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Higher Education for Smart Specialisation:

The Case of Centre-Val de Loire, France

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Executive summary

This report presents the results of the case study in the French region of Centre Val de Loire, analysing the role of its Higher Education Institutions (HEIs) in the design and implementation of the regional Smart Specialisation Strategy (S3). It forms part of the Higher Education for Smart Specialisation (HESS) project, which is managed by the European Commission's Joint Research Centre (JRC) in cooperation with DG Education and Culture.

Why Centre Val de Loire?

Centre Val de Loire was chosen as a case study in large part because of its active involvement in the Smart Specialisation Platform, It is one of the most advanced European regions in terms of S3 design and implementation, thereby providing an interesting case study to analyse the potential of universities to help drive transformative regional development. In addition, it displays interesting characteristics which may allow other similarly positioned regions to learn from its experience. Centre Val de Loire is located next to the capital region of Ile de France, providing advantages in terms of accessing services and being part of a wider urban network, but also challenges to differentiate its economy, position its universities internationally and attract talent.

Methodology

As with other HESS case studies, the research was conducted in close cooperation with the regional authority and the main HEIs - a form of 'action research' which aims to coproduce knowledge and leave a lasting impact in the region. Centre Val de Loire was actively involved through both its Department for Research and Education, and its regional innovation and development agency called Dev'Up. This allowed for two meetings between the main HEIs of the region, the JRC and an external expert: one held at the beginning of the process in Orleans, and a second at the end in Tours.

The first meeting discussed the main challenges and issues facing the involvement of HEIs in the region's S3. The initial conception of the case study with the region and HEIs in the first exploratory meeting helped participants to reflect on the wide role for HEIs within regional development, including cooperation with industry and civil society, in particular in terms of human capital development. The meeting resulted in the following research questions:

1. To understand the role of the University of Orleans, the University of Tours and the INSA-Institute of Applied Sciences in the S3 of Centre Val de Loire
2. To analyse ways in which education / training dimensions can be integrated sustainably into the S3 governance system
3. To understand the role of lifelong learning / continuous education in the Centre-Val de Loire S3
4. To explore the policy mix and the complementarity of existing instruments to strengthen the role of universities in the research and innovation system.

Following a series of interviews with the regional authority, managers of the main HEIs and other stakeholders such as the poles de compétitivité (business clusters), a second meeting was held to discuss the main findings, which are presented in this report.

Main messages

Some of the main messages from the interviews and workshop discussion include:

- Universities in Centre Val de Loire have a strong potential to contribute to smart specialisation because of their relative importance as regional institutions and

good relations with the regional authorities and its agency responsible for smart specialisation.

- The existing S3 policy mix has successfully involved the main universities, especially in partnerships with industry for knowledge transfer, named Ambition Recherche Development. However, these partnerships are mainly focused on knowledge transfer based on research and could involve students and graduates to a much greater extent, ensuring that the S3 priorities can count on highly skilled human capital.
- Other initiatives and measures that are not explicitly within the scope of smart specialisation could become part of the region's S3. These include the Campus de Metiers et des qualifications, which helps companies meet their skills needs and GIP Alfa, an agency that looks into professional competencies and employers demands. Both of these initiatives have been successful but are not currently linked to the S3 priorities, even though there is some coincidental overlap.
- The higher education system in the region could contribute more if there was greater coordination among the HEIs and structured dialogue with the regional and national authorities. Recent legislative changes at national have given HEIs more autonomy while asking them to help meet regional challenges. The boost by the creation of the Higher Education coordination body (COMUE) and the Regional Plans for Higher Education, Research and Innovation has introduced the potential for a more territorially focused HE system and could be the basis for dialogue around smart specialisation.
- While there are good relations between the regional authority and the main HEIs, this could be reinforced through more structured dialogue with the recently established COMUE (Community of Universities and Education Institutions)
- The research capacities in the region are concentrated around universities, even in the cases of national research centres (CNRS, INRA, INSERM,..), which is particularly important in the French regions context. The relevance of multi-level governance coordination in responding to S3 and the tensions of research groups to respond to regional challenges while addressing national research objectives should be taken into consideration.
- The good coordination of State administration and regional government, together with a specific regional development agency DEV'UP coordinating the S3 process, underlines the strategic character of the S3
- One of the main needs from a human capital perspective is to analyse the current match of supply and demand for graduates and other types of adult learning provided by HEIs. This could be done by the regional observatories for higher education and employment.
- Universities' contribution to S3 from the education mission it is understood to be closely linked to the existing research capacities, and therefore being difficult to influence from the managerial level. However, if the S3 priorities have carefully considered the existing HEIs research capacities, a more coordinated response of research and education missions could largely benefit S3 implementation in the region.
- The region could find ways of supporting (financially and otherwise) elements of the university curricula that already engage with industry, such as the Technology University Degree that are partly led by teachers who are actively working in enterprises. However, is important to note the national level competences in higher education, which manages the core HE financial resources, and limits the means of the regional level to promote certain initiatives.
- The reason why the HEIs have focused on their research contribution to smart specialisation is that the associated funding programmes of the European

Structural Funds have not included projects related to teaching and wider knowledge sharing activities. France as a whole has programmed very little of the European Social Fund to innovation and the European Regional Development Fund cannot fund training.

- Reinforce the actions between the region's universities and of their polytech schools in order to provide more vocationally based education and training. This could include joint provision of adult learning courses related to the S3 priority areas.
- Regional HEIs could work more closely with the regional authority to strengthen the international positioning of Centre Val de Loire, both as a place to study and do research and to live. While the improvement in Horizon 2020 participation should remain a target for the universities, participation in European programmes such as INTERREG and Erasmus+ could be explored, including joint projects involving the region and the universities. Le Studium has allowed the region to attract international researchers, but there has been less success in their retention. Furthermore, there are less structured efforts to attract and retain graduates from outside the region.

Policy recommendations

While it is difficult to make very specific policy recommendations based on the results of this cases study, it is hoped that the dialogue between the main HEIs and the regional authorities can continue. This could lead to a more comprehensive and structured role for HEIs in the context of smart specialisation, beyond the individual examples of good practice that have been shown. Moreover, those examples that are more linked to the contribution of HEIs to human capital in a broad sense could be more explicitly linked to the S3, with the Dev'Up agency taking a coordinating role, in close cooperation with the HEIs themselves or the COMUE grouping. Finally, the case study focused on the region's experience and an international comparison was beyond the scope at this stage. However, engagement with other regional authorities implementing smart specialisation could provide inspiration for new initiatives in Centre Val de Loire.

1 Introduction

Higher Education Institutions (HEIs) can play a key role in the design and implementation of Smart Specialisation Strategies (S3). They are among the few institutions that act as 'boundary spanners', bridging all three elements of the 'Knowledge Triangle' (Research, Education and Innovation). HEIs can build innovation capabilities in regions and can play a much broader role than is usually considered.

Universities have been considered as important actors in regional innovation systems and smart specialisation reinforces and amplifies this role. In this regard, an increasing role is given to universities by regional governments beyond the teaching and research missions (Kempton et al. 2013). However, this potential contribution has not been harnessed by many S3, especially in less developed regions where HEIs can have a particularly important role to play. This has been a major observation by the JRC when reviewing and monitoring the S3 and was also highlighted in a report by an expert group convened by DG Research and Innovation (European Commission 2015).

Over recent years European and international policy agendas have reinforced the role of HEIs as important players with a key role in contributing to territorial development. The European Higher Education Modernisation Agenda (European Commission, 2011) and more recently the "Renewed EU Agenda for Higher Education" (European Commission, 2017) emphasize that HEIs are not contributing to innovation as much as they could in regions. The latter in particular emphasised that HEIs could play a potentially wide role in S3 by facilitating connections between academics, entrepreneurs and public authorities, and by aligning their educational offer to S3.

This technical report presents the results of the pilot case study of Navarre region, included in the first phase of the project on Higher Education for Smart Specialisation (HESS). The project was launched in 2016 by the European Commission's JRC in partnership with its Directorate General for Education and Culture. Its overall aim is to generate knowledge and support regions in reinforcing the role of Higher Education in S3 and promoting the integration of higher education with research, innovation and regional development in S3 policy mixes, particularly through the use of European Structural and Investment (ESI) Funds.

The Centre- Val de Loire case study has had four specific research objectives:

- To understand the role of the University of Orleans, the University of Tours and the INSA-Institute of Applied Sciences in the S3
- To analyse ways in which education / training dimensions can be integrated sustainably into the RIS3 governance system
- To understand the role of lifelong learning / lifelong learning in the Centre-Val de Loire S3
- To explore the policy mix and the complementarity of existing instruments to strengthen the role of universities in the research and innovation system

Methodologically the case study has been deployed in five phases:

- An exploratory meeting where the JRC, DESRITT, DEV'UP and representatives of HEIs of the region discussed the engagement of universities in S3 and the main challenges faced in building a broader role for universities.
- In-depth interviews with HEI managers, ARD 2020, clusters, research laboratories, regional observatories and company associations.
- Analysis of the outcomes of the interviews and desk-research to extract main key findings
- A final participatory workshop with the participation of the JRC, DESRITT, DEV'UP, HEI managers and Vice-Rector, and all interviewed stakeholders. The aims of the workshop were to:

- Present the main findings from interviews
- Discuss and validate the most relevant results
- Identify potential measures to increase the engagement of universities in S3
- Learn from the experiences of other regions discussed with the invited experts
- Analysis of overall findings from the interviews and final workshop, and drawing of final conclusions, policy implications and recommendations in the form of a technical report.

The rest of the report is organised as follows:

- Section 1 explains in detail the methodological approach followed in the Centre-Val de Loire case study
- Section 2 gives an overview of the French university system and summarises the higher education and research systems of Centre- Val de Loire
- Section 3 focuses on Centre- Val de Loire regional context, describing its innovation and HEI system, with a special focus is Centre- Val de Loire S3 and the integration of education and training dimension.
- Section 4 describes the main results, namely the findings from the exploratory workshop, interviews and final validation workshop.
- Section 5 concludes by highlighting the key lessons learnt and the policy implications of the research for the region and the broader EU level.

2 Background and national context

2.1 Overview of Higher Education system in France

Higher Education and Research are in France two main State competences, since research institutions and universities are under the supervision of the French State. Regular and permanent staffs (teachers, professors, researchers, engineers, technicians, and administrative staff) are government employees (plus, short-term contracts as well). Strategic steering is done by the State, through multiyear contracts with all research institutions without any interference from the Region.

Talking about governance issues at French universities, leads to refer to National standards, whatever the regional context. The 1984 Savary Law grants the University presidents with substantial powers, even though still insufficient compared with some other European countries: the president is leading the university, and, in these capacities, pursues agreements and grants conventions, prescribes and manages the revenue and expenditure; he/she is elected by the General Assembly of three Councils and chairs the Councils of which he/she prepares and executes the deliberations; he/she is responsible for all staff of the institution.

Since 1999, 29 European states, with the Bologna Process, commit themselves for the construction of the European Higher Education Area (EHEA) and, consequently for a more hierarchical governance of the university. In addition, the Organic Law of finance law (LOLF), which entered into force in 2006, introduced new management rules – performance measures and transparency – obliging the French higher education institutions to conduct a genuine calculation of the costs, and introducing analytical accounting. The enter into force in 2006 changed slightly the deal, with the creation of the ANR (National Research Agency) and reducing basic financial support to the laboratories); University autonomy; Concentration of State's funding (Plan Campus, Grand Emprunt / Investissements d'Avenir); Strong national and international competition, heavier investments, reduction in national budgets; and very high expectations from the Regions.

French universities have progressively gained autonomy over the years with successive reforms and regulations introduced by the State.

The **Law on the autonomy and accountability of the French Universities** adopted in 2007, aimed at reforming the governance of the education institutions and the status of the teacher-researchers. For the first time, universities could manage their budget and their wage bill (rates of pay, positions...). The law provided progressively more autonomy and accountability to universities, as up to then salaries were managed mostly by the Ministry with only 20% of the national budget for universities managed by themselves in 2002 (Musselin and Paradeise, 2009)¹. The new law provided more autonomy in terms of organisation and strategy, university presidents acquiring broader authority in the recruitment and management of technical and academic staff, with right to veto over the posting of the teacher-researchers and hiring staff on temporary or permanent based contracts. Universities were giving as well autonomy on real state, owning their building heritage and raising new funding.

The **Higher Education and research system reform introduced by the Law of 22 July 2013**² constituted an important step forward in overall governance of universities, setting the basis for stronger territorial coordination on higher education system. The creation of the so called "Communautés d'universités et établissements" (COMUE),

¹ Musselin, C., & Paradeise, C. (2009). France: From incremental transitions to institutional change. In *University Governance* (pp. 21-49). Springer, Dordrecht.

² https://www.legifrance.gouv.fr/affichTexte.do;jsessionid=3452B807A1F0B55FCCEB41CE5ED2F4A5.tpdjo9_v_3?cidTexte=JORFTEXT000027735009&categorieLien=id

introduces important changes in the relationship of the State with the regions and higher education system actors. Even if the COMUE has become the unique body of higher education for a territory for the coordination of higher education with the State with strong potential for HE coordination, the evolution of the body largely varies across French regions. It modifies the governance on the coordination of the national with the territorial level in terms of higher education, grouping the higher education entities under this new governing body with the aim of improving the overall territorial coordination of the research and education strategy of the different higher education institutions of a territory. The territorial coordination is entrusted to a single institution in the group that function's in a confederal manner, giving to this community of actors gathered under the COMUE the same legal status of a university and with the same decision making bodies, governing and running structure.

The reform has resulted in the signature of site contracts between the COMUE bodies and the Ministry of Higher Education and Research. The notion of site introduced by the reform establishes the territorial level as being the relevant scale for the structuring and implementation of higher education policies to improve their international positioning, address the challenges associated to the complexity of the system- with multiple ministries and bodies managing higher education institutions- and improve the overall performance of higher education³. It must be stressed that the Ministry encountered important difficulties in applying a single COMUE model over all the territories, with different challenges to overcome in Paris, in big agglomerations such as Lyon, Marseille and Bordeaux, and in less dense population regions such as Centre-Val de Loire. A new law is in preparation in order to make the COMUE model much more flexible, which will most likely have important consequences including in Centre-Val de Loire.

The 2013 reform introduces as well changes in terms of the interactions of HEI with their research and innovation system actors and education and skills for increased employability of students. In summary the reform modifies⁴ the following:

- The landscape is modified with 25 regrouping of HEI to reinforce synergies between territorial actors and to increase international attractiveness of institutions.
- Improved coordination between the Ministry of Education and Research and the territorial actors with closer coordinatino in the overall education offer of HEI
- Stronger collaborations between HEI and business community, through strengthening of entrepreneurship education and training, with dual education or work placements
- Promotion of doctoral studies among business community and in public institutions
- Promote research valorisation & transfer and creation of companies through creation of innovation and entrepreneurship poles for students and a specific status for these students
- Elaboration of a national strategy for research (SNR) in coherence with the European programme Horizon 2020, defining the major research priorities for France.
- Stimulate professional insertion of higher education students, through compulsory professional experiences introduced at master and graduate students' level, transversal studies on entrepreneurship in all studies, path-ways for work-linked training and introduction of PhD students in the business sector.

The LRU Act (University freedom and responsibility) of 2009 introduced a new integrating approach for universities' self-governance, notably through the control of the overall

³ OECD (2014). Perspectives des politiques de l'éducation en France. http://www.oecd.org/education/EDUCATION%20POLICY%20OUTLOOK%20FRANCE_FR.pdf

⁴ http://cache.media.enseignementsup-recherche.gouv.fr/file/Loi_pour_I_ESR/23/4/MESR-1an-loi_341234.pdf

budget including the total payroll. In parallel, the MAPTAM Law (Modernisation of Public Territorial Action and Affirmation of the Metropolis) that has been enacted on 27 January 2014, is intended to clarify the conditions of certain implementing powers of local and regional authorities, notably the Regional Council in terms of economic development, enterprises' support (innovation, internationalisation...) and support for higher education and research. The NOTRe Act (New Territorial Organisation of the Republic) alters the competencies of each partner, notably concerning higher education, as regions, departments and municipalities can contribute to the funding of sites and institutions of higher education as well as research institutions and any student social services. It also allows Regions to draw up a Regional Plan for Higher Education, Research and Innovation (Schéma Régional de l'Enseignement Supérieur, de la Recherche et de l'Innovation).

Therefore, it is in this national HE framework that the regions matter and could assert its legitimacy, especially in the following areas:

At regional level:

- A significant role to play in terms of higher education and research in policies related to Economic development (SRDEII: Regional Pattern for Economic Development, Innovation and Internationalisation), Territorial Planning (SRADDET: Regional Pattern for Spatial Planning, Sustainable Development and Territorial Equality), Vocational and professional training (CPRDFOP: Regional Plan Development of Vocational Training and Professional Guidance)
- Research Higher Education rule of 22 July 2013, enabling to enlarge the field of its Competence CSTI (Scientific, Technical and Industrial Culture) and expand its role of coordination (preparation and implementation of the SRESRI).
- The "Research of regional interest" (IR) for societal orientations in coordination with regional policies through support linked to regional competences in the field of socioeconomic development (around 60% of the regional budget) and measures for specific thematic earmarks (DPS): APR IR, ARD 2020.
- "Research by Academic Initiative" (IA), for science thematics through upstream support aiming at reinforcing the institutions implemented in Centre-Val de Loire, as a complement of the State implication (about 40% of the regional budget) and measures without specific thematic earmarks: APR IA, science colloquium and conferences, Doctoral awards, Le Studium, Research Thematic Networks.

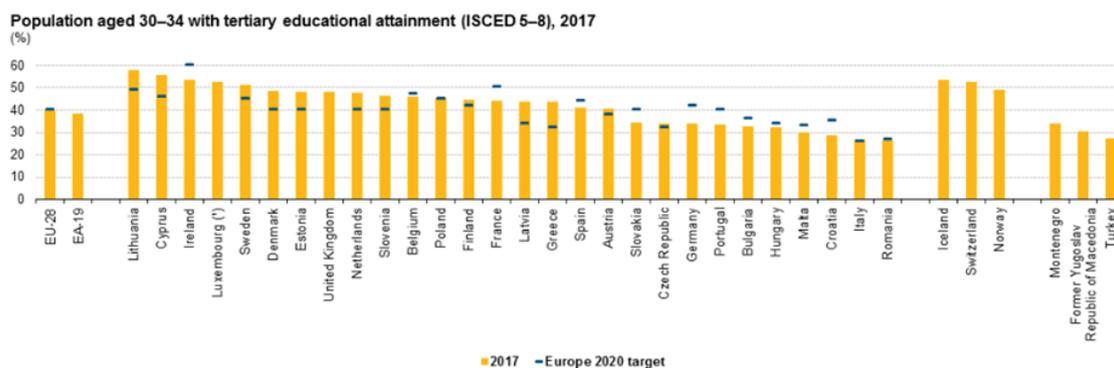
Shared national-regional levels

- A significant leverage to activate in intensifying the Regional Research budget (about 28 M€ per year regional research budget in addition to Research public expenditures 200 M€ per year from national level, including salaries, and ANR Programmes 10 M€ per year with national funding), and the ERDF management delegation to the region.
- Innovation (RIS3: Regional Innovation Strategy for Smart Specialisation) in national-regional coordination.

2.2 France key indicators for education and performance of universities

The population aged 30-34 with tertiary education (ISCED 5-8) in France is above EU average, but quite far from the Europe 2020 target

Figure 1. Population aged 30-34 with tertiary educational attainment (ISCED 5-8) in 2017

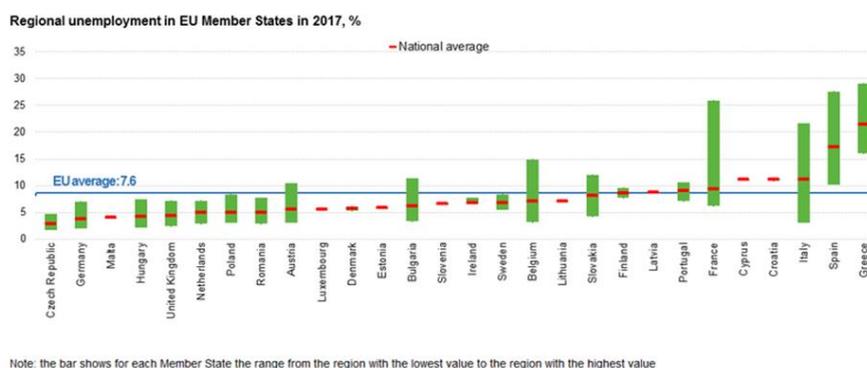


Source: Eurostat (2018)

However, the employment rate of recent tertiary graduates aged 20-34 has been declining in the last years and is currently below EU average (79.2 % against 81.9 %). The link between education and the labour market is identified as an improvement area, with particular concerns in the employability of doctoral students and their limited integration in the private sector (European Commission, 2016)⁵.

