Forward – Fostering research excellence in EU Outermost Regions

Regional Diagnosis of OR's R&I ecosystems

La Reunion

Project Acronym	FORWARD
Project name	Fostering research excellence in EU Outermost Regions
Grant agreement n°	824550
Project type	Coordination and Support action
Start date - End Date	01/01/2019 - 31/12/2021
Workpackage	WP2
Responsible partner	Nexa
Contributors	Gaston Bigey, Nexa Philippe Holstein, Nexa Fanny Mazella, Nexa Evelyne Tarnus, Nexa
Delivery date	2019/11/22

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824550

We thank our colleagues from Nexa who provided support and expertise that greatly assisted the diagnosis. We thank the researchers, entrepreneurs, public officers, elected representatives for their support and cooperation during the interviews, the workshops and informal discussions. We would also like to show our gratitude to Nicholas Harrap, from the Joint Research Center of the European Union, for sharing his insights with us.

TABLE OF CONTENTS

Introduction

Through its smart specialization strategy, La Réunion carries out an ambitious transformation program toward an ecological and social resilient island. This strategy relies on the adoption of a new paradigm, which embraces and valorizes regional singularities, rather than treating them as “handicaps” that ought to be corrected and dissolved. Indeed, being a remote island with exceptional yet highly vulnerable ecosystems and few resources to support a dense population, La Réunion is facing a challenge that will concern tomorrow every territority of the earth: invent an ecological econonomy which respect the capacities, boundaries and rythms of the ecosystems which condition all human existence and constitute its main assets. This urge offers an unique opportunity to develop knowledge, know-how and solutions that not only reduce the current dependency and vulnerability of the island but also address the needs of other regions in Europe and elsewhere.

This strategy is also based on our ability to strengthen our research and innovation capacities and to connect to other European and international research and innovation ecosystems. In an era of globalization, marked by the concentration means and talents in a few global hubs, peripheral territories risk to be trapped in a vicious circle, where the lack of resources hinders the emergence of a performant and attractive RDI ecosystem, which in turn inhibits the development of critical masses. To counteract this dynamic, La Reunion thus combines smart specialization with smart connections with European and worldwide partners.

In this perspective, European funds for research and innovation, both structural and competitive, represent essential levers to lead the region's ambition. And, while the challenges of the European Union may seem remote from the island realities, La Réunion is actually already dealing with topics at the heart of European policies: decarbonisation of large-scale electricity generation, conservation and ecological restoration, climate change mitigation and inclusive society in a multicultural environment... That is why, in 2014, the regional innovation agency, Nexa and the University created a European office whose goal is to connect Reunionnese research groups and innovation stakeholders to European centers of excellence in strategic areas. Funded by the Structural Funds, the State and the Regional Council, the European office gives support to the setting up of projects responding to calls of proposals launched by the European Union, using when relevant synergy between funds schemes. However, despite a positive dynamic during the last five years, our participation in Horizon 2020 remains weak : 14 participations for 1.88 millions euros.

If some consider the “structural characteristics” of La Réunion - insularity, geographic remoteness, small ecosystem, etc. – a natural explanation, the factors that inhibit the participation have so far not been reviewed by a proper, evidence-based analysis. Prior to the Forward project, the question of the participation of La Réunion and more globally Outermost Regions in the Framework Programmes for Research remained a blind spot.

The diagnosis conducted through the Forward project, was therefore a unique opportunity to characterize the participation , complete a thorough investigations on the determinants and factors and to question collective perceptions and determinist rhetoric.

According to the methodology guidelines developed by Nexa as WP2 leader[1], a holistic analysis of the situation of La Reunion was performed between April and November 2019. This study relies on an extensive literature review on FP participation, the mapping and analysis of all FP projects involving stakeholders from La Réunion as well as the regional innovation system, the collection and analysis of data provided by European database (Cordis / H2020 dashboard, Eurostat, ETER, Scimago Ranking), the organization of 27 face to face interviews with regional stakeholders, an online survey (59 respondents) and 2 collective workshops.

The main results are presented in this report through

- *the state of play of the participation* : this section describes the evolution of the participation of La Reunion between FP7 and H2020, draws a comparison with EU NUTS 2 and French regions, analyzes the types of stakeholders applying to FP calls, the mobilized instruments, the scientific thematics and the roles played in FP projects by local partners ;

- *an analysis of networks* : this part analyses the existing relationships between La Réunion and the European stakeholders, the intensity and the quality of such connections and also questions the well-established rhetoric which depicts La Réunion as a “European Innovation Hub/Platform” in the Indian Ocean, through the evaluation of collaboration with third-countries from an H2020 perspective.

- *a "dissection" of the regional system* : in this chapter, the impact of demographic, socio-economic and higher education-research-innovation factors on the participation is examined, independently as well as in a cumulative way, through a benchmark analysis with regions sharing similar characteristics ; the effect of R&I public policies, in terms of thematic concentration, organization of the entrepreneurial discovery process, and ERDF/FP synergy is also analyzed;

- *an analysis of the regional organizations* : this section evaluates the impact of the resources and strategies of institutions on FP participation with a strong emphasis on the higher education and research institutions which constitute a large share of FP participation.

- *an investigation at individual's scale*, taking advantages of the small size of our regional system : first, individual's determinants are evaluated through interviews questioning the patterns of success and failure as well as self-selection behavior ; second, perception, beliefs and fears are scrutinized through an online survey ; finally, main obstacles and levers according to stakeholders are mapped and organized to draft orientations responding to user's needs;

In a final section, a territorial strategic plan to increase regional participation to FP programs is presented. This plan has been drafted on the basis of the factual and symbolic diagnosis displayed as "problem trees" and embraces three priorities, nine strategic objectives and 31 priority actions.

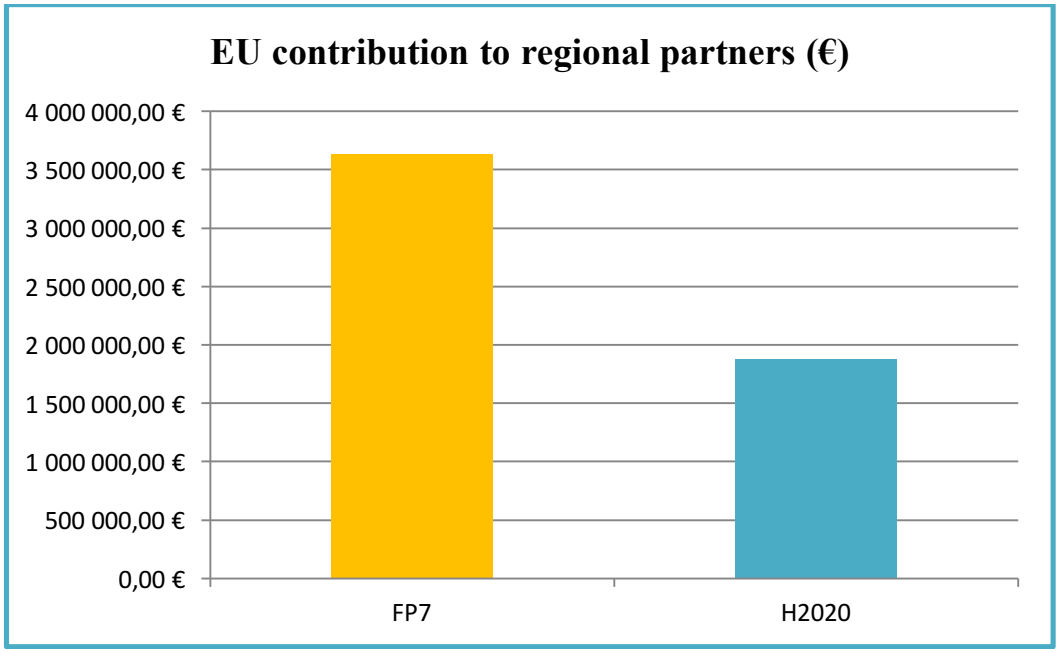
[1] Under WP2, Nexa was in charge of developing a specific methodology for all ORs to map and analyze their performance and compare themselves to other OR and EU regions. The guidelines are detailed in the deliverable 2.2 of the project, available on the forward website.

State of play of participation

One word sums up the involvement of La Réunion in the European framework programmes for research and innovation: limited. A limited and highly concentrated number of stakeholders involved; a limited list of projects submitted and accepted; a limited spectrum of instruments mobilized; a limited participation in the funded projects. All of which result in a very limited EU contribution, which makes the island one of the least active FP region of the Union.

A - A limited participation

Between 2007 and 2018, La Réunion has been implicated in 9 FP7 and 13 H2020 projects. In terms of EU contribution, such participation represented respectively 3,63 and 1,88 M€. The marked drop between the two periods reflects a major shift in the way the island is implicated in FP which will be analyzed in infra.



1) Compared to other NUTS2 regions:

With 1,879 million euros, La Réunion occupies the 253th place on 274 NUTS 2 regions, in terms of H2020 contribution[1]. Such record represents 75% less than the average regional participation which amounts to 139,6 M€. Even among the 10% least beneficiary regions, the island performs far below the decile limit (3,5 M€).

[1] The comparison is based on the data on NUTS3 regions uploaded on the H2020 "country profile" dashboard on July 16th 2019, aggregated by Nexa at a Nuts 2 level.

Table 1. Distribution of H2020 contribution to NUTS2 regions

Decile	Net EU Contribution (€)
D1	3 580 605
D2	10 331 325
D3	16 866 679
D4	26 679 549
D5	43 690 458
D6	68 577 169
D7	107 084 694
D8	185 062 479
D9	364 477 049
La Réunion	1 879 192

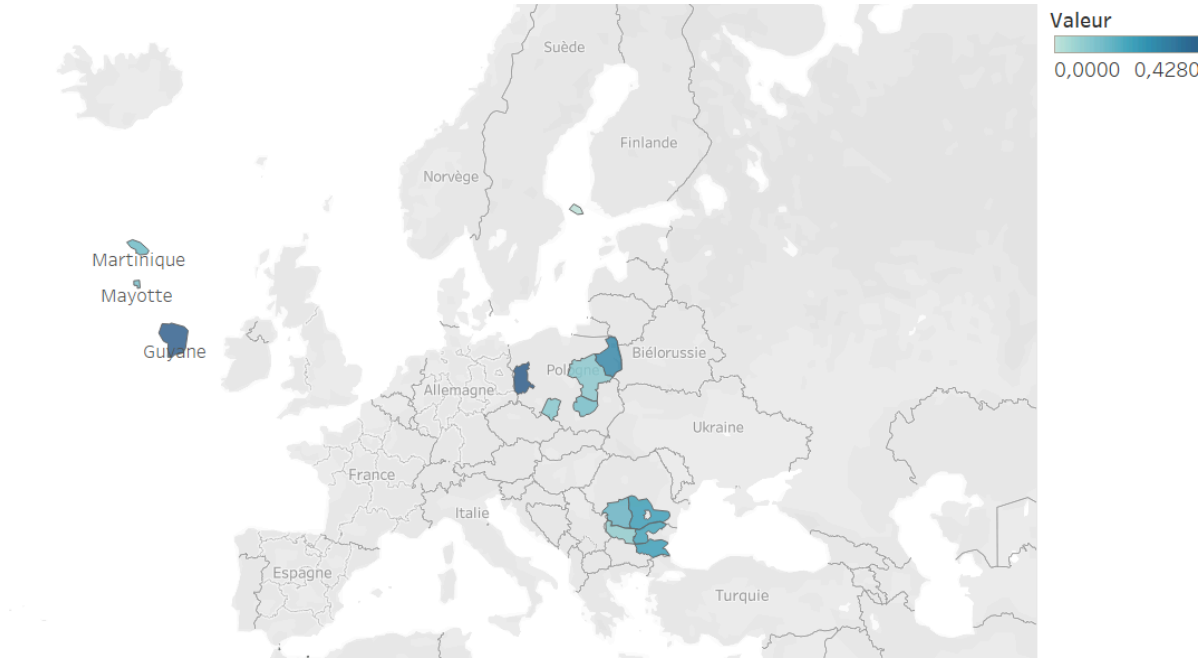
To neutralize the demographic heterogeneity of NUTS 2 regions (from 800 000 to 3 million inhabitants) which may induce a size-effect, the comparison can be improved by estimating the level of EU contribution per inhabitant, per year.[1] With 0,44 euro per year, La Réunion would then rank 258 on 274 European regions, still on the first decile :

Table 2. Distribution of H2020 contribution to NUTS 2 region per inhabitant, per year

Decile	Net EU Contribution per inhabitant per year (€)
D1	0,75
D2	1,51
D3	2,85
D4	4,49
D5	6,17
D6	8,80
D7	13,33
D8	19,63
D9	34,61
La Réunion	0,44

The 16 regions that participate less comprise 3 French outermost regions (Guyane Martinique and Mayotte), the autonomous cities of Ceuta and Melila, the Finish island province of Åland and 10 lagging behind regions from Bulgary, Poland and Romania, located on the map below :

[1] Pontikakis et al. *Mobilising European Structural Funds and Investment Funds and Horizon 2020 in support of innovation in less developed regions*



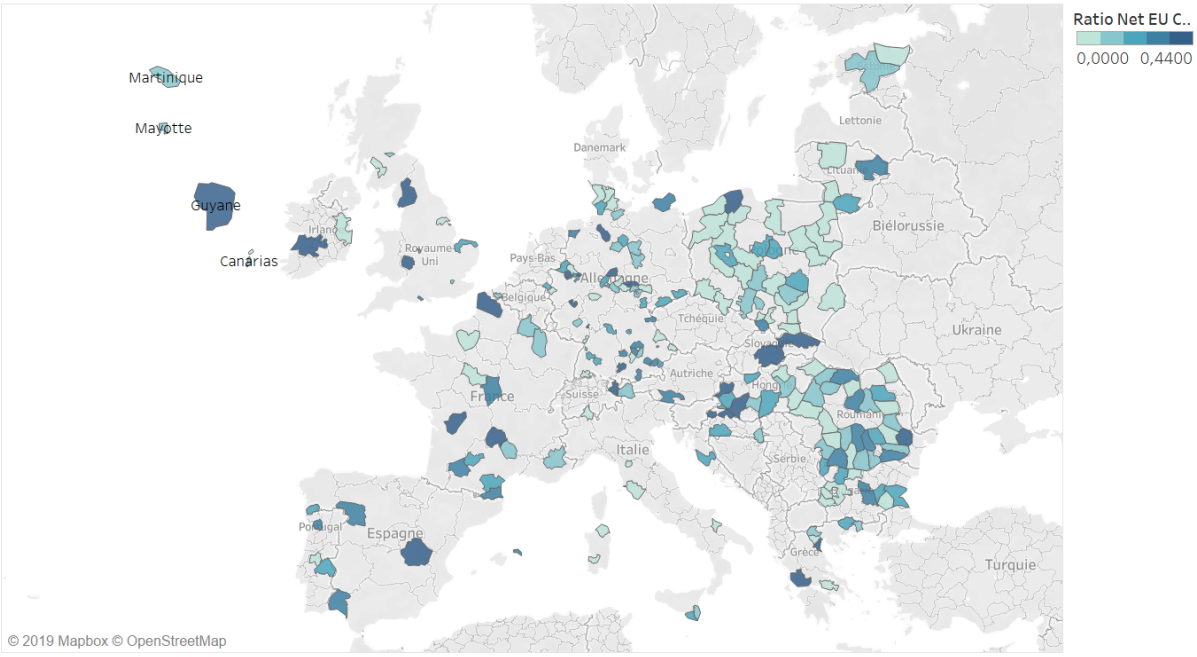
2) Compared to NUT3 regions

Considering its mono-departemental status, La Réunion is both categorized as a NUT2 and NUT3 region. Even compared to the latter which generally present a much smaller size and population (average 380 000), its participation remains limited. On average these regions have been part of 83 H2020 projects between 2014 and 2018, for a total EU amount of 32,9 M€, representing 10 € per inhabitant, per year. Though La Réunion is close to the median in terms of FP participation, the minor role played in projects combined to its relatively large population negatively impact the EU contribution per inhabitant :

Decile	Net EU Contrib. /Y.hab.Nuts2	Net EU Contribution	Participations	Population NUTS3
D1	0,00	171 125	2	92 257
D2	0,21	567 797	3	127 053
D3	0,67	1 157 492	5	163 642
D4	1,24	1 948 777	8	211 649
D5	2,02	3 212 048	13	264 738
D6	3,18	5 569 827	20	324 500
D7	5,25	10 328 000	34	410 072
D8	9,64	22 395 944	70	544 482
D9	23,65	63 118 542	177	722 716
La Réunion	0,44	1 879 192	14	852 924
La Réunion ranking	988	731	561	98

The analysis of the distribution confirms the strong concentration of Horizon 2020 beneficiaries in a limited number of highly competitive regional poles: 100 regions capturing 75% of the 39 billion euros awarded by the EU Commission since 2014. At the opposite end of the spectrum, 151 regions have played no role in Horizon 2020, and 349 obtained less than La Réunion.

Net EU/hab.



3) Compared to France

The analysis of the 101 French departments corroborates the critical concentration of Horizon 2020 participation : 10 departments accounts for more than 80% of the 4,9 billion euros awarded to French partners. La Réunion is thus way beyond the average French participation (115 projects representing a total of 50,6 M€). Yet, such situation is not exceptional : 40 departments are less involved, be it in number of participations or EU contribution. The singularity of the island stems once again from its large population which shrinks the contribution received by inhabitant.

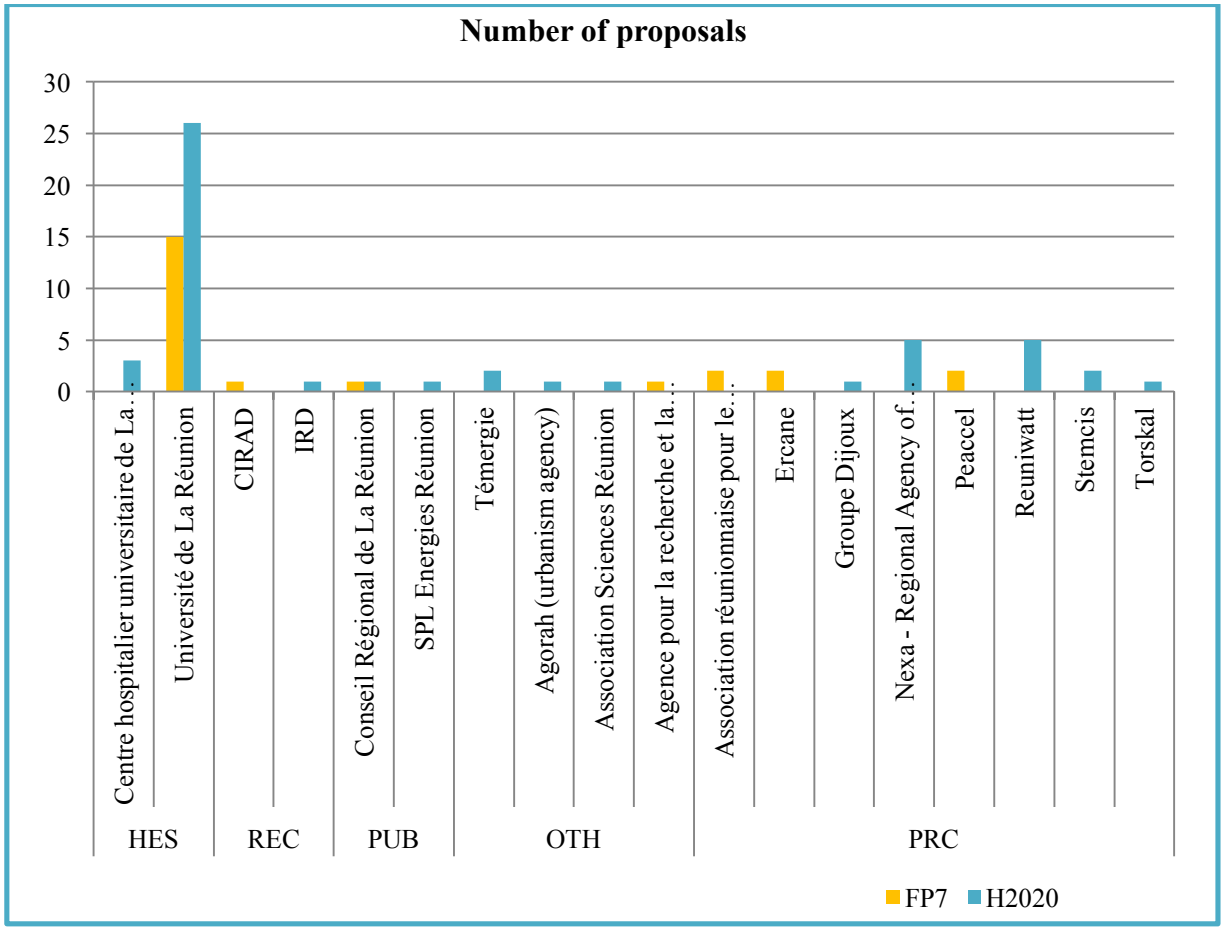
Decile	Net EU Contribution per inhabitant per year (€)	Net EU Contribution	Participations	Population
D1	0,16	311 108	3	177 855
D2	0,42	925 478	4	256 700
D3	0,69	1 412 939	6	332 583
D4	1,04	1 858 960	9	386 489
D5	1,43	3 689 995	15	532 874
D6	2,09	5 635 931	22	606 076
D7	3,57	10 748 380	38	746 643
D8	5,73	27 247 666	83	1 055 071
D9	12,33	74 218 987	212	1 379 971
La Réunion	0,44	1 879 192	14	852 924
La Réunion ranking	80	60	49	25

B - Few stakeholders explore limitedly H2020 opportunities

This participation appears as a consequence of the reduced interest paid to FP by regional stakeholders, who do not exploit the variety of instruments proposed.

