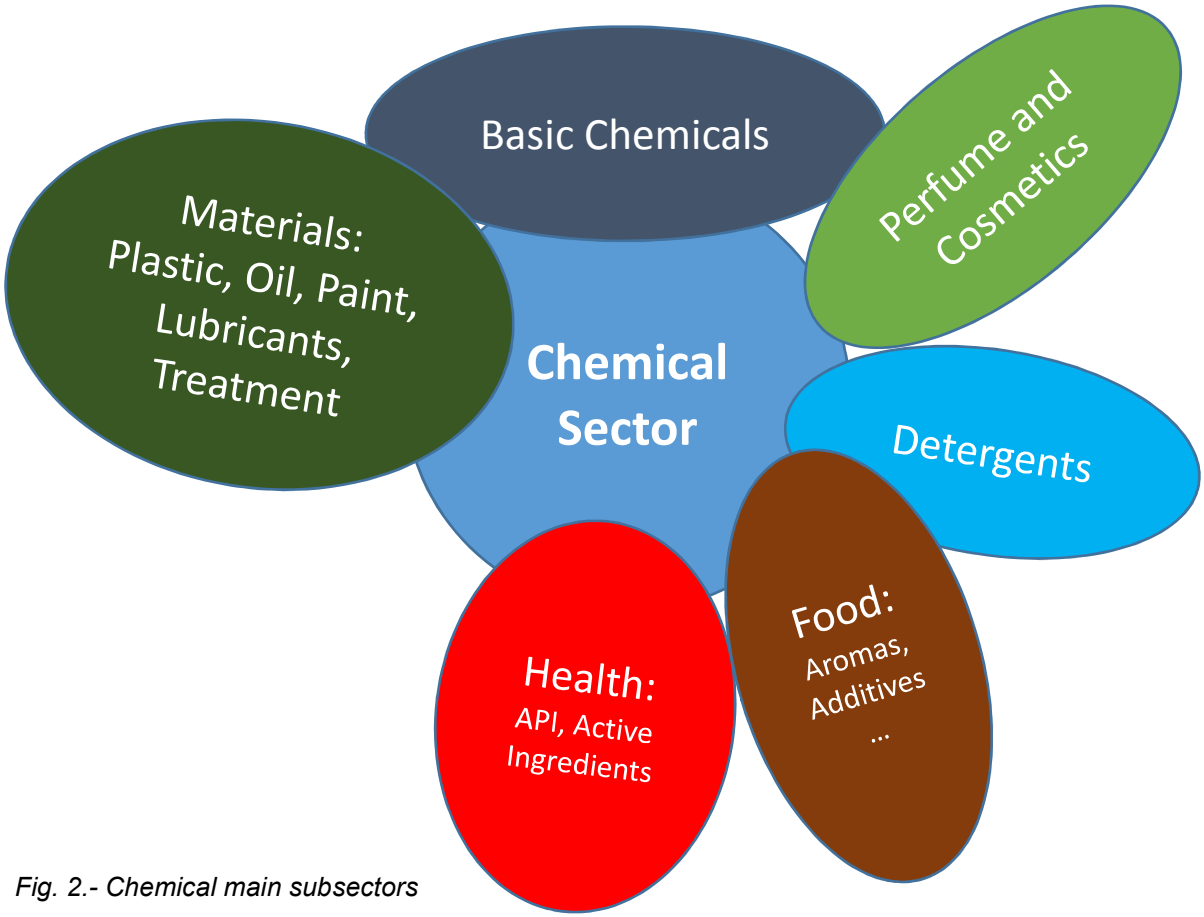


Fig. 2.- Chemical main subsectors

The chemical industry as a part of process industry can be perceived as a raw material supplier for other process as well as discrete industries.

The current structure of the chemical industry can be characterized by different products starting at with oil and gas with further refinements on the following steps with petrochemicals, basis chemicals, polymers, specialities and active ingredients.

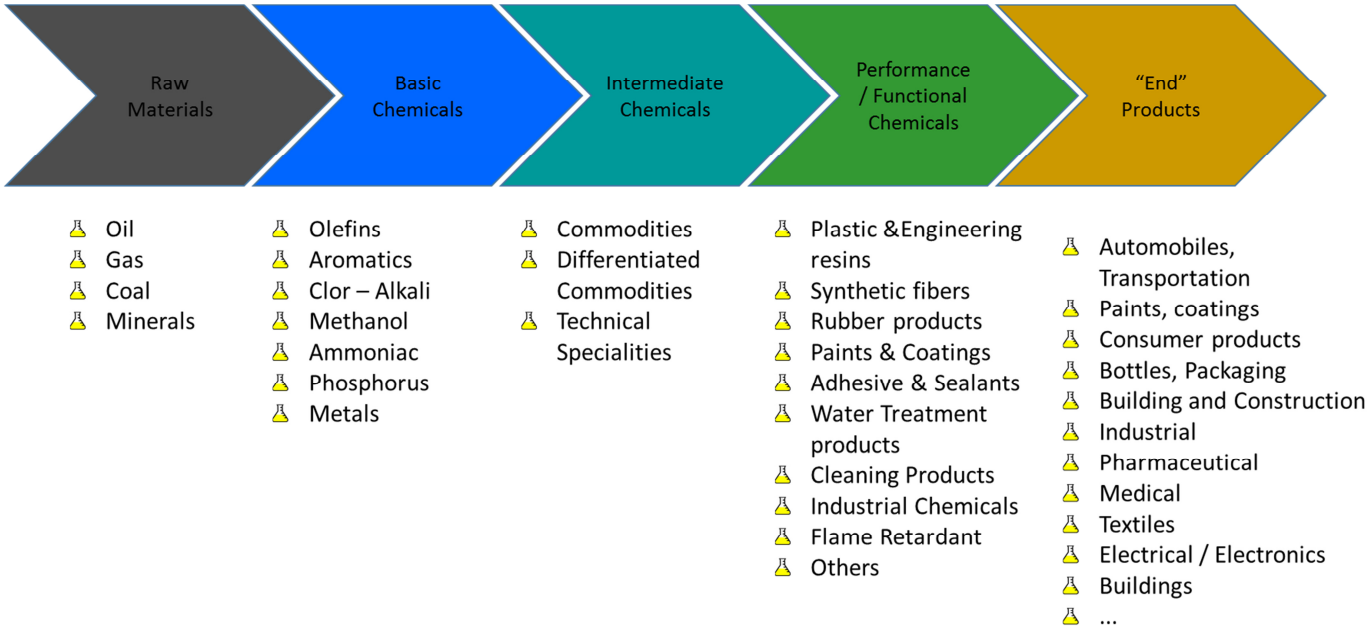


Fig.3. Conventional Chemical Industry Value Chain

In Catalonia we have practically the entire value chain, so the ecosystem is very complex and involves many industries, associations and cluster.

We can highlight their more active participation: **FedeQuim; Cluster ChemMed, Beauty Cluster Barcelona, Advanced Materials Cluster**.

FedeQuim is a non-profit organisation whose objective is to defend the rights and interests of the chemical companies, especially in Catalonia, through a follow-up by the European Union, Spanish State and Autonomous Community legal activities.

FedeQuim offers a permanent information and advise service to its associated, always looking after the progress of the sector companies and the betterment of its competitivity and public image in cooperation with the Spanish Chemical Industry Federation (FEIQUE) and other associations linked to the sector.

FedeQuim has 220 direct Associate companies and 5 attached Associations, together forming a collective of more than 500 companies, a guarantee of its corporate representation.

FedeQuim is a member of FEIQUE (Spanish Chemical Industry Federation) and member of Foment del Treball Nacional (Employers' Federation of Catalonia). FedeQuim plays a role in the Governing Bodies of both Organizations as well as in several Work Commissions. Through FEIQUE and F.T.N. FedeQuim has access to CEOE, Spanish Confederation of Employers' Organisations..

FedeQuim also collaborates with the Spanish federation of cleaning supplies and perfumery.

On its own FEIQUE is member of the European Chemical Industry Council (CEFIC). This organisation, as well as the CEOE, are part of the UNICE, the Union of European Community Industries.

http://www.fedequim.es/eng/default.htm

ChemMed Tarragona is an industrial, logistical, academic and scientific chemical cluster located in the greater Tarragona area in northeast Spain, by the Mediterranean Sea

ChemMed Tarragona encompasses:

- MORE THAN A HUNDRED CHEMICAL COMPANIES OF ALL SIZES. Production companies and and service companies. Production includes Petrochemicals, Polyolefins, Plastics, Organic Chemical Products and Industrial Products as well as Specialty Chemicals and Fine Chemicals, thus representing the classic value-creation chain
- FIRST- RATE CARGO PORT. Leading port for chemical industry, ensuring the import of raw materials and competitive feedstock and is a means to exporting products manufactured. Efficient logistics facilities
- POOLED INFRASTRUCTURE AND SERVICES. Two Combined Cycle Plants totaling 820MW power for electricity, steam, nitrogen, hydrogen, compressed air and demineralized water supply to companies within the cluster.
- Reclaimed water supply. A source of supply reaching up to 20 hm3/year
- Pooled underwater sewage outlet pipe
- Pipeline infrastructure for transportation and exchange of materials (Rack de Dixquímics) connecting all sites and companies among them and with the Tarragona harbor
- Three pooled Fire Stations
- CHEMICAL RESEARCH AND TECHNOLOGY CENTERS: Institute of Chemical Research of Catalonia (ICIQ); Chemistry Technology Center of Catalonia (CTQC)

- ACADEMIA: Southern Catalonia Campus of International Excellence (CEICS); Rovira i Virgili University (URV); Vocational training centers (Ins. Comte de Rius, Ins. Pere Martell, Ins. Vidal I Barraquer and Escola Joan XXIII)

http://www.chemmedcluster.com/

Beauty Cluster Barcelona: Group of companies, organizations and knowledge centres involved in the beauty industry value chain, which have joined together with the aim of generating new opportunities.

The Beauty Cluster Barcelona is open to companies and agents in the business of the beauty market value chain: Raw materials, ingredients, auxiliary third party-manufacturing, cosmetics and perfumery own manufacturers, packaging, electro-medical equipment, R & D centres and third-party service providers.