Even if the overall national unemployment rate in France is only slightly higher than the EU average in 2017, the regional unemployment disparities are among the largest of the EU, as show in the figure below.

Figure 2. Regional unemployment variation in EU member states (2017)



Source: Eurostat (2018)

Some key indicators about higher education attainment and performance in France can be summarised as follows:

- The public funding sources in France are more centralised than the average of EU countries, with 72% of public funding for primary, secondary, post-secondary and tertiary coming from the State, compared to 55% in OECD and 60% in EU22, the rest coming from the regional authorities (OECD, 2017)
- Employment rates for tertiary education graduates are close to OECD average but the pay gap is wider. Wage earnings for holders of a short-cycle tertiary diploma are 31% higher than for holders of an upper secondary diploma, and holders of

⁵ European Commission. 2016. Education and Training Monitor 2016: France https://ec.europa.eu/education/sites/education/files/monitor2016-fr_en.pdf

master, doctorate or equivalent ear 105% more compared to 98% in OECD and 77% in EU 22 (OECD, 2017)

- The enrolment of internationally mobile students in France is very high in higher education, with 40% of enrolments of internationally mobile students compared to 25% of OECD. This can be comparable to United States (38%) and United Kingdom (13%) (OECD, 2017)
- However, only 4% of French students pursue their studies abroad compared to 6% of OECD and 8% in EU. (OECD, 2017)
- Employment outcomes of significant investments in vocational education programmes are lower in France than other EU countries (OECD, 2017)
- Vocational path-ways enrolment by young people in France (23%) is lower than EU 22 average (29%), with lower work/study programmes pursued in France (25%) than EU 22 (32%) or than Germany, Denmark, Hungary and Latvia (more than 85%) (OECD, 2017)

In France higher education is primarily funded by the State, with 69% of the total expenditure provided by the State- 62% by the Ministry of Education and Research- 10.9% by the territorial authorities and an increasing share by companies 9.6% and other public administration bodies (1.9%)

Figure 3. Expenditure sources on Higher Education in France (1980-2014)

	1980	1990	2000	2010	2013	2014p
DEE on higher education (at current prices, in €bn) ²	4.5	11.9	18.6	27.4	29.1	29.2
DEE on higher education (at 2014 prices, in €bn) ²	11.4	16.7	23.0	28.4	29.3	29.2
Contribution to DEE (in %)	15.1	16.9	17.2	19.7	20.2	20.0
Average expenditure per student (at 2014 prices, in euros) ²	8,280	9,120	10,520	11,910	11,760	11,560
Average expenditure per student including social security and tax measures (at 2014 prices, in euros) ²				13,150	12,990	12,780
Structure of initial funding (in %) ⁴						
State,				71.4	68.6	69.0
of which MENESR				62.9	61.6	62.2
Territorial authorities				10.6	11.1	10.9
Other public administrative bodies ²				1.7	1.9	1.9
Companies				7.8	9.6	9.6
Households				8.5	8.8	8.6

Source: Ministry of Education, Research and Innovation of France (2017) ⁶

2.3 Higher education governance

The French education system is highly centralised in the State in terms of funding and education. However a progressive decentralisation of competences in the management of the education system has taken place since the 80s, increasing their role in governance, responsibility for maintenance of buildings, supply of materials, etc (EURYDICE, 2018) ⁷.

The key governance elements of France higher education system can be summarised in:

⁶ https://publication.enseignementsup-recherche.gouv.fr/eesr/9EN/EESR9EN_ES_01-education_expenditure_on_tertiary_education.php

⁷ EURYDICE, 2018. https://eacea.ec.europa.eu/national-policies/eurydice/content/france_en

1. A Higher Education coordination body (COMUE) has been established in each region after the enter into force of the Legislative Decree⁸ introduced in 2016 to give more coherence to the education policies at regional level, grouping different academic institutions of a region under a unique body. The aim is to improve coherence of public HEI educational offer, coordination of academic institutions with the region and the region with the State.
2. A yearly contract is signed between the academic council of each region and the State to formally agree on the activities that will be developed. These councils are integrated by elected university representatives, independent research establishments of these universities and external persons representing local authorities and regional stakeholders. The advice contributes to the forecasting, coordination and programming of higher education and research under the Minister of National Education. They give their opinion on programmes and credit applications from universities and other public institutions of a scientific and cultural character in this area.
3. From 2017 the previous ministry of Education, Higher Education and Research was split into two different bodies, the Ministry of (primary and secondary) Education and the Ministry of Higher Education, Research and Innovation (MESRI).
4. The COMUE- Community of Universities and Institutions created in 2013 were created to simplify the higher education system and ensure links and coordination with the bodies responsible for regional development.
5. The Regional Plan for Higher Education, Research and Innovation (SRESRI) defined by the region in close liaison with HEI stakeholders, links with other regional strategies for economic development, innovation and internationalisation (SRDEII), vocational guidance and training (CPDOP) and balanced territorial planning (SDRADDET). It defines the activities on higher education supported by the region, which in the case of Centre-Val de Loire are mainly oriented towards:
 - Guaranteeing all the bachelors the possibility of an advanced education related to the precedent secondary and then empowering and ensuring them to achieve success (with a view of 70,000 students for 2020);
 - Building a strong momentum within the educative system of Engineers-Masters-PhDs;
 - Ensuring the quality of student life, as a key factor of success;
 - Encouraging international initiatives, be they in education or in research;
 - Strengthening the links between the socio-economic environment and the research labs;
 - Promote the research experimentations in all its forms and at all levels in order to prepare for the future;
 - Grasping every opportunity of partnership and thus creating the preconditions of convergence of the institutions.

The next graphic summarises the main links of the region in higher education governance:

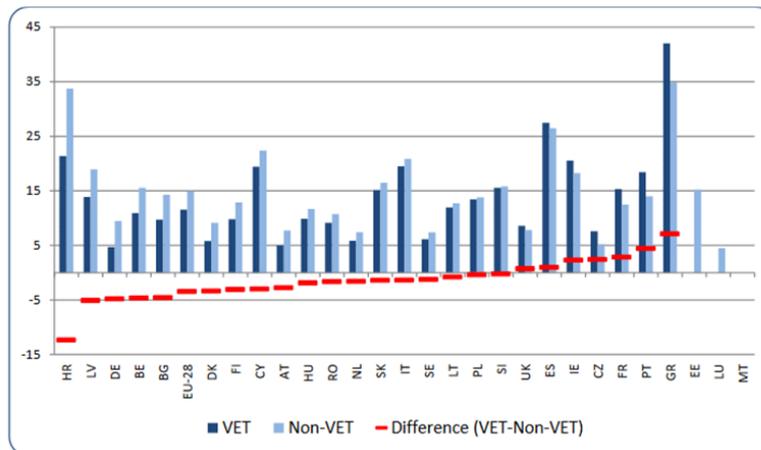
⁸ Décret n° 2015-1616 du 10 décembre 2015.
<https://www.legifrance.gouv.fr/eli/decret/2015/12/10/MENG1523843D/jo>

2.4 Vocational Education and Training (VET) and participation in European Programmes

The unemployment rates for VET compared to non-VET graduates is high compared to EU average, being the third country after Greece and Portugal with stronger differences of unemployment rates between the two categories of graduates.

Figure 4. EU unemployment rates for VET and non-VET graduates

Figure 5. Unemployment rates for VET and non-VET graduates

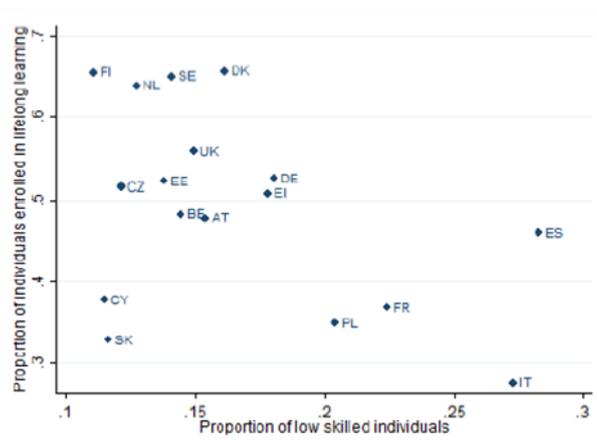


Source: Joint Research Centre⁹

France shows as well a weak participation in adult lifelong learning education and a high share of low skill achievers, being the third country in both categories.

Figure 5. Participation in Lifelong Learning and share of low skills achievers by country

Figure 9: Participation in Adult Lifelong Learning and share of low skill achievers by country



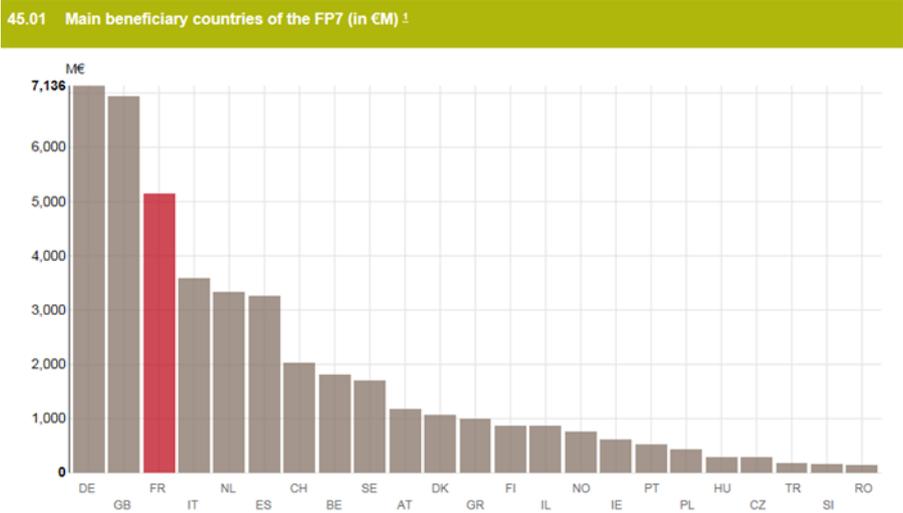
Source: Survey of Adult Skills (PIAAC) (2012)

Source: Joint Research Centre

⁹ Flisi, S., Goglio, V.. (2015). Education And Youth Labour Market Outcomes: The Added Value Of VET. Joint Research Centre. Luxembourg: Publications Office of the European Union, 2015

France is a very good performer in participating in FP7 European programme for research and innovation, being among the first three main beneficiary countries only after Germany and UK. However, it has to be taken into account the strong capital effect with a very high concentration of the FP7 funding attracted by the Ile de France area. The main partner regions of France in FP7 are from Germany (71.1%), UK (64%), Italy (53.8%), Spain (48.9%) and The Netherlands (41%).

Figure 6. Main FP7 beneficiaries (in M€)



¹ The 23 countries shown received 97% of contributions granted through FP7.

Source: Ministry of Education and Research (2018)

In terms of apprenticeship, there are important geographical disparities, with more efforts concentrated in certain French regions, varying from 4.9% at national level to 6.2% for Centre- Val de Loire region (DEPP, 2017)

2.5 Insertion of students in the labour market

The employment rate of recent French higher education graduates has fallen since 2011 to 77.3%, compared to the UE average of 82.8% (European Commission, 2017). In addition, only 40% of students who enter a bachelor's programme complete it within four years (DEPP, 2017).

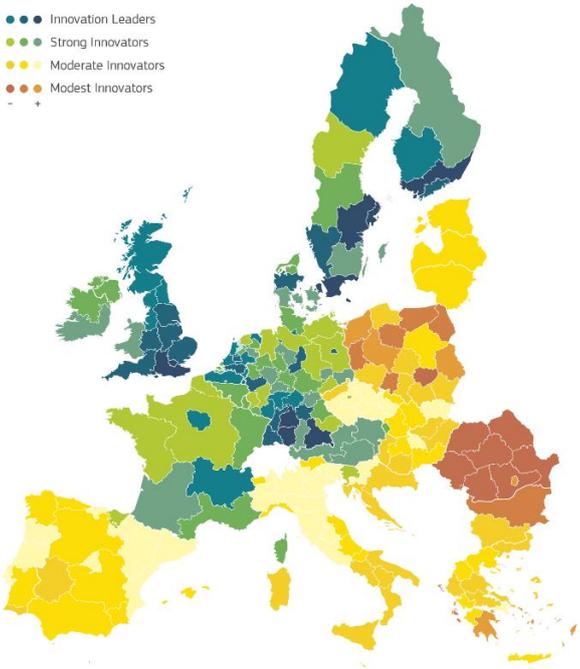
This is one of the reasons to orient the higher education and research system reforms towards improving higher education students' employability.

3 Centre- Val de Loire context

Centre- Val de Loire is among the regions in which the number of students in higher education in 2016-2017 increased the most (3.4%) with 43.725 students in universities and 62.778 including other higher education such as engineering schools, business and national schools.

According to the Regional Innovation Scoreboard the Bassin Parisien (see graphic below), in which Centre- Val de Loire region is included, is among the strong innovators. However, it should be taken into account that the way in which the regional scale has been taken in France for the purpose of the Regional Innovation Scoreboard has grouped several NUTS2 regions under one category and therefore important differences are observed among the regions included under Bassin Parisien.

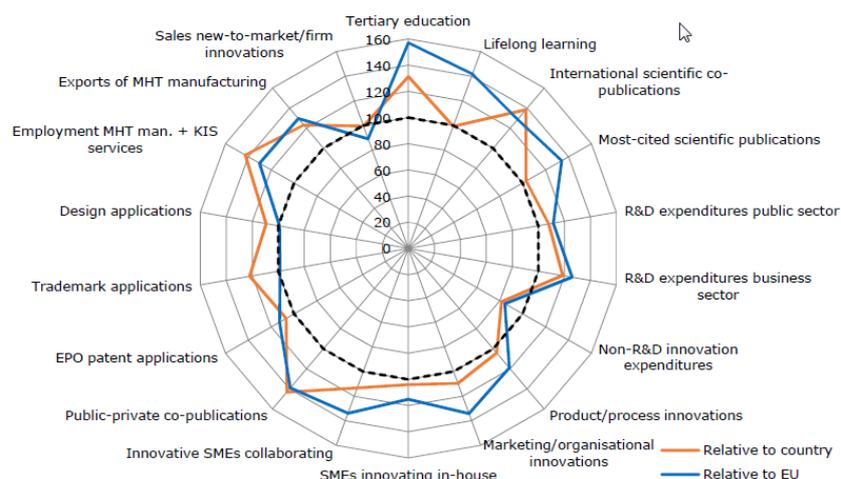
Figure 7. Regional effort in execution and financing of research (2014)



Source: Regional Innovation Scoreboard, 2018

The Bassin Parisien performs above the EU average, among others, in tertiary education, lifelong learning, EU expenditure of the business sector and R&D expenditure of the public sector, as shown in the figure below.

Figure 8. Performance of Bassin Parisien area in the Regional Innovation Scoreboard dimensions



Source: Regional Innovation Scoreboard (2017)

If we have a closer look to the specific performance of the region, the GDP per capita of the region is 27.500€ below France average 33.300€ and the European Union 29.200€ (Eurostat, 2016)¹⁰. The unemployment rate of the region in the third trimester (9%) is lower than the one of metropolitan France (9.2%), even if the employment growth slowed in 2017.¹¹

The region has 57.135 students, with the centres of Tours (51.4%) and Orleans (27.4%) concentrating the most important part of the students (data 2013-2014). Public research groups 1965 E.T.P. researchers and research professors, with research organizations representing 44% of this total. Scientific production is relatively developed in the fields of mathematics, chemistry, earth sciences agro-ecology and applied biology as well as in human sciences. The research excellence of the region is confirmed with 6 equipment of excellence and 7 laboratories of excellence, 3 of them developed by regional partners. The contribution of the region expressed in European patent applications is quite remarkable in the fields "Machinery-mechanical-transport", "Industrial processes" and "Pharmacy-biotechnology" (DESRITT, 2018), mainly due to strong private companies leverage effect.

The 55 research units of the region are specialised in 4 main domains:

- Energy - Materials - Earth and Universe Science, 12 research units;
- Mathematics - Computer Science - Theoretical Physics - Systems Engineering, 4 research units
- Health - Biological Sciences - Chemistry of Life, 18 research units
- Humanities and Society, 21 research units.

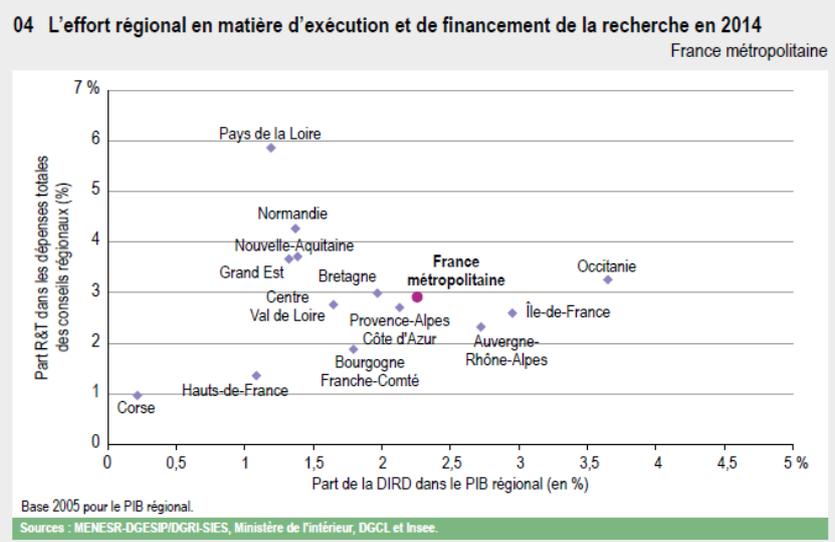
However the effort of the region in research financing is relatively low compared to other regions in France, as it is show in the graphic below. It is the third region with the lowest R&T in the total expenditure of the Conseil Régional after Corse and Haute France. Similarly the expenditure on R&D normalised to the GDP is the third lowest. The

¹⁰ Eurostat, 2016

¹¹ INSEE, 2017

expenditure in R&D of companies is as well particularly low compared to other regions in France, being the second lowest after Pays de la Loire, as shown in the following graph.

Figure 9. Regional effort on research financing in 2014

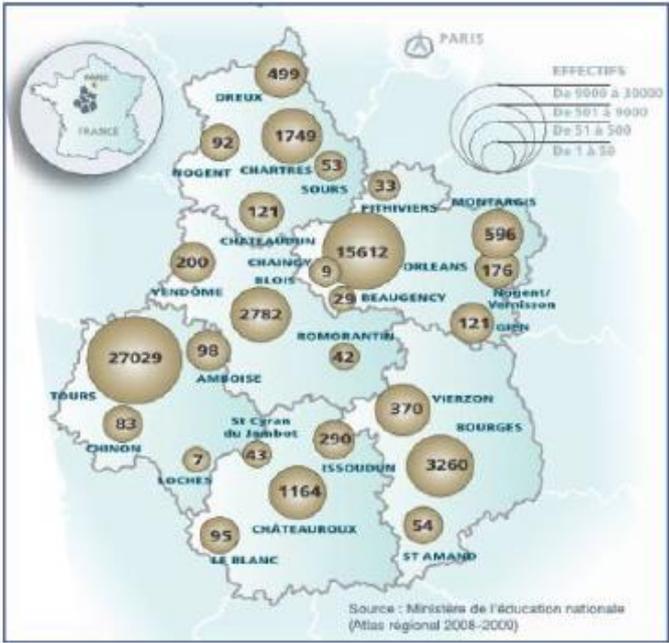


Source: L'état de l'enseignement supérieur et de la recherche en France (2017)¹²

3.1 Higher education institutions

The region has three main higher education institutions, the University of Orléans, the University of Tours and INSA-Centre Val de Loire. The next graphic shows the distribution of tertiary education students across the region.

Figure 10. Distribution of tertiary education students in Centre-Val de Loire (2008-2009)



Source: Ministry of National Education Atlas régional 2008-2009

¹² <https://publication.enseignementsup-recherche.gouv.fr/eer/10/l-etat-de-l-enseignement-superieur-et-de-la-recherche-en-france-10.php>

Within the dynamic of the Bologna Process and the European Area for Higher Education, the Universities of Orleans and Tours signed in 2004 the Convention for the creation of the "Pôle Universitaire Centre-Val de Loire" (Regional Academic Campus of Centre-Val de Loire Region) to create the Pôle de Recherche et d'Enseignement Supérieur (Research and Higher Education Pole) by 2012, and the COMUE Léonard da Vinci by 2013, in coordination with the universities of La Rochelle, Limoges, Orléans, Poitiers and Tours, but new competences should be provided to the HEIs and the Academy authorities within the strict limits of Centre- Val de Loire.