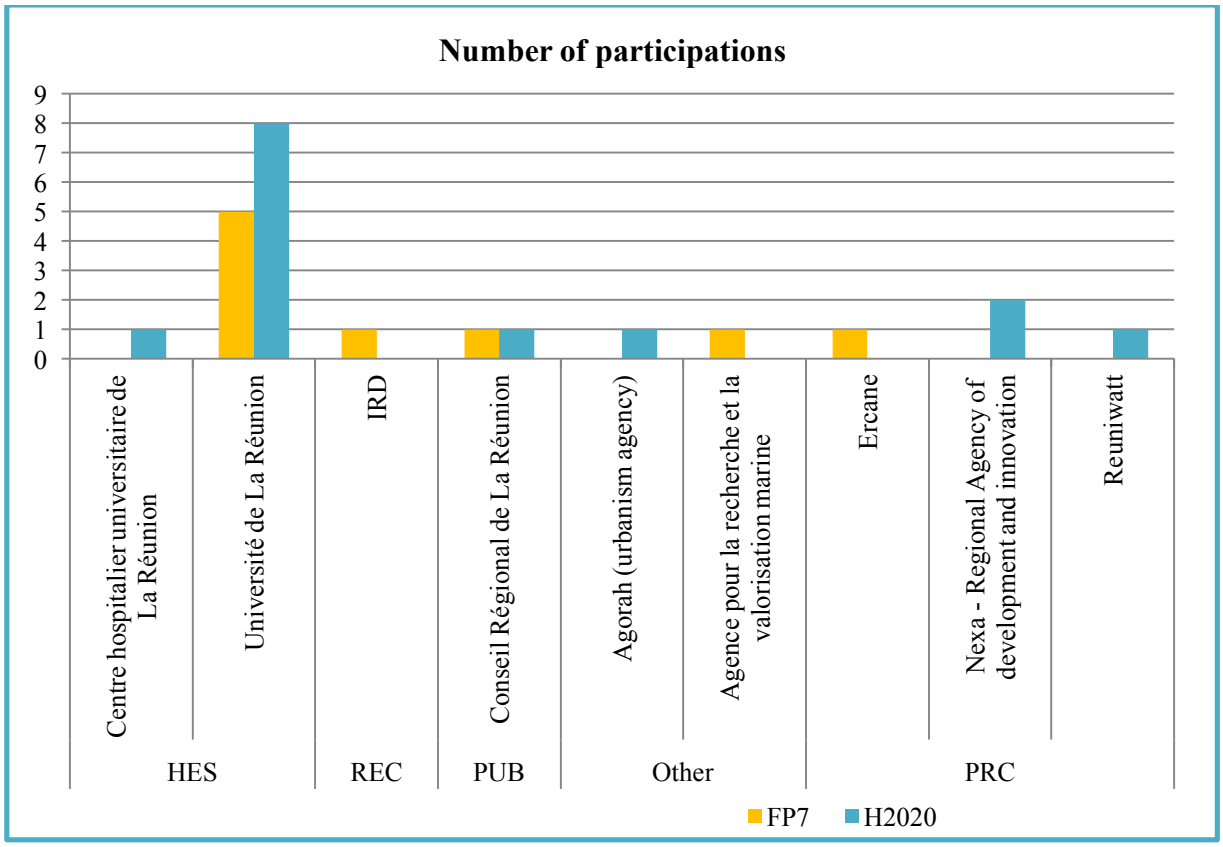
1) A highly concentrated participation

Formally, La Réunion presents a high success rate: 37,5% on FP7 and 28% on H2020, much higher than the European average of 11%. Such performance can be explained by the restricted number of proposals submitted : 24 between 2007 and 2013, and 50 since 2014. Despite a notable growth, few organizations dedicate time and resources to this activity : 7 on FP7; 13 on H2020.

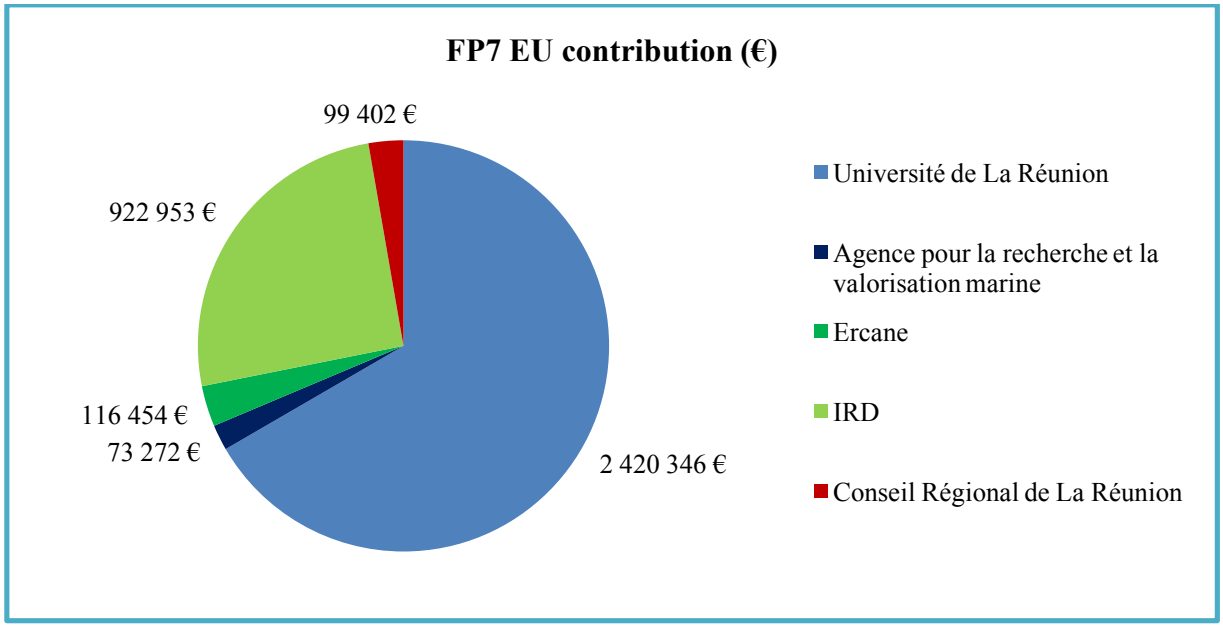


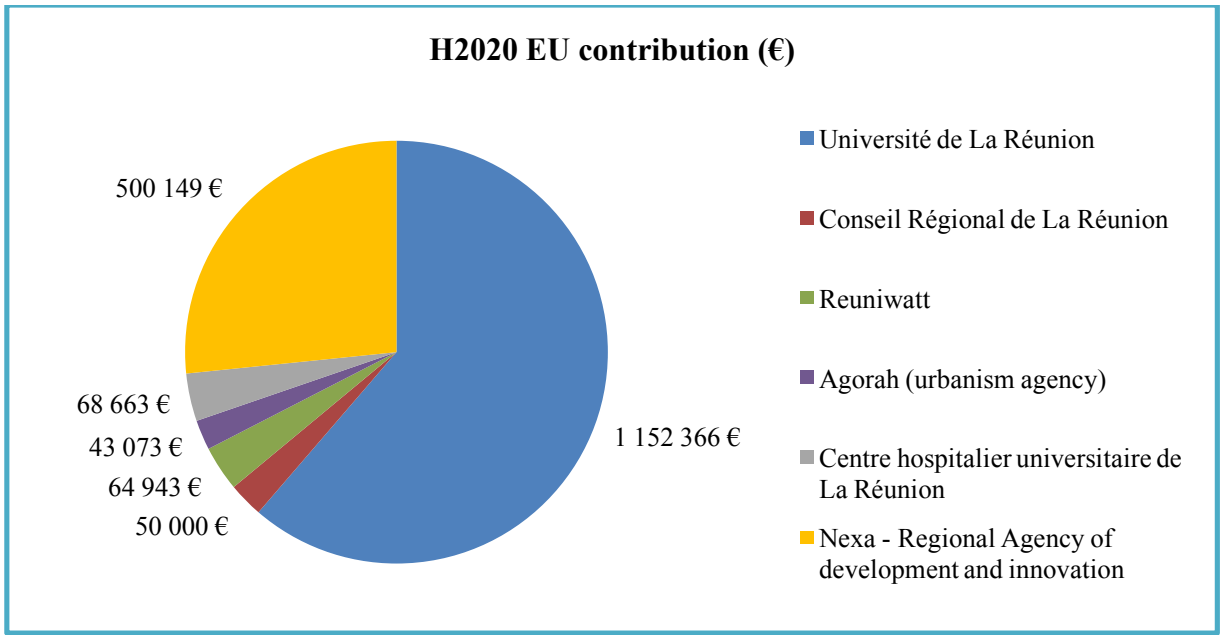
Such concentration contrasts with the relatively large number of organizations that compose the regional innovation system, described in infra, and may be linked to the minor importance attached to FP in their respective strategies. Only 2 institutions – the University of La Réunion (UR) and the Regional Council – have been continuously submitting proposals on the two periods. UR itself accounts for 62% of the FP7 and 52% of H2020 proposals. This relative contraction has been compensated by the involvement of 2 stakeholders with 5 proposals each (Nexa & Reuniwatt). Together, these 4 organizations submit 75% of proposals.

The number of organizations which actually access FP is particularly restricted: 5 during FP7 and 5 during H2020; the Regional Council and UR being the only continuous beneficiaries. The latter stands out as the number 1 beneficiary with 55% of the participations during FP7 and 57% during H2020.

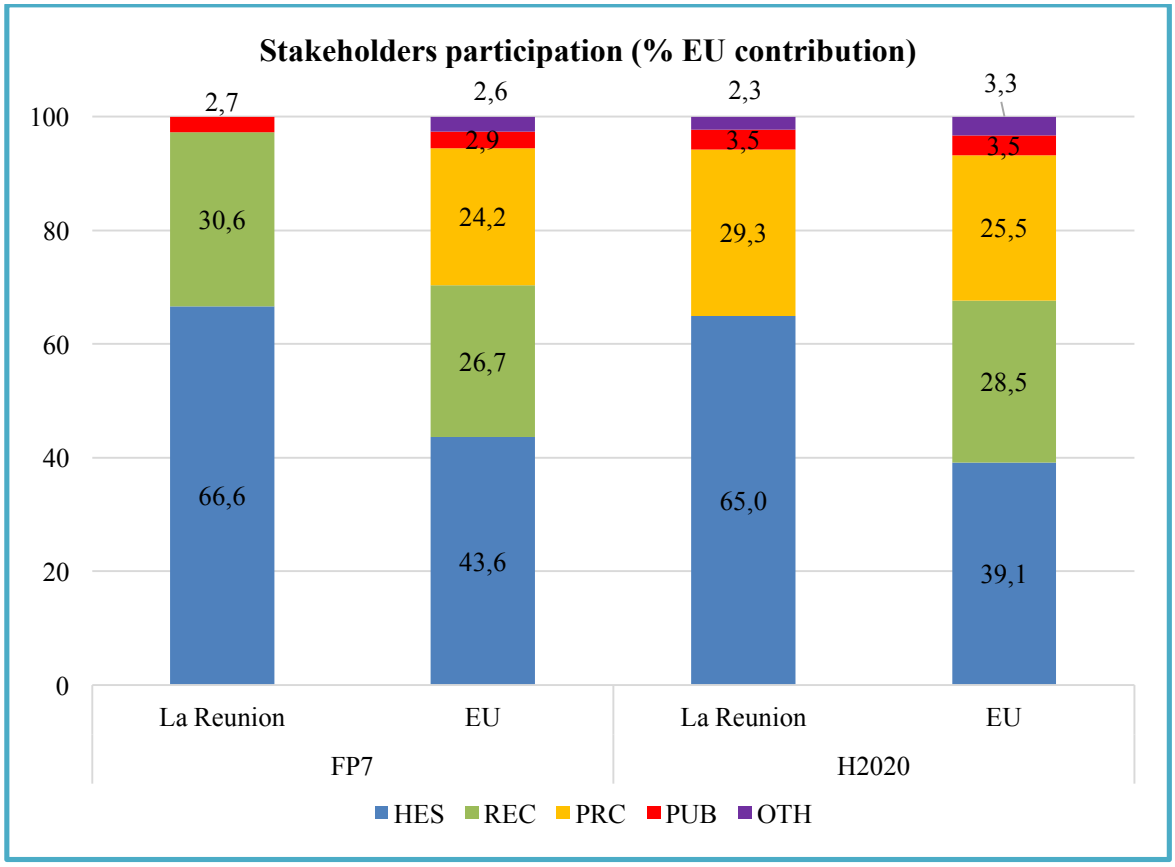


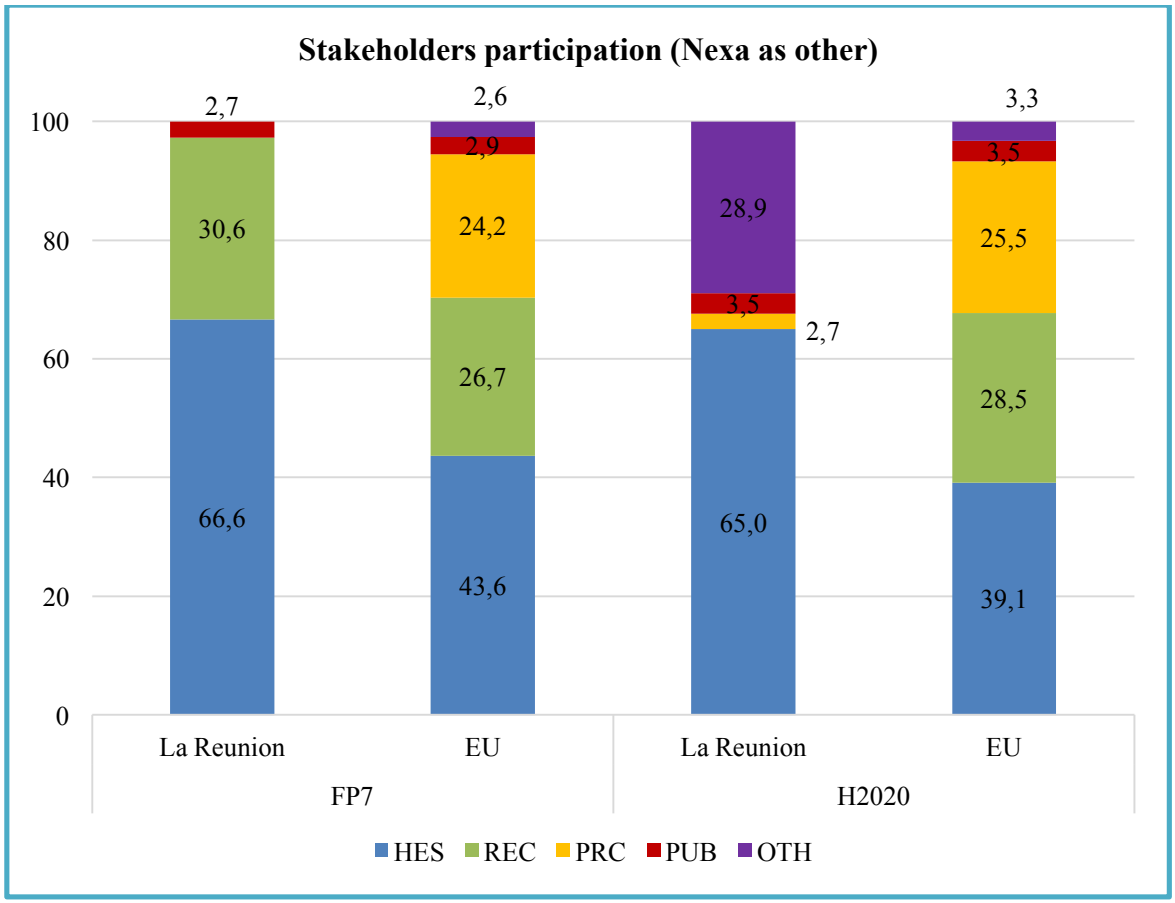
From a financial point of view, the concentration appears even more clearly. UR absorbs more than 64% of the EU contribution flowing to the island. Combined to the "Institut de Recherche pour le Développement" (IRD) and to the regional agency for development and innovation (Nexa), this proportion reaches 90% of the funds awarded between 2007 and 2020. In the case of Nexa, the contribution is largely inflated by its important role in the present Forward project.





As a consequence, La Réunion presents a peculiar profile in terms of stakeholders involved compared to European standards; notably a 1,5 time larger share occupied by higher education establishments. Interestingly, research centers which used to account for a fourth of the contribution under FP7 (through IRD), no longer participate; illustrating the high dependency on a limited number of stakeholders. Though the share of private companies seems close to the rest of the Union (29% vs. 25%), the figures do not really reflect the mobilization of local businesses. Indeed 90% of the funds were granted to Nexa, a semi-public company, directly controlled and funded by the Regional Council. Tagging Nexa as Other (like the urbanism agency, Agorah) would thus bring the share of private company to 2,7%, 10 times less than in Europe.


Stakeholders participation (% EU contribution)
100
80
60
40
20
0
2,7
30,6
66,6
2,6
2,9
24,2
26,7
43,6
2,3
3,5
29,3
65,0
3,3
3,5
25,5
28,5
39,1
La Reunion
EU
La Reunion
EU
FP7
H2020
HES
REC
PRC
PUB
OTH


Stakeholders participation (Nexa as other)
100
80
60
40
20
0
2,7
30,6
66,6
2,6
2,9
24,2
26,7
43,6
28,9
3,5
2,7
65,0
3,3
3,5
25,5
28,5
39,1
La Reunion
EU
La Reunion
EU
FP7
H2020
HES
REC
PRC
PUB
OTH

2) A limited use of available instruments

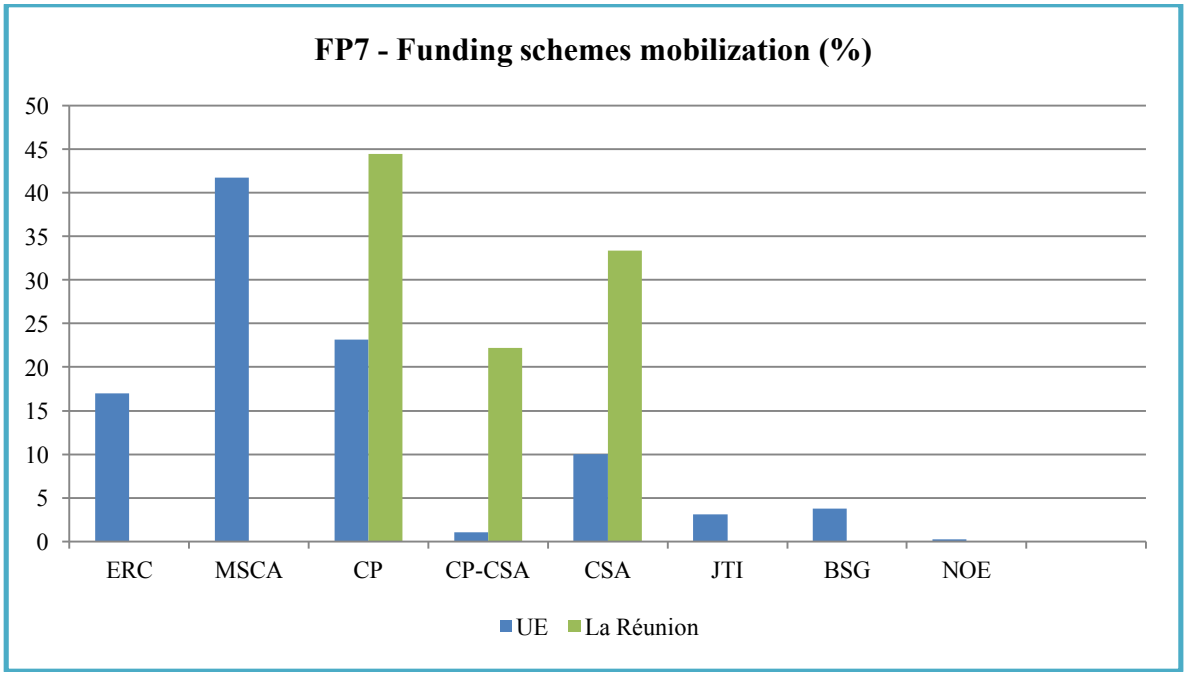
The few organizations that access the framework programmes mobilize only a portion of the funding schemes proposed. Since 2007, no individual grant dedicated to excellence science, through the European Research Council or the Marie Sklodowska-Curie programme has been obtained. The instruments dedicated to SME's also remain largely under-used: no "research for the benefits of SMEs" on FP7 and only one SME instrument on H2020.

During FP7, participation has been restricted to capacities and cooperation pillars, without any project on Ideas or People. A strong emphasis was laid on structuring regional research efforts through capacity-building and networking instruments :

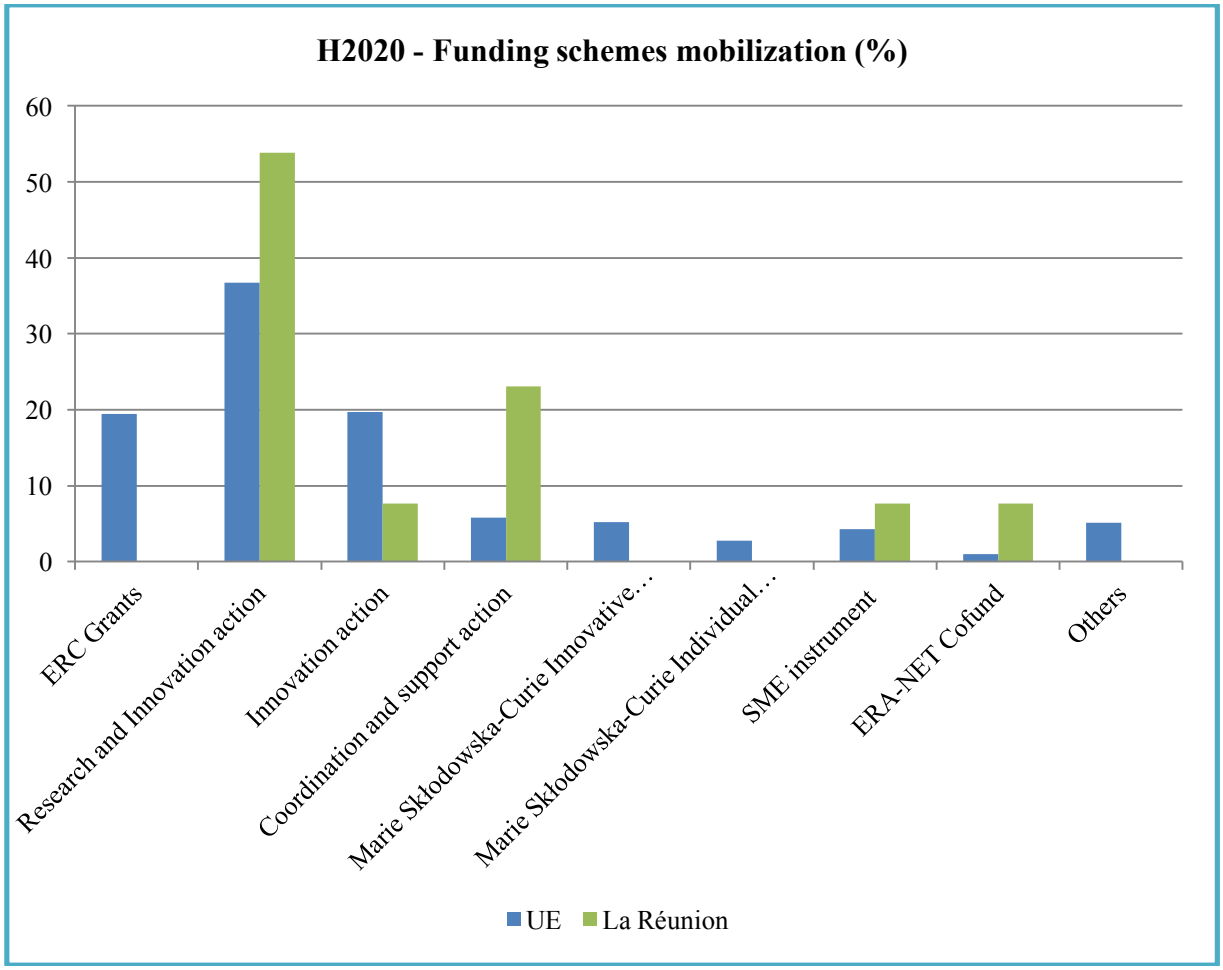
3 projects mobilized coordination and support actions (including 2 Regpots : RUNEMERGE and RUNSEASCIENCE°

2 CP-CSA designed to optimize research infrastructures usages.

The 4 remaining were classic collaborative projects (CP), focused on research activities. La Réunion did not contribute to any "network of excellence" or "joint technology initiative". Compared to the rest of the Union, La Réunion logically shows an over-concentration on the 3 mobilized instruments.