Objectives and challenges

- TO ENHANCE R&D AND INNOVATION. To increase the knowledge sharing, between the agents and thus the creation of strategic projects of cooperation.
- INTERNATIONALISATION. To improve the visibility and business activity at a global level, providing the companies with the necessary tools and knowledge to access the international markets.
- MARKETING AND BRAND POSITIONING. To give the necessary support and expertise for the identification of new business models and marketing strategies.
- TRAINING. To improve training in the technical, management, commercial, and new professional profile areas, in order to allow better business competiveness.
- Beauty Cluster Barcelona is member of Cosmetic Clusters International Network; Cluster.cat, also it has the quality labels Catalonia Clusters and Bronze label Cluster Management Excellence.

http://beautyclusterbarcelona.com/en/

Cluster Advanced Materials Catalonia is an association with legal status and non-profit organizations whose main objective to promote and contribute

to the competitiveness of companies and organizations in the value chain of the sector of advanced materials in Catalonia.

Currently, the cluster has 35 companies and associate. It promotes initiatives aimed at promoting the business of advanced materials and stimulate and exploit the synergies between members and related sectors. Provides strategic information technology and its members to improve their competitiveness also enhance opportunities for collaboration in the generation of proposals to all companies that are part of.

Cluster Advanced Materials Catalonia is member of Cluster.cat, also it has the quality labels Catalonia Clusters and Bronze label Cluster Management Excellence.

http://www.clustermav.com/

However, the chemical industry is working towards innovation and transformation to meet the challenges that arise, such as the transition towards a circular economy and low carbon economy, substitution of some raw materials and energy and resources efficiency. This implies the evolution and transformation of value chains, not only making them more global, but also more complex, with the introduction of new players in different parts of the value chain.

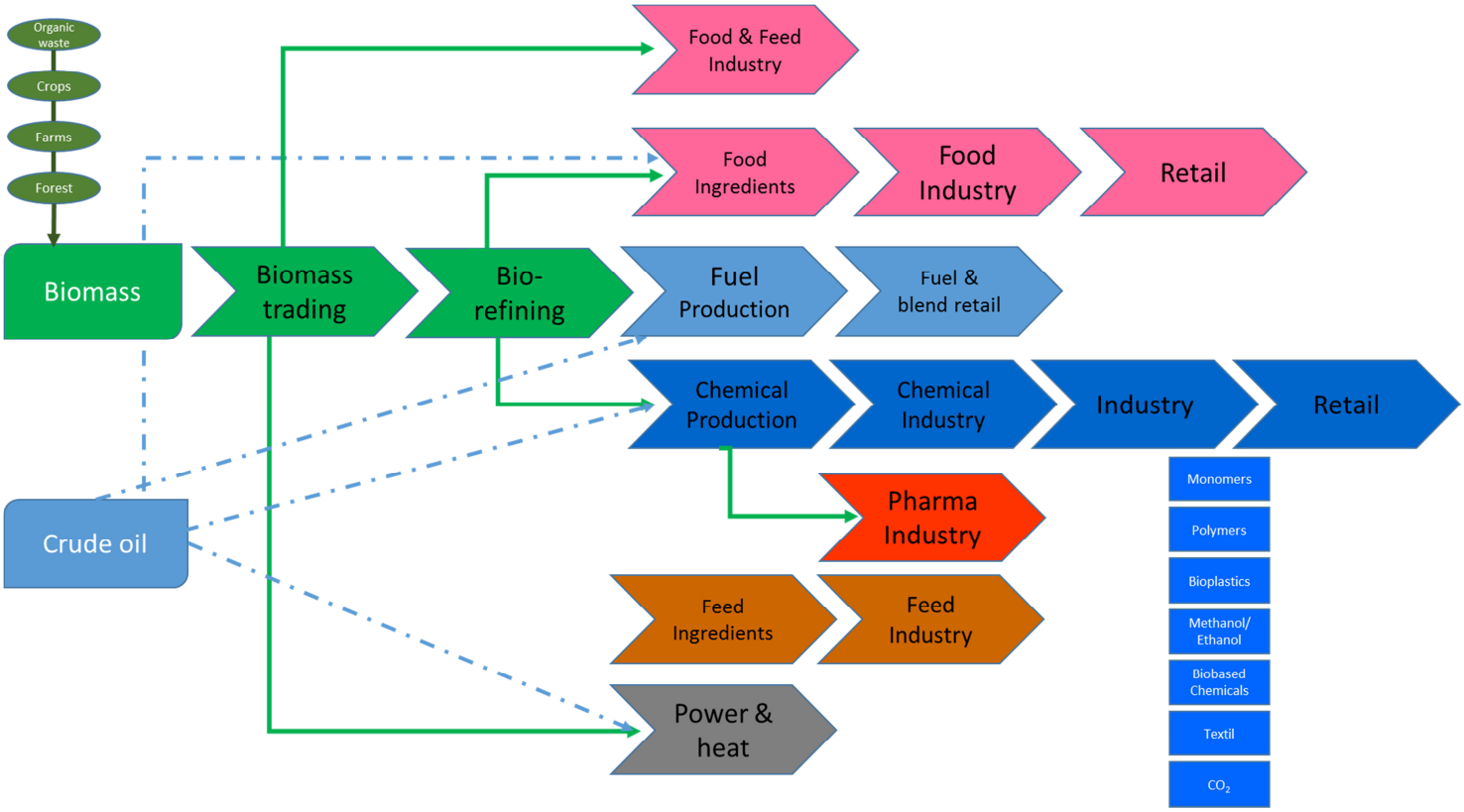


Fig 4. New chemical value chain

3. Identification of thematic priorities

As already mentioned, the chemical ecosystem in Catalonia is very wide and varied. Our working group also includes this variety, both in application areas such as profiles, research centers, companies, clusters.

For the identification of the thematic priorities it has been decided to create a matrix that crosses fields of application with enabling technologies. The result is shown in Table 1.

As fields of application of chemistry it have been chosen chemistry of health and well-being, water chemistry, energy chemistry, food chemistry, chemistry manufacture and education.

As facilitators, materials, process engineering, and biotechnology.

These priorities must respond to the challenges and trends that were established and agreed upon in the previous study, which are inspired by the challenges of the European Union, the United Nations sustainable development goals and are also aligned with the priorities of the Sustainable Chemistry Platform.

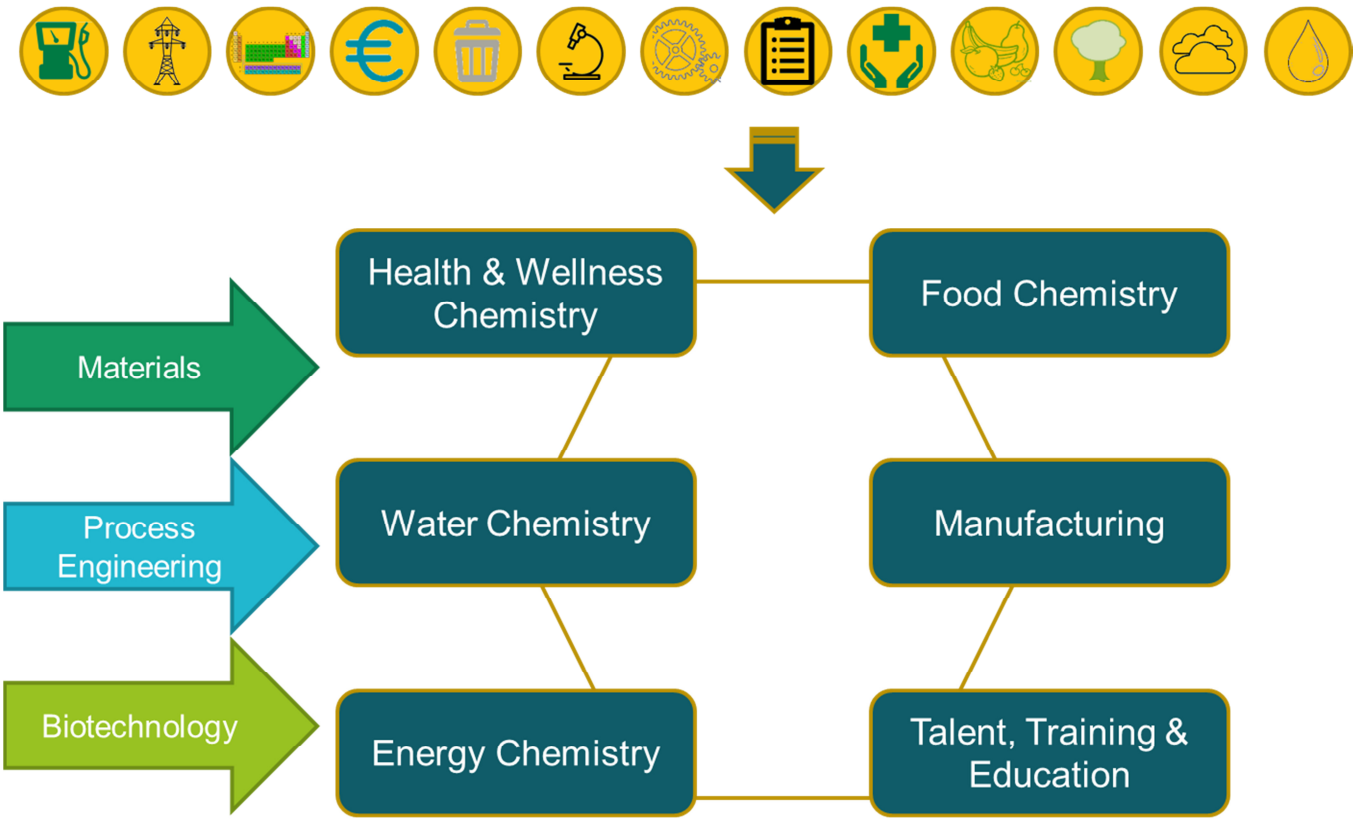


Fig 5.- Thematic priorities according to challenges

Table 1.- Catalan Chemical Priority Topics

Application Field	Materials	Process Engineering	Biotechnologies
Health and Wellness Chemistry	Biocompatible materials Nanomaterials Advanced Formulations Packaging Cosmetic/Natural Cosmetic Encapsulated Solvents	Catalysis Synthesis Waste management Process efficiency Safer processes Safer products Solvents reuse IoT	Pharma Biosensors New/Personalised formulations Bio based Natural Cosmetics
Water Chemistry	Water treatment Membranes Materials from Sewage sludge Filter media Additives: flocculants, coagulants	Regeneration Reuse Optimization and efficiency New technologies for integral water cycle management IoT Less impact technologies Sustainable Technologies	Water treatment Bioremediantion Membranes MBR Waste management