University of Orléans

Université d'Orléans, a comprehensive public institution with four sites in Centre region: Bourges, Chartres, Châteauroux/Issoudun, and Orléans. The university has around 16,000 students (12% foreign students) and 1,100 professors, instructors and researchers. The university has a diverse offer of degrees, master and doctoral study programs in law, economics, management, arts, letters, languages, humanities, social sciences, science, technology, and health. The programmes are organised in 6 multi-disciplinary thematic institutes, 4 IUTs, 1 Engineering School and 1 ESPE. Research are organised around 26 research laboratories, 4 doctoral departments enrolling 450 doctoral students yearly, 50 patents, and 100 dissertations defended each year (Campus France, 2018)¹³.

In 2015 the University of Orléans became part of the Léonard da Vinci consolidated university, which associates universities and higher education institutions (COMUE) in Centre-Val de Loire and part of Nouvelle-Aquitaine. However from 2018 the association will be limited only to Centre-Val de Loire region higher education institutions.

The University of Orléans currently includes three Research-Teaching Units (UFR) Collegium (Literature, Languages & Social Sciences, Economics, Management & Law, and Sciences & Technology), in addition to the university School of Engineers (Polytech Orléans), four University Institutes of Technology, ESPE (École Supérieure du Professorat et de l'Éducation) and OSUC (Observatoire des Sciences de l'Univers du Centre).

University of Tours

The University of Tours brings together over 27,000 students, including more than 6,100 in Medicine, about 4,400 in arts and humanities, 4,400 in Law Economics and Social sciences, almost 4,000 in Sciences and Technology, 3,400 in Literature and Languages, 2,100 in the University Institute of Technology, 1,150 in Polytechnic School, almost 900 in Pharmaceutical sciences, 600 in Blois IUT, 200 in the CUEFEE (Centre Universitaire d'Enseignement du Français pour Etudiants Etrangers), about 160 in the CESR (Centre d'études supérieures de la Renaissance), and 35 for skills and diplomas specific to continuing education programmes. In 2015, the rate of professional integration of graduates of the 2013-2014 cohort was around 91%.

The University of Tours – with seven Training and Research Unities, two University Institutes of Technology (IUT) and Polytechnic School – offers a diversified education pathways on arts, humanities, law, economics, trade and business studies, literature and languages, health and biology, science and technology, etc.

With more than 40 laboratories widely recognised both nationally and internationally, the University of Tours proves to be a significant public research institution in the region. It

¹³ https://ressources.campusfrance.org/guides_etab/etablissements/en/univ_orleans_en.pdf

develops centres of excellence in the following areas: Mathematics and its applications, Materials, Biology and Health, Languages and civilisation, History of the Renaissance, City and urban planning.

From 2004, it developed its cooperation with the University of Orléans through the creation of a private status association ("Pole Universitaire Centre-Val de Loire"). In March 2010, the University of Tours officially became a founding member of the Pole of research and higher education. The university has strengthened the international attractiveness and has started an international ad hoc portal. In 2015 it became part of the Léonard da Vinci consolidated university.

Institut National de Sciences Appliquées – INSA

INSA belongs to a leading group of French institutes of science and technology providing successful education to engineers, architects, landscape architects and PhD. Students.

INSA has been playing an active role in scientific and technological research, offer of vocational training for engineers and technicians and promotion of scientific culture. It has contributed to a successful French economy by training innovation-focused managers. Founded in 2014, INSA Centre- Val de Loire (National Institute of Applied Science in Centre-Val de Loire) is one of the 210 French engineering schools and universities entitled to deliver an engineer diploma. The INSA Group was created as a merging of the National School of Engineers of Val de Loire (ENIVL), the National School of Engineers of Bourges (ENSIB) and the National Higher School of Nature and Landscapes of Blois (ENSNP).

INSA Group– Key figures:

14,000 undergraduate engineers, 2,000 engineers and 50 architects and 35 landscape architects, graduated each year, 1,200 doctoral students, 31% scholarship students, 80,000 INSA engineers in France and worldwide, 1,500 staff, 1,590 teachers;

Cutting-edge research: 55 laboratories, 1,200 doctoral students, 300 PhD. awarded each year, 1.700 scientific publications in international journals.

International focus: over 1,250 partners all over the world; 3,840 foreign students; 11% INSA engineers working abroad (on average, 6 months abroad during the studies); 94 partners in 36 countries for international research programme; international section SIB and double degrees. International implementation since 2015, with INSA Euro-Méditerranée, in Fez, Morocco

INSA in Centre-Val de Loire is currently composed of two campuses – Blois and Bourges – and is a State institution of Scientific, Cultural and Professional teaching (EPSCP) regulated by the 1984 law concerning higher education.

From the third to the fifth year, students are enrolled in one out of the four specialties of INSA:

- Industrial risk management and control strategy (Bourges);
- Computer technologies and IT-security (Bourges);
- Industrial system engineering (Blois) ;

- Energy, environment and natural hazards (Bourges) by apprenticeship training.

INSA offers master and doctoral education programmes in partnership with University of Orléans and University of Tours and other HE institutions in these fields.

INSA envisages for the next years: (1) Development of innovative & apprenticeship training programmes (Industrial Systems Engineering apprenticeship to open in 2018; Novel training methods); (2) Development of new programmes (Renewable Energies planned for 2019, International Master degree in Water and Landscapes; Engineer/Landscape Architect & Manager/Architect).

Research with a series of cutting-edge multidisciplinary scientific policy and a joint supervision of five laboratories (in cooperation with University of Orléans and University of Tours) enable INSA CVL to award doctoral degrees

- Laboratory of Mechanics and Rheology - LMR - 2640 Team, with University of Tours;
- Research Group in Advanced materials, Micro-electronics, Acoustic and Nanotechnologies- GREMAN - with university of Tours;
- Laboratory of Fundamental computer science of Orléans - LIFO - with University of Orléans;
- Multidisciplinary Laboratory of Research in Systems engineering, Mechanics and Power engineering - PRISME - with University of Orléans.
- CITERES: Cities, Territories, Environment and Societies.

INSA is also closely involved in five Poles of competitiveness - Elastopôle, Sciences et systèmes de l'énergie électrique, Cosmetic Valley, ViaMéca, Pôle Risques PACA - and coordinates the National Pole of Industrial Risks (PNRI). Industrial partnerships in 'Applied research: expertise and applications', 'Technology transfer' (work placements), 'Methodological transfer' (recruitment, continuing education), with an annual career-fair which involves more than 50 companies, conferences, teaching collaborations, strategic partnerships...

3.2 Centre-Val de Loire research and innovation system

The regional research and innovation ecosystem has an important representation of national research laboratories and organisations. These public and private research organisations are working in close cooperation with the university research groups and higher education institutions.

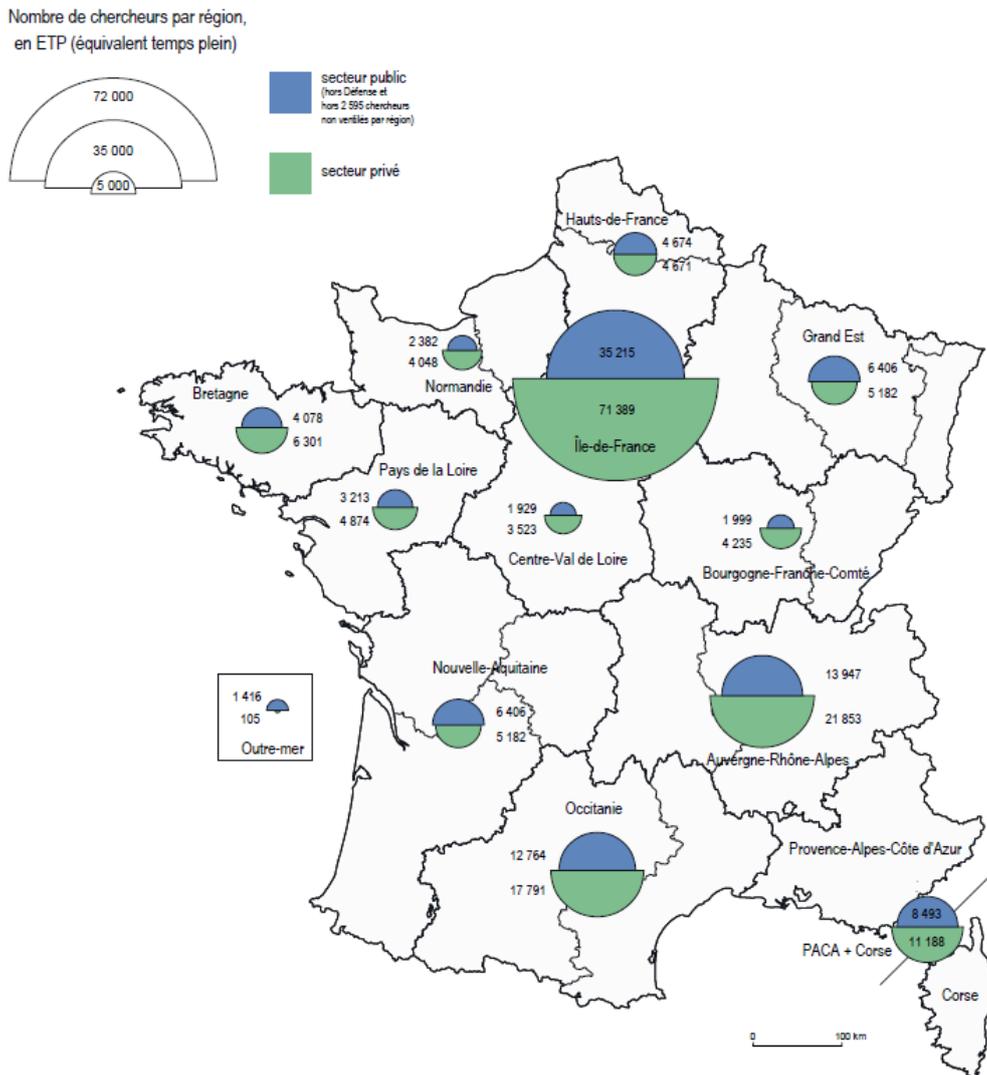
However, the region ranks low in terms of number of researchers¹⁴ compared to other French regions, ranking eleven out of thirteen with 1,929 researchers in the public sector and twelve with 3,523 in the private sector (MENESR, 2018)¹⁵. However, if we consider the percentage of research personnel in terms of the regional population, the Centre-Val de Loire region scores 0.86% eight region in France, even if below the French average (CENTRECO, 2016)¹⁶

¹⁴ Full time equivalent researchers

¹⁵http://cache.media.education.gouv.fr/file/2017/41/5/depp-RERS-2017-recherche-developpement_824415.pdf

¹⁶ Centreco, 2016. Innovation recherche & Développement en région Centre-Val de Loire <https://www.devup-centrevaldeloire.fr/media/innovation-rd-centre-loire.pdf>

Figure 11. Number of researchers in public and private institutions (2014)



Source: Ministère de l'Éducation Nationale, de l'Enseignement Supérieur et de la Recherche (MENESR)

In terms of research, Centre-Val de Loire hosts a series of headquarters' laboratories belonging to national research institutions of recognised prestige:

Table 1. Centre-Val de Loire main research laboratories

Acronym	Full name	Research domain
BRGM	Bureau de Recherches Géologiques et Minières (Geology and Mining Research Institute)	Water resources, Natural risks, Impacts of Climate change, Geothermal).
CEA Le Ripault	Commissariat à l'Énergie Atomique et aux Énergies Alternatives (National Atomic Energy and Alternative Energies Commission)	Research, Development and Materials manufacturing, Non-nuclear Systems for nuclear weapons and global security, alternative energies: research into fuel cells, energy storage.
CNRS	Centre National de la Recherche Scientifique (National Science Research Centre)	11 laboratories among others in Aerothermal Fuel and Environment, molecular Biophysics, Materials, Superheated High Pression Steam and Fusion research and EarthSciences.
INRA	Institut National de la Recherche Agronomique (National Agronomical Research Institute)	Dynamic modelling of Soils, Environmental and land management, Integrative plant Tree Biology, Integrative Animal Biology and Sustainable Management of Animal Productions, Animal Health and Public Health
INSERM	Institut National de la Santé et de la Recherche Médicale (National Health and Medical Research Institute)	Developmental Disorders, especially Autism
IRSTEA:	Institut National de Recherche en Sciences et Technologies pour l'Environnement et l'Agriculture (National Science & Technology Research for Environment and Agriculture Institute)	Ecological Earth Systems; dynamics, vulnerability and engineering.
Observatory of Radio-Astronomy of Nançay		Sun and Solar-terrestrial relation, physical-chemistry of comets

Among the most important innovation policy programmes in the last years in France, important efforts have been made to promote a stronger cooperation between research groups, education institutions and companies to increase competitiveness in specific thematic fields. Among the most important policies, we can highlight the Cluster of Competitiveness (Pôles de Compétitivité) policy promoted by the national government and supported by the region, and the Ambition Recherche Développement (ARD 2020) promoted by the regional government.

3.2.1 Regional Competitiveness Clusters ('Pôles de Compétitivité')

The Centre-Val de Loire region has financed innovative projects in local companies to increase competitiveness and generate employments, as part of the framework Agreement to support R&I Sectorial Projects¹⁷. It includes two sections:

- Research and Development Section, which promotes R&D departments in local companies to support processes and organisational innovation in industry, business-to-business service, tourism or agro-food and agro-transformation.
- Innovation Section, which promotes innovative products and processes in the above mentioned sectors.

The regional competitiveness clusters promoted in the region cover the next domains, with important number of projects labelled during the last decade¹⁸:

- Cosmetic Valley (Chartres): quality/traceability, microbiology, toxicology, biological effectiveness, cultural and sensory impacts, sustainable cosmetic
- DREAM (Orléans): diagnosis, monitoring, environmental information system and engineering of water resources and aquatic environments, alternative treatments of water and lands
- Elastopôle (Orléans): raw materials and formulation improvement, manufacturing processes, nano-materials, sustainable development and eco-technologies, binding substrates
- S2E2 (Tours): manufacturing, storage and electric networks, marine renewable energies, smart buildings, geothermal for new buildings, electronics for energy efficiency

It has to be considered that currently the current competitiveness cluster scenario is in evolution, and therefore might suffer changes.

3.2.2 Ambition Recherche Développement (ARD 2020)

The region launched in 2012 the "ARD 2020 – Ambition Research Development 2020" programme with the aim of supporting and generating new regional R&D clusters of international dimension, with a large potential for growth, added value and capacity to create employment.

Even if the ARD 2020 programme was defined previous to the S3 dynamic, their selection if consistent with the S3 priority areas and are currently well integrated based of their capacity to generate new dynamics in the S3 DPS, in the form of new collaborations in highly innovative projects with large potential impact on regional development. S3 has been instrumental to define a large research axis where many laboratories are clustered around an interdisciplinary topic, with a link to the territory.

The total devoted to the programme has been 30 M€ for 'Stages 1' within three years, and a new allocation of 25 M€ for 'Stage 2' launched in 2017 (except PIVOTS), complemented with ERDF (6 M€).

Powerful Tool of Regional Competitiveness & Attractiveness

The ARD 2020 programme wants to differentiate the region as a research territory among the national and international science community, and enhance the attractiveness of talents to the region.

¹⁷ Contrats d'Appui aux Projets Recherche Développement et Innovation (CAP R&I)

¹⁸ More than 700 projects have been labelled in the space of ten years (2005-2015) by the four regional Competitiveness Clusters – Cosmetic Valley (Cosmetics), DREAM (Ecotechnologies related to water and its environment), Elastopôle (Rubber and Polymers) and S2E2 (Energy efficiency) in the respective following domains through the FUI (Fonds Unique Interministériel) call for offers, issued by the State, selected projects being cofunded by state, regions, départements and cities.

They are expected to boost strong interactions between the regional stakeholders (enterprises, competitiveness clusters, associations, public institutions, etc.) but also key national and international actors.

Thanks to their attractiveness and their integration within the European Research Area, they are expected to significantly increase the number of researchers in the territory, particularly through the recruitment of world-class researchers. Ambitious progress is expected in terms of research valorisation, with strong objectives in terms of technology transfer and innovation. They are expected to promote close and long-term cooperations with social and economic actors, whether already present within the territory or newly attracted or created (start-ups, subsidiaries of international companies...).

Through the ARD programme, Centre-Val de Loire wants to contribute to the emergence of several world-class research and development hubs and clusters, leading to long-term growth dynamics in terms of research staff a genuine regional socio-economic development.

The region has financed so far five ARD 2020 summarised in the table below (See Annex 1 for more detailed description):

Table 2. Centre-Val de Loire financed ARD2020 (2017–2018)

Name	Thematic field, partners and objectives
ARD 2020 LAVOISIER	The partners of this ARD are the Region, CEA (the French atomic energy and alternative energies Commission), University of Orléans, INSA Centre-Val de Loire, CNRS, University François Rabelais of Tours, and Le Studium. It is focused around 4 thematic fields: hydrogen storage, electric energy storage, energy conversion (batteries and fuel cells) and hydrogen production.
ARD 2020 BIOMEDICAMENTS	Coordinated by the University of Tours, the ARD gathers as partners INRA, CNRS, INSERM, University of Orléans, the CHRU (Regional University Health Centre) of Tours, Le Studium and pharmaceutical enterprises, such as Polepharma and IMT. Its main purpose is to develop a regional research cluster, focused on biodrugs and characterised by multidisciplinary teams from several research institutions
ARD 2020 COSMETOSCIENCES	Coordinated by the University of Orléans in partnership with the University of Tours, CNRS, the world-class Cosmetic Valley cluster, and Le Studium, ARD 2020 COSMETOSCIENCES aims at establishing the territory of Centre-Val de Loire as an international reference in the cosmetics field, both in terms of private and public research, education and training processes, entrepreneurship and socio-economic promotion as well.
ARD 2020 Intelligence des Patrimoines I-PAT	IPAT offers interdisciplinary research and scientific innovation in the heritage tourism, as well as new teaching and employment. Eight founding members: University of Tours (leader), University of Orléans, CNRS, INRA, IRSTEA, INSA, BRGM, ESCM, in addition to forty laboratories and researchers from Tours and Orléans, led by CESR (the Centre for Higher Studies of the Renaissance).
ARD 2020 PIVOTS	PIVOTS-Platforms of Innovation, Valorisation and Optimisation of Environmental Technologies- is a coordinated effort of six research platforms in environmental issues, including PRAT ('Reactivity Atmospheric Platform' with the University of Orléans and CNRS), PESAt and PESAA ('Soil-Atmosphere Platform' with INRA, the University of Orléans and CNRS), PRIME ('Platform for the remediation and innovation in Environment Metrology' with BRGM), O-ZNS ('Soil, sub-soil, water' with CNRS and the University of Orléans), PERMECA ('Sub-soil, geo-mechanic, geothermal energy' with ANTEA Group), and DECAP ('Development of sensors' with the University of Orléans and CNRS).

3.3 Centre-Val de Loire Smart Specialisation Strategy

3.2.3 S3 governance

During the preparation of the new RIS3- Regional Innovation Strategy for Smart Specialisation, one of the key challenges for the regional industry was to retain value-added in the region and resist delocalisation pressures. Considering that the region has a weak visibility, the attraction of talent and investors are the main concerns. The impact of national and regional STI policies is visible in the regional innovation ecosystem, which has been better structured, with four Competitiveness Clusters and other clustering initiatives. In addition, networks support and the creation of a critical mass in the

productive sector, through the facilitation of interactions between business and public research has been promoted. In 2012, innovation support was recognised as the highest priority by the State and the Region. This favourable context raised awareness on the need to further enhance the efficiency and the impact of the 'research and innovation' policy.

Transition from Regional Innovation Strategy to Smart Specialisation

The previous Regional Innovation Strategy adopted in June 2009, decided to establish an ad hoc Committee and a Regional Innovation Conference. Centre-Val de Loire was one of the first French regions to adopt the SRI policy as recommended by the European Commission.