During H2020, La Réunion developed projects on 4 of the 5 pillars, at the notable exception of "Spreading Excellence and Widening Participation", French outermost regions being excluded from this critical program to build critical masses. On the 13 projects which included local partners, 7 contributed to "societal challenge", 4 to "excellence science", one on "science with and for society" and one "industrial leadership". The analysis of funding schemes confirms the importance of research and innovation actions and coordination and support actions. The projects developed under the societal challenge pillar are for the most part dedicated to low TRL initiatives.

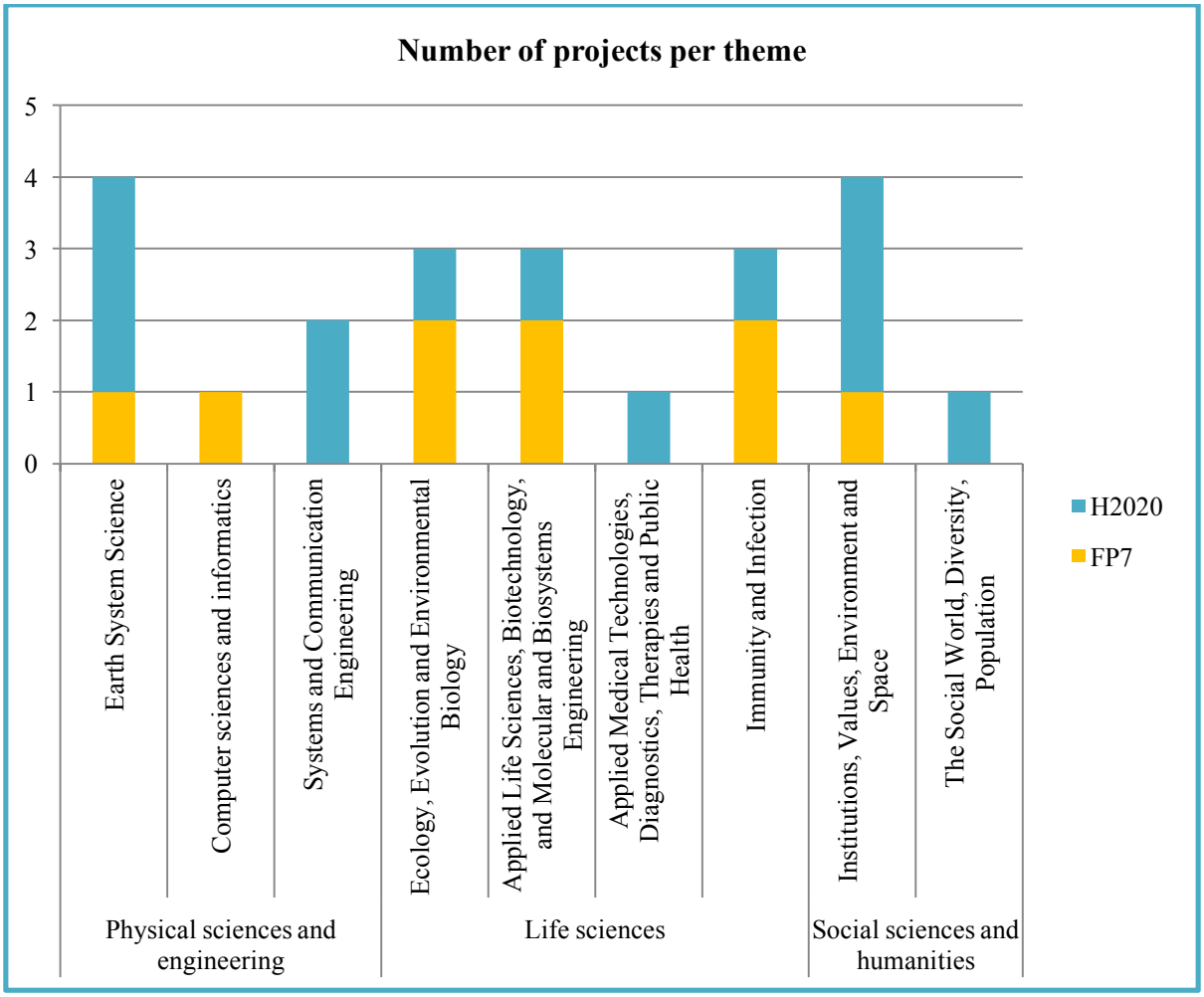


C - A minor participation spread across a large number of fields

The lack of involvement of regional stakeholders contrasts with the extensive number of scientific domains explored: the 22 projects are scattered across 9 scientific domains. Such fragmentation contributes to, and is influenced by, the difficulty to be identified as valuable partners in a specific field of excellence, leading to minor participations in the projects developed.

1) A highly fragmented participation

Since 2007, La Réunion has been involved in varied scientific fields, each represented by a limited number of projects. With 4 projects, the more active domains are earth system science and social sciences ("institutions, values, environment and space", according to the 2019 ERC evaluation panel). They are followed by 3 themes with 3 projects each : ecology, evolution and environmental biology; applied life sciences; and immunity and infection. Energy transition represented by "Systems and communication engineering" accounts for 2 projects. Three other themes participated once : computer sciences, scientific education ("the social world, diversity, population") and applied medical technologies.



The detailed review of the projects (excl. Forward) and the analysis by fields of interest rather than scientific domains temper this fragmentation impression. One major pole concentrates 7 projects : the observation and conservation of the unique island ecosystems, through adapted policies and the ecological transformation of economic activities :

Acronym	Title	Objectives	Regional partner	Programme
BIODIVERSA 3	Consolidating the European Research area on biodiversity and ecosystem services	Network of 32 funding agencies to coordinate research support effort on biodiversity and implement co-funded calls for project.	Région Réunion	H2020
ENVRI PLUS	Environmental research infrastructures providing shared solutions for science	Cluster of research infrastructure for environment observation	OSU-R – University of La Réunion	H2020
NETBIOME	Strengthening European research cooperation for	Cooperation between regional stakeholders and mobilization of research effort to address	Région Réunion	FP7

	smart and sustainable management of tropical and subtropical biodiversity in outermost regions and overseas countries and territories	biodiversity policy needs.		
RUN SEA SCIENCE	Improvement of the Tropical Sea Sciences Research Potential in Western Indian Ocean, and of the Technology Capacities in La Reunion Island	Regpot project dedicated to the construction of a regional critical mass in the observation and protection of marine environment.	IRD	FP7
SCREEN	Synergic Circular Economy across European Regions)	Reinforcing the synergies between RIS3, Structural funds and Horizon 2020 to accelerate the regional transition toward circular economy models.	Nexa – Regional agency for development and innovation	H2020
URBAN-WASTE	Urban strategies for waste management of tourist cities	Reduce the production and improve the valorization of waste induced by tourism activities.	Agorah (urbanism agency)	H2020
VIBRANT	Virtual biodiversity research and access network for taxonomy	Digital solution to support the development and network of biodiversity research communities	University of La Réunion	FP7

The sustainable economic use of regional biodiversity, notably through biotechnologies, completes the "ecological economy" value-chain that constitutes the core of La Réunion smart specialization strategy.

Acronym	Title	Objectives	Regional partner	Programme
ECSAFESEAFOOD	Priority environmental contaminants in seafood	Identification and monitoring of the risks induced by the presence of biotoxins in sea food.	Arvam	FP7
DEMA	Direct Ethanol	Biofuel production	Ercane	FP7

	from Microalgae	project based on the engineering of cyanobacteria.		
MADE	Mitigating Adverse Ecological impacts of open ocean fisheries	Reduction of by-catch of sea-birds, turtles an sharks induced by tuna fishing	University of La Réunion	FP7
TASCMAR	Tools and strategies to access to original bioactive compounds from cultivation of marine invertebrates and associated symbionts	Production and extraction of bioactive ingredients for pharmaceuticals, nutraceuticals and cosmeceuticals industries.	University of La Réunion	H2020

The third pole, in terms of participation and EU contribution focuses on health issues, with a net predominance of infectious diseases and transmission mechanisms, through a "One Health" approach, which reflects the island exposition to such emerging pathologies :

Acronym	Title	Objectives	Regional partner	Programme
ICRES	Integration of Chikungunya research)	Coordinating European research efforts on the mechanisms, impacts, diagnosis and potential treatments of the disease.	University of La Réunion	FP7
RUN EMERGE	Supporting the research potential on emerging infectious diseases in La Réunion Island, an EU outermost region in the South-Western Indian Ocean	Regpot project designed to develop a regional inter-disciplinary research capacity on emerging diseases.	University of La Réunion	FP7
ZIKALLIANCE	A global alliance for Zika virus control and prevention	Global network of clinical and basic research institutions working on the comphrnesion and management of epidemic threats.	University of La Réunion	H2020
EUROLINKCAT	Establishing a linked European	European network to optimize diagnosis, prevention and treatment of	Centre hospitalier universitaire	H2020

	Cohort of Children with Congenital Anomalies	these pathologies.	de La Réunion	

Contrary to the three previous fields, the fourth pole relies on a single structure : the "OSU-R", a joint Earth system observatory operated by the CNRS and UR. It encompasses the observation of atmospheric processes and their potential impact on air quality and climate change through:

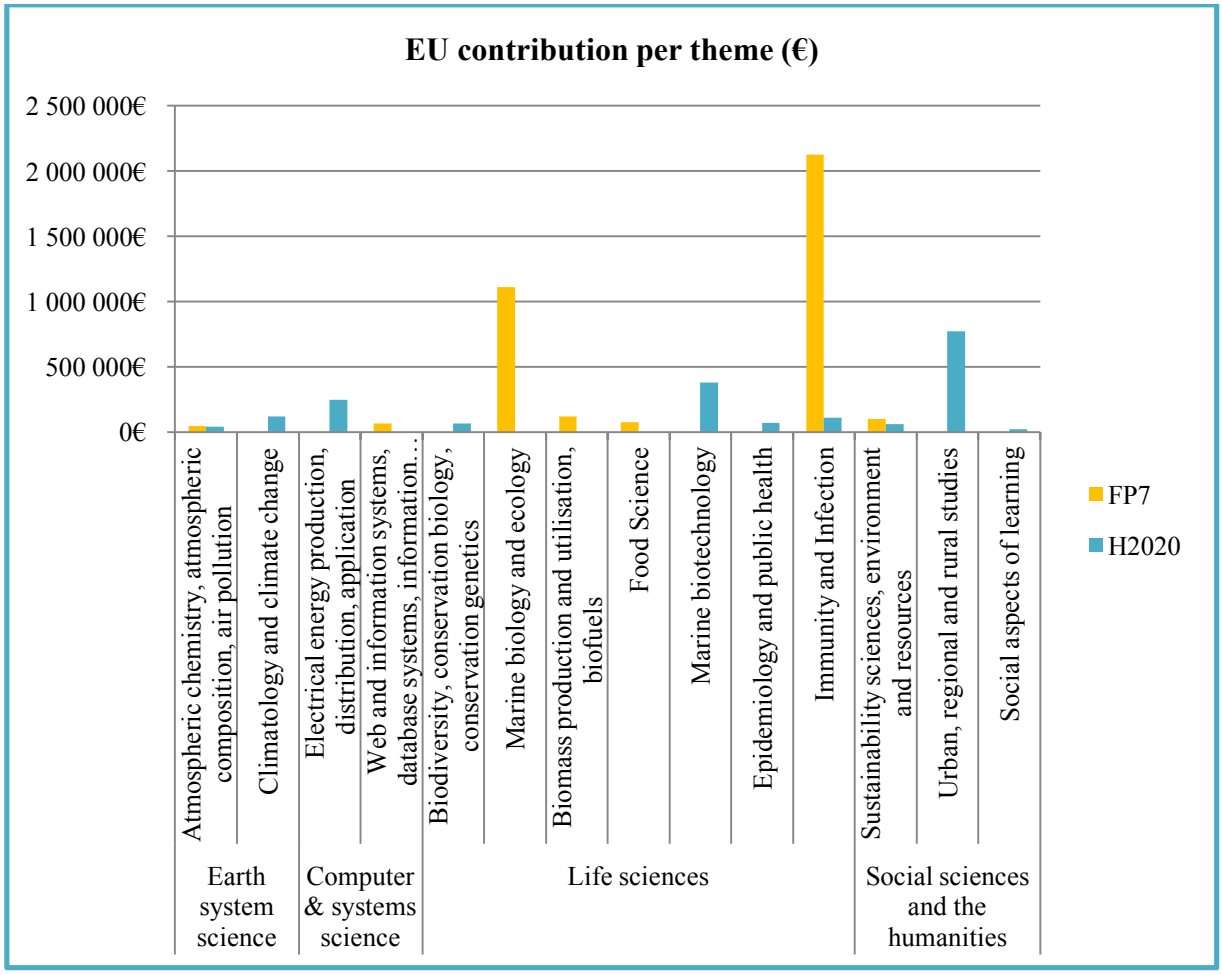
Acronym	Title	Objectives	Regional partner	Programme
ACTRIS	Aerosols, Clouds, and trace gases research infrastructure network	Coordinating European effort through a network of ground-based stations that use the same observation protocols and share data.	OSU-R – University of La Réunion	FP7
ACTRIS 2	Aerosols, Clouds, and trace gases research infrastructure network	Coordinating European effort through a network of ground-based stations that use the same observation protocols and share data.	OSU-R – University of La Réunion	H2020
ARISE 2	Atmospheric dynamics research infrastructure in Europe	Observation and modelling of the middle atmosphere to improve weather forecasting through a European network.	OSU-R – University of La Réunion	H2020

In line with regional challenges and strong research-innovation capacities, a fifth pole has emerged under H2020 : energy transition in island context. Such field is characterized by a strong innovation orientation, with the only SME instrument and one innovation-action project :

Acronym	Title	Objectives	Regional partner	Programme
E-space monitoring	e-solar performance analysis and data collection for energy monitoring	Assessment of photovoltaic installation performance through the measurement of solar irradiance.	REUNIWATT	H2020
REACT	Renewable Energy for self-sustAinable island communities	Increasing island energy system resilience through production and	LE2P – University of La Réunion	H2020

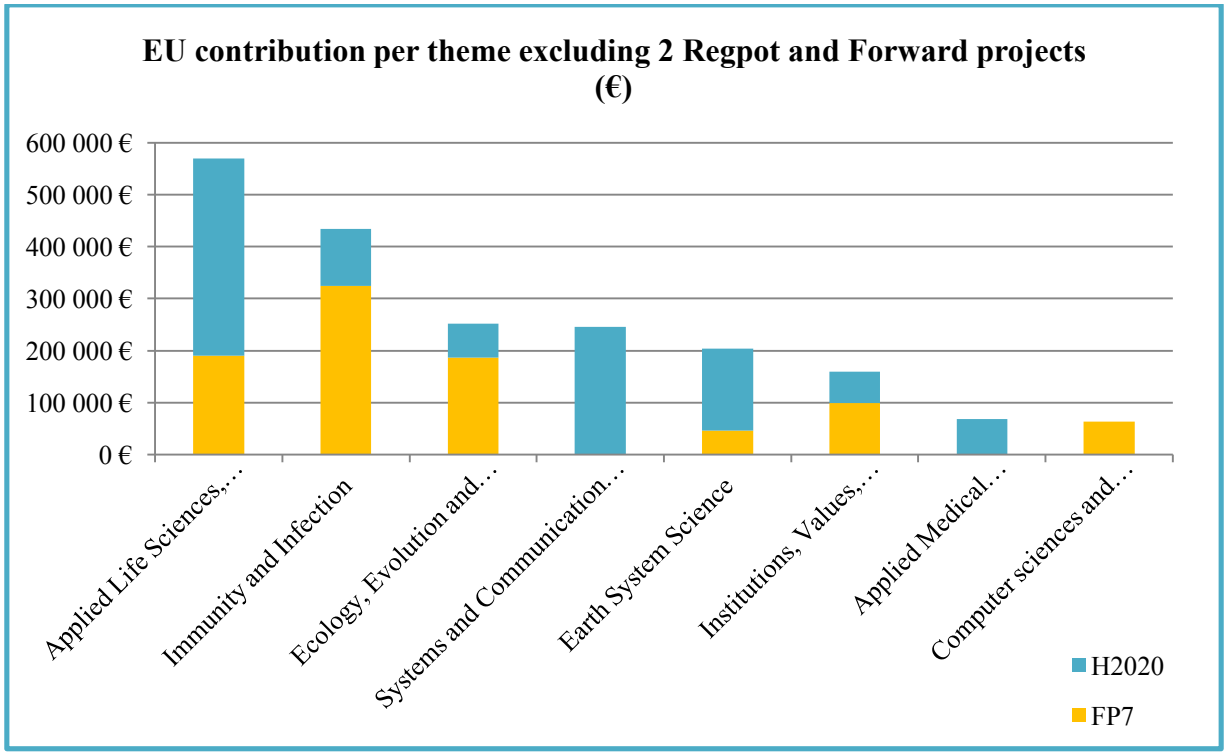
		consumption modelling, supply optimization and synergies between micro-grids. .		

The emergence of new research and innovation fields is accompanied by a significant difficulty to capitalize on previous initiatives to develop more FP projects. Such phenomenon appears clearly at the scientific domain scale : 4 themes present under FP7 have disappeared from H2020, including marine biology and ecology, funded by the "Research potential programme" (REGPOT) – RUNSEASCIENCE whose precise objective was to "unlock and develop existing or emerging excellence in the EU's convergence regions and outermost regions" to "become more active players in the European Research Area"1. The other REGPOT beneficiary – Immunity and infection – has seen its participation shrunk from 2,1 M€ to 110 000 €.



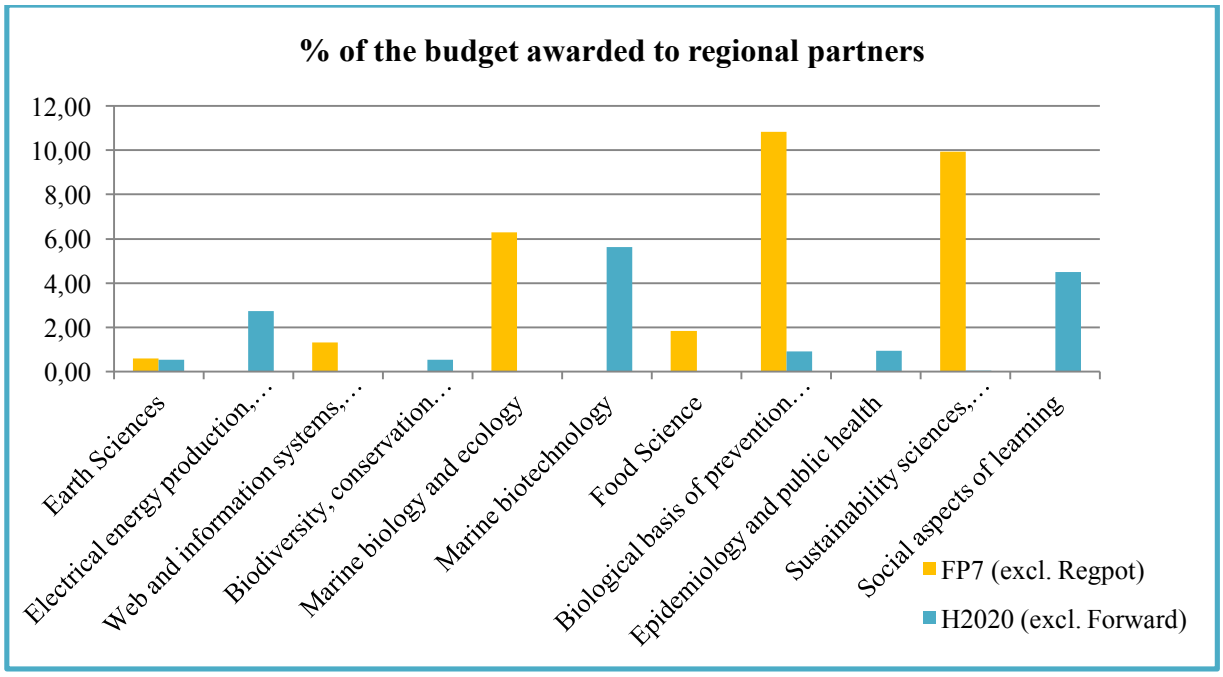
Excluding the two REGPOT and Forward, no theme has been mobilizing more than 600 000 euros between 2007 and 2019.