Application Field	Materials	Process Engineering	Biotechnologies
Energy Chemistry	Solar CO2 Construction /Buildings (Efficiency) Insulation Hydrogen Storage (ion-batteries) Fuel cells	Environmental Technologies IoT Efficiency Hydrogen from solar Waste to Energy	Biomass Biofuel
Food Chemistry	Sensors Fertilizers Biocides Packaging Seed Encapsulated Bio based materials Aromas and additives	Process efficiency Safety Waste management Product Properties Waste to food Recycle/ Reuse IoT	Waste to bio economy Fertilizer Biocides

Application Field	Materials	Process Engineering	Biotechnologies
Manufacturing Chemistry	Nanomaterials Graphene & nanotubes Composites Secondary raw materials Lightweight materials Adhesives Waste to materials Bioplastics Functional textiles Sealants Oils, lubricants, paints Polymer Metals and Alloys	µreactors Membranes 3D-printing Surface treatment and Modification Synthesis Catalysis Batch to Flow Safety Solvents IoT Circular Economy	Bio economy Circular Economy Waste to materials (bioplastics, bio lubricants,…)
Training & Education	New materials Basic Chemistry and Processes Specialized Master Vocational Education / Dual	Process Engineering Circular Economy Specialized Master Vocational Education / Dual	Materials & Processes Bioecomomy Biorefinery techniques Vocational Education

In addition, and to establish the roadmap, the points of intersection with the axes of action of the National Pact for the Industry of Catalonia must be found:

- Business Competitiveness
- Business Dimension and financing
- Industry 4.0 and digitization

- Training.
- Infrastructure and energy
- Sustainability and the Circular Economy

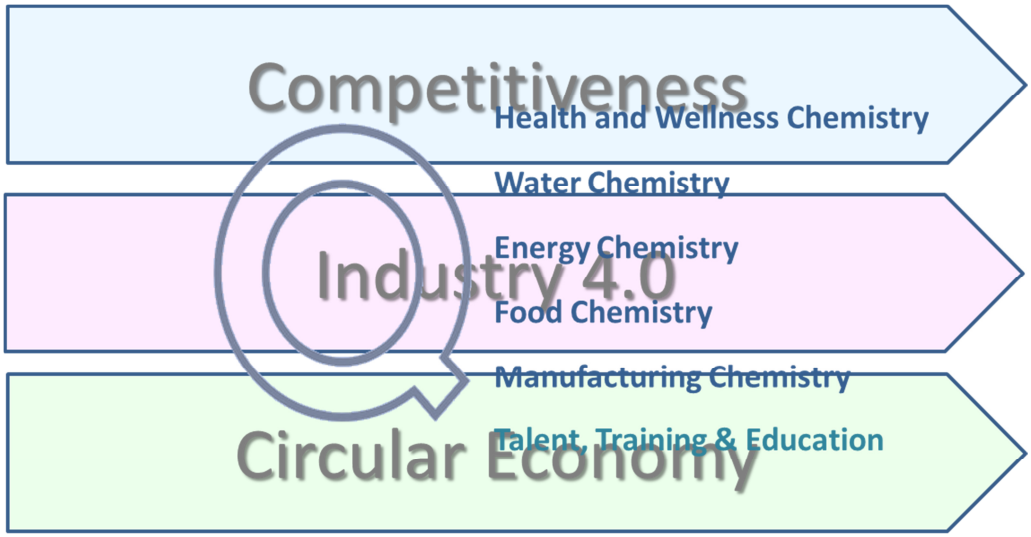


Fig. 6.- Policy Axes

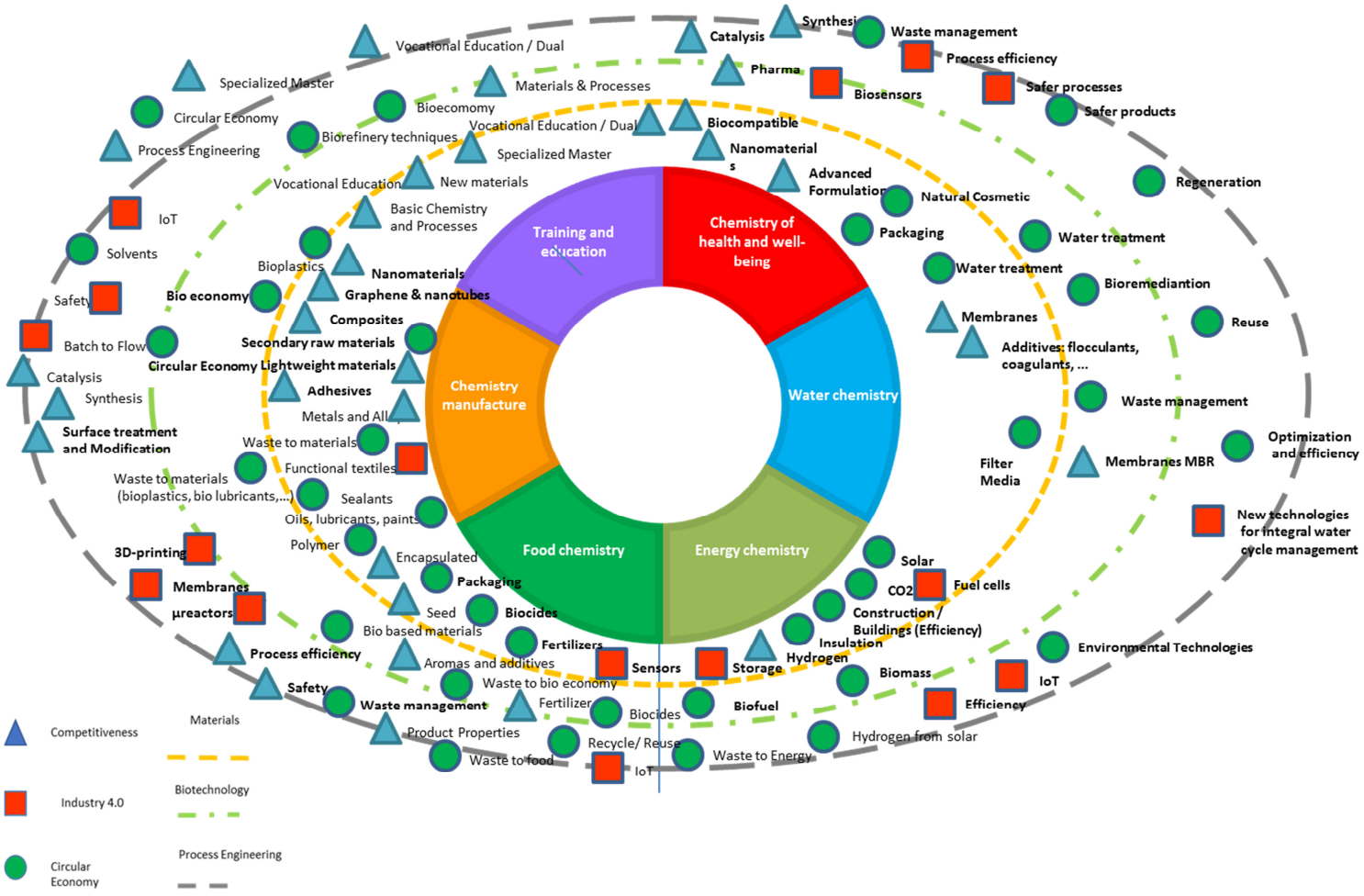


Fig. 7.- Intersection Chemical Priority Topics and Policy Axes

4. Conclusions and Recommendations

The existing RIS governance already indicates an advanced level of cooperation. Stakeholders and partners are fully integrated into the preparation of RIS.

But no fixed governance structure has been created that includes stakeholders. Although these are consulted through surveys.

However we create a chemical stakeholders group to involve regional actors. Representatives from industry, administration and academia worked together to define the main challenges and opportunities.

And now the biggest challenge is the participation of companies, technology centers and research in the defined instruments.

4.1 Which needs for improvement have you identified?

Among the main improvement needs we can highlight:

Improvement of instruments, making them simpler in their application and more agile for justification. In this way they will be more attractive for SMEs.

Improve funding conditions, both on a loss-making basis and with preferential interest loans.

Expand the concepts eligible, so that specific challenges and problems of the chemical sector can be included.

4.2 Expectations to interregional learning

In this project we want to learn from our colleagues, especially how to involve SMEs and increase their participation in innovation projects, both at regional level and at European level.

Learn about other instruments that help improve the competitiveness of companies in the chemical sector and help them to face the changes and challenges they cope in a new economy framework.

It is also very interesting to know how they carry out the technology transfer and dialogue between companies and technological centers, so that it is maintained in a sustainable way.

Industry and chemical science do not have a good social image, we must make joint efforts to improve this image and get young talent to approach this field of knowledge.

5. Annex 1: Regional Stakeholders

Catalan Stakeholders represent the chemical ecosystem and is composed of representatives of the Administration: the general direction of economic development, competition and regulation of the Generalitat of Catalonia, which is responsible for the implementation of the RIS3 strategy in Catalonia, Expoquimia, World reference fair in the field of chemistry; Representatives of the world of research and major universities, as well as associations and clusters related to chemistry, materials and some companies.