The region has capitalised the knowledge and results generated since 2007, particularly through the assessment of the eleven actions implemented, which concluded that the regional policy makers should focus their efforts on a number of priorities directly related to the specialisation areas (DPS). In November 2009, during the assessment of the Regional Innovation Strategy process, the first approach of 'Smart Specialisation' concept was introduced by ARITT (Regional Innovation and Technology Transfer Agency, the former Dev'Up) and in 2010 intensive discussions and reflections at regional level took place. An awareness raising campaign among key regional actors was promoted, particularly among companies and academic-research fields, while multi-level mobilisation approaches were brought to the regional public authorities. This included specific actions on 'innovation strategies' and 'smart specialisation' issues that were targeted to the regional decision makers at the highest political level:

- Inter-regional benchmark during three-day study-missions held in Flanders (Belgium), including the President and vice-presidents of the Region Council, as well as main managerial levels, chairmen of the three higher education institutions, entrepreneurs and representatives of regional Laboratories and Poles de compétitivité
- Active participation of the ARITT managers in a National Task-force and ad hoc think-tanks of DATAR (Délégation inter-ministérielle à l'aménagement du territoire et à l'attractivité régionale - Paris), specifically dedicated to the issue of "Smart Specialisation"
- Commitment with European working-groups of EURADA (European Association of Economic Development Agencies – Brussels)
- Participation to the workshops of the Smart Specialisation Platform of the European Commission for the design and implementation of the S3 Programme
- Labelling certification as test-region by DG REGIO

Broad spectrum of stakeholders in S3 governance

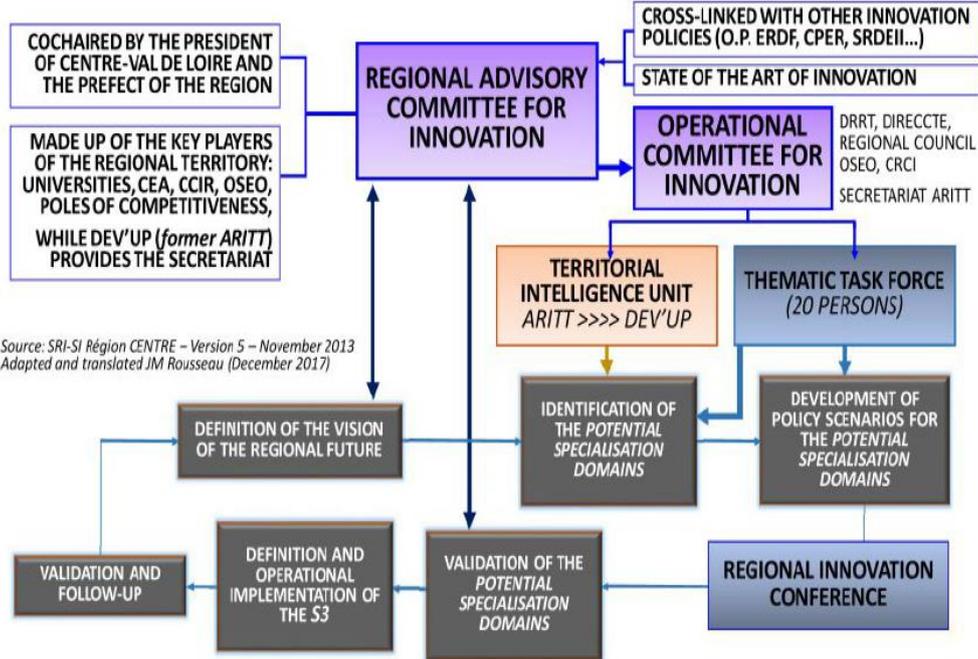
As a result of the regional S3 mobilisation, in March 2012 the 'Committee of Research and Innovation' of the Region validated the S3 Roadmap and moved from the previous RIS programme to the new S3. The main lessons drawn from the adoption of the S3 Programme were observed in terms of regional governance issues, with a genuine

identification of useful resources, adoption of Potential Specialisation Domains (DPS) and a full acceptance by the main territorial actors.

The introduction of S3 entailed a strong promotion of collaborations between different actors and partnerships. A particular emphasis was placed on the need of collaborative efforts, with specific measures to enhance collaborations among firms, companies and education and research institutions, in addition to the existing multi-level coordination between public authorities (regional stakeholders and regional representatives from the State).

From the very beginning, the S3 governance was structured around Steering Groups, which were reinforced by a closer collaboration and a genuine involvement – around flagship projects such as ARD 2020 – with a large spectrum of stakeholders involved, including the whole academic sector. The S3 has underlined the crucial role of universities and research centres as major actors. The knowledge flows and open innovation approaches have considered SMEs as primary beneficiaries to become more competitive, and thus boosting the regional economy.

Figure 12. S3 Governance in Centre-Val de Loire



Source: SRI-SI Région CENTRE – Version 5 – November 2013
Adapted and translated JM Rousseau (December 2017)

Source: DEV'UP website

The governance of the first Regional Innovation Strategy was introduced in 2007, which was later modified to broaden the new S3 governance spectrum and step up the endeavours and cooperation efforts of the regional stakeholders.

The governance system includes the following main bodies and processes:

- Regional Advisory Committee for Innovation: that pilots and validates the modifications likely to occur in the selected Potential Specialisation Domains
- Operational Committee for Innovation: responsible for ensuring that the

implementation of the strategy is consistent with S3 objectives

- Consensus-building process: involving working groups, the 'Territorial Intelligence Unit' and the 'Thematic Task-force'
- Innovation Conference, especially dedicated to the Potential Specialisation Domains with the aim of encouraging the emergence of innovation and research projects
- Follow-up and monitoring of the strategy to verify whether or not the expected results are being achieved.

Former ARITT particularly focused efforts on the participation and engagement of SMEs that are major S3 pillars, especially with the purpose of developing an Entrepreneurial Discovery Process. As a consequence in the first steps of S3, the Region chose a governance system mostly SMEs-oriented. Nevertheless, the Region also offered the university and the public research sectors to actively participate in transversal measures.

However, it was considered important the full involvement of universities and research actors in the five S3 Potential Specialisation Domains. As a result, higher education institutions (HEIs) have helped develop policy and inform funding decisions in the framework of S3.

3.2.4 The Way Forward to Targeted Potential Specialisation Domains

The ERDF financial allocation of Centre-Val de Loire to Axis 1 – A job-creating knowledge-based society – has been primarily concentrated in 'Public Research' (16.5 M€), 'Technology Transfer and Cooperation between the University and local SMEs' (16,5 M€), 'Clusters and SMEs' (5.2 M€), 'Direct support to SMEs' (6 M€) and 'Entrepreneurship and Spin-offs' (5.8 M€).

The financial resources planned for the implementation of S3 for the period 2014-2020 will reach over 1.3B€, including 40% private funding and 60% public funding (31% national; 17% regional; 10% EU; 2% local). The constructive collaboration between national and regional authorities have facilitated that several "focused DPS" regional interventions matching with national interventions. As an example, national funds support larger infrastructure and equipment while regional funds are targeting innovation projects; national funding targets upward-TRL and regional money downward-TRL. More than half of this funding (56%) is expected to go directly to the "vertical" priorities (DPS).

Dev'Up Regional Innovation and Development Agency created in 2017 as a merge between the Innovation Agency (ARITT) and the Economic Development Agency, is playing a catalytic role in conveying the European priorities and policies of the region and the S3 design. Currently Dev'Up continues to play an orchestrating role in S3 implementation. Companies, industrial players and other economic actors have been involved in the process. In particular Competitiveness Clusters have been asked to prove their critical contribution to the S3 goals.

In addition, public research actors have been mobilised with Higher Education partners in a limited number of Potential Specialisation Domains (see below), requiring a stronger commitment with the socio-economic development. As a result, new incentives have been introduced for these actors in order to develop more impact-oriented projects,

including industrial applications and entrepreneurial discovery. The Regional Council has gained as well a stronger capacity and credibility in this process, with an increased role in stimulating the regional innovation ecosystem interactions.

More interconnections and cooperation projects have been boosted, mainly facilitated by funding programmes oriented towards collaborative initiatives among stakeholders from diverse sectors and spheres, mainly coming from industry, academy and research institutions. Programmes have been equally oriented to fund projects that increase applications for regional innovation and encourage new partnerships.

Convergence has been achieved between challenges of enterprises in terms of territorial competitiveness and challenges of the research and higher education ecosystem in terms of talent attractiveness. Bolstered by this successful experience, regional actors have developed a growing appetite for interregional learning and cooperation, which has been essentially fuelled by the S3 implementation. As a result, the region is for the first time leader of an INTERREG Project – on the entrepreneurial discovery process (“Beyond the Entrepreneurial Discovery Process” led by Dev’Up in partnerships with 10 EU regions) and has been invited to become partner in other INTERREG Project, including an interregional cooperation of Biotech Clusters.

However, some interviewees of the case study have pointed out that particularly through the S3 programme the region is privileging short-distance projects, prioritising immediate and fast return on investment projects. As an example, the environmental metrology should be backed and supported in order to lead to public decision-making and industrial decision-making tools, as a result of work in mechanistic and geostatistical modelling analysis, with the so-called ‘predictive’ approaches.

The nature and the content of the S3 specialisation domains are of central significance for Higher Education Institutions considering they could actively contribute to the implementation of the regional S3, based on the following assumptions:

- Education and/or research institutions were involved in drafting the regional S3 agenda
- Implementation of S3 essentially related to research and innovation (ERDF, ARD 2020)
- The main mechanisms of the regional higher education are not thematically targeted
- Significant challenges have emerged mainly on anticipating the enhancement of the S3 role within the EU policies
- Major evolution and awareness-raising in terms of higher education into the ARD 2020 actions
- As a result, five Potential Specialisation Domains (DPS) blending business strengths, market perspectives and innovation-oriented know-how in the form of research and education-training activities

The next graphic summarises the region’s S3 Potential Specialisation Domains:

Figure 13. Centre-Val de Loire S3 priority domains



Source: DEV'UP website

Value chain analyses undertaken under the supervision of Dev'Up, in cooperation and agreement with the largest panel of regional stakeholders, including the relevant higher-education-and-research fields, to ultimately achieve the following S3 priority areas (See Annex 2 for further details):

DPS 1 – Environmental engineering and metrology for natural-resources-consuming activities

DPS 2 – Biotechnologies and services applied health services and cosmetics

DPS 3 – Conception of energy storage systems that is not limited to the electricity storage but also has to be in line with the available resource (form, quantity, variability...)

DPS 4 – Energy Efficiency Technologies for the construction and renovation of buildings

DPS 5 – ICT and services for heritage tourism

3.2.5 S3 transversal priority: Human capital

Centre-Val de Loire has been the only region in France to integrate human capital as a S3 measure. The region has considered that the financial tools in place to support innovation can have an impact if accompanied by human capital measures that ensure that those innovations are implemented in the region's economic fabric, increasing their overall competitiveness.

The main objective of the S3 Human capital transversal axe is to increase the competencies and skills of the young and adult population, in view of adapting to the technological, economic and labour market changes.

HEIs play a central role in the Human Capital Transversal measure, particularly as outlined in the following four key objectives:

- Objective 2.2. Enhancing the competences of the regional populations and attracting new talents for developing the innovation approach by adapting them to the market trends in the Potential Specialisation Domains
- Objective 3.1. Encouraging linkages between sciences and economic players in order to disseminate knowledge within the enterprises recruiting researchers in the enterprises; staff mobility between enterprises and research centres; attracting researchers with an international dimension.
- Objective 3.2. Transfer and valorisation of technologies to enterprises to generate industrial application through collaborative research projects between laboratories and/or enterprises; implementation and development of enterprise-oriented platforms for pooling the technology offer and accelerating time-to-market.
- Objective 3.3. Support for regional public research in its participation in Horizon 2020: identification of relevant research products of research and higher education institutions, as regards the issues, stakes and requirements of Horizon 2020; support for research bodies in the setting up of research projects.

In addition to the specific transversal axe on human capital, other transversal axes reinforce as well the HEIs links with the R&I system, particularly:

Axe 1 Strengthening collaborations between entrepreneurs and research centres, particularly HEIs

Axe 2 Boosting collaborations between business, research and education centres

3.2.6 S3 Peer-review and self-evaluation

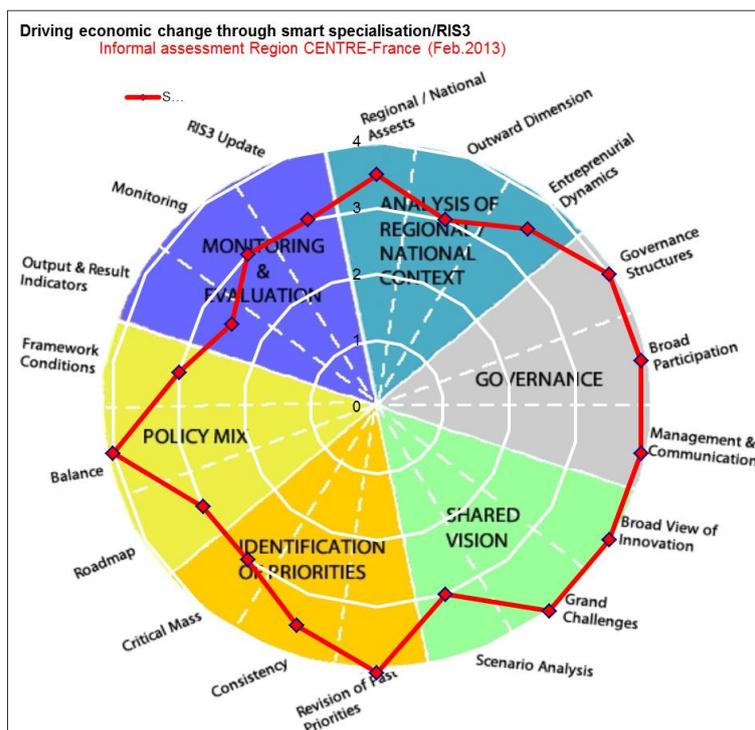
In September 2012 the S3 of the region was peer reviewed by other regions in the context of a Peer Exchange Learning workshop¹⁹ organised by the JRC Smart Specialisation Platform. The region presented the S3 process²⁰ with the progress made so far, highlighting the challenges and opportunities faced. The peer review exercise showed the highest level engagement in the S3 process and clear way forward that the region would like to pursue, with a strong effort in reinforcing the outward looking perspective of the strategy.

In addition, the region has self-evaluated the RIS3 implementing a tool proposed at that time by the Smart Specialisation Platform for this purpose. The result of the self-evaluation provided the following picture regarding six key dimensions

¹⁹ <http://s3platform.jrc.ec.europa.eu/documents/20182/120350/Final+Agenda+Pisa.pdf/dde60448-dc1b-44a6-86c2-d2a8bef0f10b>

²⁰ http://s3platform.jrc.ec.europa.eu/documents/20182/120350/Centre_Final_PisaSept2012.pdf/32141cf5-32c5-46cf-a706-5a4e14fd4565

Figure 14. Centre-Val de Loire S3 self-evaluation results



Source: ARITT Centre website

The exercise showed strong dimensions, such as governance and shared-vision of the strategy, and some dimensions to be improved, particularly the outward-looking dimension, monitoring and evaluation system and existing policy mix.

3.2.7 S3 Partnerships and continuous EDP

The Centre-Val de Loire region is encouraging interregional partnerships and collaborations projects to boost S3 implementation and reinforce certain challenges identified in the region. Two of these initiatives can be highlighted.

- The 'Beyond EDP' project²¹ funded under Interreg Europe programme, aims at strengthening the entrepreneurial discovery process among the partner regions, stimulating innovation among SME and creating entrepreneurial discovery environments. In partnership with 10 regional and national authorities working in the implementation of S3 they are looking into best practice and policy learning.
- The Industrial Transition Pilot Action funded by DG REGIO²² that will provide tailored support from the European Commission experts and technical assistance supported by ERDF to draw up economic transformation strategies, identify interregional cooperation and exchange good practices.

²¹ <https://www.interregeurope.eu/beyondedp/>

²² http://ec.europa.eu/regional_policy/index.cfm/en/policy/themes/industrial-transition/

4 HESS project field research

This section summarises the results extracted from the different phases deployed throughout the Centre-Val de Loire case study, namely the exploratory meeting to engage the key regional stakeholders in the case study, analysis of regional context and face-to-face interviews. The aforementioned phases took place between September 2017 and July 2018.

4.1 Methodology

The HESS case study in Centre- Val de Loire has been deployed in four different phases:

- Phase 1: Definition and agreement with regional stakeholders of the workplan of the case study
- Phase 2: Regional context analysis to understand the R&I ecosystem, key stakeholders, interactions of the HEI with regional actors and role in the S3
- Phase 3: Field research with more than 30 interviews to regional stakeholders and Final event to discuss and validate the results
- Phase 4: Analysis of main conclusions and Final report drafting

The case study has focused in 3 main objectives:

- Understand the role of the University of Orleans, the University of Tours and the INSA-Institute of Applied Sciences in the RIS3
- Analyse ways in which education / training dimensions can be integrated sustainably into the RIS3 governance system
- Understand the role of lifelong learning / lifelong learning in the Centre-Val de Loire in RIS3
- Explore the policy mix and the complementarity of existing instruments to strengthen the role of universities in the research and innovation system

4.2 Case study main findings

The main findings have been organised around the four objectives of case study, with key conclusions and messages extracted from the exploratory meeting, interviews and final validation workshop.

4.2.1 Current education and research capacities mobilised in S3

The S3 has been a real transformation in the way HEI contribute to the regional R&I system. It has activated transformational changes under the research and education processes of universities. The limited capacity of the region to provide financial support on education and training needs to be acknowledged, considering the fact that it can only be funded by trade agreements due to the nature and content of the training and

education programmes. This capacity is as well limited by the national competence on higher education that restricts the actions that can be promoted at regional level.

Some interviewees mention that the S3 Programme should help their institution to shape a more specialised educational offer with a real added value for the region.

4.2.1.1 Good alignment of education offer with S3 priorities

The higher education system of the region covers a wide range of disciplines, which match fairly well with the selected S3 priorities. However, the S3 has been primarily focused on research, with scarce attention paid so far to education, even if the region has certain competencies to encourage the higher education territorial engagement. Dev'Up Regional Development Agency has been empowered within this framework to boost this vibrant ecosystem.

The region has around 50,000 students and 20,000 access the higher education system each year. Whatever the S3 programme, one needs to bear in mind the need to cover immediate economic needs and maintain the link between the two levels of training, while the teaching staff has some tools to make distance between them.

4.2.1.2 University-business collaborations

The region has interesting examples of university-business collaborations in education, especially with leading industrial groups, which has led to promising results.

The DUT (Technology University Degree) offers a Professional Bachelor benefiting from education programmes led – at least at a level of 25% – by teachers who are actively working in enterprises and are fully consistent with the economic reality. In areas with internships, such as the “computer science of networks and digital networks”, the anticipation of requirements helps to compensate the shortfall of teachers-researchers; for the “industrial processes”, where a particular attention is paid to the enterprise expectations.

The University of Orléans has established strong partnerships with leading industrial corporates (Servier, LVMH, PSA, Renault, EADS, Orange). However, how to strengthen cooperation between the university and SMEs needs to be more broadly considered. Fablabs can play an exemplary role and may be a solution as happens with “We Lab Cosmetic” open to SMEs.

In addition, ICON (Institut de Convergence d’Orléans Numérique)²³ brings together 23 research laboratories around the university of Orléans, the CNRS, the BRGM and INRA, for inter-disciplinary projects and activities. More than 50 enterprises, including large industrial groups such as ATOS, but also start-up firms take part in mutualised research and training activities. ICON is integrated in the digital ecosystems on the following aspects: (1) Research (Inter-disciplinary Research Labs) and scientific challenges; (2) Valuation with, among other measures, the seed of new collaborations between research laboratories from university and/or enterprises, notably SMEs or start-up firms.

4.2.1.3 Integration of ARD2020 and Poles of Competitiveness in S3

Some interviewees have stated that several relevant sectors and Poles of competitiveness have not been sufficiently considered within Phase 1 of the S3 process.

²³ ICON is currently funded marginally by Orléans Métropole

Similarly, the expectations of some ARD 2020 partners have not been fully reflected in the 'Potential Specialisation Domains' (DPS), probably explained by the strong focus of the DPS on research valuation during this first phase. This has been addressed during Phase 2, focused on the Entrepreneurial Discovery Process and establishing closer links between laboratories and companies, as well as academia and entrepreneurial fields. The main challenge addressed was the established dynamics, in which only laboratories are the ones seeking cooperation with companies, without any expectation of reciprocal or mutual interest. It proves therefore useful and necessary that the region reinforces this link in both directions, with companies seeking to cooperate with research institutions laboratories, preferably from the region, in order to reinforce the visibility and attractiveness of Centre-Val de Loire.

The creation of the ARD 2020 Biomedicaments has been very consistent with the selected S3 priority domains. However, there is the impression that the university and CNRS have not kept the same pace with these changes. According to one of the interviewees, even there has been a significant support from the region to the agronomic thematic, this has not been selected as a DPS, which seems not to be coherent with the regional capacities in this field and could lead to improve its attractiveness for companies.