[1] European Commission. *Final evaluation of FP7 research potential programme.* 2014



2) La Réunion plays a minor roles in the projects

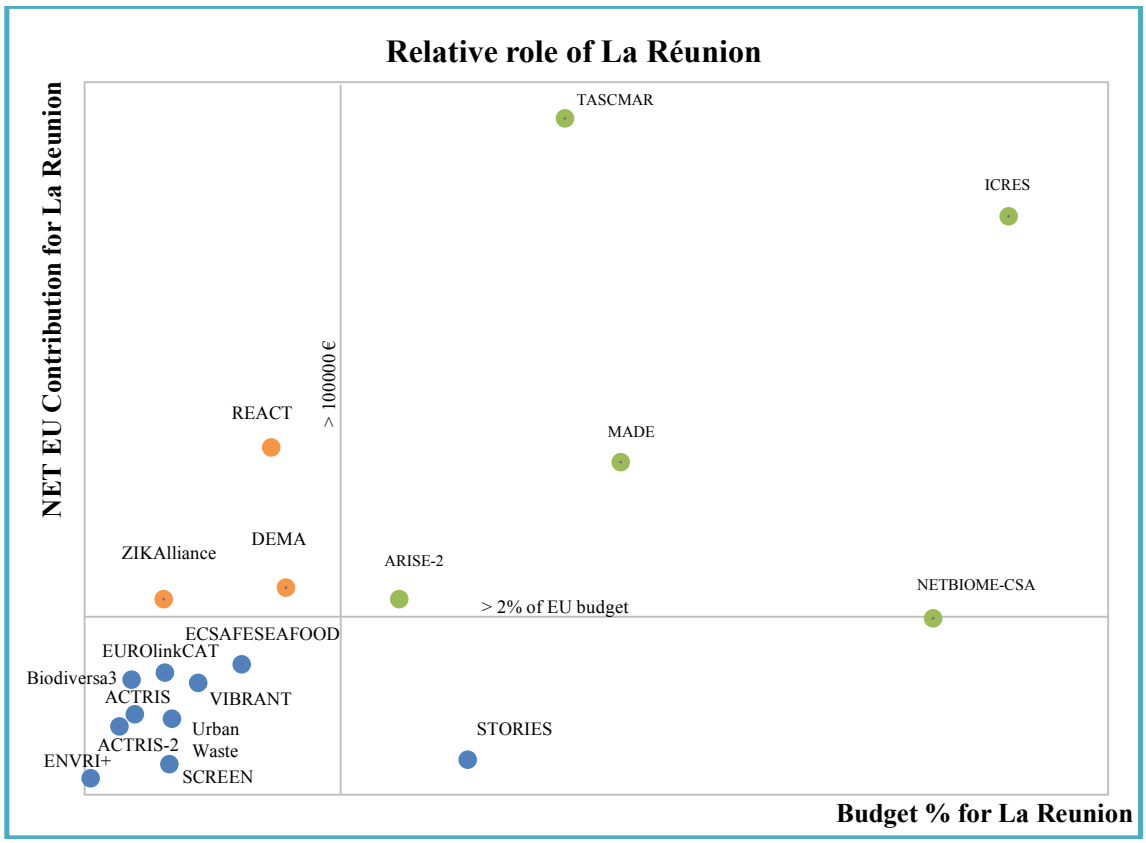
The limited amount of EU contribution obtained reflects the role played by La Réunion in the funded projects. Excluding the 2 Regpot and the SME instrument, no stakeholders did assume the role of coordinator and only 3 acted as a work package leader (on MADE, ICRES and Forward). On average, the stakeholders from the island obtained 3,2% and 1,8% of the budget awarded to the projects they were involved respectively in FP7 and H2020 (excl. Forward & the 2 Regpot). This global situation masks a large heterogeneity among the themes:



According to the funding intensity, 3 types of participation scenario can be elaborated.

1) Less than 2% of the budget clearly indicates that La Réunion is considered an "add-on" to a preexisting proposition, which it will enrich through some minor contribution (one more observation site; outermost regions status, etc.). Local partners are generally invited followers, who joined the consortium at a late stage and who concentrate on producing data or providing an observation site for the project activities, designed by other. Such is particularly the case for 3 earth system projects (ACTRIS, ACTRIS2 and ENVRI PLUS) for which the OSUR was only integrated as third party of the CNRS; as well ECSAFE, EUROLINKCAT, SEA FOOD, SCREEN, URBAN-WASTE, VIBRANT.
2) The projects that dedicate 2 to 5% of their budget to partners from La Réunion perceive a strong added-value of the island, provided by its pecific natural conditions and the quality of the research activities, for the very objectives of the project. For instance, in ARISE 2, DEMA or REACT.
3) More than 5% attests from the significative role played by regional partners in the development of the proposal at an early stage, capitalizing on pre-existing networks: TASCMAR, ICRES, MADE.

Combined to the EU contribution expressed in absolute number, this intensity criteria illustrate a global shift from FP7 and H2020, toward the multiplication of minor collaborations and projects.



Promising under-used networks

To better understand such low level of participation, investigating the international connections constitute one major clue. Indeed, being part of powerful, existing networks remains a precondition to participate in the Framework Programmes. Because of their collaborative and competitive nature, the latter are indeed characterized by a strong concentration, materialized by the extensive domination of a few stakeholders, who benefits from the cumulative advantages induced by prior participation1. Some authors underline the existence of "persistent oligarchic networks that would appear to constitute clubs, closed to those less fortunate". Meanwhile, newcomers to European research, seeking funding without well-developed networks and with no prior experience, are likely to fail" (Enger 2017). Besides this direct relation, global connections, especially through the integration in the European Research Area, play a key role in the transition toward knowledge economy. For a remote island, such relations offer the opportunity to reinforce the regional capacities to produce, absorb and transform knowledge into innovative solutions, as well as to reach the lacking critical masses, which in turn will influence its participation in Framework Programmes.

Analysing the existing relationships between La Réunion and the European stakeholders, the intensity and the quality of such connections, thus constitutes a major opportunity to understand the obstacles and the potential levers to increase the participation (A). Network analysis also offer the opportunity to question the well-established rhetoric which depicts La Réunion as a "European Innovation Hub/Platform" in the Indian Ocean (B)

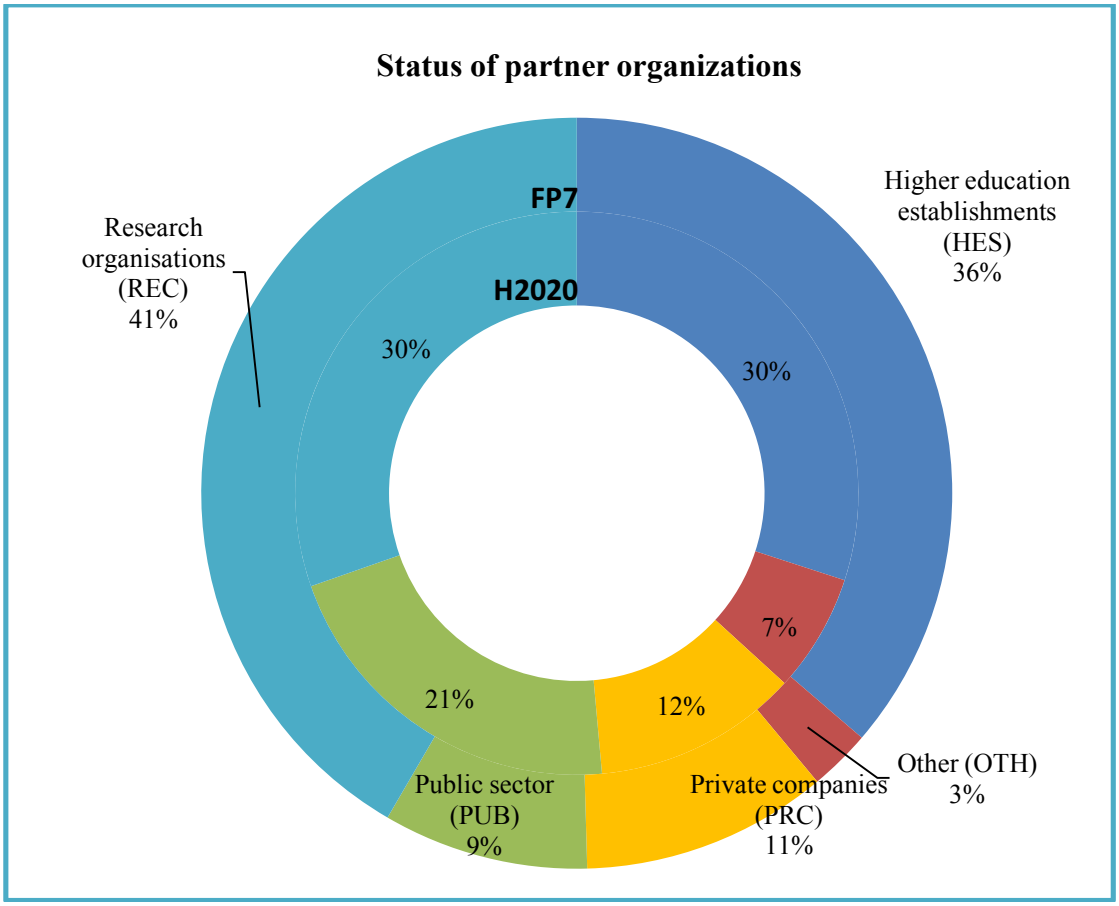
A - Connections with European stakeholders

Thanks to CORDIS and the grant agreements scrutinized, a list of all partners involved in the 9 FP7 and 13 H2020 projects that include La Réunion, was established; constituting a total sample of 113 organizations in FP7 and 274 in H2020.

1) Partners' profile

Compared to the global structure of Horizon 2020, these partners present a peculiar profile, which corresponds to the singularities of the projects that implicate La Réunion, described in supra. If the share of research organizations is close to the European standard (28,5% vs. 32%), two categories appear under-represented : higher education establishments (30 vs. 39%) and more critically, private for profit (12 vs. 25,5%). On the other and, public institutions are over-represented with 21% vs. 3,3%, a consequence of the lion share detained by coordination and support actions or Era-Net cofund. The progression is particularly notable between FP7 and H2020 (from 8 to 21%).

[1] Lepori et al. 2015

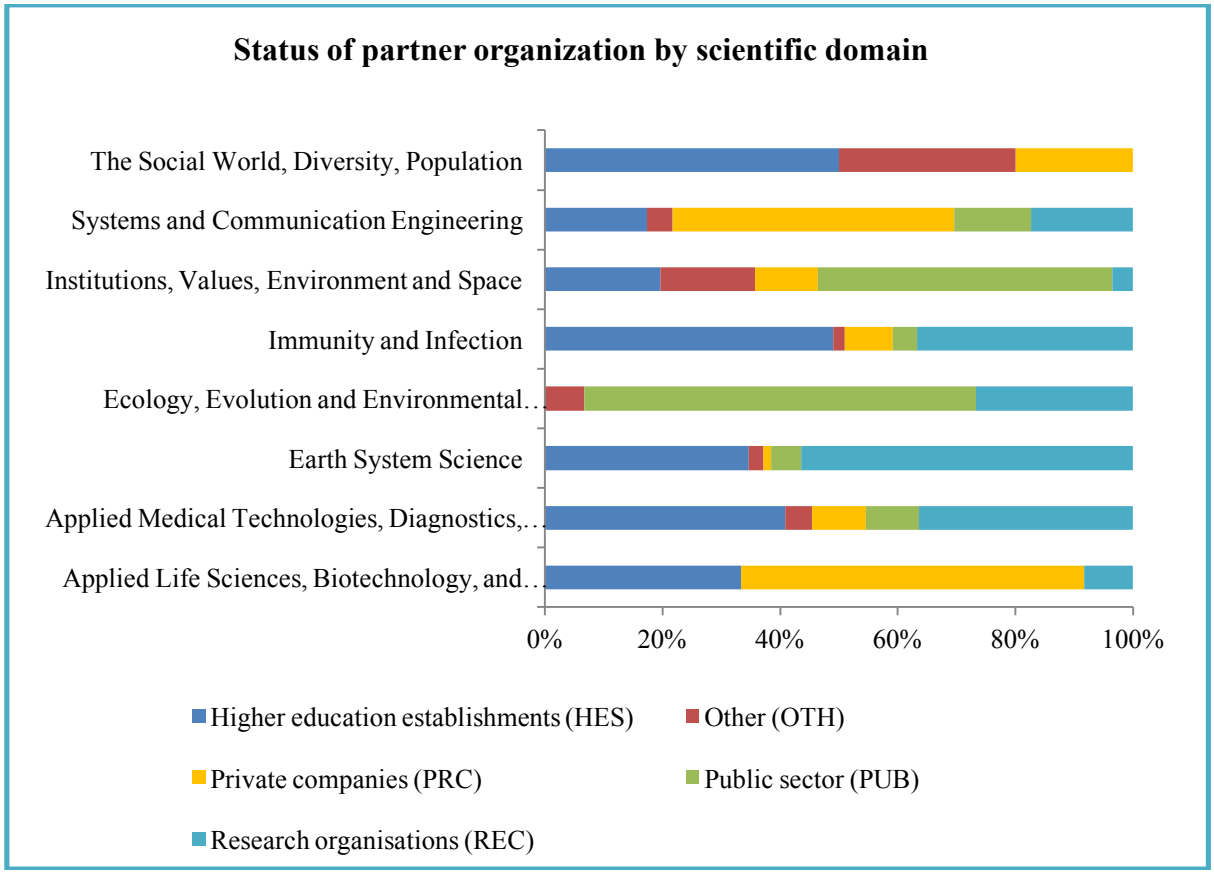


Strong differences can be deciphered between scientific domains. Two are highly dominated by public organizations:

- "institutions, values, environment and space", which brings together stakeholders involved in the design, implementation and coordination of public policies, in fields like circular economy
- "ecology, evolution, and environmental biology", due to the very nature of the only project represented - the Era-Net, Biodiversa 3, composed of public authorities / funding agencies.

At the opposite end of the spectrum, two themes presenting an advanced TRL and proximity to the market, mostly mobilize private institutions: "applied life-sciences and biotechnology" (represented by TASCMAR, a research and innovation action project) and "systems and communication engineering", focusing on energy transition (REACT project).

The two most FP active themes – Earth System Science and Immunity and infection – are research oriented and thus mobilize higher education and research organizations.



2) La Réunion mostly collaborates with minor FP players

The analysis of the "quality" of these partners, measured by the number of FP participations, lays emphasis on the lack of exploitation of the existing relations, especially connections to "locomotives", which could integrate La Réunion in many new projects. Indeed, under FP7 and H2020, respectively 25 and 38 partners were involved in at least 100 projects, representing 22 22% and 14% of the total number of partners.

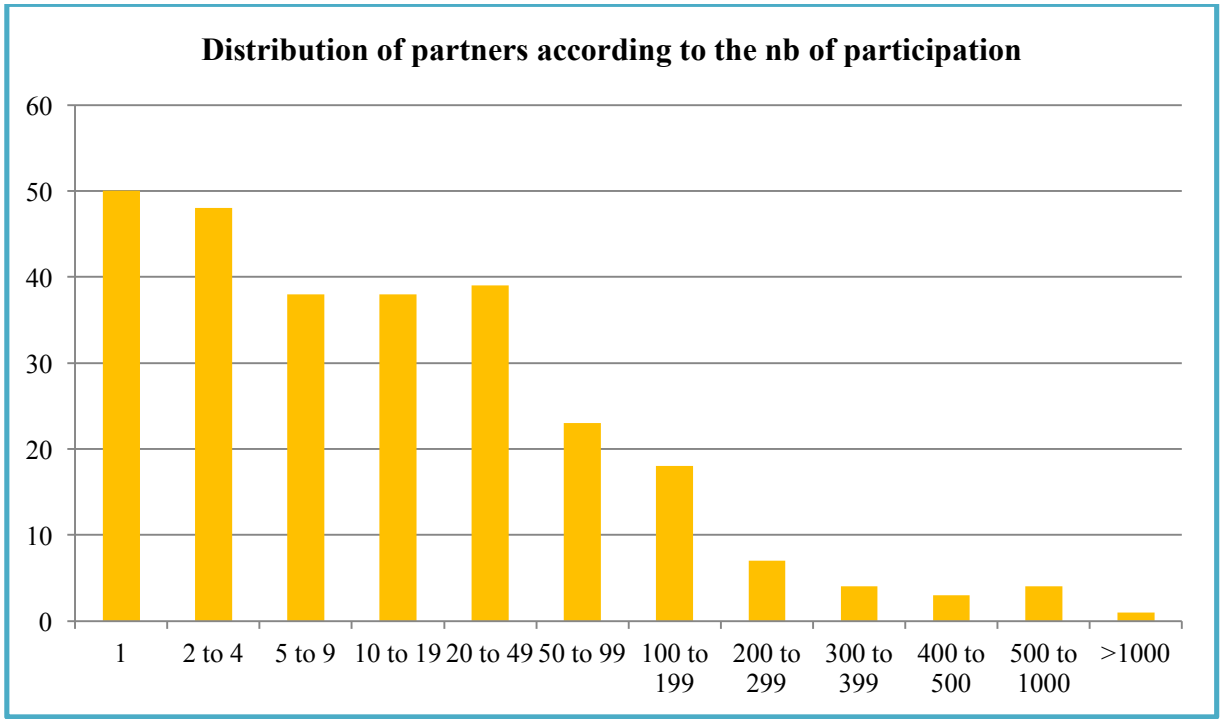
Such stakeholders includes French institutions like the Centre National de la Recherche Scientifique, (CNRS) or the Institut National de la Santé et de la Recherche Médicale (INSERM) that are directly connected to La Réunion through joint research units or platforms (like the OSU-R dedicated to earth system science; or the CYROI for medical sciences), and indirect partners like the Commissariat à l'Energie Atomique et aux Energies alternatives or the "Institut National de Recherche Agronomique" (INRA).

Yet national connections are not predominant; for they only represent 4 of these 38 partners, based in 14 countries.

Countries	Nb of +100 projects partners
Austria	1
Belgium	2
Denmark	3

Finland	3
France	4
Germany	4
Ireland	1
Israel	1
Italy	1
Netherlands	3
Norway	2
Spain	2
Sweden	4
United Kingdom	7

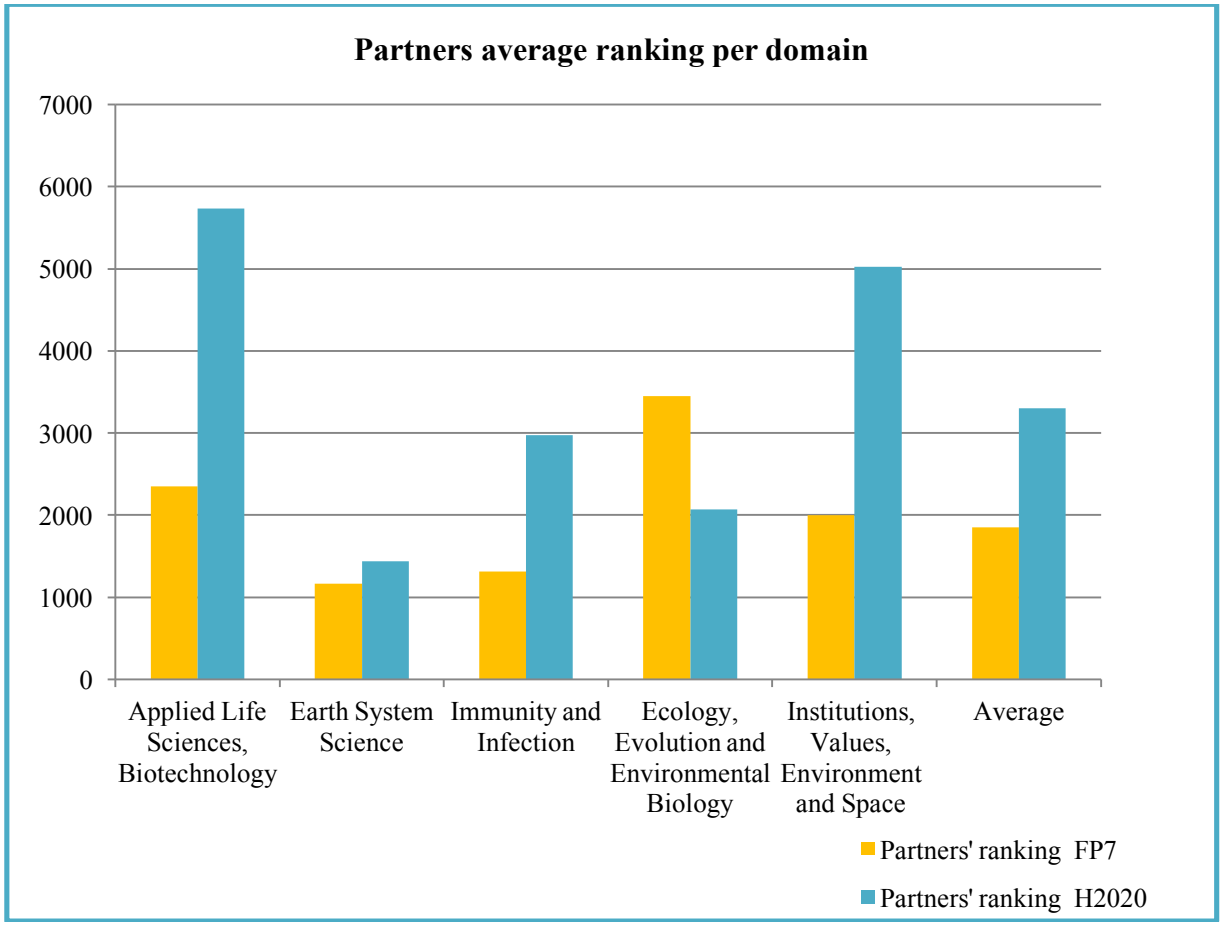
Though the proportion of top organizations appear substantial, 78% of the projects mobilize partners with less than 50 participation; 35% with less than 10.