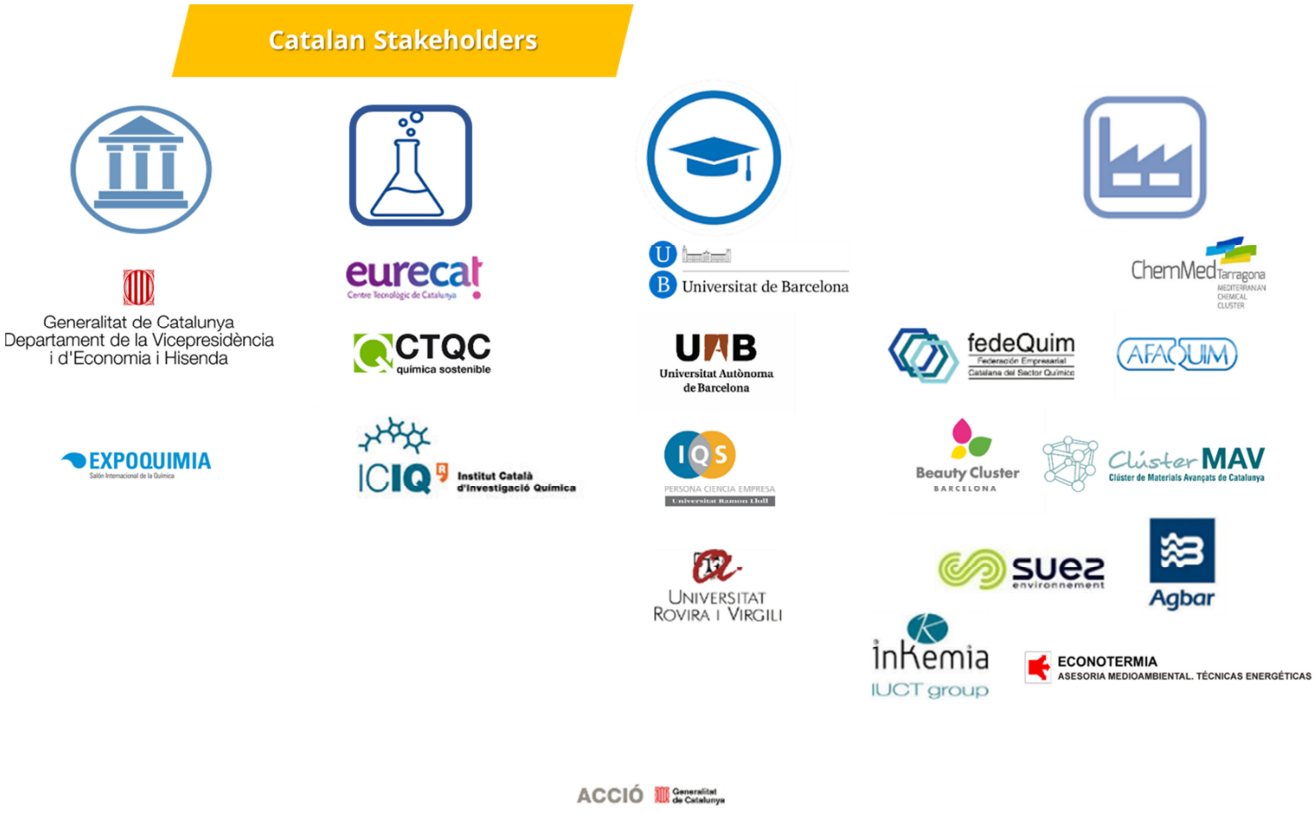


Fig. 4.- Catalan Stakeholders

5.1 Public Authorities

Directorate General for Economic Promotion, Competition and Regulation Ministry of the Vice-presidency and of the Economy and Finance (Government of Catalonia)

Description of Main Competencies and Responsibilities / Role in RIS Implementation:

The Directorate General for Economic Promotion, Competition and Regulation Ministry of the Vice-presidency and of the Economy and Finance (Government of Catalonia) is the responsible body for designing, promoting, coordinating and monitoring the RIS3CAT strategy (ACCIO is in charge of implementing some of the RIS3CAT Instruments for RDI).

The implementation of RIS3CAT requires strong, multi-level governance, due to that the General Directorate for Economic Policy at the Regional Ministry of Economy and Knowledge leads the RIS3CAT Steering Committee de RIS3CAT (the body designated by the Catalan Government to formulate, promote and coordinate the RIS3CAT strategy). It is a collegiate body formed by the representatives of this Directorate General; the Directorate General for Research; and the Secretariat for Business and Competitiveness (Ministry of Business and Knowledge).

The main functions of the RIS3CAT Steering Committee are:

- To submit the RIS3CAT document to the Government for approval.
- To approve the annual RIS3CAT strategic priorities.
- To ensure the coherence of RIS3CAT with the budget policies of the Catalan Government, ECAT2020 and Government plans.
- To promote coordination with other administrations linked to RIS3CAT, particularly the European Commission, the Central Administration and local authorities.
- To promote coordination and cooperation between ministries and other administrations and stakeholders in the research and innovation system in all actions related to RIS3CAT.
- To define and manage internal and external monitoring of RIS3CAT.
- To approve the annual RIS3CAT implementation and monitoring report.
- To appoint the members of the RIS3CAT Technical Committee.
- To approve the RIS3CAT Communication Plan.
- To share information, experiences and best practices in RIS3 with other European regions.

The RIS3CAT Steering Committee is assisted in its tasks by a Technical Committee.

Source: RIS3CAT

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Fira Barcelona – EXPOQUIMIA

Description of Main Competencies and Responsibilities / Role in RIS Implementation:

Fira Barcelona is a consortium comprised by the Barcelona City Council, the Catalan Generalitat and the Barcelona Chamber of Commerce, which combines public ownership with autonomous company management.

Constituted in 1932, every year it organises and hosts shows and congresses that cover the economy's main sectors, as well as numerous corporate, social and cultural events. It has two large venues and offers exhibitors, organisers and visitors all the resources of a modern and efficient institution.

Fira is one of the most important European trade fair organisations and its international prestige is closely linked to the Barcelona brand, a city with over a century of trade fair tradition. Its annual economic contribution to the city of Barcelona and its surroundings is estimated at over 2,600 million Euros and also brings added social and public value.

Life science and Chemistry Business Unit, organizes all events related of this fields. Events such as: Expoquimia, Equiplast, Eurosurfas, IN3DUSTRY, Healthio, etc. Pilar Navarro is the director of this area.

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5.2 Networks and Clusters

Beauty cluster Barcelona

Type of Organization:

- ☐ Informal network without legal personality
- ☐ Project-funded network / cluster without legal personality
- ☒ Member-funded network / cluster with its own legal personality

Structure / Members:

Who are the participants / members (companies, science, public authorities, etc.) of the network? How is the relationship?

Members of the cluster are companies working on healh& beauty from the following sectors:

Consulting, Contract manufacturing, Cosmetics, Devices, Distributors and retailers, Engineering and automation, Healthcare, Hygiene, Marketing and Communication, Media, Packaging, Perfumes, Raw materials, Technical and scientifical services, Training, Transport and logistics

Among others: AKTIVA DESIGN, bicosome, birchbox, bit beauty intelligence, CENTRO DE TECNOLOGÍA CAPILAR, Cosmetica Creativa S.L., Cosmetics in Mind, CTQ, Dermoestetica del Sur S.A. Eggroup, EC, Bosch I Guimpera Universitat de Barcelona, GO4EXPORTS, I.E.C., IDERMOSKIN, IMAGO, IPB CONSULTING, JMR PHARMA, M.CAMPS, MP CONSULTORS, MYOWNPRESS COMUNICACIÓN, SIM COSMETICS, SOCIEDAD ESPAÑOLA DE QUÍMICOS COSMÉTICOS, TERNUM COSMETICS, THE BEAUTY MAKERS, UMO, WORLD DERMIC.

For full list of company members of the Health & Beauty Cluster:

http://beautyclusterbarcelona.com/en/members/

Description of the Main Competencies / Fields of Activities:

A cluster is an effective instrument for connecting businesses and agents in the same business and accordingly to common interests, to identify and implement projects, both individually and collaboratively, to help improve the competitiveness of the participating companies.

The Beauty Cluster Barcelona is open to companies and agents in the business of The beauty market value chain: Raw materials, ingredients, auxiliary third party-manufacturing, cosmetics and perfumery own manufacturers, packaging, electro-medical equipment, R & D centres and third-party service providers.

Objectives and challenges

- To enhance R&D and innovation. To increase the knowledge sharing, between the agents and thus the creation of strategic projects of cooperation.
- Internationalisation. To improve the visibility and business activity at a global level, providing the companies with the necessary tools and knowledge to access the international markets.
- Marketing and brand positioning. To give the necessary support and expertise for the identification of new business models and marketing strategies.
- Training. To improve training in the technical, management, commercial, and new professional profile areas, in order to allow better business competiveness.

Relevant Thematic Innovation Priority / Research Field:

Natural Cosmetics

New natural preservatives

Barrier materials

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ChemMed

Type of Organization:

- ☐ Informal network without legal personality
- ☐ Project-funded network / cluster without legal personality
- ☒ Member-funded network / cluster with its own legal personality

Structure / Members:

Who are the participants / members (companies, science, public authorities, etc.) of the network? How is the relationship?

ChemMed Tarragona is an industrial, logistical, academic and scientific chemical cluster located in the greater Tarragona area in northeast Spain, by the Mediterranean Sea

ChemMed Tarragona encompasses:

- MORE THAN A HUNDRED CHEMICAL COMPANIES OF ALL SIZES. Production companies and service companies. Production includes Petrochemicals, Polyolefins, Plastics, Organic Chemical Products and Industrial Products as well as Specialty Chemicals and Fine Chemicals, thus representing the classic value-creation chain
- FIRST- RATE CARGO PORT. Leading port for chemical industry, ensuring the import of raw materials and competitive feedstock and is a means to exporting products manufactured. Efficient logistics facilities
- POOLED INFRASTRUCTURE AND SERVICES. Two Combined Cycle Plants totaling 820MW power for electricity, steam, nitrogen, hydrogen, compressed air and demineralized water supply to companies within the cluster.
  Reclaimed water supply. A source of supply reaching up to 20 hm3/year
  Pooled underwater sewage outlet pipe
  Pipeline infrastructure for transportation and exchange of materials (Rack de Dixquímics) connecting all sites and companies among them and with the Tarragona harbor
  Three pooled Fire Stations
- CHEMICAL RESEARCH AND TECHNOLOGY CENTERS
  Institute of Chemical Research of Catalonia (ICIQ); Chemistry Technology Center of Catalonia (CTQC)
- ACADEMIA
  Southern Catalonia Campus of International Excellence (CEICS); Rovira i Virgili University (URV); Vocational training centers (Ins. Comte de Rius, Ins. Pere Martell, Ins. Vidal I Barraquer and Escola Joan XXIII)

Description of the Main Competencies / Fields of Activities (in headwords)**:**

ChemMed an industrial, logistical, academic and scientific chemical cluster.

With more than a hundred chemical and services companies of all sizes (Production companies and service companies. Production includes Petrochemicals, Polyolefins, Plastics, Organic Chemical

Products and Industrial Products as well as Specialty Chemicals and Fine Chemicals, thus representing the classic value-creation chain).
Relevant Thematic Innovation Priority / Research Field: Membrane for water solutions (Dow Chemical) Polyurethane raw materials for coatings (Covestro) Catalysis and renewable energy (ICIQ) Catalysis for the production of fuel and chemical products of added value. Membrane technology. Microcapsules and process engineering. Nanophotonic and utradetection (CTQC) Metallocene polyethylene for packaging (Repsol)
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Advanced Materials Cluster

Type of Organization:

- ☐ Informal network without legal personality
- ☐ Project-funded network / cluster without legal personality
- ☒ Member-funded network / cluster with its own legal personality

Structure / Members:

Who are the participants / members (companies, science, public authorities, etc.) of the network? How is the relationship?