The central government has promoted a strong policy to put in place the poles of competitiveness, with an established roadmap and action plan supported by specific performance measures signed between the State, the Region and financial backers of the poles. From 2012, the poles are particularly oriented to promote public-private collaborations that result in innovative products, processes or services that reach the market, with special attention given to support innovation in SMEs.

According to some interviewees the poles of competitiveness promoted in the region have not deployed training missions, mainly due to the lack of an appropriate analysis of the match between the education supply and the skills needed by enterprises. However, there are some promising initiatives, for example Pole DREAM has launched a longstanding collaborations with universities and several regional schools, as well as a promising start of collaboration with the Apprentice Training Centre of Orléans which is focused on water treatment, while a scholarship programme is in progress for an implementation of an internship-employment system within the Pole.

In addition, the poles of competitiveness are gradually positioning in the EU arena. As an example, ELASTOPOLE has given its seal for approval to two winning projects of the SME Instrument Programme²⁴ and seeks to be more actively involved in European projects. In 2016 they signed an agreement²⁵ to be part of "The European Elastomer and Polymer Partnership Initiative" (TEEPPI) with the aim of exchanging good practices with similar clusters in Europe and improving the participation in EU funded programmes. The members of the European cluster come from Walloon region (Belgium), Poland, Madrid (Spain), Turkey and Elastopole.

In terms of internationalisation, technology exchanges and partnerships are currently underway with India, Brazil, the US and Canada, notably Québec (Vallée des Élastomères and University of Sherbrooke), but ELASTOPOLE has made the choice to refocus on Europe. One of the interviewees think that given the scientific excellence which is recognised in the region, notably thanks to ELASTOPOLE, the S3 mid-term evaluation

²⁴ <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/sme-instrument>

²⁵ <https://www.elastopole.com/Signature-du-partenariat-intercluster-Europeen>

should lead to a subsequent enrolment within one of the Potential Specialisation Domains.

4.2.1.4 Education alignment with S3

The S3 process has opened a reflection by all stakeholders on the future actions that would be needed to strengthen the alignment of HEIs educational offer to the S3, and the following have been identified in terms of education and skills needed in the region.

- Adapting educational content to the local economic fabric needs and new offer

Recent analysis has pointed out that some Master degrees may not be accredited due to the inadequacies and weaknesses in the applications and the adaptation to the economic context. Therefore students are considered to be not sufficiently ready to access the labour market at the national level. With a very gradual orientation towards specialised areas during their Bachelor studies, students appear to be benefiting from information training sessions from the early stages of schooling. As an example, SefCo (Continuous Training Service) ensures a piloting management by the teachers/researchers for the return-to-work, reintegration and acquisition of new skills, provided that it is proactive and not merely reactive and short-term.

In addition, INSA has planned to launch by 2020 new education programmes, for instance in the field of Renewable energies (including the hydrogen sector). Similarly, from September 2018, the offer will be gradually oriented to training through apprenticeship and on-and-off-the job training. As an example, the education offer on 'Security and computer technologies' (opening planned for 2020) is planning to introduce a specialised curriculum of 'Industrial system engineering', through apprenticeship in cooperation with the chamber of commerce and industry of Bourges, currently involved in an education programme in the field of 'Energy-risks-environment'.

The University of Tours offers as well two Master degrees, a Master in infectiology, vaccinology and biopharmaceuticals and an Erasmus Mundus Master in Infectious Diseases and One Health, that match very well with the S3 priority area of Biotechnologie applied to health and cosmetics. The former specialised on education in infectiology, biopharmaceuticals vaccinology and infectious diseases, and the later offered in cooperation with Universitat Autònoma de Barcelona and University of Edinburgh.

- Attracting young people in S3 priority areas.

The same could apply around the fields of training and higher education, Centre-Val de Loire has to reinforce the attractiveness of the territory for young people, both making more appealing for those from the region to stay or drawing from outside the region. Sustained efforts are provided for the guidance and the educational trajectory of the students and pupils of secondary school, with the prospect of job opportunities in region. This turns into the modularization of training and education processes, a gradual specialisation of the students towards promising disciplines and proposals of Masters related to specific sectors within the region.

- Continuous EDP and refinement of S3 priorities to regional capacities

Among the interviewees there is a general impression that the second phase of S3 should enable to further shape the composition of the DPS, currently limited to five. More precisely, the stakeholders point out that the second phase should look into two directions. Firstly, the S3 priority areas should be broadened to other key regional sectors, pointing out to examples such as elastomers, aeronautic industry or agriculture and forests. Secondly, the scope of the selected priority areas should be modified. For example, some interviewees think that the Agritech Valley should be integrated in the selected DPSs, bringing the expertise on digital agriculture, engineering and environmental metrology. In addition a greater attention could be given to the agriculture and ecological transition field.

There are concerns that some sectors, such as electro-chemistry for instance, are judged to be of lower priority within the two related DPS, due to a lack of interest from all participants – entrepreneurs, academics or scientific structures – in spite of its undeniable strategic importance. Nevertheless, some interviewees consider that DPSs should progress and adapt to rapid advances in technologies and markets, notably for thematics such as “Connected buildings”, “Internet of Things” and all the software applications such as Google Home type.

Some interviewees' underline that S3 should reflect the current and evolving technological reality, as well as the economic and territorial issues at stake, considering the evolution of the DPS for a new impetus.

- Matching the regional strengths to selected instruments

Some interviewees highlight that the sectors selected for funding under the four ARDs 2020 and related DPS of the Regional Innovation Strategy for Smart Specialisation (S3) do not necessarily reflect the reality and the analysis of the regional landscape observed by GIP Alfa with OREF and ORES tools. In this regard, it would be beneficial to invite GIP Alfa to participate to the steering committee meetings of some ARD 2020 and/or DPS.

It should be taken into account that even this cooperation will be beneficial within S3, there are challenges that will need to be addressed mainly regarding the mismatch between human capital sectorial needs and the specialisation domains.

According to some interviewees, the information about the S3 priority areas and the four ARD 2020 is considered still insufficient and could be considerably improved, going beyond the objectives and perspective. The selected priority areas should expand their focus in specific micro-niches and improve the match to the sectors with strongest regional potential.

As an example, one interviewee points out that the agricultural sector has not been considered in the DPSs and ARD 2020, which according to him it has a real potential of innovation and industrialisation that has not been taken into account. GIP Alfa has identified a number of fields, including agro-food, where important technology developments are taking place either in terms of emerging market models or professional skills. However the SWOT regional analysis for the S3 purposes has not highlighted such areas.

4.2.2 Integration of education/training in S3

Even if human capital has been introduced as a horizontal priority within S3, the reality shows that education has not been brought up in the S3 in practice in terms of the different tools, governance and processes activated in the process. Research has been the main driver of the S3, particularly focusing on research-business collaborations.

4.2.2.1 Integrating education and regional development dimensions in R&I policy coordination bodies

The CORIT and COMUE are particularly relevant bodies in the Centre-Val de Loire region in terms of R&I policy coordination and education contribution to regional development, which could strengthen their role in integrating education in a sustainable way in the S3 governance.

The CORIT- Research, Innovation and Technology Coordination Council²⁶ is an advisory body of the region that provides opinions and recommendations to the regional administration in the main areas of regional policy in support of research and innovation. Its role is not that of a Scientific council nor the management of funding programmes for regional research and innovation projects. The CORIT has a large representation of enterprises, around 25 members attending regularly. The CORIT is currently meeting yearly for a plenary session instead of the two or three times it used to in the previous years. Working groups are integrated by 3-4 people and focus on specific themes. According to one interviewee, even if the Poles of competitiveness are an important part of the R&I system of the region, the CORIT does not link to these poles, therefore the SMEs of the region do not have the opportunity to express their views on this policy development, even if the region has made significant efforts for enterprises' valuation and interactions with the economic field.

In the framework of the CORIT the needs of the region have been analysed mainly based on the research and pedagogical domains, but there is an interest in shifting towards a stronger consideration of regional development challenges in the fields of education and pedagogical innovation with information and communication technologies.

The COMUE- Community of universities and education institutions aims at promoting its members – universities of Orléans and Tours, INSA, BRGM, CHU Tours – as its priority objective, locally and at the international level, becoming a platform for dialogue to implement cooperation projects, with monthly meetings at the highest level. Although it is positioned in a broader context than the S3 and the regional ARD 2020 initiatives, there has been an important restructuring effort of this body, however with a stronger focus in research activities than in education.

The COMUE constitutes an interesting decision body, considering that it gathers the region's higher education institutions under a common legal entity, which could play a more relevant role in coordinated efforts from higher education to S3.

²⁶ <http://www.regioncentre-valde Loire.fr/accueil/ma-region-et-moi/une-chance-pour-tous/recherche-et-innovation/le-corit.html>

4.2.2.2 S3 multi-level governance

The S3 priority areas and framework has been considered in the definition and allocation of funding programmes, particularly looking to a good coordination with existing national funding programmes.

The Délégation Régionale à la Recherche et à la Technologie (DRRT), responsible for the implementation of the Government policy in terms of Research and Innovation in the region, has at his disposal various policy levers:

- Preparation of Plan for Investment of the Future (PIA3) in coordination with the - Regional Directorate for enterprises, competition, consumption work and employment (DIRECCTE).
- Launching of the call "Innovation Sector for the Future" (Inno Avenir Filières)

DRRT is also managing the State-Region Plan Contract (CPER) and ensures its relation and interconnection with the S3 Programme (National funding: 7 M€ for the R&D part, and 1.91 M€ for the Innovation dimension; Regional funding of the same global level or even higher). It actively participated in the preparation of the Regional Scheme of Higher Education, Research and Innovation (SRESRI) and is invited to attend the annual meeting of the CoRIT (Research and Innovation Council), an advisory body for the Regional Council, notably related to the major support policy for research and innovation. The DRRT, as a representative of the State, serves on the Strategic Orientation Board, co-led at the regional level by the chairwoman of INRA and the president of the University of Orléans, to conduct a monthly dialogue between the State and the region in terms of science policy.

The DRRT is in charge of ensuring that the S3 Programme is placed at the centre of the priorities and is coherent with the national policy. This is particularly done through:

- The participation in the Steering Committee of the ARD 2020
- Following up the policy of the regional Poles of competitiveness, notably DREAM, S2E2 and Elastopôle.
- Ensuring the consistency with the S3 of the State-Region Plan Contract, Poles of competitiveness and ARD 2020.

4.2.2.3 Integration of observatories in S3

According to interviewees the S3 governance requires better integrating education and training, which have not been fully deployed and it is expected to have a major impact for the region. The main weakness pointed out is not related to the education offer, which goes far beyond the S3 domains, but to the liaison between education institutions with the socio-economic fabric of the region. The S3 is considered a unique opportunity to work in this direction.

The observatories, OREF and ORES, are collecting very relevant data, which should however be shared. Interesting experiences can be highlighted in the collection of data about Polytech graduates and their placement in companies which has been carried out

by the Conference de Grandes Écoles (CGE) in cooperation with Association for Managers Employment (APEC)²⁷ and Association of Engineers and Scientists of France (IESF)²⁸

There is a proliferation of organisations dependent on the national or regional level tracking the employment of students as well as identifying the future labour market demands, which however have not been considered in the S3 governance system.

4.2.2.4 Valorising internationally recognised excellence initiatives

It is considered important to strengthen the valorisation of the significant actions taken under the Plan d'Investissement d'Avenir- PIA, financed by the State, which include from basic research to industrial innovation, education-training issues and technology transfer. As an example, the region has the LABEX VOLTAIRE – with the two other LABEX CAPRYSES et MABIMPROVE – that could be better integrated and accompanied by the region and the Smart Specialisation Strategy.

Stronger complementarities between Labex and ARD 2020 logic could be explored, the LabEx on the one hand and ARD 2020 with DPS2 on the other hand, as they are not based on the same logic. As an example, the ARD 2020 Biomédicaments and DPS2 (Biotechnologies, Applied Health Services and Cosmetics) of the S3 are largely inspired by the LabEx MAbImprove, focused on antibodies and clinical research action mechanisms and distribution. DPS2 however is both pharmaceutical- and cosmetics-oriented.

The LabEx MAbImprove, based on a partnership between the universities of Tours and Montpellier, bringing together INSERM, le CNRS, INRA and CHRU of Tours and the Cancer Institute of Montpellier, rests on the complementarity of two sites in connection with a national network of academic teams and pharmaceutical laboratories and biotech companies. In the past under the previous PRES and COMUE, through the Plan Investment of the Future (PIA), it is currently led by the University of Tours and state-funded for ten years with 8 M€ (equally distributed between Montpellier and Tours).

4.2.2.5 Improving S3 outward looking perspective

One interviewee considers that projects supported within S3 priority domains should be more ambitious and go beyond the regional scope, helping position innovation and research in the international arena with a large-scale enduring vision. Supporting more ambitious and long-term perspective projects would have stronger leverage effect in the territorial fabric. The competitiveness, technological catch-up and absorptive capacity would notably improve if such aspects were introduced in the project selection criteria. In this regard, the international position and visibility of certain regional stakeholders can be taken as an opportunity for a leverage effect for the internationalisation of the region.

For example, ISTO's international position in terms of scientific excellence constitutes an opportunity for fruitful synergies in the regional socio-economic fabric. The creation of an IRC (industrial research chair) could shift certain major corporates' attention on the regional innovation potential, even with no immediate measurable results ISTO's innovation spirit is giving excellent results, both in terms of education content and high

²⁷ <https://www.apec.fr/>

²⁸ http://www.isl45.org/IESF_CVL/presentation.html

added value of the research/education continuum. However, it is difficult to show the immediate and local (short-distance) usefulness for the students.

4.2.2.6 Mismatch between private sector skills need and education offer/quality

The demand of skilled students in the private sector of the region is very high. It is considered essential to put in place training programmes in response to needs-analysis in terms of quantity and quality of qualifications, as well as clearly identify the obstacles to the realization of such training. Skill-needs are multi-oriented and there is a certain degree of uncertainty about the way the enterprises use it. The most demanded profile by companies is a skilled worker with two to three years of professional experience after graduation. However, according to one of the interviewees, the education offer should improve the medium to long-term vision paying further attention to structural and not necessarily cyclical factors.

In addition, the HE offer is driven by a systemic view rather than a vision on the quality of the offer, companies expectations or the territorial needs. Interviewees underline the existing mismatch between the conception of the competences by the enterprises and their understanding by the higher education: BTS (Brevet de Technicien Supérieur) and DUT (Diplôme Universitaire de Technologie) are more valued by entrepreneurs than the bachelor, degree, as they claim to better address their needs.

Therefore, more attention should be paid to vocational and continuing education that is considered to be more relevant to match the needs of the regional economy, rather than focusing exclusively in initial education. According to some interviewees, the vocational continuing training should gain more attention in the assessment of the five priorities of the S3. Even if attention should be also paid to the previously mentioned mismatch between the human capital needs and the specialisation domains.

An interesting initiative is partly addressing this issue within the S3, with the so-called 'Developers Network' ("Réseau des Développeurs"), under the Dev'Up responsibility. The aim is the organisation of short-term cascade training sessions for the so-called 'Developers' (330) to irrigate the whole territory and disseminate innovation in SMEs, as well as improve the services provided to the enterprises. The financial support for the initiative coming from the region is of 80.000€ per year and counts with the participation of numerous intermediate bodies, such as chambers of commerce and industry, municipalities, department councils, etc.)

4.2.2.7 R&I stakeholders overall coordination and companies engagement

Conclusions drawn by the Centre-Val de Loire SRESRI (Schéma Régional de l'Enseignement Supérieur de la Recherche et de l'Innovation) point out that the cooperation among the regional stakeholder is better structured than in the past, however the critical mass of stakeholders should be improved, particularly in the involvement of industrial firms that are not sufficiently committed, which are mostly driven by grants and financing.

International orientation should be reinforced, with stronger measures to incentivise higher education orientation towards regional economic objectives.

4.2.3 Mechanisms to identify skills and competencies demands

4.2.3.1 Key role of regional observatories

The regional Observatories provide very useful tools for the region to anticipate upward skills and competences trends, as well as to forecast regional labour market demands. Namely, ORES- Observatory of Higher Education and OREF- Observatory of Orientation, Training and Employment are an important part in the strategic orientations and prospective studies of the region.

The ORES (Regional Observatory of Higher Education), with one dedicated liaison officer within GIP Alfa and another one within the University of Orléans, is a branch of the OREF. However, a reorganisation of the whole system is currently under discussion between the Rectorate (Academy) and the Region. The ORES is fully funded by the Region but depends on data shared by the Rectorate, the University of Orléans and the Region, which however lacks a systemic approach.

Additionally, the State and the region have chosen in the early 2000s to establish the GIP Alfa Centre-Val de Loire, a common and shared space to work and reflect on employment and education-training, with the objectives of: (1) exploiting the databases on training provision and the certifications; (2) observation of the relationships between training and employment (through OREF, Regional Observatory of Employment and Training); (3) professionalisation and the facilitation of networks dedicated to jobs and commercialisation.

GIP Alfa works with all the academic authorities and is consulted by the head teachers of secondary schools or the teaching staff about the economic reality prevailing in the territories. The observations carried out on the specific needs and requirements of the actors involved in the vocational training and education and the local employment, may not be in complete accordance with the conclusions drawn by the regional public authorities and the strategies pursued by the Regional Council for the economic territorial development. And this particularly applies for the needs in terms of employment, competences, skills and qualification, as well as training and education.

4.2.3.2 Strong role of Campus de Métiers et des Qualifications

The CAMPUS des Métiers et des Qualifications created in 2013 is a French national inter-ministerial label placed under the authority of the ministry of National Education, the ministry of Higher Education and Research and ministries of Economy and Employment. It aims to accompany companies to deal with their skill needs (one of the main barriers to economic development) by matching with the vocational training. The Label is granted by a Committee of experts, after calls for projects, the most recent launched in May 2017. The new government is expected to give continuity to the CAMPUS. Currently there are around 78 labelled CAMPUS, classified according to twelve types of activities for the whole country, including three for Centre-Val de Loire.

The mission of the CAMPUS is therefore to gather and facilitate a network of training organisms, with regional Poles of competitiveness, Clusters, enterprises and orientation and employment actors (SRPO, Pôle Emploi, Local Missions, etc.) in order to reflect on the following themes: professions' and sectors' attractiveness, anticipation of jobs and skills', training and education offers, innovation in teaching methods, safeguard of career paths (ranging from CAP level to BAC+5 and even BAC+8).

The Centre-Val de Loire CAMPUS is co-steered by the Education authority (Regional Rector) and the Region, with the Regional Orientation Strategies Committee (CROS) that certifies the strategic roadmaps of each CAMPUS: a Guidance and Development Council by CAMPUS has to define and implement an annual action Plan and strategy. The whole academic and administrative staff is appointed by the Regional Rector.

The CAMPUS des Métiers et des Qualifications are viewed as a support tool for sectors of activities that have a major economic issue at the regional level. The region has labels for "Campus Mécatronique (MMICO)", the "Campus des Industries Cosmétique et Pharmaceutique (CICP)" and the "Campus Tourisme et Art de Vivre". A regional coordinator has been appointed from April 2017 under the Directorate for Training and Orientation of the Regional Council of Centre-Val de Loire, to support the operational directors of the three CAMPUS.

The three CAMPUS units have their parallel guidance in three ARD 2020, namely ARD Biomédicaments and ARD Cosmétosciences for the CAMPUS dedicated to "Cosmetics and Pharmaceutical products", and ARD I-Pat for the CAMPUS related to "Tourism and art of living", while the MMICO CAMPUS just applied to a specific call for projects related to the "Industry of the Future".

These three so-called CAMPUS were not created by economic actors but were initiated by academic authorities. That is why they are more or less involved in the construction of the network and the implementation as well. By contrast today, some entrepreneurial areas, such as aeronautic industry, are keen to develop new CAMPUS, that could be added and adapt to the MMICO CAMPUS when the label will be renewed (conducted at four-year intervals after assessment).

There is a good coordination with the regional observatories, and for example the databases delivered by OREF (Regional Observatory of Employment and Education) will allow the tracking of CAMPUS cohorts and enhance the link between training and employment.

However, the international dimension should be strengthened, with international activities still in an embryonic stage at all skill levels and limited for the moment to the Erasmus Plus initiative of the CAMPUS "Tourism and art of living" with a cooperation and partnership with about fifteen students training session with the "Istituti Professionali" of Tuscany (Italy) in the field of catering. This activity should be enhanced in the coming years.

4.2.3.3 DEV'UP role in identifying needs and strong coordination with observatories

One fundamental role of facilitator of DEV'UP in bringing the needs of the enterprises to the attention of the whole regional system, collecting information on the spot (350 officers from chambers of commerce and industry, municipalities, districts, departmental institutions, etc.) and proposing decision-making tools.