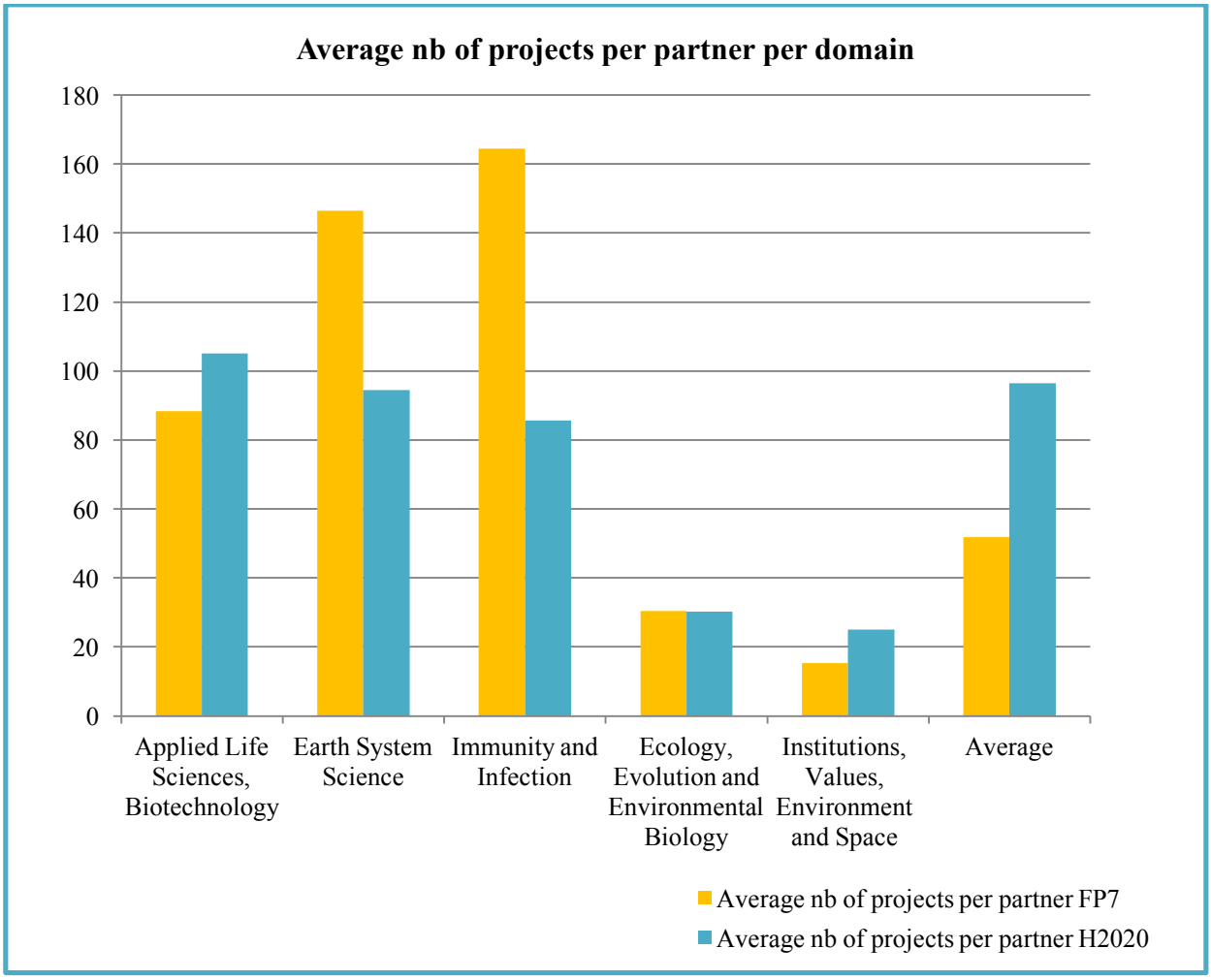


Based on these data, institutions have been positioned on a "H2020 ranking" determined by the number of participations of the 30 472 active organizations. They occupy a modest, average 3 303 rank. Once again, these results vary greatly from one field to another. The two most FP active domains are also the ones which enjoy the highest connections to top players, which confirms the analysis developed by Enger & al. Indeed, Earth System Science and Immunity and infection have implicated respectively 19 and 10 organizations part of the top 100 H2020 participants. On the contrary, the themes represented by projects developed through political networks mobilize very few top 10 or top 50 institutions; especially in social sciences:

Domains	TOP 10	Top 15	TOP 20	TOP 50	TOP 100
Earth system sciences	5	7	8	15	19
Immunity and infection	4	4	5	6	10
Applied medical technologies	1	1	1	2	4
Systems and communication engineering	1	1	1	1	4
Institutions, values, environment and space	1	2	2	3	3
Ecology, evolution and environmental biology	0	1	1	1	1
Applied life sciences	1	1	1	1	1
The social world, diversity, population	0	0	0	0	0

Such phenomenon is logically reflected by the number of projects or the ranking.





3) Connections remain largely unexploited

During FP7 and H2020, one time collaborations concerned respectively 105 of the 113 and 245 of the 274 partners involved. In other words, 93,5% and 89,4% of the organizations developed only one project with stakeholders from La Réunion. This confirms the difficulty to capitalize on preexisting relations or projects highlighted in the analysis of the participation. However, though they represent only a minor share, recurrent partnerships have slightly progressed between the 2 periods from 2 common projects to 5.

Number of common projects	Number		Proportion	
	FP7	H2020	%FP7	%H2020
5	0	1	0,00	0,36
4	0	1	0,00	0,36
3	0	4	0,00	1,46
2	7	23	6,48	8,39
1	101	245	93,52	89,42
Total	**108**	**274**	**100**	**100**

Such recurrent partners represented 14 of the 115 interactions under FP7 (i.e. the total number of collaborations) and 67 of the 312 interactions under H2020. This indicates that the

participation remains scattered across a large number of stakeholders and not concentrated on a few stakeholders.

4) Determining entry points

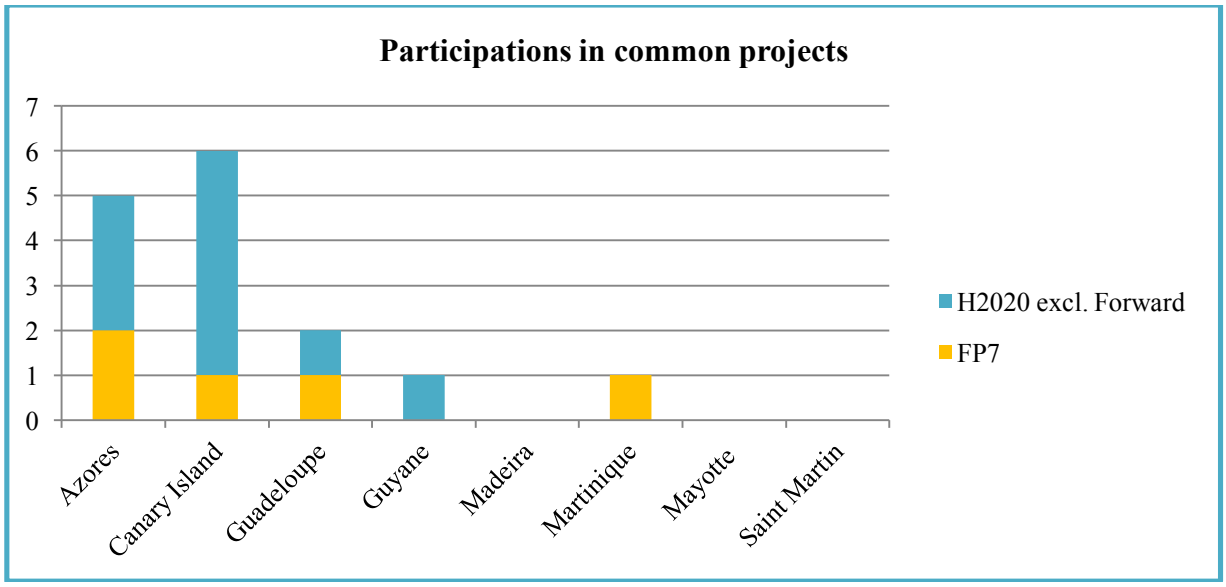
Regular interactions offer powerful clues to identify the existing networks leading to FP participation. Such networks constitute major entry points in the programmes; confirmed during the 9 face to face interviews conducted with successful candidates, who were notably asked how they entered the consortium. On the 22 projects (minus 1 mono-beneficiary SME instrument), 3 types of networks play a critical role.

The first network, mentioned earlier, stems from the historic, strong connections with mainland France research institutions, which played an active role in at least 8 projects. 4 of these 8 projects were developed through the integration of OSUR in the national earth system observatories network, coordinated by the "National Institute for Universe Sciences" (INSU) managed by the CNRS. 3 other projects were initiated or facilitated by the regional representation of the "Institut de Recherche pour le Développement" (IRD), active in La Réunion directly and through joint research units with the University of La Réunion. Such projects include the two Regpot (Run Emerge & Run Sea Science), and Made, dedicated to the ecological impact of fisheries, which also benefited from the regional presence of the IFREMER. The last project (Stories) has been designed by the French conference of universities to adapt the European Researchers' Night concept. The University of La Réunion was invited to replace a defaulting partner, after the submission of the project.

The second largest network in terms of projects (7) is composed of the agglomeration of several individual networks. These people capitalized on prior collaboration, through common research projects or professional networks, and their reputation to join successful consortia. Most of them were invited to join this team because of their expertise and the singular aspects that La Réunion may bring to the projects, as experiment sites or primary resources provider. This is notably the case of three biotechnology projects (DEMA; ECSAFESEAFOOD; TASCMAR), three medical projects (EUROLINKCAT, ICRES, Zikalliance), and one computer science project focusing on the creation of a digital network for biodiversity research (VIBRANT).

The third network is composed of the outermost regions, which accounts for 4 of the 21 projects. 3 of the 4 are direct result from preexisting relations between regions : NetBiome CSA and its follow-up Biodiversa3 dedicated to the coordination of public support and research effort to preserve biodiversity; and Forward. The last project, Urban Waste relies on a broader network than the single OR, but is coordinated by the government of the Canary Islands, who invited to the projects representatives of La Réunion, i.e. the regional urbanism agency. Including two other projects, which implicated other partners from the OR but not centered on their challenges (ARISE2 and SCREEN) and excluding Forward, La Réunion has been collaborating 15 times with other partners from the OR. This figure appears relatively limited compared to the total 382 interactions with European institutions registered between FP7 and H2020. The absence of cooperation in common research fields such as blue economy, emerging diseases, energy transition in island context, marine biotechnologies,

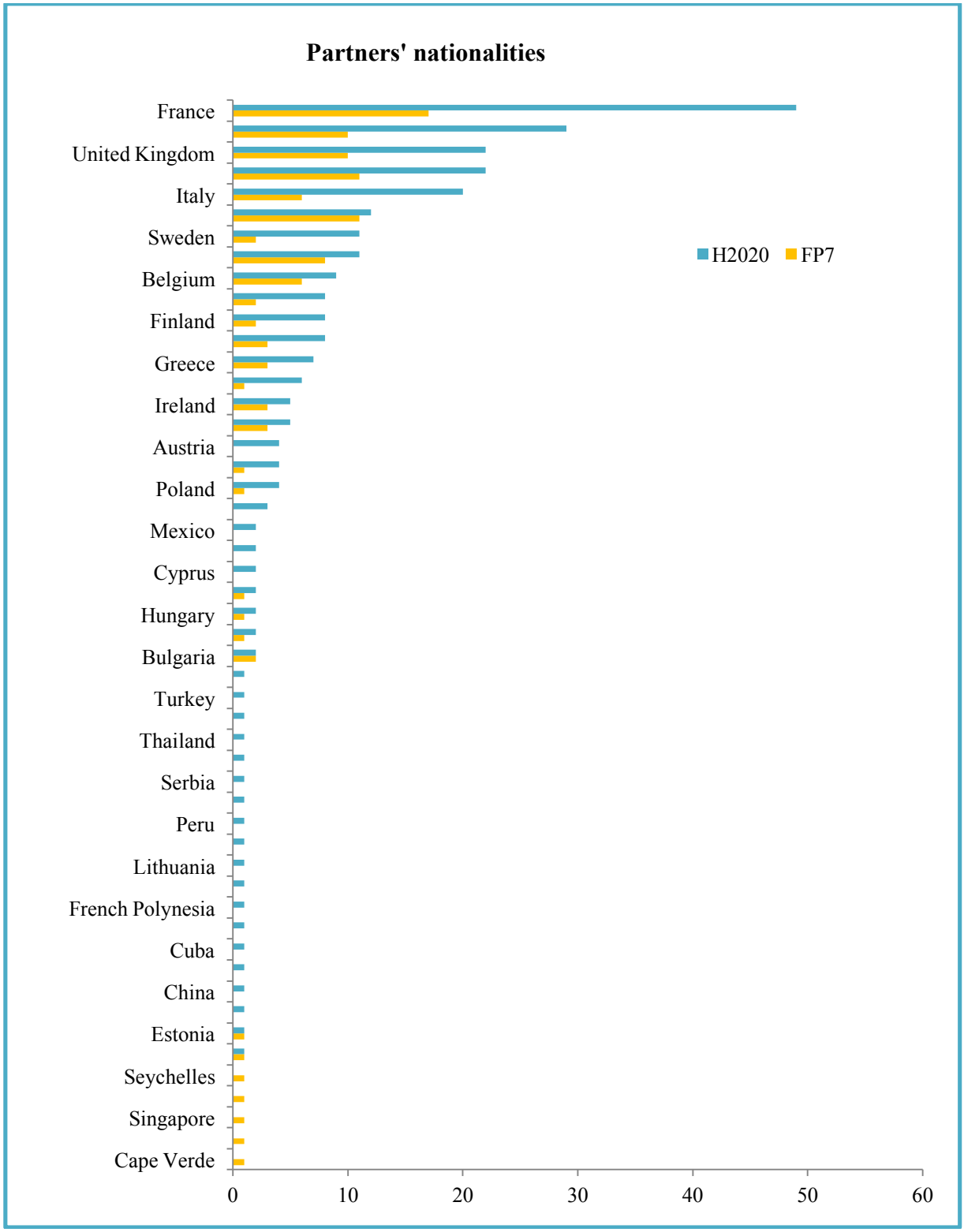
highlights the potential for increased connections. On these 15 interactions, the Canary and the Azores constitute the two major partners, with respectively 6 and 5 participations, way beyond Guadeloupe (2) and Guyane (1). Expressed by partners, FRCT constitute the number 1 institution (2 common projects excluding Forward),



A fourth kind of network has emerged between FP7 and H2020 as a consequence of the European office created by Nexa and the University to support access to H2020. One of the main activities of this office, described in the next section, is to increase the connection to European stakeholders, notably through the promotion of the island's expertise to consortium leaders. Thanks to the office own networks, La Réunion has been part of 2 projects: SCREEN, dedicated to the transition toward circular economy and REACT on energy transition.

5) A strong national orientation

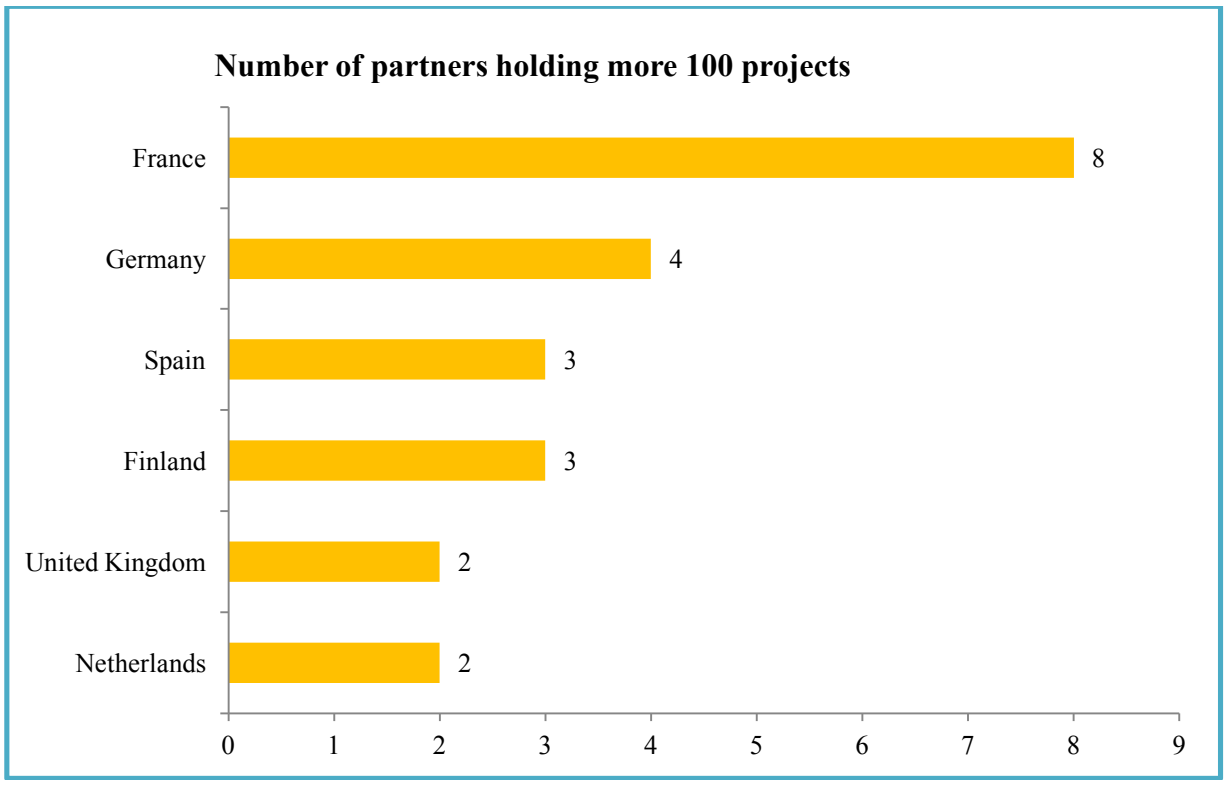
Under FP7 and H2020, La Réunion has been collaborating with stakeholders based in 51 countries.



This participation is highly concentrated : 5 countries accounted for 52,7% of the FP7 and 50,7% of the H2020 participation.

Countries	% FP7 partnerships	Countries	% H2020 partnerships
France	15,18	France	17,50
Germany	9,82	Spain	10,36
Netherlands	9,82	Germany	7,86
Spain	8,93	United Kingdom	7,86
United Kingdom	8,93	Italy	7,14
Portugal	7,14	Netherland	4,29
Italy	5,36	Portugal	3,93

At one exception (Finland), these countries also host the top H2020 institutions with whom La Réunion has been collaborating more than once.



In this podium, mainland France still constitutes the number one source of partners. At one exception (REACT), La Réunion has never been part of a project that does not include a French partner. Such proximity can be as the consequence of three intertwined factors : a historic integration/dependence to national research centers (the University of La Réunion used to be an extension of Aix-Marseille Academy), the preexisting professional networks of researchers who, for the most part, originate from or were trained in mainland France, as well as the comfort offered by a same language.

B - Regional connections

In its 2008 Communication1, the European Commission called for a paradigm shift that would "make the most of the characteristics of the OR" and turn them in "outposts of the European Union in the world". At that time, Outermost Regions were described as the "vanguard of the EU's position vis à vis other major economic blocs", that would fully "participate in the development of a true wider neighbourhood policy through their geographical, cultural and historical links with other countries and peoples, particularly in Africa and the Americas" and become "platforms for the dissemination of technologies and veritable scientific portals in their respective environments". Such ambition was recalled 10 years later, in the 2017 Communication, which insisted on the necessity to "strengthen cooperation initiatives" and "facilitate exchanges and joint projects, between the outermost regions, their neighbouring countries and territories, and regional organisations"2.

Analyzing the participation of La Réunion neighbouring countries in the Framework Programmes offers an unique opportunity to question the factuality of such ambition, which constitutes the core of European declarations but also of a well-established local rhetoric that depicts the island as a "knowledge hub" or "expertise center" exporting training, research and innovation to the Indian Ocean.

1) Neighbouring countries are familiar with Horizon 2020…

According to the data provided by CORDIS and the Horizon 2020 dashboard, neighbouring countries present a mixed profile in terms of FP participation. The first cooperation circle, composed of Mauritius, Madagascar, the Seychelles and Comoros present a very limited implication. The second circle composed of Eastern African countries appear more dynamic and led by two major players : Kenya (50) projects, and South Africa (139).

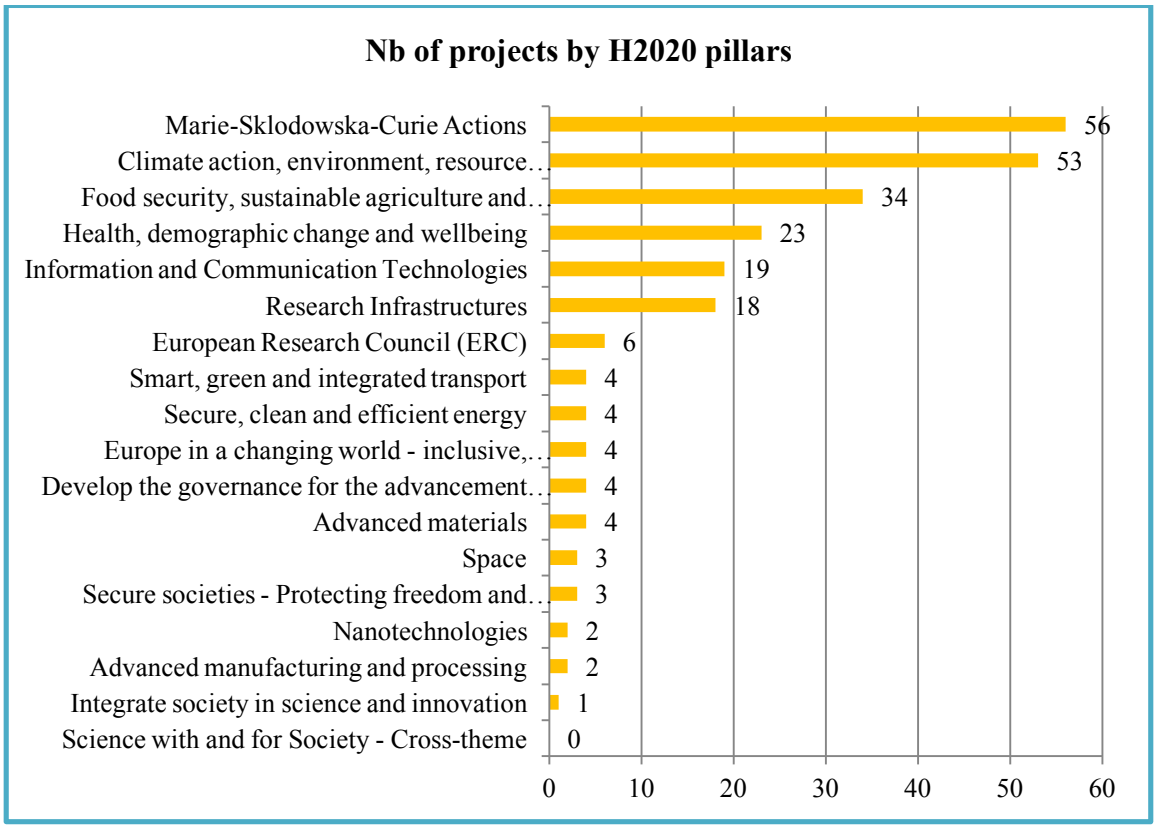
Countries	Signed grants	Participations	EU contribution
Comoros	0	0	0
Kenya	50	70	€ 13 580 258
Madagascar	5	8	€ 952 420
Malawi	9	11	€ 2 301 431
Mauritius	2	2	€ 24 750
Mozambique	9	1	€ 1 010 658
Seychelles	1	1	€ 79 500
South Africa	139	201	€ 31 568 969
Tanzania	20	25	€ 7 320 821
Zambia	5	5	€ 1 442 452
Zimbabwe	0	0	€ 0
Total	240	324	58 281 260

[1] European Commission. *The outermost regions: an asset for Europe*. 2008

[2] European Commission. *A stronger and renewed strategic partnership with the EU's outermost regions.* 2017

They represent a total of 240 projects and a net EU contribution of 58,2 M€. Such participation highlights once again the abnormal situation of La Réunion, which despite its natural connections with Europe and strong R&I effort, presents scores close to countries like Mozambique (9 projects for 1,1 M€), Madagascar (5 projects, 952 420 €), Malawi (9 projects; 2,3 M€) and Zambia (5 project, 1,4 M€).