The Cluster Advanced Materials Catalonia is an association with legal status and non-profit organizations whose main objective to promote and contribute to the competitiveness of companies and organizations in the value chain of the sector of advanced materials in Catalonia.

Advanced materials are those that involves in its structure or configuration superior or new properties to conventional materials as the ability to memorize shape or direction changes; also we work intensely with the technologies related with these materials.

As a transversal cluster, we work in sectors as automotive, packaging, health technology, design, railway among others.

The chain value is represented from the configuration of the material till the distributors of additives, going through fabricators, engineering analysis, Universities, and Technical centers.

For full list of company members of the Advanced Materials Cluster:

http://www.clustermav.com/membres/llistat-socis/

Description of the Main Competencies / Fields of Activities :

The MAV cluster includes companies and agents throughout the value chain that share a common technological base: new metallic materials, composite materials, polymeric materials and ceramic materials.

- Addition plastics/rubber to concrete to improve acoustic properties
- Nanocoating

- Functional surfaces treatments
- Textiles structures with a range of functionalities like water-proof, fire-proof, anti-slippery or aesthetic traits like printing, embossing and lamination
- Blends of diferent thermoplastic polymer for superior thecnical propierties
- Carbon fiber with Aluminion
- Multilayer ceràmic cofiring. Graded materials
- Estructures whit flax fibers
- Textile structures with wool fibers
- Natural pavements with micronized recycled glass with properties free maintenance.
- Non-destructive inspection (NDI) by means of ultrasounds (C-Scan), radiography and computerized X-ray tomography (CT).
- Thermomechanical characterization of composite materials (TMA, DMA, TGA, DSC, etc.).
- Experimental characterization of bonded joints between dissimilar materials

Relevant Thematic Innovation Priority / Research Field:

Lightweight materials; nanotechnologies; functional surfaces; Additive Manufacturing; Fabric structures; BioSource materials

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5.3 Industry

Asociación Española de Fabricantes de Productos de Química Fina (AFAQUIM)

Manufacturers' Association of Pharmaceutical Chemistry

Description of Main Competencies / Fields of Activities :

AFAQUIM, Manufacturers' Association of Pharmaceutical Chemistry groups and represents the set of manufacturing plants of Active Principles and Intermediate Pharmacists (API), of which 30 companies belong to AFAQUIM. This sector has a turnover near 1.500 million Euros and an export of about 1.000 million Euros.

AFAQUIM, Manufacturers' Association of Pharmaceutical Chemistry groups and represents the set of manufacturing plants of Active Principles and Intermediate Pharmacists (API), of which 30 companies belong to AFAQUIM. This sector has a turnover near 1.500 million Euros and an export of about 1.000 million Euros.

In spite of the world competition in prices, specially of the developing countries, the sector has answered with quality and service and supports a constant line of growth superior to five per cent per year. Spain is the third European country in importance in the production of pharmaceutical raw materials, very over his industrial position in the set of nations.

The main successes achieved by AFAQUIM in these years, in his labor of defense of the interests of the sector and acting directly or across the groups in which it takes part, they have been:

Relevant Thematic Innovation Priority / Research Field:

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Position:

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Email: http://www.afaquim.org/contenido/contacto

Website: **http://www.afaquim.org/**

FEDEQUIM – Federació Empresarial Catalana del Sector Químic

Structure / Members:

FedeQuim is a non-profit organisation whose objective is to defend the rights and interests of the chemical companies, especially in Catalonia, through a follow-up by the European Union , Spanish State and Autonomous Community legal activities.

FedeQuim offers a permanent information and advise service to its associated, always looking after the progress of the sector companies and the betterment of its competitivity and public image in cooperation with the Spanish Chemical Industry Federation (FEIQUE) and other associations linked to the sector.

FedeQuim has 220 direct Associate companies and 5 attached Associations, together forming a collective of more than 500 companies, a guarantee of its corporate representation.

FedeQuim is a member of FEIQUE (Spanish Chemical Industry Federation) and member of Foment del Treball Nacional (Employers' Federation of Catalonia). FedeQuim plays a role in the Governing Bodies of both Organizations as well as in several Work Commissions. Through FEIQUE and F.T.N. **FedeQuim** has access to CEOE, Spanish Confederation of Employers' Organisations..

FedeQuim also collaborates with the Spanish federation of cleaning supplies and perfumery.

On its own FEIQUE is member of the European Chemical Industry Council (CEFIC). This organisation, as well as the CEOE, are part of the UNICE, the Union of European Community Industries.

Governing Bodies (http://www.fedequim.es/eng/organs.htm):

- The General Assembly is a sovereign governing body and is constituted by a Representative of each of the members of FedeQuim, companies as well as associations. In principle, the General Assembly meets twice a year under the chairmanship of the President.
- Board of Directors
- Excecutive Committee
- The Advisory and Executive Bodies are formed by work Commissions created to inform and offer opinions and reports to the Governing Bodies, the Members and the Secretary's office regarding specific fields of management activities. These Work Commissions are open to the participation of experts in Member companies.

Description of Main Competencies / Fields of Activities (in headwords)**:**

Basic objectives of FedeQuim

- Promotion, support and defence of the interests of the Chemical Sector, ensuring the improvement of its competitivity and public image.
- Reply to queries and find solutions to business problems.
- Corporate representation of the Sector with the adequate level in each circumstance.

The activities of FedeQuim are oriented towards the achievement of these objectives and giving

service to its members:

Relationship with the public Administration.

Active participation in legislative procedures: community, state and autonomous, offering allegations and proposals to modification of texts being composed. Agreements of collaboration with autonomous and local Administration:

- Interior Department of the Generalitat of Catalonia. (Board of Emergencies and Civil Security). Collaboration Agreement with the Coordinating Centre of Carriage of Dangerous Goods.
- Education Department of the Generalitat of Catalonia.Training of students in companies.
- Professional Training Council of the Barcelona City Council. Education, training in companies and work promotions.
- Barcelona Chamber of Commerce, Industry and Navigation. Agreements and Collaborations of diverse nature related to the Chemical Industry.

Participation and collaboration with other Federations and other employer organizations. (See: Corporate and Institutional Integration of FedeQuim).

Active participation in negotiations with Collective Agreements between management and workforce within the Chemical Sector:

- General Collective Agreement of the Chemical Industry.
- Agreement of Wholesalers and Importers of Chemical Products.

And its subsequent follow-up and interpretation through Mixed Commissions.

Mediation and conciliation of labour conflicts within member companies

Promotion of Plans for Continuous Group Trainings. Organisation of seminars for the staff of member companies.

Permanent advisory and information services to Members. Through Commissions and through communications and informative sessions on labour subjects, fiscal, environment, industrial technical security, product security, logistics and transport, quality systems and international commerce.

Organisation of conferences and seminars and participation in other contests and meetings linked to the Sector.

Information to the media when necessary.

Participation in EXPOQUIMIA in collaboration with FEIQUE. Expoquimia is the main chemical industry and trade fair in Spain celebrated every 3 years in Barcelona.

Promotion Plan of I+D+i in Chemical Companies.

Collaboration Agreements with business to business companies.

Relevant Thematic Innovation Priority / Research Field:

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Inkemia IUCT Group S.A.

Description of Main Competencies / Fields of Activities:

InKemia has as a mission the generation of knowledge of high technological value to give support to the industries in the life sciences field.

InKemia has as objective to generate knowledge of high technological value for the chemical, pharmaceutical, biotechnological, cosmetic, nutraceutical and related industries.

Since its establishment, IUCT has signed some 300 contracts with companies for R & D, technical services and consulting, accumulating more than one service or project for any company. Of which we could highlight 25 projects of R & D for companies. In the area of own R & D for technology transfer companies generated IUCT designed and developed 17 projects under the different policy areas. Developed over the past 3 years are detailed below. Of these projects they have requested five national patents which have been extended to PCT. It is currently being drafted 2 more patents contracts with companies for R&D, technical services.

The activities of IUCT group in four strategic areas:

• Projects of R&D&i and Technological Transfer

1. Own projects R&D&i and transfer of results to the industry ---> Pipeline
2. Customized R & D projects for companies
3. Development of own Technological Platforms, available for the use of industrial projects

• Technological Services

1. Analysis in different scientific areas
2. Pharmaceutical production, cosmetic and nutraceutics
3. Services of consulting and technical audits

• Transmission of Knowledges and Skilled Formation

1. Open formation
2. Formation to size in wide areas of scientific knowledge
3. Conferences, Seminars, Workshops and Congresses

• Entrepreneur of High Technology

1. Spin off of IUCT of own technologies
2. Business collaborationswith companies consolidated
3. Support to entrepreneurship through the Fund of Capital-Knowledge

Relevant Thematic Innovation Priority / Research Field:
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5.4 Science

Technology Centre of Chemistry (CTQ)	
Number of Researchers: ……	
Type of Institution	**Research Category**
☐ University ☒ Research Institute ☐ Research and Centers for Development, that are operated by industrial enterprises	☐ Basic Research ☒ Industrial Research ☒ Experimental Research

Description of Main Competencies / Research Areas:

The Technology Centre of Chemistry (CTQ) is a private non-profit organization created in 2008 with the aim of contributing effectively to the sustainability way, competitiveness, innovation and technological progress of European companies and organizations in the chemical sector and related sectors, events and international reference center on sustainable chemistry.

CTQ helps companies and organizations, large and small, in areas such as optimization of energy consumption in processes, reducing environmental impact, improving maintenance functions, improving productivity, improvement or replacement of products and materials, or the incorporation of advanced materials. CTQ collaborates by providing services; execution of R + D + I; and recruitment, adaptation and transfer of innovative technologies. He has worked since its founding with a growing number of companies of all measures. In July 2013 Medcom Advance, the first start up the CTQ in collaboration with the Universitat Rovira i Virgili (URV) Medcomtech and the Catalan Institution for Research and Advanced Studies (ICREA) was established.