There is the need to develop a training and education policy in the sector of forward-looking territorial management of jobs and qualifications as well. However, some interviewee points out that the education offer should not be exclusive shaped with the HEIs, but in agreement with all the major stakeholders of the R&I system.

Compared with the so-called "Dev'Up Developers' Network" – rather focused on economic development and markets and products aspects – GIP Alfa and the OREF intervene on

forward-looking matters of regional skills, based on the case studies of 'FRANCE STRATEGY' and the 'FUTURIBLES' model. A seminar was held in 2017 with six GIP Alfa officers on training and implementation of anticipatory and proactive approach (variables identification and scenarios testing). The short-run 'Dev'Up Developers Network' have some discrepancies with the so-called CLEOR approach that is carried out by GIP Alfa through reliable statistical data application with projections based on the evolution of the territorial employment.

Regrettably, the main actors of employment and training are not, at the moment, associated to this "Dev'Up Developers Network", but cooperation proposals between both institutions are being explored for closer links in view of complementarity regarding a cross-functional approach on trade flows of the region. This cooperation with the "Dev'Up Developers Network" is deeply wished and looked forward by GIP Alfa and, more particularly, by OREF and its ORES and higher-education dimension. It should also lead to more frequent exchanges and closer relationships with the ARD 2020 and DPS, as well as provide opportunities for GIP Alfa and OREF-ORES to participate in the preparation or the coming second stage of the S3.

4.2.3.4 Attraction and retention of talent

The job opportunities in the region are quite broad for Ph.D. and Post-Doctoral students, but in close competition with other French regions. This phenomenon is not so systematically observed with international mobility. Therefore the region needs to make a particular effort to retain the highest-level students within the region.

The activities of the Region have been focused in attracting the Ph.D. and Post-Doctoral students, as well as raising awareness of academic talents on the territory and the S&T demanded expertise. Poles of Competitiveness help compile and merge efforts in terms of research for the benefit of SMEs and mid-cap companies. However, there is a limited participation in H2020 projects.

The assessment of the employability rate of the students ensures the measurement of the job opportunities available at the regional and/or national levels (creative and art professions, social and solidarity economy, finance-taxation-legal affairs). In general, Master degree holders are rapidly attracted by the major cities such as Paris, Nantes, Lyon, Strasbourg. OREF (Observatory of Education and Training) is observing very positive results in terms of maintaining and integrating the students through internships with important impact of the apprenticeship-vocational training policy implemented.

There is a significant deficit of regional and national candidates for Doctorate Programmes within specific disciplines, which is offset by a real worldwide attractiveness. Regional students choose to enter the labour market in the private sector, particularly those who obtained a Master degree giving professional qualifications. Academic careers are actually less popular, even though those who have chosen a private orientation sometimes, after several years of professional activities, come back in order to complete their doctoral studies.

4.2.3.5 Reference initiative to attract international researchers- Le Studium

Through LE STUDIUM²⁹, good opportunities for cooperation are offered in the field of hard sciences such as Human sciences and society (for example in 2018, with one Canadian and one Indian). These activities have helped promote the regional attractiveness and competences of the science laboratories or industrial performances.

²⁹ Detailed explanation of LE STUDIUM in page 55

The national Master initiative ('Education' work package), driven in cooperation with ARD 2020 and the MAbImprove Labex, is an initiative highly recognised by the students, the private laboratories and the enterprises with 60 internships of six months. Nearly 70% of the courses are carried out by guest speakers (Pasteur of Lille or Paris, Cochin hospital, Vet Hospital Centre of Cordeliers). The employability rate after completing the studies is between 90 and 99%, depending on the cohort. The Erasmus Mundus Master, with a cohort of 24 students in 2017 and in 2018 (out of more than 700 worldwide applications).

4.2.3.6 Pôles and ARD 2020 interesting initiatives for university-industry cooperation

The region has done a considerable effort to promote instruments that strengthen university-business collaborations. However the focus of such cooperation has been mainly in research and innovation with scarce attention to the education dimension of such collaborations to identify the needs in terms of skills and competencies.

As an example, the DREAM Pole of Competitiveness is one of the three French poles oriented to the sustainability of water resources in its environment. Its aim is to link enterprises with research laboratories in order to promote the emergence of innovative projects in the field, support the implementation and development of projects (methodological approach in ecology, proposals of alternative treatments) and internationalisation of its members.

The DREAM pole comprises around hundred organisms, 70% of them enterprises from which 90% are SMEs. The pole is funded by 55% public and 45% private funding (membership, grants and subsidies as well as fee-based services to enterprises). With a team of eight professionals, DREAM mostly seeks to provide labelling: 160 projects since 2010, including 80 labelled. The combined budgets of the funded projects is roughly 80 M€, within a range from 100,000 € to 3 M€ per project, with regard to the first phase 2013- 2018.

In addition, the ELASTOPOLE Pole of Competitiveness, dedicated to rubbers, elastomers and pliable polymers since 2008, encompasses four regions, including Centre-Val de Loire, Île-de-France, Auvergne- Rhône Alpes and pays-de-la-Loire. Interregional Pole with a national vocation, numbers 120 members, including greater companies such as Hutchinson and Michelin and a large majority of SMEs and mid-cap companies; it has developed its research activities in the building of the University of Orléans.

4.2.3.7 Promotion of interregional cooperation and regional attractiveness

The university-business collaboration instruments have a very important potential to increase the attractiveness of the region for international investors, collaborations in EU projects as well as strengthening interregional collaborations within France.

The DREAM pole is a good example, which through the participation in the ARD 2020 PIVOTS is involved in the S3 Potential Specialisation Area (DPS 1), thanks to the expertise in environment metrology, within three actions: prospection for enterprises which are likely to use metrology platforms, communication services of PIVOTS and assistance in setting-up projects. In addition to PIVOTS, the Pole operates within a unique ecosystem in France, together with INRA, the CNRS laboratories, the universities of Orléans and Tours, the Water Agency, BRGM and some enterprises such as ATOS

Equally, since 2005 the Pole Cosmetic valley has launched 300 collaborative research project in the region, especially through the ARD 2020 'Cosmétosciences', while at the national level, many teams of GDR (Research Groups of the CNRS) Cosm'Actifs, promote biodiversity and new biological tools for skin and body care. Therefore cosmetics is becoming an additional advantage towards the attractiveness of the region, with an important achievement of attracting the German company EVONIK (active pure products based on plant cells), which settled in Tours at the end of 2017.

4.2.4 Life-long learning role in S3

The regional stakeholders have highlighted the need for stronger integration in S3 of life-long learning to become more operational and more effective for regional development. In this direction, several academics within the CORIT are particularly providing new insights on the regional economic development dimension and the S3.

4.2.4.1 Rich offer of continuing education programmes

The continuing training offered by some organisations such as Polytech Orléans are greatly encouraged in order to attract new students. They present very high employability of their students, with an important percentage of students finding a job short after completing their studies.

The networks of 14 Polytech schools across the whole country, has two in the region Centre- Val de Loire: Orléans and Tours. In Polytech Orléans, there are 1,350 students this year, against 900 enrolled in 2014, with very satisfactory employment results. The Human resource managers of the enterprises in Centre-Val de Loire appreciate and value this type of education while the Polytech students have no problem in finding a job, either in Centre-Val de Loire or other French regions. However, companies are often reluctant to identify potential candidates among first year students, while this is mostly done in the last year of studies. This highlights some concerns, as 75% of the graduates are from another region, and 80% of those who are leaving Polytech find a job outside the region. In addition, the international students rate has decrease during the last years, with a reduction from 150 international students in 2015 to 90 in 2018.

Continuing training within the school is not regarded as a priority and it would be necessary to introduce changes despite the ambition and scale of the task. In this regard, Polytech Orléans, has observed during the last years that the number of continuing training internships is reduced, despite the interest and attention of the approach. Even if monthly sessions have been organised to encourage exchanges with enterprises and employees, currently these training schemes find really challenging to attract potential clients and donors (Pôle Emploi, FONGECIF, entreprises...).

4.2.4.2 Continuing training to respond to S3

The available continuing education offer does not meet the demand in the scientific fields, such as computing-maths, law and legal issues, civil engineering (Polytech), health sector (immunology), chemistry and vegetal biology. Continuing education is conceived as the continuation of the academic education background or to learn specific skills. It provides a good opportunity to widening the scope of applications on the basis of a technique (computer) or deepening in a new dimension on a specific technique

(apprenticeship of – or awareness of and familiarity with – computing for technicians in other disciplines).

The Chartres Engineering School of Cosmetics and Pharmaceutical Industries is a good example, which in addition will open a private Cosmetics school in October 2018. In addition, Polytech Orléans, offers three-year education courses, and Master 2 in the bioactive productions and cosmetics fields. In the Loiret department, ACM Pharma industrial laboratories offer a broad range of tailor-made services to its Pharmaceutical and Cosmetics SME and micro-enterprise clients, from the analysis of products up to the valuation of methods, including training, audit and consulting for the marketing of products in compliance with the regulatory requirements.

In Tours, Le Bio³ Institute (or Bio Cube) is an important bridge between the theoretical knowledge of the applied biotechnologies for health and well being on the one hand, and the industrial practice in pharmaceutical and cosmetics bioproduction, on the other hand. Cosmetic Valley has an extensive range of one- or two-day continuing trainings in the fields of cosmetics with twenty sessions for six to eight trainees coming from enterprises or seeking employment.

4.2.4.3 Vocational education and training potential

Through continuing education activities and the coordination with the regional enterprises, the university offer has evolved based on the enterprises' demand and the highest employment potential sectors.

However, the Professional Licence (one-year diploma) in the 'Biomédicaments' area has still not been offered due to the emerging position of the sector, although it has proved sufficiently strategic at the regional level to offer an apprenticeship scheme.

On the university side, training is progressively aiming to offer highly specialised students ensuring to address the employment pool (currently too small). New jobs and emergent trades have significant potential areas for development. Even the difficulties to identify the future emerging fields, the university is cooperating with companies to establish a forecasting system which combines the strategic vision of the sector, with the notion of excellence and influence at the region, national and international levels. Apprenticeship and on-going training allow addressing the short-term needs, but the university is moving towards a competency-based approach focusing in competences of curricular content and not only on the scientific contents.

In this regard, universities show less interest in adapting their education system to the S3, are more willing to identify the training programmes that better the DPS axes and bring synergies between the disciplines within the curriculum programmes, as well as with the regional public and private partners (laboratories, enterprises, etc.).

4.2.5 Policy-mix and complementarity of existing instruments

The region' policy-mix primary aim is the selection of actions that are likely to favourably impact the regional economy. According to this, two main aspects are considered to guide policy decisions: 1) progressive narrowing down of the selected priorities in the territory 2) looking for relevant priorities in terms of education and teaching.

Some interviewees have pointed out the importance of the ambitious dimension that S3 should have, with a long-term vision to promote the attractiveness of the local sites beyond the strictly visible and immediate interests. Some consider more useful to consider employability aspects instead of far beyond competences, with the need to focus on creativity and innovation skills that guide research approaches and methodologies such as the so-called "Blue Sky" research.

The higher education policy in the region envisions to set in motion a process to reinforce networks, such as EUCLIDE – within Dev'Up – and the LE STUDIUM, as well as one of the seventeen actions of the SRESRI with TREMPOLINE initiative, funding "seal of excellence" labelled projects with additional funds to the ones already undertaken by the scientific and academic partners. It is attempted to avoid deadweight and windfall effects, which could benefit to certain enterprises or laboratories.

In addition, the higher education system should play a more relevant role in the international positioning of the region, which it is considered to be mostly carried out by individual professors and researchers, but would need stronger engagement and strategic direction by university managers. This process could be improved by promoting the identification of multi-disciplinary fields of interest for international alignment, breaking the existing silos between departments.

4.2.5.1 Strengthen international position of universities and region

In terms of international positioning, both the excellence of the university research teams and the visibility and influence of the university and the Region should be highlighted. The Erasmus Mundus Programme has enabled to propose Masters, for example with the One Health international project (animal and human infectiology) lead by the University of Tours in consortia with Barcelona and Edinburgh.

The international dimension of INSA is central in the students' training, with a semester to be completed abroad, either in a university or in an enterprise located outside France. INSA has collaborations with a number of foreign universities to send or receive students in the framework of double-diploma agreements.

The international dimension of research is key for the visibility of the institutions as well as for the whole region. The three main higher education institutions of the region dedicate specific budgets to hire foreign researchers, which attract important number with particular relevance of the international collaboration of Doctoral students, particularly for the joint thesis supervision, is also a relevant initiative.

The PIA (National Programme of Investments for the Future), whose goal is to promote the French science excellence, funded two major projects of ISTO, the EQUIPEX PLANEX and LABEX VOLTAIRE. LABEX VOLTAIRE (VOLatils – Earth, Atmosphere and Interactions - Resources and Environment) at the origin of which was created ISTO, is a nine-year project of 11 M€, that beyond the scientific and geographical reality, can contribute to the reputation of research excellence of the region as well as strengthening its attractiveness of talents (curricula with European universities, economists, and large companies and enterprises in Poles of competitiveness). EQUIPEX PLANEX, a seven-year operation financed with 5.6 M€, enhances the instruments available within the CNRS Campus of Orléans, with a clearly differentiated strategy for a greater visibility in the national and international scientific community.

At international level, even if H2020 projects are challenging for Polepharma, it collaborates with the Pole of competitiveness BOWIN of Wallonia (Belgium) while it

would like to start a cooperation with the biotech industries in Flanders, in line with the previous benchmarking initiatives led by Centre-Val de Loire public authorities with the Catholic University of Leuven (KUL).

The Region is making a stronger commitment towards the international cooperation – particularly with European regions – without necessarily referring to the national level (that is too often used as a communication channel for Europe). First consideration should be given to the involvement of in-house engineers and scientists, specialised in the setting-up and management of European dossiers, notably for H2020. Introducing specific training at the master level in European funding programmes for the next Horizon Europe programme or introducing European education modules at the Master level of different science disciplines could be proposed. This training in academic institutions could provide specific expertise in the preparation of research projects, the constitution of consortia and searching appropriate European partners.

4.2.5.2 ARD 2020 Instrument

The ARDs have specifically been made on priority initiatives with a view to generating adapted trainings. Among the main missions of ARDs we can highlight:

- Research and equipment programmes
- Education
- Dissemination of the scientific, industrial and technical culture
- Valorisation of industrial partnerships
- Attraction of international researchers

ARD 2020 constitutes a sound basis and relevant instrument for the implementation of the S3 objectives. With an excellent and result orientation they constitute a great improvement from the previous approaches that suffered from a serious deficit of socioeconomic impact in terms of regional competitiveness. The ARD 2020 enable to finance projects and promote exchanges to achieve tangible results.

ARD 2020 play a pivotal role and generate a real impetus with a great interest from the economic and academic stakeholders of the region. However, up to now they have been intensively research-oriented and their attractiveness and quality of training and education programmes could be strengthened indirectly. According to one interviewee, additional funding for public training and education institutions would be welcomed with the aim of: (1) offering economic affairs managers and relationships with enterprises positions; (2) initiating procurement procedures for professional teaching materials for training and education programmes; (3) symbiosis need between schools and poles of competitiveness, despite the risk of competition in the field of training and education programmes.

- Co-shared funding at national and regional level

The ARD 2020 benefits from the Centre-Val de Loire's funding, with €7 million for the Stage 1 (over a period of three years) and additional €9 million for Stage 2 (over three years), expanded with the ERDF and CPER (State-Region Plan Contract) contributions, equivalent to €20 million over six years. These large-scale investments of the Region proved to be determining in the success of the large regional partnerships.

In the case of ARD 2020 IPAT, the Region has contributed to finance these actions up to €2.9 million, with additional €1 million from the ERDF Programme. The regional support of ARD 2020 is more and more significant, progressively increasing from €680,000 for the 2014-2016 period to €2.9 million in 2017 (for three years). The whole action provides a framework of more than 110 projects for an overall amount of €33 million (regional, national and European AAP).

- Prospective analysis and promotion of entrepreneurship

Some specialisation fields in the region are doing an effort to promote entrepreneurship and identify emerging needs of the sector. The cosmetic field is a good example, in which ARD Cosmétosciences has promoted the so-called collaborative laboratory "We Lab Cosmetic" and the "Regional network of accompanying measures for new ideas". The latter promotes ideas throughout the value chain from the generation of ideas up to the economic validation and the creation of enterprises, with the intermediary steps of technical valuation, upgrading competences, scientific expertise and incubation process.

The "We Lab Cosmetic" has promoted three laboratories to promote entrepreneurship among students in collaboration with micro-enterprises or SMEs, in the fields of vegetal chemistry, formulation and biology. Calls for tenders are launched regularly for research projects, while partnerships are proposed by ARD 2020 Cosmétosciences. For 2018, nine Master students, including six in partnership with three very small enterprises, two student groups of the award competition "Crea Campus", two students-entrepreneurs and three independent entrepreneurs, launched innovation solo- or duo-projects.

- Need for stronger visibility and ownership by universities

According to one interviewee ARD 2020 and LabEx should be given more visibility and dissemination, with specific websites with detailed information about their current and future activities. Generally speaking, the LabEx and ARD 2020 are not included under the dissemination umbrella of the universities' websites, which probably goes at the expense of less consistent and visible initiative in the international community.

- Strong potential for university-industry collaborations

Even if the main aim of ARD 2020 programme is to boost research-business collaborations for greater economic impact, the reality has shown that different barriers are faced. For example, at the first state of ARD 2020 Biomédicaments partnerships between the academic system and the regional industry were promoted, however only two out of four selected key-projects could establish a fruitful cooperation with a private company in the given time frame. During the second ARD 2020 stage, all the eight selected projects got an industrial partner, including two in the Loiret department (Orléans) linked with an academic team from Tours and another team from Orléans, and six from Indre-et-Loire department for six Tours academic teams. A ninth project was subsequently included in cooperation with the Servier laboratories, essentially connected with Tours academic teams.

Another example by Polepharma has shown the difficulties of implementing the innovation component even if the sector is strongly industry driven, with ARD 2020 Biomédicaments as well as DPS2 (Biotechnologies and applied health services and

cosmetics) both constituting a basic tool for regaining control of the industrial policy. In the ARD 2020 Biomédicaments, Polepharma plays a coordinating and motivating role as well as an interface between the academic and industrial spheres, with a view to accompany the necessary regional changes and innovations in biotechs. However, technology intensification and innovations in the sector are so disruptive that no enterprise can fully handle alone technological research. This requires close cooperation between enterprises and research institutions, without diminishing the decisive role that regional public authorities can play. In fact, Centre-Val de Loire with the S3 could potentially be a turning point for the territory and move forward by encouraging and supporting the acquisition of a genuine knowledge, notably with the university of Tours and the LabEx MAbImprove.

- Stronger focus on research than education and skills

According to some interviewees, the ARD have primarily focused on research, while attention should be paid as well to developing skills. As an example, in the ARD Biomedicaments training and education do not appear to be successfully addressed until now, given the predominance of the research dimension and probably due to the lack of linkage between Education and Research within the French universities. The Masters (Biology/Health and Life Sciences, for example in Tours) are in fact disconnected from the research teams while the training proposals are difficult to identify for the students.

Within the DPS2 (Cosmetics and Health) education is not widely addressed, but the region particularly focuses on promoting partnerships' between scientists and entrepreneurs, and supporting start-ups in the fields of animal health, infectiology and animal psychology.

Some interviewee points out that certain existing capacities, such as the UMR ISP1282 (University of Tours and INRA) and the EUR Bio Health Project research in the field of infectiology and public health, could be integrated in the ARD 2020 Biomédicaments and DPS2 of the S3. The 'Biopharmaceuticals and parasiticide treatments' team was awarded for one of the ARD 2020 project concept of immunotherapeutic treatments and anti-cancer drugs protozoa. In fact regional funding has played a decisive role in the initiation and successful cooperation project with private north-american investors (Kymeris start-up) in terms of scientific staff and intellectual property. The allocation of a Ph.D. student paid by the ARD Project and by Kymeris has been key for the success of the project collaboration.

In addition, the École supérieure en Intelligence des Patrimoines, depending on the CESR of the University of Tours proposes, in Master 1 and Master 2, four training curricula within the mention "History, Civilisation and Heritage" ("Careers of Heritage Sciences, Culture and Renaissance Heritage", "Culture and Food Heritage" and "Careers of Archeology and Archeomatic"). There are also two Master curricula within the mention "Digital Humanities" ("Intelligence in Databases of Culture and Heritage", "Digital Mediation of Culture and Heritage"). An international option that is on the time limited to a cooperation with the University of Québec at Montréal, should shortly result in connections with universities in Canada (Alberta), in India, in the US and in China.