The fields of interest of the projects developed present strong connections with the domains of excellence of La Réunion : climate action, environment and resources; food security and sustainable agriculture; health and demographic change.



2) … but seldom cooperate with La Réunion…

Despite their active participation, very few projects include both La Réunion and one neighbouring country : 1 under FP7 with Seychelles (Made) and 1 under H2020 with Madagascar (ARISE 2). These joint projects account for 0,28 and 0,19% of the budget obtained by these countries during the two periods.

	FP7	H2020
Total EU Contribution	67 870 862 €	58 281 260 €
Joint projects	187 050 €	110 000 €
%	0,28	0,19

Such limited collaboration appear all the more surprising, that many projects involving these partners are in direct line with the island fields of expertise. For instance, the Seychelles

are part of Farfish, a research and innovation action, dedicated to the "management of EU Fisheries outside Europe"; South Africa of TROPICSAFE, which focuses on the prevention of "insert-borne prokaryote associated diseases in tropical and subtropical perennial crops" (such as citrus) and implicates stakeholders based in La Réunion, like the CIRAD. Kenya for its part is implicated in many food safety and one-health projects like LEAP-AGRI ("A long term EU Africa research and innovation partnership on food and nutrition security and sustainable agriculture"), PALE-Blu ("Understanding pathogen, livestock, environment interactions involving bluetongue virus"), or B3Africa ("Bridging Biobanking and biomedical research across Europe and Africa"). It is also a full partner of a project decidated to ecosystems monitoring through Earth Observations (EcoPotential), which was joined by La Réunion with the help of ERDF, after the project submission…

All the more, these common fields of interest are often the subject of joint research programmes supported by INTERREG. Between the 2007 and 2013, and 2014-2018, respectively 22,8 M€ and 15 M€ were mobilized to support research and innovation programmes with countries like Mauritius, Madagascar, Seychelles, South Africa (not under the last period). Yet, such investments were not transformed in FP projects, which represent less than 1% of the amount mobilized.

	2007-2013	**2014-2020**
INTERREG	22 756 833 €	15 045 510 €
FP	187 050 €	110 000 €
%	0,82	0,73

The very limited synergy between INTERREG and Horizon 2020 as well as low level of cooperation in competitive projects clearly indicates that for now La Réunion is not identified or considered by its neighbors as an expertise center or a valuable partner which could contribute to their research effort or increase their chance to access H2020. This diagnosis questions the whole scientific cooperation strategy implemented on the island since the last 20 years, which considers regional cooperation as a first step to develop the island innovation system and increase its international position.

3) … contrary to national organizations

Indeed, such partners prefer to orient themselves directly toward national organizations, who despite their proclaimed commitments to make La Réunion their regional hub, develop strong connections and projects, which do not include the island. According to the H2020 dashboard, France is number one partner for Madagascar with 11 common participations (and only 1 with La Réunion), and the number 3 partner for South Africa (185 common participations, none with La Réunion).

More, national organizations do not have the reflex to include partners from La Réunion in the consortia they coordinate. In Mauritius, the Institute for Research on Development (IRD) coordinated a Marie Slodowsca-Curie staff-exchange project on "Slavery in Africa : a dialogue between Europe and Africa", whose objective is to "establish a top level

scientific network of institution from Europe and Africa on the field of slavery studies", that include several organizations from mainland France, Kenya, and South Africa. The National Agency for Research (ANR), leads with the help of 3 institutions based in La Réunion (IRD; the French Agency for Development - AFD, and the CIRAD, whose 2nd largest implantation is La Réunion), a 33M€ ERA-NET dedicated to a "Europe-Africa flagship initiative for Food and Nutrition Security and Sustainable Agriculture" : LEAP Agri. In Madagascar, the National Institute for Agronomic Research (INRA) and its counterpart for tropical regions (CIRAD) are leading a project on soil carbon sequestration in agriculture.

Such examples reveal the long way ahead to integrate La Réunion in the regional and european networks and to turn them into effective FP projects, through the common mobilization and effort of all stakeholders – national and regional authorities and funding agencies, national research organizations and their regional representations, regional research and innovation organizations – to turn La Réunion into a real European Hub in the indian Ocean. To that end, one priority to consolidate and develop a research and innovation system, which despite the great efforts engaged in the last years remains at this stage, one of the bottleneck of an increased participation in the future Horizon Europe.

Regional system

La Réunion's limited participation in the European Framework Programmes and fruitful connections to major players are both a symptom and a cause of the weak performance of its regional innovation system, itself embedded in a dynamic, yet vulnerable development model, which makes the island of the poorest and most transfers-dependent region of the Union. To address the major economic, social and ecological challenges and organize the transition toward a more resilient model, La Réunion is engaged in an ambitious smart specialization strategy, based on a conviction : the very sources of vulnerability offer opportunities to design innovative solutions that may be exported to other islands or tropical regions, and provide new niches of values and jobs. To build these new competitive advantages and reach the required critical masses, a strong focus has been set on integrating La Réunion in the major European and global networks, notably through an increased participation to Horizon 2020. Though important means were mobilized since 2015 to support the production and transformation of new knowledge into solutions, the participation in FP has paradoxically been divided by more than 2. Such paradox may find its source in the marked disconnection between the ambition proclaimed by public policies and the modes of allocation of ERDF funds, which have comforted and extended to the realm of research and innovation the rent-seeking behavior inherent to its economic model.

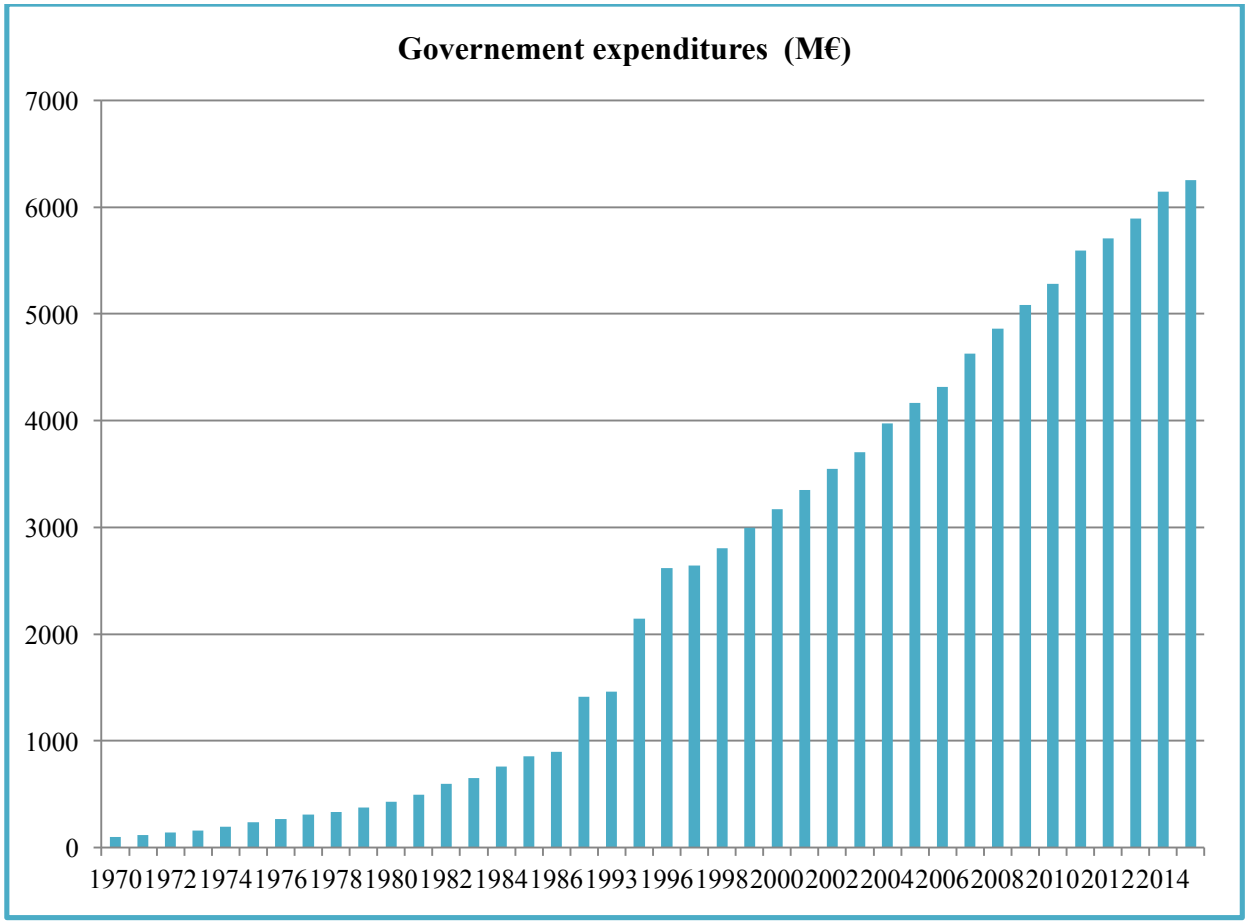
A - A fast-growing, yet vulnerable region

Like the other French outermost regions, La Réunion presents a very peculiar economic model, shaped by the "departementalization" process, engaged in 1946. After three centuries of colonization, several decades of structural crisis and 4 years of British blockade, the institutionalized plantation system which fashioned the island's population, economy, social practices and landscapes, faced a dead-end. The ruined colony held the world record of infant mortality (14,5%) and life expectancy barely reached 48 years. In reaction, local representatives initiated a law, which abolished the colonial status and organized the complete integration to the French rule of law. During the 60s, this new status met the ambition of Michel Debré, former Prime Minister and local deputy, which deployed a thorough modernization policy to "decree" development, to organize the economic and social "catch-up" toward a naturalized European standard. Such policy relied on three main pillars, that sill constitute the core of public intervention today:

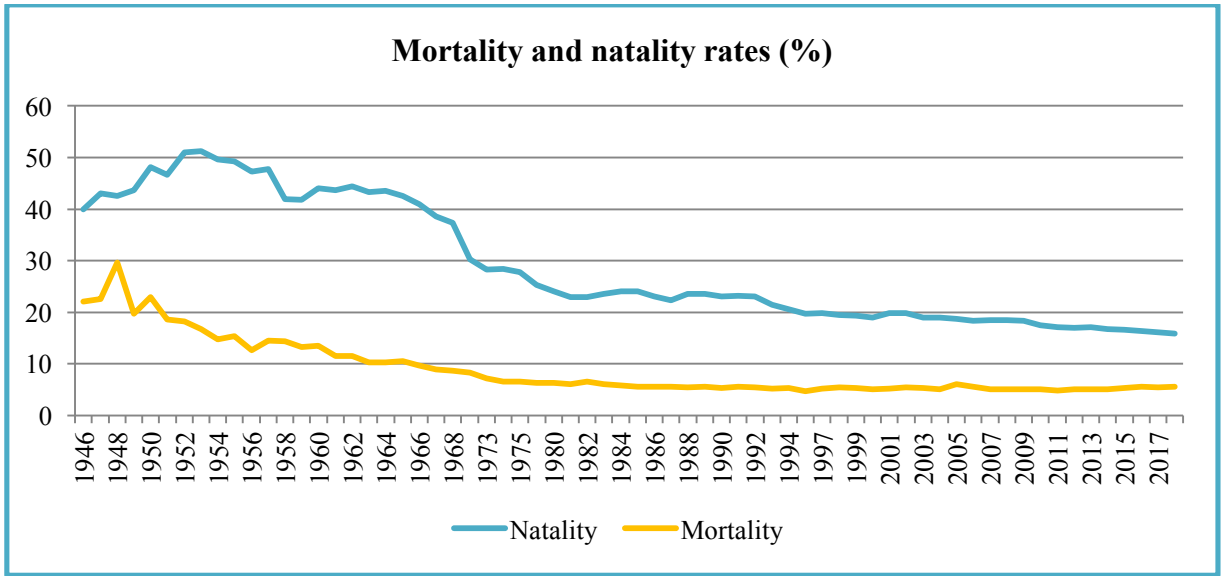
- construction of world-class infrastructures to address the population needs (physical and digital communication; education; health, etc.)
- development of human capital through education and training policies, support to social integration, etc.
- consolidation of the established agro-industries (dominated by sugar production) and the promotion of alternative economic activities, through protection (Octroi de mer) and public support.

1) A formal convergence

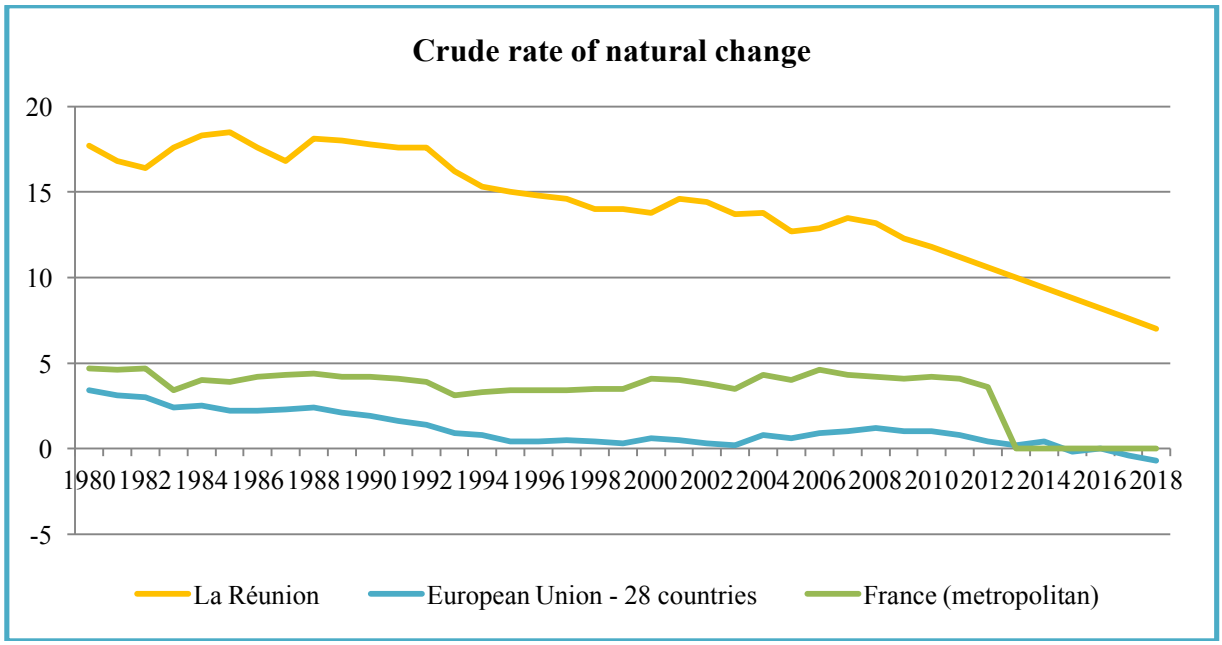
The transformation engaged in the 60s relied on the large mobilization of public resources : between 1970 and 2015, government expenditures have risen from 100 M€ to 6,2 Bn €, excluding the tax reductions and subsidies injected in the economy :



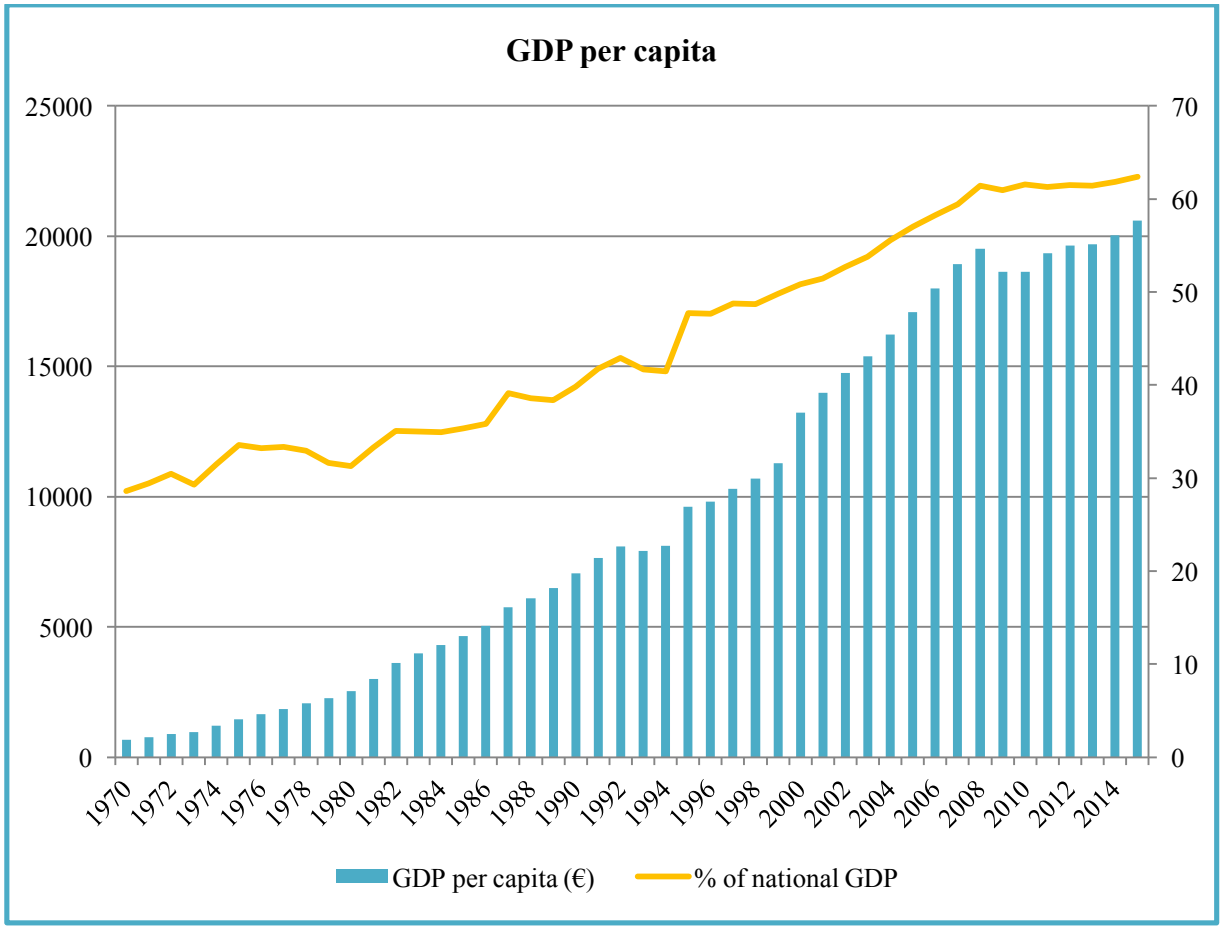
Such engagement rapidly altered transformed living conditions, erasing the chronic mal-nutrition and exposition to malaria, and led to a demographic revolution. Since 1945, life expectancy has almost doubled (80,4 years in 2015), the mortality rate has been divided by almost four and the natality rate by almost three.



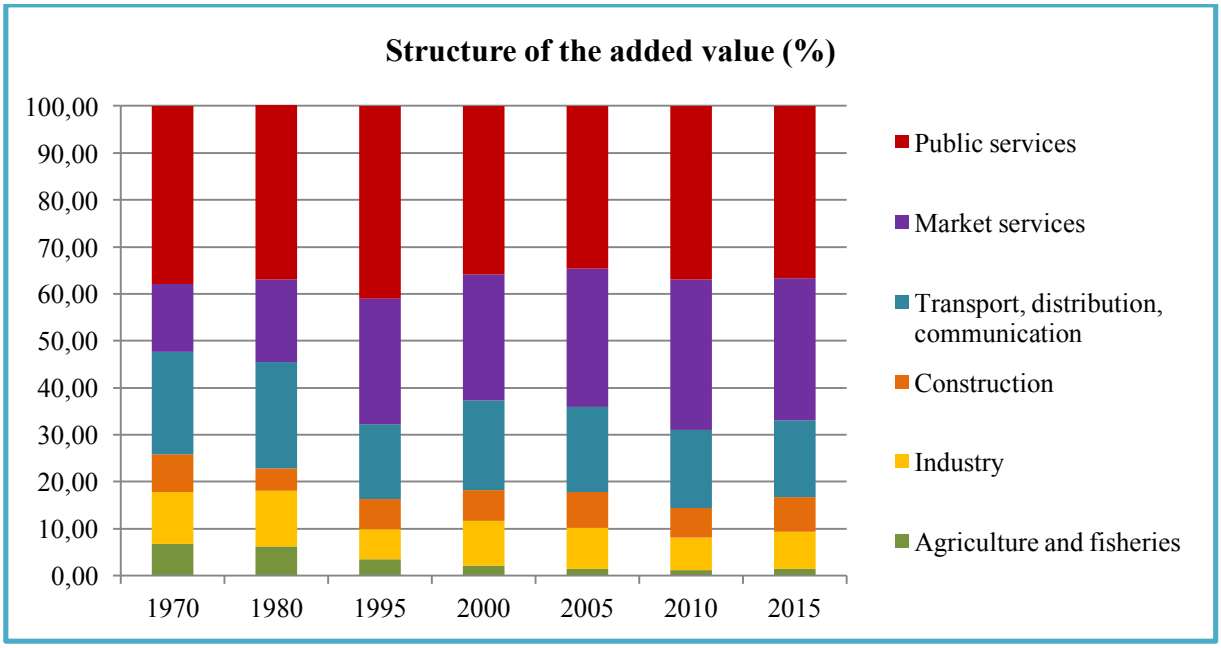
This shift provoked an accelerated demographic transition and a critical increase of the population, from 227 000 people to 866 000 in 2019. With an average 17,7% natural change per year, La Réunion has the fastest growing population of all European regions.