Relevant Thematic Innovation Priority / Research Field:

- Industrial developments
- Catalysts for the production of fuels and chemical products of added value
- Membrane technology; microcapsules and process engineering
- Nanophotonic and ultradetection

- **Industrial developments**

The objective of this work is to give a quick response to the needs of companies in their day to day in those areas in which the Centre has sufficient experience and knowledge. The activities are aimed, above all:

✓ Design and assembly of pilot plants (laboratory scale and semi-industrial) for determining the efficiency of processes or raw materials.
✓ Systems quantification of the efficiency of maintenance labor. Area of great interest to the industry by improving the efficiency and effectiveness that entails.

- ✓ System detection and quantification of odor episodes in villages near industrial sites. Area of great social impact where society-industry interaction is fundamental.
- ✓ System to ensure the transmission of knowledge in industrial operations. Area of great interest for the risk of loss of knowledge accumulated in the next generation of industrial workers.
- ✓ Development and implementation of systems that improve the efficiency of industrial processes. Area involving an improvement in the competitiveness of companies by the economic benefits that entails and brings environmental benefits associated reduced consumption of raw materials and waste generated.

Catalysts for the production of fuels and chemical products of added value

The objective of this line is to provide solutions to the current energy situation and the need for the chemical industry to obtain energy products in a sustainable way and enhance byproducts for production of products with high added value.

Valorization of technologies for liquid fuels. Development of technologies for the conversion of natural resources such as coal, natural gas and biomass into ultra-clean synthetic liquid fuels with low CO2 footprint. The Centre works on projects ranging from exploratory research in collaboration with companies to apply new concepts of nanotechnology for Fischer-Trospch process.

Products derived from the processing of CO2. Imitation making process plants through photosynthesis allows, in the laboratory, use sunlight to split water and use the resulting electrons to create hydrocarbons from CO2. The Center develops catalysts and chemical chromophore used as antennas for projecting the 7è Eco2CO2 framework program of the European Union (FP7-NMP-2012-SMALL-6). Experience catalysis is also used to create new materials from the reaction of CO2 with other substrates.

Catalysts for the recovery of industrial raw materials. The aim is to develop new and improve existing processes to make them more sustainable in obtaining chemicals more effectively. Obtaining chemicals from cheap and affordable raw materials represents a major challenge for the industry.

Membrane technology; microcapsules and process engineering

In the last decade there has been a growing interest in the use of membranes in different industrial processes that have improved their effectiveness. Companies using membrane technology developed are mainly large multinational companies that focus their business interest in major markets. This is an opportunity to influence other applications where a specific design of selective and intelligent membranes that can respond to stimuli controlled or changing environmental conditions so necessary.

The Center collaborates with companies for the preparation and characterization of different types of membranes and microcapsules (membrane design to the letter, including the synthesis of

materials) selection and use of commercial membranes, if appropriate) to design or assist in engineering processes membrane separation, fouling optimization, morphological characterization, design of membrane modules and simulation and optimization of specific processes, among others.

Nanophotonic and ultradetection

- ✓ **Synthesis, improved engineering and evaluation of optical properties of nanoparticles.** Some techniques of surface spectroscopy (SERS, SEF and SEIRA) allow the detection limit down to a single molecule. In order to use these techniques with analytical purposes there needs to be deposited neatly metal nanoparticles on the surfaces to provide the necessary electromagnetic field. The center prepares these nanoparticles nanoestructuradoss systems and designs.
- ✓ **Sensors monitoring applications contaminants, diagnosis and biosensing.** Besides direct techniques in the evaluation of components in a given sample, other approaches include indirect detection by exploiting certain spectroscopic properties of molecular systems. The manufacture of hybrid systems based on nanoparticles are taking prominence as a method for the manufacture of complex sensing elements from sensors lock-and-key (key-and-lock) or indirect interactions (cross reaction arrays)

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EURECAT

Number of Researchers: ……

Type of Institution	**Research Category**
☐ University ☒ Research Institute ☐ Research and Centers for Development, that are operated by industrial enterprises	☐ Basic Research ☒ Industrial Research ☒ Experimental Research

Description of Main Competencies / Research Areas:

Eurecat is the result of integrating the TECNIO network's most important technology centres in Catalonia. With 38M€ of incomes, EURECAT integrates more than 450 professionals and participates in over 100 R&D&i high-level strategic projects. Therefore, the role of this stakeholder could be extremely important to achieve several of the Industrial Systems Promotion Program challenges and, particularly, for the implementation of the RIS3CAT.

Eurecat Figures: 450 Professionals, 40 M€ Revenues, +1.000 Clients, 7 Spin-Offs, 73 Patents, +160, R+D Projects

Relevant Thematic Innovation Priority / Research Field:

A multidisciplinary and international team made up of scientists and technologists from the industrial and digital fields are currently working on more than 160 highly strategic applied R & D projects. All of those projects aim to acquire new knowledge that is transferred to specific applications and solutions, to cover the needs of our most immediate industrial fabric, as well as to improve already existing products, processes and services.

Eurecat's lines of research also address the strategy of innovation and research for the smart specialisation of Catalonia (RIS3CAT) for the 2015-2020 period:

Metallic and ceramic materials, Plastic Materials, Material composites, New manufacturing processes, Autonomous and professional robotics, Functional printing, Functional fabrics, Product innovation and development, Simulation, Sustainability, Big Data & Data Analytics, Audiovisual technologies, Digital Humanities, Smart Management Systems, IT-Security, E-health.

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Name of the Research Institution: Institut Català d'Investigació Química (ICIQ) Institute of Chemical Research of Catalonia

Number of Researchers: ……

Type of Institution	**Research Category**
☐ University ☒ Research Institute ☐ Research and Centers for Development, that are operated by industrial enterprises	☒ Basic Research ☒ Industrial Research ☒ Experimental Research

Description of Main Competencies / Research Areas:

The Institute of Chemical Research of Catalonia Centre of excellence, an internationally recognised leading institution in the field of chemistry committed with performing research at the frontiers of knowledge

Founded in 2000 by the Government of Catalonia, the Institute of Chemical Research of Catalonia started its research activities in 2004. Since its creation, ICIQ aimed at becoming a centre of excellence, an internationally recognised leading institution in the field of chemistry committed to performing research at the frontier of knowledge. The institute also has two other objectives: Knowledge and technology transfer to the chemical, pharmaceutical and energy industrial sectors and that of training the future generation of scientists by offering high-quality educational programmes to master and PhD students and postdoctoral researchers as well.

Our mission is to lead, from the vantage point of molecular science, cross-strategies for solving major social and economic challenges, thereby contributing to the establishment of a knowledge-based economy and improving quality of life for all. We're achieving this by conducting top quality research on two main areas: Catalysis and Renewable Energy.

ICIQ hosts:

- 26 research laboratories
- 7 research support laboratories
- 2 high pressure labs.
- 1 computational lab.
- Computational cluster
- Clean room

- Electronic, mechanical and glass blower workshops

ICIQ research groups focus their work on applying chemistry at the frontiers of knowledge in two main areas: **Catalysis**, which aims at discovering new and useful catalytic processes to tackle challenges such as sustainability, health and energy, and **Renewable Energy**, focused on the generation of hydrogen from water through sustainable processes, the development of more efficient photovoltaic devices and the CO2 conversion into liquid fuels and feedstock for the chemical industry.

Here at ICIQ we have a multidisciplinary approach to research, encouraging international collaborations with other research groups/centres and positioning chemical research in the European research strategy agenda.

Relevant Thematic Innovation Priority / Research Field:

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Institut Químic de Sarrià (IQS)

Number of Researchers: ……

Type of Institution	**Research Category**
☒ University ☐ Research Institute ☐ Research and Centers for Development, that are operated by industrial enterprises	☒ Basic Research ☒ Industrial Research ☒ Experimental Research

Description of Main Competencies / Research Areas:

IQS is a Higher Education Center founded by the Society of Jesus, with over one hundred years of experience and an extensive track record and history in the academic field that enable the institution to offer a fully consolidated and proven teaching method. IQS offers research and solutions in:

- Chemical Engineering (Flow and Green Chemistry, Advanced water recycling, CO_2 Capture)
- Material Science (Biomaterials, Surface treatment and modification, graphene)
- Bioengineering (Biomedicine, Organ Regeneration, Enzymes)
- Organic Chemistry (Computer Assisted Design of Drugs, New API for cancer, AIDS treatment, Microwaves Assisted Synthesis, Teranostics, Mesoporous Materials)
- Analytical and Inorganic Chemistry (Electrochemistry)
- Photochemistry (Biological Therapy of Cancer, Solar Filters)
- Energy (Renewable Resources)
- Manufacturing technologies (Additive manufacturing)

Relevant Thematic Innovation Priority / Research Field:

Process Engineering / Speciality and Fine Chemicals

Contact Details:

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LEITAT

Number of Researchers: ……

Type of Institution	**Research Category**
☐ University ☒ Research Institute ☐ Research and Centers for Development, that are operated by industrial enterprises	☒ Basic Research ☒ Industrial Research ☒ Experimental Research

Relevant Thematic Innovation Priority / Research Field:

LEITAT possesses competences in:

- Synthesis of nanomaterials, manufacture of nanofibers and nanosafety studies
- Surface treatments: paints, inks and coating formulation and characterization
- Textiles manufacturing and finisihing
- Polymers synthesis, double screw extrusion and processing through injection moulding, injection blow moulding, spinning.
- Micro and nanoencapsulation and others nanobodies for health applications
- Manufacture of monoclonal antibodies
- Design and manufacturing of Biosensors
- Waste and biological sourced raw materials and synthesis of biomaterials
- Design and application of new materials for post lithium batteries and third generation organic solar cells
- New bio, nano and electro technologies for water treatments
- Design of new materials (polymers and metallic) for additive manufacturing
- Development, formulation and characterization of lubricant
- Development, formulation and characterization of detergent.

Leitat is interested in the five pillars (Green, Materials, Energy, Health and processing) and is able to collaborate through two mains models:

- Research contract
- Collaborative project with industry and university

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Universitat Autònoma de Barcelona (UAB)

UAB Universitat Autònoma de Barcelona

Number of Researchers: ……

Type of Institution	**Research Category**
☒ University ☐ Research Institute ☐ Research and Centers for Development, that are operated by industrial enterprises	☒ Basic Research ☐ Industrial Research ☒ Experimental Research

Description of Main Competencies / Research Areas (in headwords)**:**

The Universitat Autònoma de Barcelona (UAB) is a public university of an international outlook, fully integrated within its area, offering quality education in close association with research activity, the transfer of scientific, technological, cultural and educational knowledge, the promotion of the potential of its human capital and the responsible management of available resources.