In the case of ARD 2020 COSMETOSCIENCES an Advisory Group of Strategic Reflection (GRS) was set up, financially supported by the Region and co-piloted by Cosmetic Valley, which gathers since 2015 entrepreneurs of the cosmetic industry, researchers and teachers-researchers, and regional actors such as Dev'Up, Cosmetic Valley, the city of

Orléans... The GRS meeting in 2015 allowed enhancing accompanying measures to innovation in cosmetics and to entrepreneurship skills of students in this sector.

In terms of training a Master of 'Bioactive Chemistry Molecules' is offered from 2013 within the University of Orléans, an engineering training in Polytech on "Industrial Engineering applied to Cosmetics, Pharmacy and Agro-food", and a Professional License in "Biotechnology" in the University of Tours.

The review by the University of Orléans during its four-year existence reports that from 43 graduated students, 28 have been hired in the private sector (16 in the region and 11 other students distributed within the national territory and one in Belgium); 7 have been hired in a non-cosmetic sector company (pharmacy, agro-food...) and 8 were still seeking employment at the time of the survey.

Through the 'Training' component of ARD 2020, there are financial opportunities for internships of Master 2 level, in academic and industrial spheres), while international mobility internships were offered as well as seminars and other kind of meetings (internship-employment forum, visit-study of sites, conference) in order to facilitate close links between students and entrepreneurs. Foreign researchers are welcomed on the STUDIUM basis during two-week periods (Expert Days) or twelve-month periods (Fellows), and partners are encouraged to participate in European projects (H2020, INTERREG).

- Strong national collaborations and need to reinforce international dimension

The international dimension of ARD 2020 has still not been sufficiently developed. In some cases the LabEx Programmes and ARD 2020 are partly hampered by the weak capacity of the statutory researchers who are insufficiently available to establish efficient collaborations. Strengthening of the research teams is sometimes difficult due to the attraction of new generation of students to the private industry. Partnerships of the ARD 2020 initiatives are mainly encouraged with other French regions, which is very positive as it provides further strengthens to the field to access international value chains

Partnerships are encouraged with other regions such as Brittany for animal breeding and Nouvelle Aquitaine for goat rearing.

The ARD Biomedicaments is increasing international positioning through education, with an Erasmus Mundus in cooperation with different countries (Argentina, Mexico, Thailand, China) in the field of infectiology, animal biology, forests and soils, while such an influence helps them to extend a dynamic display policy, as well as the attractiveness of the Region, notably in its fields of science excellence.

In the case of ARD IPAT, in addition to the cooperation with Montréal and forecasted commitments with US, India and China in the field of education, some projects are undertaken with Liège (Belgium) and with Florence (Italy). Thanks to the H2020 application, the CESR has taken the lead of a twelve-partner network (Poland, Italy, Spain, France, Belgium, Germany, etc.), but now has the ambition to expend its horizons beyond Europe with China (Changsha), India (Pondicherry), Brazil and Iran (Teheran).

In the case of Pole Pharma, in order to avoid overlaps and duplications between the three partner regions, some of the projects are committed with the Pole of competitiveness Medicen that is located in Île-de-France. This latter region also hosts a majority of research centres, but there are in Centre-Val de Loire heavy weight incumbents of the pharmaceutical industry such as Sanofi or GSK, among an important fabric of SMEs.

4.2.5.3 LE STUDIUM Instrument

LE STUDIUM is a regional agency, non-profit association that was created by 1996 by Professor Paul Vigny who led a CNRS laboratory. The concept consisted to create a structure of hiring highly skilled and experienced foreign researchers for a period of at least one year, in view to intensify international scientific exchanges and reinforcing the attractiveness of the region. The aim was to get foreign researchers more involved in laboratories located in Centre-Val de Loire.

The Region supported this initiative from its initial stages. The experience started in 2000 in Orléans with the laboratories of the CNRS campus and the University, and has been significantly extended to the university of Tours in 2004-2005, before being more broadly spread all over the region. LE STUDIUM includes in its membership all the research centers based in the region: CNRS, INRA, INSERM, BRGM... In 2010, LE STUDIUM has strengthened and extended its offer with the organisation of events (inter-disciplinary seminars, international workshops and scientific conferences...) and by granting 7-8 annual awards. The founder, Paul Vigny, also CORIT member, chaired LE STUDIUM until 2014, substituted by the president of the University of Orléans, Ary Bruand, until 2017, and by currently by Yves-Michel Ginot (Director of the Innovation department of the Pharmaceutical Development sector in Servier laboratories).

Since 2015, LE STUDIUM benefits from a European co-funding (COFUND) that substantially increased its visibility and that of its regional partners. LE STUDIUM relies on a scientific contacts' file of around 5,000 researchers. Each year, a dozen of researchers are selected. At the present moment, LE STUDIUM hosted in the region more than 170 researchers from North America, South America, Asia, Africa, Oceania and Europe in the broadest sense (including Russia and Central Asian countries. It is worth noting that about 5% of the guest researchers are settling in the region after their cooperation session in a regional laboratory.

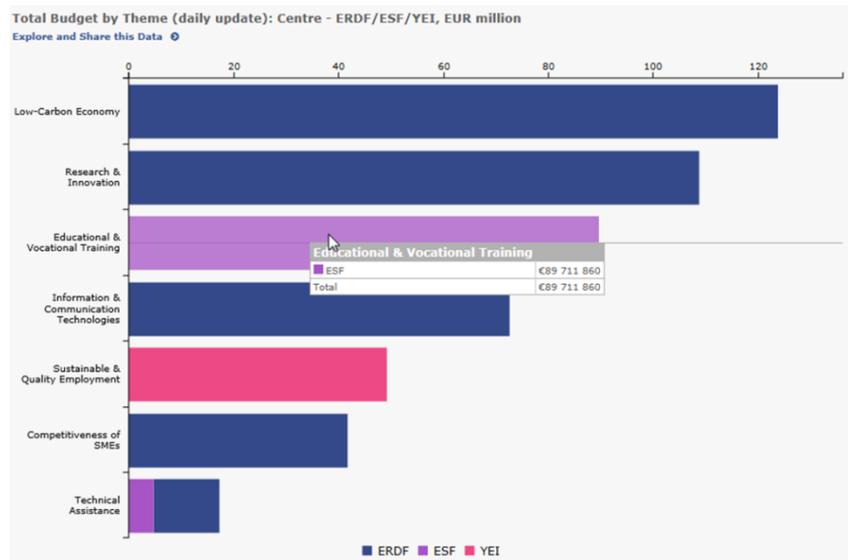
Since 2013, LE STUDIUM is the official partner of Centre-Val de Loire Region for five programmes of Smart Specialisation, as promoter of the international partnership dynamics for the ARD 2020. LE STUDIUM yearly selects and hires several experienced researchers for the ARD 2020 research teams. It stimulates as well the internationalisation of research encouraging H2020 projects preparation through scholarship programmes to promote research networking through the 'LE STUDIUM Consortia' programme.

4.3 European Funding and regional objectives

4.3.1 ERDF Operational Programme 2014-2020

The total planned investment of European Structural and Investment Funds of Centre-Val de Loire for the period 2014-2020 is of 503.458.623 €, from which 259.938.623€ are EU funding and 243.520.000 € are National funding.

Figure 15. Total Centre-Val de Loire ESIF planned budget by theme (2014-2020)



Source: Open Data portal, DG REGIO

The ESIF amount that has been planned for R&I activities is of 54.42M€, and 44.85M€ for education and vocational education and training activities.

The operational programme is driven by six strategic ambitions for the territory, specified in six thematic axis that are organised around thematic objectives to achieve enough critical mass:

Axis 1: A knowledge society with jobs (Budget: 28.2 million €)

Objective 1: Increase investment and skills in 5 potential areas of specialization from the Regional Innovation Strategy:

- Environment: environmental engineering and metrology
- Health and cosmetics: biotechnology and applied services
- Energy: storage system design
- Building: energy efficiency technologies
- Heritage tourism
- ICT and services

Objective 2: To increase by half the number of innovative companies by providing a favourable environment for companies in their innovation efforts and by supporting individual and collaborative research, development and innovation projects. (Budget: 26.2 million €)

Axis 2: a digital society - infrastructures, uses and mutualisation

Axis 3: the transition to a low-carbon economy

Axis 4: solidarity with the most disadvantaged urban neighbourhoods

Axis 5: a learning and inclusive society

Axis 6: support young people towards employment

These priorities are coherent with the EU 2020 strategy which invite French regions to increase R&I intensity, especially in SMEs, to focus on the labour market and a more sustainable use of resources (DESRITT, 2018).

In terms of the expenditure of the Operational programme 2014-2020, the data available for the expenditure on 2014-2016 provides interesting results. The universities have received 9.62% of the total EU funding allocated during the period 2014-2016, 2.52% the University of Orléans and 7.10% the University of Tours. All the allocated funding corresponds to ERDF, and is mostly under the heading Innovation/ICT (97.42% of total funds for HEI). Analysing the type of projects approved under the three headings, creation of employment, sustainable development and innovation, it is observed that there are no innovation in education related projects funded for any of the two universities. However, socio- professional insertion, qualification systems, training, accompanying and coordination projects have been funded under ESF 2014-2016, with other non-university actors as beneficiaries.

Table 3. Centre-Val de Loire ESIF expenditure in HE projects by institution and by objective (2014-2016)

	Total cost of projects	Total EU funding	% Total EU funding
UNIVERSITÉ ORLEANS	8,793,304.15	4,056,279.96	2.52%
UNIVERSITE FRANCOIS RABELAIS DE TOURS	27,053,024.91	11,438,256.05	7.10%
TOTAL HEI 2014-2016	35,846,329.06	15,494,536.01	9.62%
TOTAL ALL BENEFICIARIES 2014-2016	499,480,152.70	161,137,488.10	
	Total cost of projects	Total EU funding	%
Creation d'emploi	466,356.66	89,851.86	0.58%
Développement durable et prévention des risques	736,761.94	310,302.62	2.00%
Innovation, TIC	34,643,210.46	15,094,381.50	97.42%
TOTAL	35,846,329.06	15,494,535.98	

Source: JRC own work with CGET data, 2018

If we consider the young employment initiative (YEI) promoted by the European Union, with the aim of facilitating professional insertion to young people 15 to 24 that are looking for employment, we see that 310.2M€ have been allocated to France. The total YEI funding will be targeting 13 French regions and 3 departments. In the case of Centre- Val de Loire a total amount of 49.25M€ for YEI has been allocated (15.87% of the total).

Horizon 2020

The participation in H2020 of the region is relatively low, if we compare it to the French average funding return, with 13.21€ per inhabitant captured compared with 42.75€ per inhabitant France average.

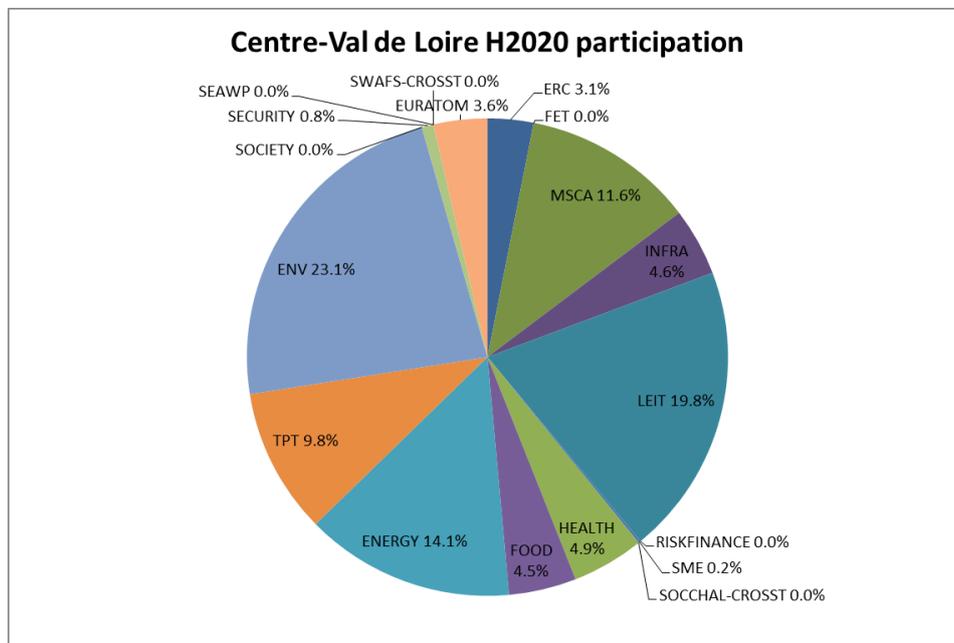
However, we observe that among the French regions with similar Regional Benchmarking structure (JRC Tools, 2018)³⁰ to Centre-Val de Loire, other regions present lower participation in H2020 programme, such as for example Poitou-Charentes (4.45€ per capita), Franche-Comte (13.23) or Pays de La Loire (12.45).

In terms of the participation by H2020 thematic field, we observe that the region is strong in:

- ENV- Climate action, environment, resource efficiency and raw materials (23.1%)
- LEIT- Leadership in enabling and industrial technologies (19.8%)
- ENERGY- Secure, clean and efficient energy (14.1%)
- TPT- Smart, green and integrated transport (9.8%)

The next graph summarises the Horizon 2020 programme funding obtained by the region:

Figure 16. Centre-Val de Loire H2020 programme participation by programme (2014-2018)



Source: S2E project, Joint Research Centre, European Commission, 2018

4.3.2 ERASMUS+

According to the Platform E+ Project Results³¹ the higher education institutions of Centre-Val de Loire are participating in the following active projects:

1 Erasmus+ Strategic Partnership project named "Connected Spaces of Learning in Europe"³². The project has partners from 6 EU countries and aims to create a sustainable youth oriented online solution for European cities and regions to map, deliver and identify diverse learning opportunities for young people.

- 3 Erasmus+ mobility projects:

³⁰ <http://s3platform.jrc.ec.europa.eu/regional-benchmarking>

³¹ <https://ec.europa.eu/programmes/erasmus-plus/projects/eplus-projects-compendium/>

³² <https://ec.europa.eu/programmes/erasmus-plus/projects/eplus-project-details/#project/2017-2-DE04-KA205-015518>

- 1) The project Information Technologies for Business Intelligence with 14 international partners. The aim of the project IT4BI is to provide understanding, knowledge and skills to train computer scientists who understand and help develop the strategies of modern enterprise decision makers.
- 2) The project SUD-UE - Student Mobility (EU - Latin America)³³ with 11 partners from EU and Latin America to bridge two political entities (UNASUR and European Union) through two strategies: mobility (EMA 2 experiences) and recognition (using the tools developed by Tuning Latin America (LA) projects such as competence based system, student centred and a new credit for the region CLAR).
- 3) The International MSc in Infectious Diseases and One Health (IDOH), a two-year (120 ECTS) joint master degree taught in English and awarded by three European universities (Université de Tours - France, Universitat Autònoma de Barcelona - Spain and University of Edinburgh - UK). The IDOH programme has ambitious goals to attract the very best students worldwide and to construct a multidisciplinary network focused on infectious diseases in a One Health framework, addressing health risks at the animal-human-ecosystems interfaces.

Past experiences in Erasmus programme, include as well a European Master in Computer Science, a 6 countries' network to develop a European Computer Science (ECS) course delivering a bachelors' degree in 3 years encouraging mobility amongst students at this level.

Interesting international experience has been developed by regional stakeholders on Vocational Education and Training, especially in a the project Experimenting with ECVET in a Practical context- working in a partnership with 7 EU regions for the development of a system to recognize the competences gained in another context, using ECVET and leading to a common memorandum of understanding at European level in our network.

In the same sense, ECSEM institution based in Tours has had leading experience of Erasmus projects in the past, such as the project "Transfer of skills and innovation to deliver vocational training to develop in enterprises policies and RH process integrating Social Responsibility", the project " Label for professional careers in HR" or " Ariadne, the managerial guidance in Social Economy based on intrinsic skills, competences and values: commitment, behaviour and motivation".

4.3.3 COSME

According to the database of the programme³⁴, the Centre- Val de Loire region is participating in 3 projects:

- Cosmetics4Wellbeing, a partnership of 3 clusters (Cosmetic Valley, Beauty Barcelona Cluster, Transilvania Lifestyle Cluster), 1 network of clusters (France Cluster) and 1 business network (Beira Baixa Business Association), covering 4 European Member States (FR, ES, RO, PT). The aim of the project is the creation and development of a European Strategic Cluster Partnership–Going International (ESCP-4i) in the cosmetics sector and related industries (Technology, Health and

³³ <https://ec.europa.eu/erasmus-plus/projects/eplus-project-details/#project/545658-EM-1-2013-1-ES-ERA%20MUNDUS-EMA21>

³⁴ <https://cosme.easme-web.eu/>

Agro-food), which is oriented towards increased internationalisation and strengthened sustainability of European SMEs.

- EERA project, with the participation of the Region Centre-Val de Loire to create the European Equestrian Route d'Artagnan, the first transnational equestrian and touristic itinerary, with a 3 000-kmlength, crossing 6 UE Member States.
- TOPICSCALEUP project, with the participation of DEV'UP Centre-Val de Loire and the Chamber of Commerce and Industry, to implement capacity building activities as well as partnering and advisory services (in particular EEN services) in order to support selected young innovative companies from the EEN TOPIC geographical area (Paris Ile-de-France region in particular) scaling-up their activities in the Single Market.

5 Conclusions and policy recommendations

Centre-Val de Loire is one of the most advanced European regions in terms of S3 design and implementation, thereby providing an interesting case study to analyse the potential of universities to help drive transformative regional development. Two elements of the S3 experience in Centre Val de Loire stand out particularly and have provided a good context for the engagement of its universities:

- The strong institutional capacity for knowledge based territorial development provided by the Dev'Up agency, combining the responsibilities of two formerly separate bodies covering research and innovation, and economic development. The pro-active and territorial focus of the agency is complemented by a balanced and inclusive governance structure that has helped to provide consensus and raise awareness of S3, including among the academic community.
- Well-designed funding instruments, especially the Ambition Recherche Developpement programme (ARD 2020) that has created sustainable partnerships between industry and researchers focused on the region's S3 priorities. The region's HEIs which are involved in all ARD 2020 partnerships report that this instrument has allowed them to focus an element of their research portfolio on regional priorities.

However, the HESS case study has challenged the regional authorities and the HEIs to think more about the contribution of HEIs to the S3, particularly in terms of teaching and learning including engagement with employers on current and future skills needs. While the regional S3 stresses the importance of human capital as a horizontal priority, the policy mix does not include any specific measures and the HEIs were not consulted on how they may contribute. As in Europe as a whole, the policy process starting at EU level has not encouraged or facilitated a wider role for universities since the ESIF have not been programmed to support skills for smart specialisation. However, the regional authorities and the Dev'up agency as the implementing arm for S3 could do more to bring together existing initiatives and structures that are not explicitly part of the S3 but could make an important contribution. These include:

- Making the most of the recent changes introduced to the national HE system that give more autonomy to HEIs while at the same time encouraging a more territorial vision. These include the creation of COMUE composed of academic representatives that make a formal agreement with the national government on regional needs. In addition, regional authorities are now asked to define a Regional Plan for Higher Education, Research and Education in close liaison with the HEIs, linked to other territorial strategies.
- Find ways of supporting (financially and otherwise) elements of the university curricula that already engage with industry, such as the Technology University Degree that are partly led by teachers who actively working in enterprises.
- The current evolution of the competitiveness clusters, provides an interesting

context to explore the labour market needs of the *poles de compétitivité* located in Centre Val de Loire and promote their links with the regional universities. For example, the DREAM pole has recently initiated scholarships for internships that could be integrated into degree curricula.

- Work with the regional observatory for Higher Education and Orientation, Training and Employment to study future skills and competence needs in the labour market.
- Build on the synergies between the three *Campus de Metiers et des qualifications* and the ARD 2020 partnerships that are coincidentally aligned with three of the S3 priorities. The Campus de Metiers bring together training suppliers in key sectors of the regional economy. They could be more demand led however, and be enlarged to emerging sectors. They also need to become more international, which could be done through participation in the EU's Erasmus+ programme.
- Reinforce actions of the region's universities and their polytech schools in order to provide more vocationally based education and training. This could include joint provision of adult learning courses related to the S3 priority areas.
- The region could further build on the experience of S3 multi-level governance in the coordination of the national higher educational competencies with regional R&I policies and instruments, namely to integrate the multiple national and regional observatories and agencies working in forecasting future labour market needs and understand the careers paths followed by graduates
- The valuable knowledge generated by the different observatories and agencies working on matching labour market needs with the offered skills and competencies should be shared and further used for policy decision-making processes. Sharing experiences with similar agencies at EU level could improve the international positioning of very relevant experiences developed by these observatories. For example, considerations of using such data for S3 monitoring or evaluation.
- The mismatch between the sectors with strong human capital needs do not necessarily correspond to the selected S3 priority areas could be explored in different ways. The continuous EDP could explore the potential for other sectors to be included in the DPS or to link them to the current ones by related variety³⁵ addressing the sectors that have pull effect on labour market demand.
- In addition to the regional prospective analysis of the evolution of skills needed, attention could be paid to European tools and observatories on skills and jobs. As an example, the one by CEDEFOP³⁶ or OECD³⁷ could be of interest.