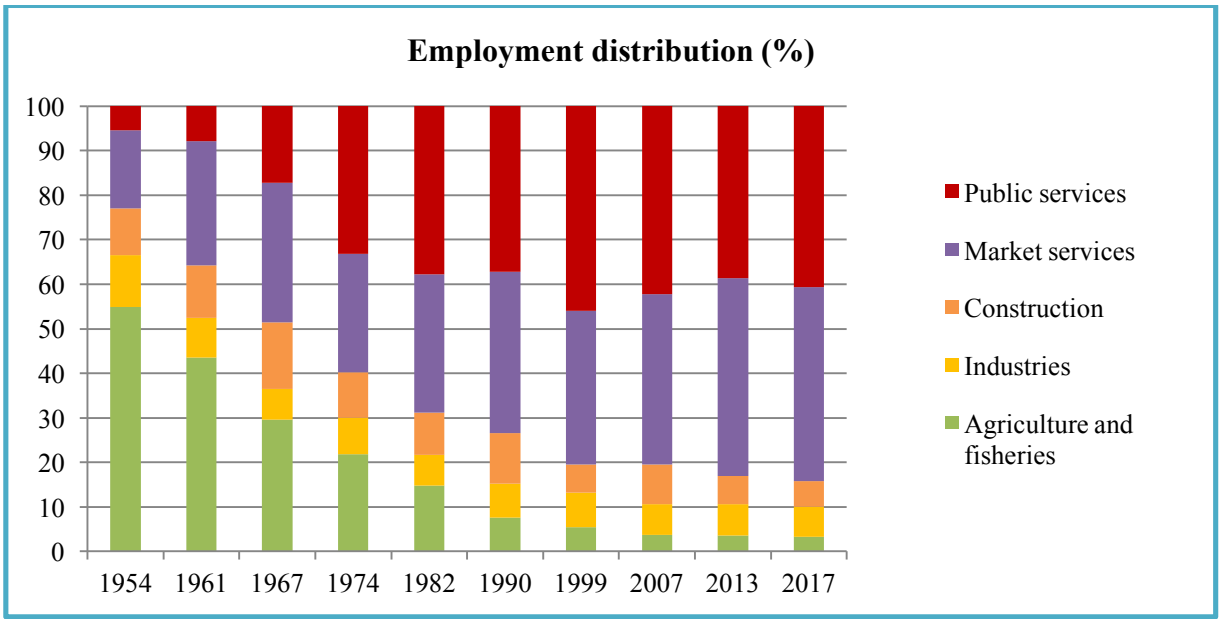
This demographic shift has been supported by an impressive economic growth : the GDP per capita progressed from 683 to 20 608 € between 1970 and 2015. With a 3% annual growth rate, La Réunion now belongs to the 40 most dynamic European regions (NUTS 2). Such performance contributed to an accelerated economic convergence, though the GDP per capita is still 69% of the EU average.



The remarkable demographic and economic growth, combined to new desires and schemes of consumption, created a dynamic and solvable local market, supported by public expenses. Such market has led to a profound transformation of the economic structure of the island, centered around this captive, domestic demand. Local services account for more than 66% of the GDP (36% public/30% private), transport and retail trade 16%, construction 7% and industries 8%. The latter are composed of three main activities : sugar production, food-industry and construction materials, supported by an import-substitution strategy which relies on duty protections and subsidies. The primary sector, former cornerstone of the plantation systems, now represents less than 1,5% of the GDP.



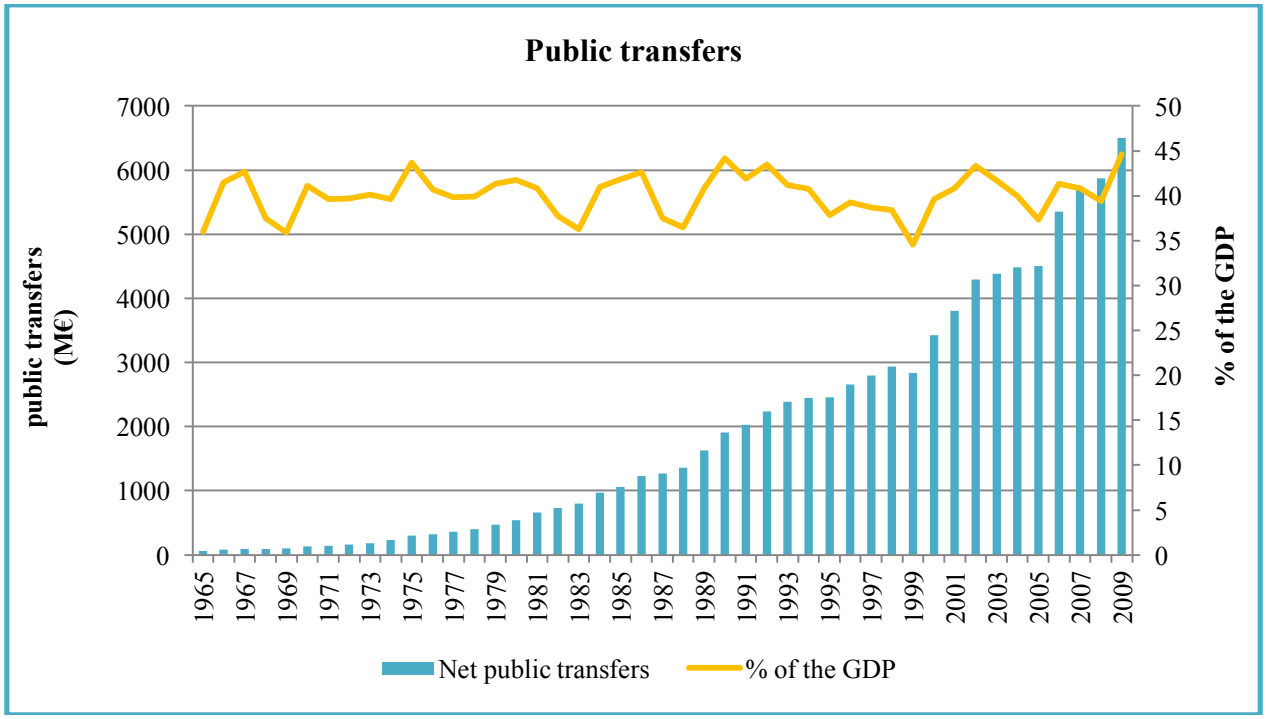
The shift is even more pronounced through the employment lens, the mechanization of sugar-cane production having led to a decline of agricultural jobs.



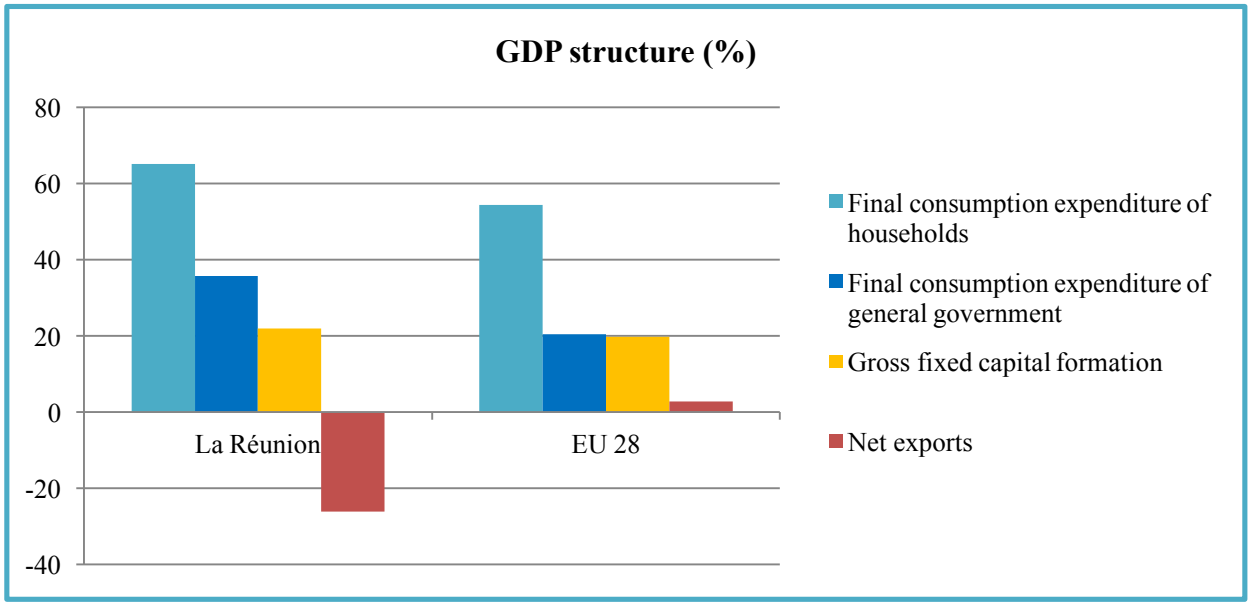
2) Strong dependencies and vulnerabilities

Though the regional economy appears dynamic and engaged in a strong convergence toward European standards, a closer analysis exposes strong singularities that restrict its innovation potential.

First, the island suffers from a financial dependency on public transfers from the mainland. Between 1983 and 2010, they grew from 800 million to 6.5 billion euros, representing respectively 38 and 42% of the GPD.



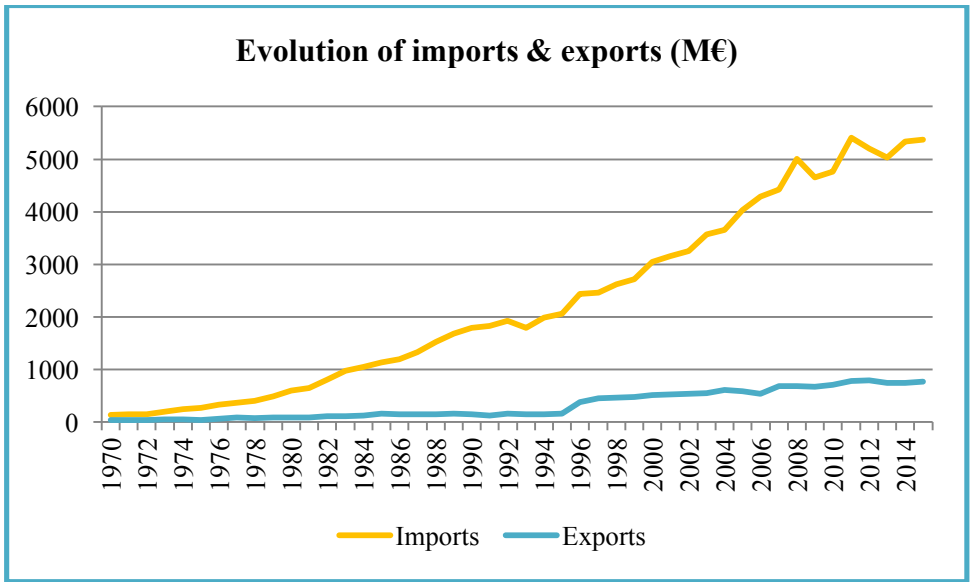
Public expenses alone represent 35,6% of the GDP compared to 20,4% in the European Union. They also play a major role in private consumption, largely supported by social transfers, as well as in the development of private investment mainly focused on construction. The emergence of a protected, predictable and profitable interior market constitutes a strong incentive to concentrate investments and resources on inward-looking activities, fueled by a demand that represented in 2015 more than 105% of the GPD.



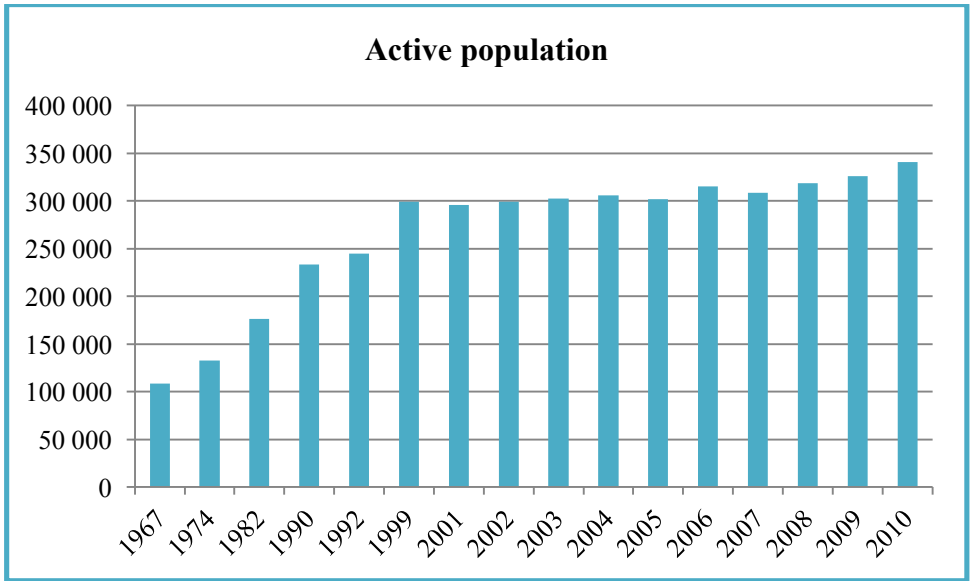
The rapid demographic and economic growth since the 1970s and the introduction of mass-consumption has generated a tremendous need for resources which contrasts with the limited carrying capacity of the 2 500 km² of the island. Between 1946 and 2017, imports thus grew from 230kg to 3,8 tons per year, for a total cost of 5,8 billion euros. Besides the

financial dependency, La Réunion is thus facing a major material dependency, more than 17 million tons of imported resources are necessary to maintain its metabolism.

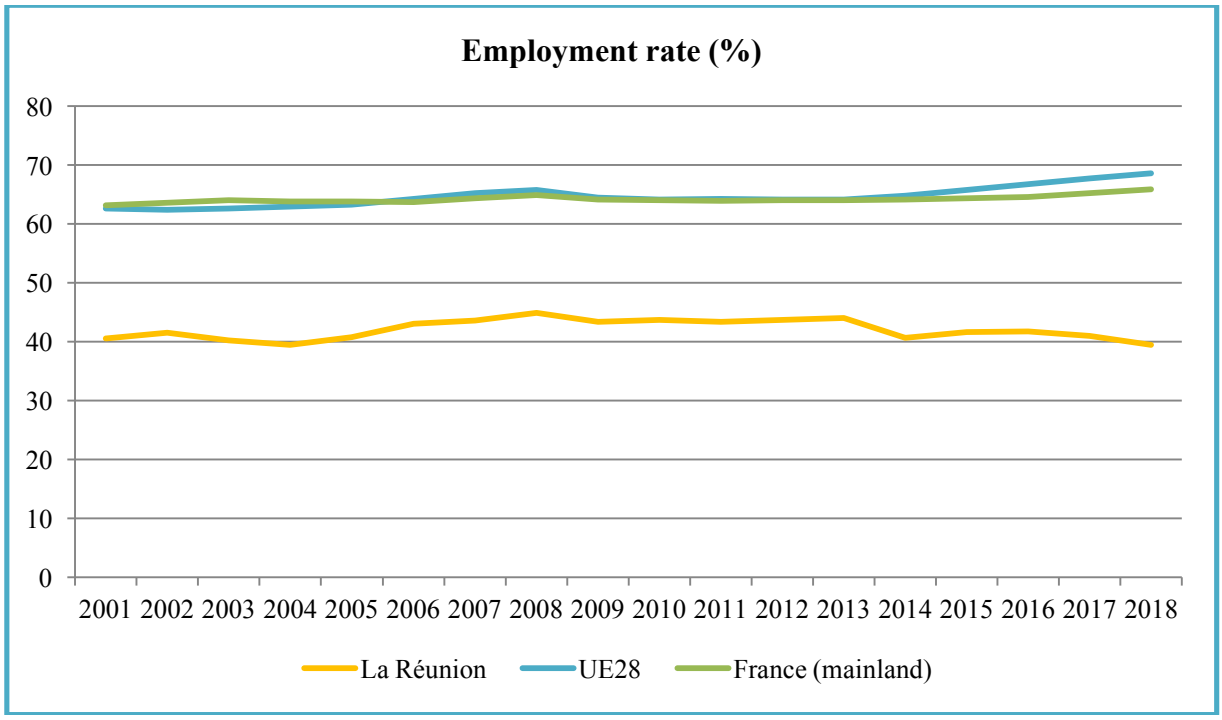
While imports were fast growing, export remain limited. Besides the traditional exports of sugar and rum, protected by European quotas, the high-production costs and the perceived risks and lack of profitability of exposed activities in limit their development. Exports thus rely primarly on raw products (fresh fruits and fisheries) and on the resell of imported goods, be it waste or productive equipment. As a consequence, La Réunion presents a marked trade deficit (26% of the GDP)

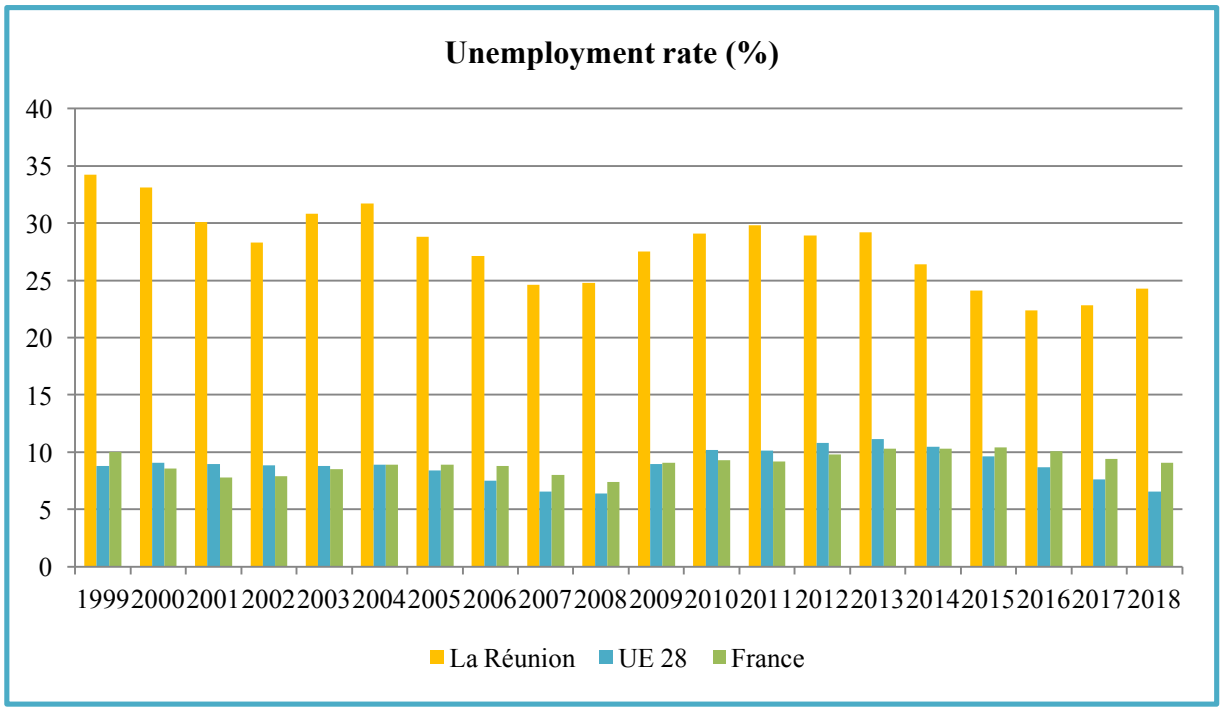


Despite its dynamic, the local market proves to be insufficient to support the activities and the job creations needed to integrate a fast-growing active population which has more than tripled between 1967 and 2010.



The direct consequence of this gap is a particularly low employment rate. With 39,5% of the 15-64 year old occupying a job, La Réunion lies among the bottom 5 European regions, almost 30 points below the E.U. average :





Due to the global disequilibrium between work demand and supply, La Réunion presents of the highest long-term unemployment rate (267 on 274 regions) : 16,9% of the population has been looking for a job for more than 12 month, versus 4,2% in mainland Europe.

As a consequence of such large unemployment, the island face a great social dependency issue : more than 164 000 people (19% of the population) entirely rely on social benefits and half of the population lives beyond the national poverty line. Facing such mass unemployment, entrepreneurship often remains the sole option left. La Réunion thus present a strong entrepreneurial spirit, with 44 267 companies, representing a 16% net creation rate between 2000 and 2016. Yet, 68% have no employee, 95% less than 10. As a consequence, only 53% of the firms are still active five year after their creation (60% in mainland France).