The Department of Chemistry is structured according to the four areas of knowledge comprise: Analytical Chemistry, Physical Chemistry, Inorganic Chemistry and Organic Chemistry.

Relevant Thematic Innovation Priority / Research Field:

GREEN CHEMISTRY

- Catalysis. Catalytic processes aiming towards the production of H_2 (as a renewable fuel) from water and sunlight, for which it is also necessary to catalytically oxidize water to O_2. The same procedure is used to catalytically reduce CO_2 into valuable feedstock (i.e. CO) or fuels (methanol). **COS research group**
- Chiral compounds, applied to Asymmetric/enantioselective catalysis, ligands for metal catalysts, Organocatalysts, **SERQ research group**
- Definition and scope. Use of natural biomass in order to save the use of synthetic materials with a certain component or contaminant removal difficulty (all compounds used as polymer resins systems adsorption of contaminants are potential contaminants due to their difficulty to be removed). **GTS research group**
- Improvement and transformation of chemical processes. Process control: Development and improvement from a smart design. Applications in Pharma (process Analytical Technologies (PAT), and Quality by Design (QbD). These concepts are also applicable to Chemistry and Petrochemistry. **QA research group**

WASTE CHEMISTRY

- CO2 as raw material. Catalytic processes capable of reduce CO_2 into valuable feedstock (i.e. CO) or fuels (methanol), which will have an impact in the carbon footprint. **COS research group**
- Valorization and recovery of residues present in polluted effluents. To minimize the presence of contaminant species in the residues, mainly aqueous and polluted soils with inorganic and organic compounds (PAHs or heavy metals). **GTS research group**

MATERIALS

- Nanomaterials. The catalysts used to oxidize water to O_2, reduce H^+ to H_2, or reduced CO_2 are in many cases metallic or metal oxide nanoparticles. Furthermore, it is required to anchor these nanoparticles into different types of surfaces (carbon nanotubes, graphite...) in order to obtain nanostructured electrodes needed for the photoproduction of H_2. **COS research group**
- Use of natural biomass and modified with nanoparticles as membranes and membrane systems modified with other nanoparticles as well as specific systems **GTS research group**
- Design, manufacture and implementation of ceramic and polymer microreactors for process intensification. Application in the synthesis and purification under continuous flow conditions of nanomaterials (NPs, QDs, CarbonDots, etc).**SiB Research group**

HEALTH

- Cell penetrating peptides (CPP): To combine different natural and unnatural amino acids, the last conferring stability to peptides against proteases. These peptides are suitable to link a drug to be delivered into a cell or a microorganism. Good preliminary results have been obtained with HeLa cells and with the parasite Leishmania. **SERQ research group**
- Surfactants as new non viral vectors in gene therapy and drug delivery. They are non toxics for cells. **SERQ research group**
- Contrast agents (CA) for Magnetic Resonance Imaging (MRI). Complexes of Gd(III) with DOTA conjugates have been prepared and tested affording promising results. Other complexes are under development. The final goal is to combine this MRI-CA with CPP to develop image-guided drug-delivery systems. **SERQ research group**
- Pharma / Encapsulated. Synthesis, development and evaluation of new photo-active metal complexes as antitumor agents. The ultimate goal of this project is to obtain systems (pro-drug) where the active metal remains encapsulated by means of a highly coordinating ligand so this can be activated (released) voluntarily by external stimuli which modifies conformationally the ligand reducing therefore its ability to stabilize the active metal, thereby controlling the supply of the active antitumor agent (Drug-delivery). **SOE and MREFA research groups**
- Development of nanotechnology materials applicable in the field of health (teeth remineralization and dental hygiene). **GTS research group**
- Sensors, Biosensors and Bioassays of application in the field of health and food safety. Sensors and Biosensors disposable for Self-control domiciliary of chronic diseases. Application of the IoT concept in the health area through the development of devices for continuous monitoring of critical parameters with the aim of improving both the quality and the life expectancy of the

population. **SiB Research group**

PROCESSES

- A renewable method for the production of hydrogen, CO, methanol or other solar fuels or feedstock is a key step in the improvement of other chemical transformations requiring energy or the aforementioned feedstock as reagents. **COS research group**
- Flow: Design and manufacture of microfluidic structures for application in cell cultures and assisted reproduction. **SiB Research group**
- Water: Development of Sensors, Biosensors and Miniaturized Analytical Systems for automatic control of all natural and industrial processes involved in the water cycle or air pollution. Design, manufacture and implementation of instrumentation for continuous and in-situ monitoring of contamination parameters from anthropogenic sources in drinking or natural waters. **SiB Research group**
- Development of intelligent manufacturing technologies of microfluidic devices based on multilayered structure by ablation Laser and CNC micromachining using ceramic (LTCC) and polymeric materials and integrating. **SiB Research group**
- Management, treatment and recovery of waste (gaseous emissions, liquid effluents and solid waste). Biological processes for the cleaning of waste water. Control, simulation and optimization of biological treatment processes (solid, liquid or gaseous) waste. Deodorizing gas emissions. Design of Bioreactors for treating emissions. Study, analysis and design of the composting process of municipal and industrial organic waste. Determinations biodegradability and stability of materials and products to soil and landfill. Monitoring and control of waste treatment plants and evaluation of the effectiveness of the treatments and processes using respirometry rate. **BIOGLS research group**

OTHER

- Renewable and storage. Catalytic processes aiming towards the production of H2 (as a renewable fuel) from water and sunlight. In these way, sunlight, a renewable energy source, can be transformed and stored into chemical bonds (H2). **COS research group**
- Implementation of processes of generation and optimization of biofuels in pilot plant from biomass. Study and Optimization of the quality of biofuels through the use of ceramic microreactors operating at high temperature as a tool for the intensification of processes. **SiB Research group**

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University Barcelona. Faculty of Chemistry

UNIVERSITAT DE BARCELONA

Number of Researchers: ……

Type of Institution	**Research Category**
☒ University ☐ Research Institute ☐ Research and Centers for Development, that are operated by industrial enterprises	☒ Basic Research ☒ Industrial Research ☒ Experimental Research

Description of Main Competencies / Research Areas:

As a public university, the UB's pursuit of all its missions—teaching, research, and knowledge transfer—reflects a social perspective and a commitment to the values of freedom, democracy, equality, solidarity and scientific rigour. The UB's research, innovation and transfer policies have strengthened its reputation as a research intensive university and have helped to attract and retain leading research talent. The UB is the leading producer of scientific output in the Spanish university system, and advances over the last academic years have enhanced its international projection and fostered on-going promotion of research excellence.

In particular, the Faculty of Chemistry is a research centre of the highest level in aspects of Chemistry, Chemical Engineering, Biochemistry and Materials Sciences, for which it is internationally recognised. It has agreements with universities worldwide, and exchanges lecturers and researchers. It participates in highly varied research programs at the following levels: national (CIRIT, IEC), state (CICYT, FISS), European (BRITE, JOULE, TEMPUS, SCIENCE, COST, etc.) and worldwide (NATO, Integrated Actions, etc.). It also has applied research contracts with companies and organizations. The Faculty of Chemistry has offered tuition in chemistry, chemical engineering and materials engineering for many years and is renowned for its teaching excellence. It provides graduates and public and private sector professionals with the opportunity to complete their training through postgraduate degree courses and university extension activities, university master's degree courses and doctoral programs.

The Faculty also participates in national and international research projects, achieving a significant level of scientific productivity and contributing a considerable degree of knowledge transfer, and of exchange between professors, lecturers and students, thus justifying the widespread recognition of its research quality.

The Science and Technology Centres (CCiTUB) are a group of facilities whose main mission is to

support research and innovation in the fields of chemistry, materials science and the biosciences. They provide the scientific and industrial community with the latest scientific instruments and offer advice on experimental techniques.

The CCiTUB successfully passed the re-certification for ISO 9001:2008, which was obtained originally in 2005, and renewed US Food and Drug Administration (FDA) Self-Identification as a contract laboratory for drug trials. In addition, the Centres began the process of renewing recognition as a member of the Xarxa IT Tecnio (accreditation that was first obtained in 2001) created by Acció, and the CCiTUB's Nuclear Magnetic Resonance Laboratory was again included in the Map of Singular Scientific and Technological Infrastructures (ICTS).

By focusing on innovation and knowledge transfer, the University of Barcelona helps to ensure an active role in economic development and contributes to social welfare.

UB by numbers: 65,643 students, **5,311** members of teaching and research staff and **2,283** members of administrative and service staff.

Relevant Thematic Innovation Priority / Research Field:

The University of Barcelona occupies a competitive position at national, European and worldwide levels in the most important ranking tables designed on a range of variables within different geographical areas.

The University of Barcelona holds a place among the top 250 world universities, according to the new edition of the ranking edited by the British journal The Times Higher Education (THE). The new edition of the international ranking, which includes 978 institutions from around the world. According to the indicators of the ranking in The Times Higher Education, the University of Barcelona stands out for citation indicators, a field with which holds the 169 position with a score of 81,3 (international average is 48,3). In other indicators, the values of University of Barcelona are: teaching, 33,7; internationalization, 49,3; knowledge and innovation transfer, 35,3; and research, 33.

The results obtained by UB researchers in the 2014 call of the National Plan for Scientific and Technical Research and Innovation, overseen by the Spanish Ministry of Economy and Competitiveness (MINECO) have placed the University at the forefront of Spanish research and development production and among the leading performers in the area of competitive research funding. In total, the UB received over 10.2 million euros for 107 research projects on more than twenty different areas of knowledge. Of these projects, 59 correspond to the Spanish national programme to foster scientific research and technology of excellence, and 48 to the Spanish national research, development and innovation programme to meet social challenges.

At the close of the Seventh Framework Programme, a total of 151 international projects had been awarded to the University, with a combined value of some 56 million euros. The UB coordinated 31 of these projects. Data from the start of the new European Union programme, Horizon 2020, show high participation of UB researchers, reflecting the strategic decision to pursue international funding.

Regarding recognition of research quality, the BKC Barcelona Knowledge Campus received the highest final rating from the Ministry of Education, and consolidated its position as a campus of international excellence.

Due to the high level of the Faculty research groups, we have enough good quality, precise instruments to provide services for industry and other universities and research centres. The Faculty participates in national and international projects, and undertakes numerous exchanges of knowledge, teaching staff and students, with which it attains an extremely high level of scientific production. All of the aforementioned aspects provide evidence of the recognized quality of our research.