³⁵ Related variety concept one expects that knowledge spillovers will primarily occur between related sectors

³⁶ <http://www.cedefop.europa.eu/en/publications-and-resources/data-visualisations/skills-forecast>

³⁷ <http://www.oecd.org/els/emp/skills-for-jobs-dataviz.htm>

- The strong integration of Le Studium in the S3 dynamic is very positive to achieve the proposed objectives, and exploring possibilities of collaborating with similar agencies could have additional benefits
- The complementarities between the different instruments, particularly through linking ARD2020 initiatives and competitiveness poles to the existing excellence equipment of Labex and Equipex could have a positive impact in the S3
- The region has done important efforts to establish partnerships with other EU regions and there should be a clear strategy on how to capitalise these experiences for S3 implementation. In this regard, it would be beneficial as well to increase the multi-level coordination of S3, increasing the leverage effect of international experiences in H2020 projects and Interreg.
- Further efforts from HEIs to orient educational offer towards skills and competencies based on the needs identified in the territory under the S3 framework could be implemented. In this regard, the European competencies framework could be explored.
- The continuous engagement of stakeholders in the Entrepreneurial Discovery Process could be further promoted through the reinforcement of the policy-mix, potentially shaping funding instruments that promote projects that continue exploring the S3 priority areas (DPS), helping to narrow down, expand or the priorities.
- The national competencies on higher education, complemented the cooperation with the regional administrations constitute a good example of multi-level coordination. The role of the COMUE in the region could be further explored, with the potential to integrated associated organisations, particularly from the private sector, which strengthens the curricula content definition considering the skills and competencies demanded in the region.
- In terms of governance, the S3 context provides a good opportunity to explore the possibility of the region to play a more relevant role in the negotiations between the national level (State) and the higher education institutions of the region. This could be particularly beneficial to ensure that the content of the curricula presented by HEIs matches the skills and competencies that would have stronger impact in the territory
- Doctoral studies within universities have an important potential to contribute to the regional economic fabric, reinforcing the entrepreneurial and innovation. The connection of such doctoral students to Le Studium initiative could potentially bring interesting results, considering the good experience and strong link of this initiative to S3. In addition the strong potential of the researchers attracted with the initiative could help develop European project skills in HE students

- Stronger continuity between degree studies and research careers could be strengthened, through the promotion of research careers within HEIs, design of research careers paths and promoting the early orientation of studies towards research careers vocation.

In addition to the strengthening of human capital through university-industry cooperation, the regional HEIs could work more closely with the regional authority to strengthen the international positioning of Centre Val de Loire, both as a place to study and do research and to live. While the improvement in Horizon 2020 participation should remain a target for the universities, participation in European programmes such as INTERREG and Erasmus+ could be explored, including joint projects involving the region and the universities. Le Studium has allowed the region to attract international researchers, but there has been less success in their retention. Furthermore, there are less structured efforts to attract and retain graduates from outside the region.

While it is difficult to make very specific policy recommendations based on the results of this cases study, it is hoped that the dialogue between the main HEIs and the regional authorities can continue. This could lead to a more comprehensive and structured role for HEIs in the context of smart specialisation, beyond the individual examples of good practice that have been shown. Finally, the case study focused on the region's experience and an international comparison was beyond the scope at this stage. However, engagement with other regional authorities implementing smart specialisation could provide inspiration for new initiatives in Centre Val de Loire.

Interviewed stakeholders

Name	Position	Organisation
Catherine BEAUMONT	Regional Representative	INRA
Francis BERTRAND	Director	Pôle DREAM
Anne BESNIER	Regional representative, Vice-President for Higher Education and Research	REGION Centre-Val de Loire
Franck BLEIN	Scientific leader ARD LAVOISIER	CEA et ARD Lavoisier
Nathalie CHOTARD	Manager for "Campus des métiers et des qualifications" at the Directorate of Orientation and Education	REGION Centre-Val de Loire
Isabelle DIMIER-POISSON	Project coordinator EUR BIO HEALTH "Biopharmaceuticals-Infectious Diseases, One Health"	UMR Université-INRA ISP 1282
Nicolas DUBOULOZ	Director DESRTT	REGION Centre-Val de Loire
Serge DUFORT	Director	CEA
Patrice DIOT	Dean	Faculté de médecine de Tours
Claire ELFAKIR	Scientific Leader COSMETOSCIENCES	Université d'Orléans / ARD 2020 Cosmétosciences (UO porteur)
Jérôme FINOT	Director	POLE S2E2 - STMicroelectronics
Philippe FREYSSINET	Director for Strategy, Research and Evaluation of BRGM and ARD 2020 PIVOTS	BRGM
Sophie GABILLET	Secretary General	STUDIUM
Jean-Claude GAPIN-FREHEL	Director general	GIP Alfa Centre-Val de Loire
Olivier GILLE	Director	ELASTOPOLE
Cécile GOI	Vice-Rector for Education	Université de Tours

Marc GUERIN	Regional Representative for Research and Technology	Ministère de l'Education Nationale, de l'Enseignement Supérieur et de la Recherche / Délégation Régionale à la Recherche et à la Technologie de la Région Centre-Val de Loire
Jacqueline LECOURTIER	President	CoRIT - Conseil de la Recherche, de l'Innovation, et de la Technologie
Christophe LEGER	Director of Polytech CVL	Polytech'Orléans et Programme PEPITE
Emmanuel LESIGNE	Vice-Rector for Research	Université de Tours
Marc LETHIECQ	Head of Education	INSA CVL
Christophe MASSON	Scientific Director	Pôle de compétitivité COSMETIC VALLEY
Yann MERCIER BRUNEL	Vice-Rector for Education	Université d'Orléans
Lionel MERCURY	Director	CNRS / Université d'Orléans ISTO
Benoist PIERRE	Head of ARD 2020 IPAT and project EURI PAT "Graduate Research School in Heritage Intelligence"	Université de Tours - CESR
Frédéric PINNA	Director	DEV'UP Agence régionale Développement éco
Fabien RIOLET	Coordinator of project d'EUR "Orléans Graduate School in Energy, Materials, Earth System, and Space Sciences"	POLEPHARMA
Ioan TODINCA	Vice-Rector for Research	Université d'Orléans
Hervé WATIER	Scientific Coordinator of ARD 2020 Biomédicaments	Université de Tours - Faculté de médecine

Participants of exploratory meeting

- Emmanuel Lesigne (Vice Président Recherche, UFRT)
- Daniel Alquier (Vice Président Partenariats et innovations, UFRT)
- Marc Desmets (Vice Président aux Relations internationales, UFRT)
- Marc Lethiecq (INSA Centre-Val de Loire)
- Anne Besnier (Vice Présidente de la Région)
- Isabelle Coudert (Chargée de mission, DESRTT Région)
- Catherine Dagorn-Scaviner (Chargée de mission DESRTT, Région)
- Claire Girard-Rodary (Chargée de mission DESRTT, Région)
- Cécile Goï (Vice Présidente Formation, UFRT)
- Ary Bruant (Président UO)
- Yann Mercier-Brunel (Vice Président Formation et vie étudiante Université d'Orléans)
- Anne Delouis (Chargée de mission relations internationales Université d'Orléans)
- Marc Lethiecq (INSA Centre-Val de Loire)
- Frederic Pinna (DEV'UP)
- Nathalie Boulanger (DEV'UP)
- Nicolas Dubouloz (Directeur, DESRTT Région)
- Isabelle Coudert (Chargée de mission, DESRTT Région)
- Claire Girard-Rodary (Chargée de mission, DESRTT Région)
- Eskarne Arregui (Joint Research Centre)
- John Edwards (Joint Research Centre)
- Jean-Marie Rousseau (Expert auprès du Joint Research Centre)

Participants of final meeting

- Philippe Vendrix, Président Université de Tours
- Frédéric Pinna, Directeur DEV'UP
- Cécile Goï, Vice-Président Formation, Université Tours
- Emmanuel Lesigne, Vice-Président Recherche Université de Tours
- Yann Mercier-Brunel, Vice-Président Formation, Université d'Orléans
- Claire Girard-Rodary, Chargée de mission Enseignement supérieur/ Recherche/ Culture Scientifique Technique et Industrielle
- Anne Dolouis, Chargée de mission relations internationales Europe, Université d'Orléans
- Isabelle Dimier, Responsable projet EUR BIO HEALTH, UMR Université de Tours- INRA
- Claire Elfakir, Responsable scientifique de COSMETOSCIENCES, Université d'Orléans
- Marc Lethiecq, Responsable formation INSA Centre-Val de Loire
- Olivier GILLE, Directeur ELASTOPOLE
- Hervé Watier, Coordinateur scientifique ARD 2020 Biomédicaments, Université de Tours
- Jean-Claude GAPIN-FREHEL, Directeur général GIP Alfa Centre-Val de Loire
- Morgane Chaumier, Chargée de mission PhD, ARD IPAT, Université de Tours - CESR
- Livia Avaltroni, Chargée de mission pour l'Incubateur-accélérateur en intelligence patrimoniale et touristique, Université de Tours
- Eskarne Arregui, JRC- Commission Européenne
- John Edwards, JRC- Commission Européenne
- Jean-Marie Rousseau, EU expert

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List of abbreviations and definitions

HESS	Higher Education for Smart Specialisation
GDP	Gross Domestic Product
EU	European Union
R&D	Research and Development
R&I	Research and Innovation
RIS3	Regional Innovation Strategy for Smart Specialisation
S3	Strategy for Smart Specialisation
DPS	Potential Specialisation Domains of Centre-Val de Loire S3
EDP	Entrepreneurial Discovery Process
HE	Higher Education
HEI	Higher Education Institution
HESS	Higher Education for Smart Specialisation
VET	Vocational Education Training
INTERREG	European Territorial Cooperation Programme
ESIF	European Structural and Investment Funds
ERDF	European Regional Development Funds
ESF	European Social Funds
YEI	Young European Initiative
ARD 2020	Ambition Recherche Developpement
INSEE	National Institute of Statistics and Economic Studies
COMUE	Community of Universities and Education Institutions
LABEX	Excellence laboratories label
EQUIPEX	Excellence equipment label
MESRI	Ministry of Education, Research and Innovation of France
CoRIT	Research, Innovation and Technology Council

Annexes

Annex 1. ARD 2020 detailed description

ARD 2020 LAVOISIER

Beyond its security objectives, the CEA has the ambition to ensure its full participation in the local and national economic life. It promotes its know-how and research capacities by industrial applications and technology transfer, as well as patent filling and licensing, with the creation in 2013 of the so-called "Laboratoire à Vocation d'Innovation pour la Sécurité et l'Industrialisation des Énergies Renouvelables" (Laboratory of innovation for the security and the industrialisation of renewable energies). Located in Ripault, it is dedicated to research and transfer technology in the field of energy materials (electronic storage and hydrogen option) partly financed by the Region Centre-Val de Loire. The partners of this ARD are the Region, CEA (the French atomic energy and alternative energies Commission), University of Orléans, INSA Centre-Val de Loire, CNRS, University François Rabelais of Tours, and Le Studium. Its actions are focusing around four thematic: hydrogen storage, electric energy storage, energy conversion (batteries and fuel cells) and hydrogen production.

The dissemination of the scientific, technical and industrial culture aims, as a first priority, to improve the acceptability by the educational environment (teachers, pupils and students) of the new energy technologies and particularly hydrogen and fuel cell technologies, through public events and specific actions of scientific and technical mediations. The training through research activities are displayed in hosting PhDs, trainees and work-based alternate training Masters for industrial purposes. Education and training sectors are introduced in the university and engineering schools, while the research and innovation optimisation essentially aims at strengthening the region through the exploration of partners and technological projects, guiding and engineering research and innovation initiatives, connecting actors – research organisations, enterprises and regional and local public authorities, etc. – as well as attracting international researchers and disseminating the science culture.

Website: <http://www.lestudium-ias.com/fr/content/le-programme-lavoisier>

ARD 2020 BIOMEDICAMENTS

Carried forward and supported by the University of Tours, this ARD Programme unites as partners INRA, CNRS, INSERM, University of Orléans, the CHRU (Regional University Health Centre) of Tours, Le Studium and pharmaceutical enterprises, such as Polepharma and IMT. Its main purpose is to develop a regional research cluster, focused on biodrugs and characterised by multidisciplinary teams from several research institutions. It involves the "Bio3", a platform of 2.000 m² organised as a bioproduction factory which combines:

- a) a training and education tool with a real-life professional situation and simulation phases of bioproduction and quality control under industrial conditions;
- b) a research and development tool with technical support to the development of new molecules and new production processes and post-manufacturing modification, non- GMP pilot batches' production and galenic formulation support;
- c) a development tool for optimisation of processes and formulations in terms of quality control and industrial efficiency.

It is also an academic project, specialised in three domains of competences which are about biodrugs and biocosmetics manufacturing, bioproduction equipment maintenance and quality approach adapted to bioproduction and science-life products. This project is

based on work-related training from the pre-university level up to Master- and PhD-level, aiming to educate and train in ten years' time 1,200 students by initial education, 4,200 students by alternate-based training and about one thousand employees.

Researchers from various life-science disciplines will participate in synergy in the following issues: immunology, medical imagery, infectiology, synthetic chemistry, reproductive biology... Achieving a critical mass will contribute to the creation of an environment conducive to innovation and generation of intellectual property rights and patents, while endeavouring to foster a vibrant innovation culture and commercialisation of research and knowledge-transfer, by cooperating with healthcare and life-sciences enterprises and startup companies.

Website: <https://www.lesbiomedicaments.fr/>

ARD 2020 COSMETOSCIENCES

Coordinated by the University of Orléans in partnership with the University of Tours, CNRS, the world-class Cosmetic Valley cluster, and Le Studium, ARD 2020 COSMETOSCIENCES aims at establishing the territory of Centre-Val de Loire as an international reference in the cosmetics field, both in terms of private and public research, education and training processes, entrepreneurship and socio-economic promotion as well. Researchers are briefed about the divers calls for tenders and project proposals (ANR, FUI, FEDER, CIFRE H2020) and then supported for the preparations of files and IPR and patenting, within the context of partnership between academia and industry in Centre-Val de Loire. ValBioCosm for the valorisation of biodiversity for the cosmetics industry, MISTIC – smart materials for the liberation and stimulation of bioactive cosmetics – actually implement 20 teams belonging to several regional research institutions. These projects are supported by transversal actions such as training and education, dissemination of know-how socio-economic promotion and commercialisation that are carried out by Laboratoires d'Entrepreneuriat Cosmétique (cosmetics entrepreneurship labs). Cosmeto Makers Factory aims to provide work and meeting space with human and technical resources for students-entrepreneurs in the University of Orléans in order to boost start-ups rates and the chances of business creations in the cosmetics sector.

Website: <http://cosmetosciences.org/>

ARD 2020 Intelligence des Patrimoines I-PAT

Supported by the Region Centre-Val de Loire, the programme I-PAT develop partnership research projects based on three strategy and policy directions:

1. The research and innovation priority through five interdisciplinary thematic task forces that cover the entire heritage potential of the region and, in addition, a transversal task force that is a digital platform interconnected with divers natural and cultural ecosystems, e-learning and vocational and continuing training processes;
2. The research and education priority with the experimentation of the École Supérieure en Intelligence des Patrimoines – ESI-Pat (High school in smart heritages) gg – in the context of the Master-PhD in human and social sciences over horizon 2023;
3. The research and development priority by the creation of the Centre d'Expertise, Valorisation et Transfert d'Intelligence des Patrimoines (ESI-Pat-Transfert) in cooperation with the academic and socio-economic partners; its main purpose is to help create tourism start-up companies in a sector that generates within the territory about €3 billion per year (3% of the French touristic consumption).

The IPAT offers interdisciplinary research and scientific innovation for the service of economy, of heritage tourism – in the area of Centre-Val de Loire – and also for the service of new teaching and employment. It deploys unprecedented approach to the promotion of the territory combining scientific research and the socio-economic world to design new initiative services and products, via digital, for heritage tourism. Eight founding members: University François Rabelais de Tours (leader), University of Orléans, CNRS (the National Centre for Scientific Research), INRA (the National Institute for Agricultural Research), IRSTEA (the National Research Institute of Science and Technology for Environment and Agriculture), INSA (the National Institute of Applied Sciences), BRGM (the French National Institute for research on Earth and Environment Sciences), ESCEM (Business School); Forty laboratories and around researchers from Tours and Orléans, led by CESR (the Centre for Higher Studies of the Renaissance); International strategy with Le Studium: a unique regional agency, signatory of I-Pat since 2017, dedicated to research and welcoming high-level foreign researchers to the Region. In close coordination with the DPS (Potential Specialisation Domain), “ICT and services for heritage tourism” (Innovation Strategy for Smart Specialisation of Centre-Val de Loire).

Website: <https://intelligencedespatrimoines.fr/>

PIVOTS

PIVOTS – Platforms of Innovation, Valorisation and Optimisation of Environmental Technologies – is a coordinated package of six research platforms in environmental issues, including PRAT (‘Reactivity Atmospheric Platform’ with the University of Orléans and CNRS), les PESAt et PESAA (‘Soil-Atmosphere Platform’ with INRA, the University of Orléans and CNRS), PRIME (‘Platform for the remediation and innovation in Environment Metrology’ with BRGM), O-ZNS (‘Soil, sub-soil, water’ with CNRS and the University of Orléans), PERMECA (‘Sub-soil, geo-mechanic, geothermal energy’ with ANTEA Group), and DECAP (‘Development of sensors’ with the University of Orléans and CNRS).

PIVOTS partners offer a variety of products and services, upstream of the value chain, to manufacturers, process integrators and process developers working in R&D and product launching phases, as well as enlarging applications and scope domains for products or services:

- Additional developments to be carried out to integrate the constraints of use,
- Performance characterization to validate a product or process,
- Fine tuning protocols for use.

They also work downstream with remediation companies, design offices and geomatics companies through the offer of services for the:

- Development of new models characterizing the natural or contaminated systems functioning
- Definition of new strategies and methodologies for measurement and sampling campaigns
- Improvement, testing and validation of digital simulation processes developed
- Providing sensor networks delivering qualified data
- Enhancement of real-time processing of data

- Broadening the range of possible scenarios for the evolution of the studied systems or testing and comparing the results of the simulation with those directly obtained through the platforms
- Optimising the integration of user needs for GIS development

Website: <https://www.plateformes-pivots.eu/>

Annex 2. Centre-Val de Loire S3 specialisation areas

DPS 1 – Environmental engineering and metrology for natural-resources-consuming activities: that encompasses a large set of activities related to the analysis of the environment. The environmental engineering includes a wide range of tools and services devoted to the rehabilitation and restauration of the ecosystems, particularly aquatic environments with the deployment of ecologically effective solutions of sanitation and purification.

DPS 2 – Biotechnologies and services applied health services and cosmetics: by taking into account of further advances in microbiology, biochemistry, cellular and molecular biology, genetic engineering, chemical engineering and process design software. The supply of external services of the cosmetics and health industrial actors is designed to stimulate the regional fabric of sub-contractors.

DPS 3 – Conception of energy storage systems that is not limited to the electricity storage but also has to be in line with the available resource (form, quantity, variability...) and stating the end-use depending on the needs of the market (quantity, availability, environmental impact, costs...); it calls for a multi-disciplinary approach of the competencies as regards a comprehensive issue or focus on a sub-system or a mere component.

DPS 4 – Energy Efficiency Technologies for the construction and renovation of buildings: services that are achieved to save energy for equal or better service, by both increasing the intrinsic qualities of the buildings (building envelope, thermal comfort...) and the active energy efficiency in order to optimise the management of energy flows with energy consumption control and measurement tools.

DPS 5 – ICT and services for heritage tourism: ICT and services for the tourism industry address a set of communication and innovative services that aim at improving the quality of the cultural heritage – particularly castles and monuments – and the touristic heritage – accommodations, food service industries, etc. – in Centre-Val de Loire in order to gain customer loyalty and attract new clients.

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