The **Faculty of Chemistry** at the *Universitat de Barcelona*, by appropriate management of both human and material resources provided, aims to fulfil, with maximum effectiveness and efficiency, its tasks of training technically competent professionals in the fields of Chemistry, Chemical Engineering and Materials Engineering. Such professionals should be ethically responsible, able to guarantee health and safety, and be committed to environmental conservation.

FIELDS OF INTEREST

- Chemistry
- Chemical engineering
- **Materials science and engineering** (main): from minerals or raw materials to final object for use.

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Universitat Rovira i Virgili

UNIVERSITAT ROVIRA I VIRGILI

Number of Researchers: ……

Type of Institution	**Research Category**
☒ University ☐ Research Institute ☐ Research and Centers for Development, that are operated by industrial enterprises	☒ Basic Research ☒ Industrial Research ☒ Experimental Research

Description of Main Competencies / Research Areas:

The URV was created in 1991 by the Parliament of Catalonia from the already existing university faculties and schools. In this way the Tarragona University of the 16th century was restored.

The School of Chemistry's main objective is to provide good graduates in Chemistry and Biochemistry to society. Fully related to their environment, the faculty responds to a clear social need, as it is located in the middle of what will be the largest petrochemical and industrial center in southern Europe.

The Faculty of Chemistry at the Rovira i Virgili University is located in Tarragona which is home to the largest petrochemical park in the south of Europe. The Faculty of Chemistry has more than 45 years of experience forming Graduates in Chemistry and more than 25 years forming graduates in Biochemistry. Additionally, several studies o master are offered to graduate students: Master in Synthesis, Catalysis, and Molecular Design, Master in Applied Chromatographic Techniques, Master in Nutrition and Metabolism, Master in Tools for professional development in industry and Master in Genetics, physics and Forensic Chemistry. The staff of the centre belongs to three Departments: Analytical and Organic Chemistry, Physical and Inorganic Chemistry and Biochemistry and Biotechnology.

COMPETENCES

- Training students as professionals of Chemistry and Biochemistry
- Doing research, through the departments, in different fields of Chemistry and Biochemistry.
- Spreading science to society

Relevant Thematic Innovation Priority / Research Field:

- Green Chemistry
- Chemistry of wastes

- Materials
- Improvement and transformation of chemical processes

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6. Annex 2: Indicators of the RIS3CAT Action Plan

Table 1: Operational objectives and indicators of the RIS3CAT Action Plan

Indicator		Operational objective	Starting point		
			Figure	Year	Source
1.	R&D as % of GDP	2%	1.5%	2013	INE
2.	% of private sector spending in total R&D	67%	56.6%	2013	INE
3.	% companies that introduce technological innovations	20%	14.39%	2011-2013	INE
4.	Number of companies that take part in Horizon 2020 Programme projects (base 100)	113	100	2015	CDTI
5.	% researchers employed in the private sector	42%	37.8%	2013	INE
6.	Number of emerging companies (start-ups)	–	–	–	DEMO
7.	% participation in Horizon 2020	2.45%	2.45%	2015	CDTI
8.	Standardised impact of scientific production in Catalonia	1.53%	1.44%	2006-2010	SCImago
9.	% companies that develop or have acquired R&D	22%	19.6%	2014	Innovation Barometer
10.	% companies that innovate	60%	56.8%	2014	Innovation Barometer
11.	% companies that innovate in cooperation with other companies or R&D&I stakeholders	55%	52.4%	2014	Innovation Barometer
12.	% companies that innovate in cooperation with international companies or R&D&I stakeholders	60%	56.3%	2014	Innovation Barometer
13.	% innovative companies that implement innovative activities abroad	30%	26.4%	2014	Innovation Barometer
14.	% companies that use risk capital to finance investment in innovation	2.5%	1.6%	2014	Innovation Barometer

2. Calculated by ACCIÓ based on INE data.
3. Percentage of the total companies with more than nine employees.
4. Number of beneficiary companies (may have participated in one or more projects).
5. Percentage of total research personnel in Full-Time Equivalent (FTE), calculated by ACCIÓ based on INE data.
9-14. Innovation barometer, designed by ACCIÓ.
9 -10. Percentage of the total companies with more than nine employees.
11 -14. Percentage of total Innovative companies with more than nine employees.

Source: Generalitat de Catalunya. RIS3CAT Action Plan 2015-2020, page 35

Table 2: Performance indicators for innovation and knowledge

Box 5. Performance indicators for innovation and knowledge

Indicator	Definition
Public and private investment in R&D&I	Public and private investment in RIS3CAT actions, number of projects, number of R&D&I stakeholders, number of researchers and number of companies
Collaborative R&D&I projects	Public and private investment in collaborative R&D&I projects, number of projects, number of R&D&I stakeholders, number of researchers and number of companies
Projects to improve processes and management	Investment in projects to improve processes and management, number of projects, number of R&D&I stakeholders, number of researchers and number of companies
Innovative public procurement projects	Budget for innovative public procurement projects, number of contracts number of R&D&I stakeholders, number of companies
Companies that use platforms and infrastructure cofinanced with the ERDF	Companies that use or commission infrastructure and facilities cofinanced with the ERDF
Emerging companies (start-ups)	Spin-offs and other technology-based companies established as a result of RIS3CAT projects
Patent applications and registrations	Patents applied for or registered by R&D&I stakeholders and companies as a result of RIS3CAT projects
Brands created and registered	Brands created or registered by R&D&I stakeholders and companies as a result of RIS3CAT projects
Companies that innovate	Companies that innovate as a result of RIS3CAT projects
Projects complementary to Horizon 2020 projects and those of other European competitive programmes	RIS3CAT projects linked to Horizon 2020 projects and those of other European competitive programmes

Source: Generalitat de Catalunya. RIS3CAT Action Plan 2015-2020, page 37

Table 3: Performance indicators for sustainable growth

Box 6. Performance indicators for sustainable growth

Indicator	Definition
Jobs created	Jobs created within the framework of RIS3CAT actions
People that receive training within the framework of RIS3CAT projects	People that receive training within the framework of RIS3CAT actions
Companies with increased revenues	Companies that increase their revenues as a result of RIS3CAT projects
Companies with increased exports	Companies that increase their exports as a result of RIS3CAT projects
Companies with new international business opportunities	Companies that with new international business opportunities as a result of RIS3CAT projects
Companies that increase productivity	Companies that reduce costs as a result of RIS3CAT projects
Companies that have introduced innovations to reduce water consumption	Companies that introduce measures to improve efficiency and saving in the use of resources through participation in RIS3CAT projects
Companies that have introduced innovations to reduce energy consumption	
Companies that have introduced innovations to reduce CO2 emissions	
Companies that have introduced innovations to reduce waste (recycling, eco-design)	
Projects linked to the circular economy	RIS3CAT projects that contribute to the circular economy

Source: Generalitat de Catalunya. RIS3CAT Action Plan 2015-2020, page 37

Table 4: Smart specialisation indicators, by sector and by RIS3CAT technology

Box 7. Smart specialisation indicators, by sector and by RIS3CAT technology

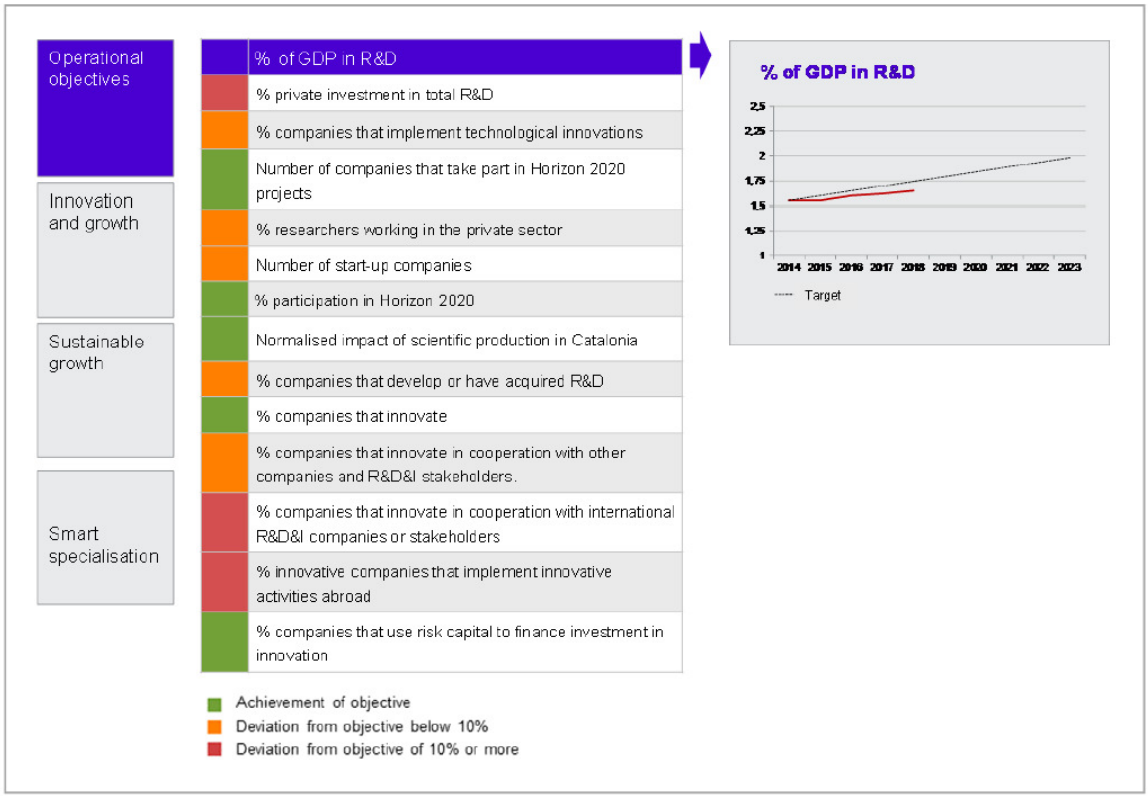
Indicator
Projects
Total investment
Private investment in R&D&I
Public investment in R&D&I
Companies that take part in projects
Technology and research centres that take part in projects
Researchers that take part in projects
Start-ups

Source: Generalitat de Catalunya. RIS3CAT Action Plan 2015-2020, page 38

Annex 3: Scorecard

Image 1: Operational objectives at the Scorecard

Box 1. Operational objectives



Source: Generalitat de Catalunya. RIS3CAT Action Plan 2015-2020, page 41

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