3) An abnormal participation

If these characteristics constitute a major obstacle to participate actively in H2020, they alone cannot explain the difficulties encountered, for other island, outermost, sparsely populated or poor regions perform better.

a) Compared to small size regions…

A small population is often pointed out as an obstacle to innovation due to the lack of critical mass of stakeholders and resources, essential to reach a competitive advantage in a specified field of interest. Yet, compared to 31 regions whose population is comprised between 600 000 and 1 million inhabitants, La Réunion shows a peculiar profile. Despite a much higher population density which could favor frequent social interactions leading to innovation, the net EU contribution obtained since 2015 appears 20 times higher in other NUTS2 regions

	Net EU Contrib. /Y.hab.Nuts2 (Euro)	Net EU Contribution (Euro)
La Réunion	0,4	1 879 192
Average	10,7	40 910 239
Average Nuts 2	12,9	135 880 529
Average +/- 20%	INF	INF
Decile	1	1

b) … other islands

The second frequently invoked obstacle is geographical. Due to their small size and remote position, island are often treated as “handicapped” regions, lacking the naturalized continental assets: critical mass, diversified economy, strong connections. If these traits may impact the participation, La Réunion presents once again a high singularity among the other 18 other EU islands considered:

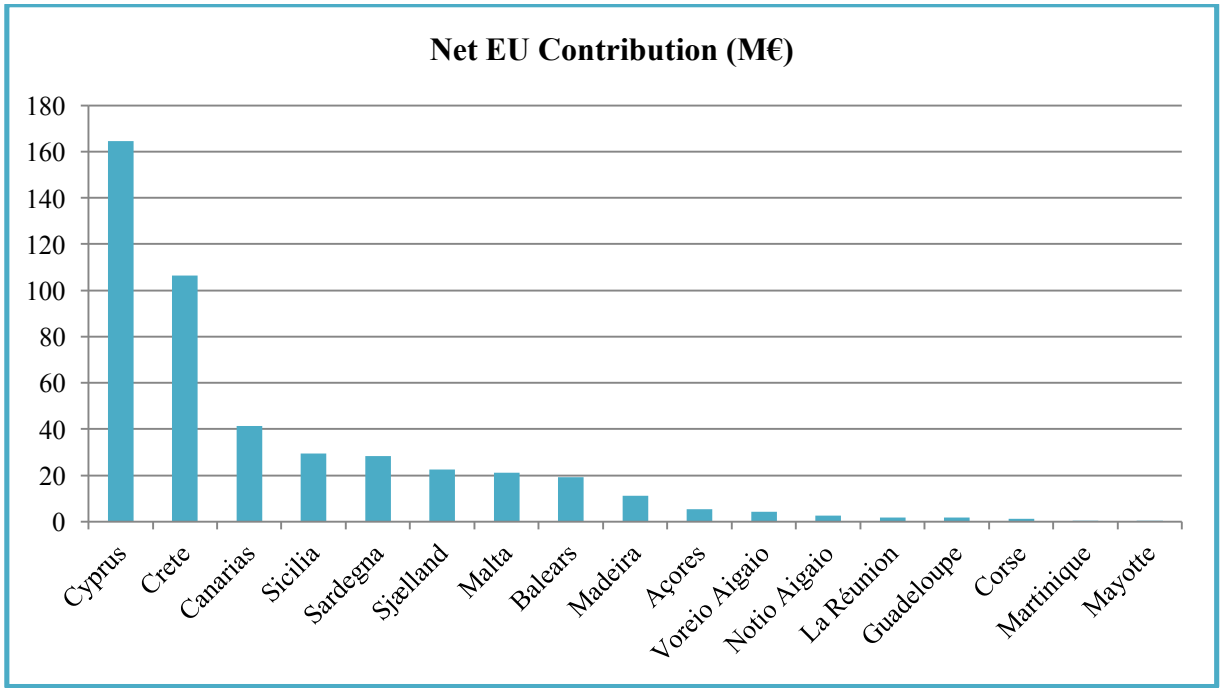
- 2 independent States : Cyprus and Malta
- 6 outermost Regions : Açores, Canary, Guadeloupe, Madeira, Mayotte, Martinique
- 3 Baltic regions : Aland, Hovedstaden, Sjaelland

- 7 Mediterranean regions : Baleares; Corsica, Crete, Notio Aigaio; Voreio Aigaio; Sardegna, Sicily

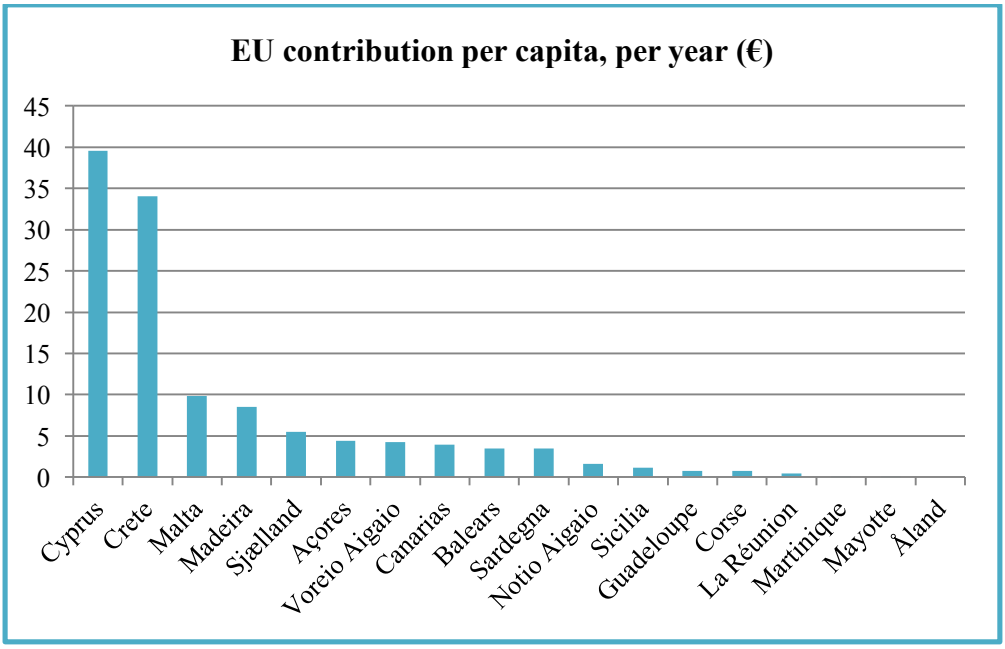
With a total contribution of 1,9 M€, La Réunion performs 30 time less than the average EU island.

	Net EU Contrib. /Y.hab.Nuts2 (Euro)	Net EU Contribution (Euro)
La Réunion	0,44	1 879 192
Average	10,5	59 583 139
Average Nuts 2	12,9	135 880 529
Average +/- 20%	INF	INF
Decile	2	3

The only islands obtaining less than La Réunion are the French overseas department and the Finish archipelago of Aland.



Divided by the number of inhabitants, La Réunion is the 5th least participating island region of the Union.



c) … or poor regions

The economic characteristics of the island cannot either explain alone its limited involvement in FP. Compared to the 44 regions with a GDP per capita comprised between 18 and 22 000 €, La Réunion is situated among the 10% less active regions in terms of contribution per capita and the 20% less performant in terms of EU contribution.

	Net EU Contrib. /Y.hab.Nuts2 (Euro)	Net EU Contribution (Euro)
La Réunion	0,44	1 879 192
Average	5,13	34 972 504
Average Nuts 2	12,89	135 880 529
Average +/- 20%	INF	INF
Decile	1	2

A very low employment rate (below 60%) is no more a convincing reason, for the 27 regions that share the same characteristic (including many islands Regions, like the Canary, Guadeloupe, Martinique, Sicily, etc.) have obtained on average 65,8 M€ since 2014.

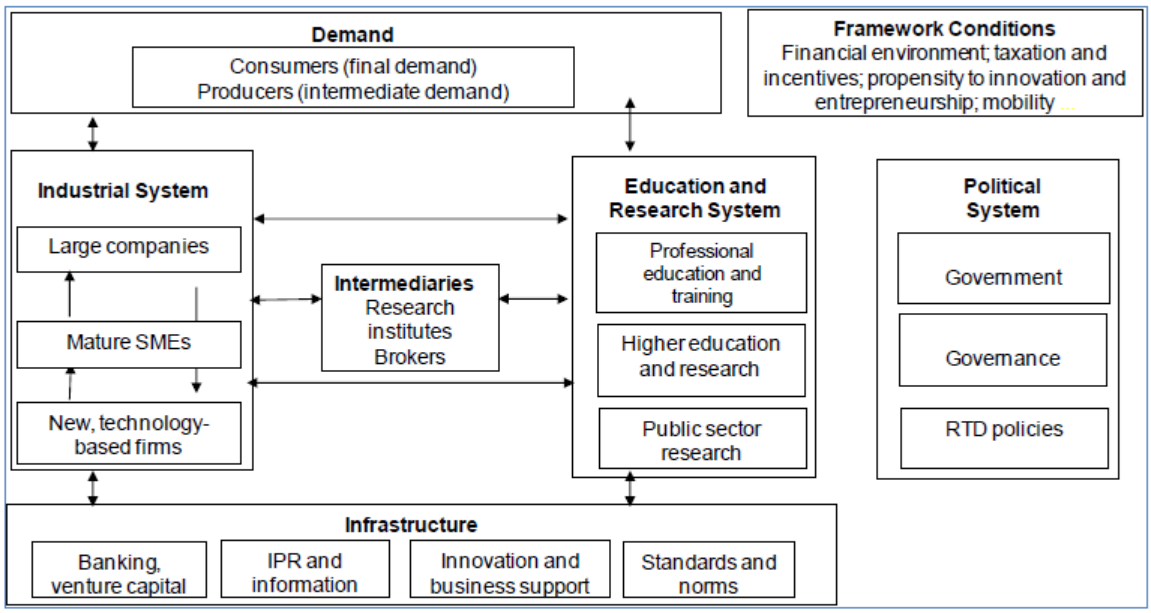
	Net EU Contrib. /Y.hab.Nuts2 (Euro)	Net EU Contribution (Euro)
La Réunion	0,44	1 879 192
Average	9,27	65 813 091
Average Nuts 2	12,89	135 880 529
Average +/- 20%	INF	INF
Decile	**2**	**3**

B - An embryonic research and innovation system

Since demographic and economic conditions reveal themselves insufficient to explain such a weak participation, the analysis of the regional research and innovation system may bring some complementary evidences.

1) A small and scattered network

Innovation is above all a social process, which depends on regional stakeholders' ability to produce, combine and turn existing knowledge into "novel solutions, successfully embedded into society". Schematically, innovation is considered an outcome of a regional system composed of intertwined organizations, which influence and are influenced by the global dynamics through their interactions. Such organizations can be divided into 6 blocks: higher education; research; transfer & innovation intermediaries;



Source: Kuhlmann and Arnold (2001: 2)

a) Higher education system

The structuration of the higher education system began in 1963 with the creation of the Institute for law, economic and political studies, an antenna of the Institute of business administration from Aix-Marseille. In 1970, this institute, then composed of three faculties – Law-Economics, Humanities and Sciences – became the university center of La Reunion. In 1982, it acquired the status of university1. Since its creation, the institution has experienced a critical growth, from 400 students in 1963, to 2 000 in the early 80's and almost 20 000 today. The University of La Réunion (UR), which is analyzed in details on infra, remains the cornerstone of this subsystem, concentrating 66,5% of the island's students:

[1] free translation of the SOURCE (strategic plan of the University of La Reunion)

Tertiary education[1]

Higher education institutions	Share of students (%)
University of La Reunion	66,5
Higher technicians sections	20,4
Medical and social schools	6,6
Higher School Preparatory Classes	3,3
Schools of Arts and Cultures	1,4
Business schools	0,8
Other	1,0

Among the 20 000 students, approximately 302 are engaged in a PhD each year

PhD students

Doctoral schools		Average number of phD students per year (calculated over 2014-2017)	Number of research groups linked to the doctoral schools	Number of scientific domains (according to HCERES definition)
Health, Sciences and Technology	phD students	146	16	12
	phD graduation	25		
Humanities and Social Sciences	phD students	156	8	6
	phD graduation	16		
Total	phD students per year	302		
	phD graduation per year	42		

b) Public research system

The University of La Réunion also constitutes the core of the public research system, which brings together the University Hospital (CHU) and the regional representations of 5 national organizations :

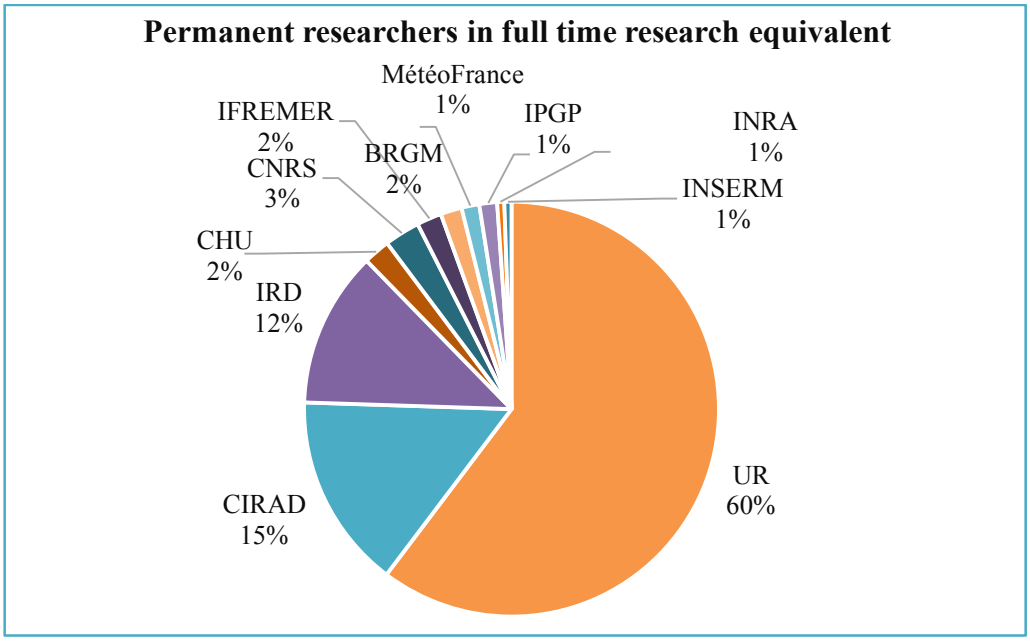
- « Bureau de recherches géologiques et minières » (BRGM)
- « Centre de coopération internationale en recherche agronomique pour le développement » (CIRAD) :
- « Institut français de recherches pour l'exploitation de la mer » (IFREMER)

[1] data from the SEFORRE (Regional strategy for higher education and research)

- « Institut de recherche pour le développement » (IRD)
- « Météo France »

Other national research organizations are represented on the island through individual researchers involved in local research groups, such as the French Scientific Research Council (CNRS), the French medical research institute (INSERM), The Paris Institute of Earth Physics (IPGP), the French Institute for Agricultural Research (INRA).

Overall, 477 permanent researchers (361 full-time equivalents) are currently working in 40 research groups. Researchers from the University of La Reunion represent 60% of the research effort (with 326 FTE and excluding phD students), making the University the first R&D public employer before the CIRAD and the IRD (with, respectively, 55 and 44 FTE).



The 40 groups are composed of 9 joint units ("UMR" - *unité mixte de recherche*) that gather the University of La Reunion with one or more national research organizations; 17 joint units between national organizations and 14 research labs, composed of a single institution. The relative large share of joint units is the consequence of a strategy developed in the late 2000s to reinforce the integration of La Réunion is the national research landscape and to contribute to the emergence of critical masses in such fields where La Réunion singularities constitute an asset for research effort.

Despite the limited number of researchers, these groups embrace a broad panel of scientific domains: 24 operate in life sciences, 10 in physical and engineering sciences and 8 in social sciences and humanities; with a net preeminence of applied life sciences, which alone form a third of the groups.

Scientific domain	Panel[1]	Number of groups
Life sciences (24 groups)	Physiology, Pathophysiology and Endocrinology	1
	Applied Medical Technologies, Diagnostics, Therapies and Public Health	2
	Genetics, 'Omics', Bioinformatics and Systems Biology	1
	Immunity and Infection	2
	Ecology, Evolution and Environmental Biology	4
	Applied Life Sciences, Biotechnology, and Molecular and Biosystems Engineering	13
Physical sciences and engineering (10 groups)	Earth System Science	5
	Products and Processes Engineering	1
	Synthetic Chemistry and Materials	1
	Systems and Communication Engineering	1
	Computer Science and Informatics	1
Social Sciences and humanities (8 groups)	Cultures and Cultural Production	1
	Individuals, Markets and Organisations	1
	Institutions, Values, Environment and Space	1
	The Social World, Diversity, Population	4
	The Study of the Human Past	1

The research effort is supported by 6 cutting-edge platforms, covering the main fields of investigation, excluding energy transition:

- the Cyclotron Reunion Indian Ocean Biotechnology Platform (CYROI)
- the infectiology technical platform (PLATIN-OI)
- the Centre for Clinical Investigation and Epidemiology (CIC-EC)
- the Observatory for earth systems (OSU-R)
- the Center for Satellite-assisted Environmental monitoring of the Indian Ocean (SEAS-OI)
- the Plant protection plateforme (3P)

Name of the facility	Description	Owner	Human resources (FTE)	Facitilities	Research activities	Research Support	Innovation support	European infrastructures network
CYROI	Biotechnology plateforme	University of La Reunion / Centre hospitalier Universitaire	20-25 (approx.)	Cyclotron, small animal PET-scan, P2-P3 labs, NMR facility, microbiolo	Emerging infectious diseases, metabolic diseases,	Access to lab, research & technical equipment and offices	Access to lab, Physical, chemical and biologic al	NO

[1] According to ERC Panel structure 2019 : https://erc.europa.eu/content/erc-panel-structure-2019

				gy and molecular biology equipments, …	biodiversity extraction		analyses, business incubator	
PLATIN-OI	Infectiology technical platform	University of La Reunion	1	Level-three-security laboratory, animal facility and insectary	Emerging infectious diseases			NO
OSU-R	Observatory for earth systems	CNRS / University of La Reunion	15	Atmospheric observatory and instruments, hydrological station, Marine reef station, Forestry station	Systems monitoring and climate change effects	Integration of specific equipments, data provision, data analysis, researchers hosting		ACTRIS, ARISE, ENVRI+
SEAS OI	Satellite-assisted Environmental monitoring of the Indian Ocean	French government / Regional council of La Reunion / IRD/University of La Reunion	15	Data reception and remote sensing center of expertise	Urban planning, Coastal area management, flood risk	Data provision		NO
CIC-EC	Centre for Clinical Investigation and Epidemiology	Centre hospitalier Universitaire / INSERM	4	Clinical research capacities, medical data system, patient survey plateforme, biological samples conservation and analyses		Epidemiology studies support (methodology, statistique and logistical) for metabolic infectious and perinatal diseases	Clinical research for private sectors	NO
3P	Plant protection plateforme	CIRAD / University of La Reunion / Anses / FDGDON	N/A	Plant health laboratory, Plant clinic, NS2-NS3 quaratine	Plant Heatlh, Pathology and Molecular genetics,	Access to lab, research & technicalequipment and offices	Technology transfers, Biotech SMEs hosting,	NO

				levels labs, trial plots with insResearchect-proof shade houses, NS1-2 green houses, microbiology unit, mycology unit, chemical ecology center, insect breeding unit, biological resources conservation center, offices	Ecology, Biological resources conservation & dissemination		Analyses for private companies	

c) Transfer and innovation intermediaries

Driven by numerous national initiatives and regional support, multiple structures emerged during the 2000 to support the development of innovation projects :

- three centers specialized in technology transfer toward the private sector : CRITT for food-industries (run by the Reunion Chamber of Commerce), CIRBAT for construction and materials (Run by the chamber of trade and craft industry) and CITEB for aquaculture and marine bioresources (run by Nexa) ;
- the regional agency for development, innovation and investment, Nexa which assists the Regional Council in the design and implementation of research and innovation policies (such as the S3) and provides support to entrepreneurs and researchers in projects' funding, notably through H2020.
- the "Technopole" association, created in 2001 to manage business and technology parks
- a research incubator, operated by the Technopole
- a biotech incubator (CB-Tech) run by the CYROI platform
- a join unit dedicated to support the dissemination, transfer and use of academic research results coordinated by the University of La Reunion and the Consortium de Valorisation Thématique Sud (The French consortium dedicated to the transfer of technology to Southern countries)
- a competitiveness cluster, Qualitropic, created in 2005 to develop synergies and cooperation between companies, research and training centers in the agro-industry and bioeconomy field.

- a cluster dedicated to Energy transition, Témergie.

According to a study conducted by Nexa in 2016 on the collaboration between academic and economic stakeholders, based on return on experiences on 60 projects, the most used types of collaboration were :

- collaborative projects (18)
- the mobilization of a PhD student for a private project (CIFRE) (9)
- the mobilization of a post doctoral student (9)
- the creation of a start-up, with the support of a regional research group (7).

On the contrary, very few projects (2) were developed as spin-off from a public research activity. The main motives for collaboration were the need of scientific expertise, preexisting relations and the access to high-quality equipment. Most of these collaborations (56%) gave rise to product innovation, process and service innovation.

d) Private sector

Aside from Qualitropic and Temergie which present a marked innovation-orientation, several business sectors operate on the island, like :

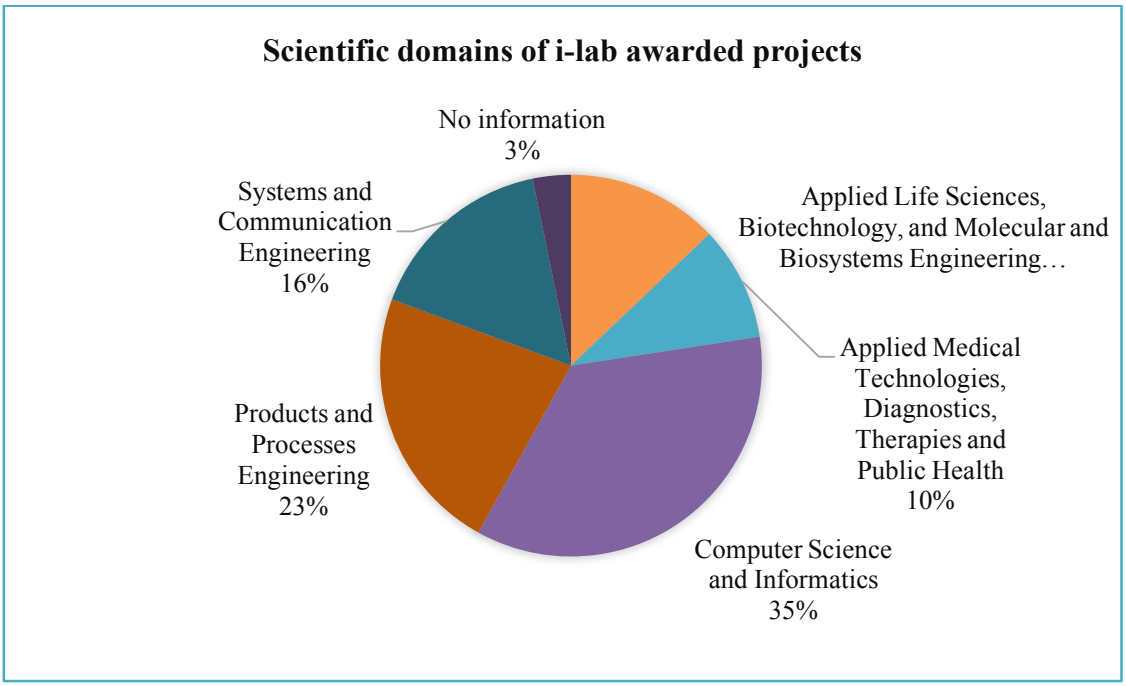
- Green, a cluster dedicated to waste management run by the union of trade and import businesses (SICR)
- Club Export, gathering international companies
- Digital Réunion, dedicated to ICT.

According to the last only and last edition of the Community Innovation Survey, conducted between 2008 and 2010, 53% of the local firms employing between 10 to 250 people had been innovating. The most cited types of innovation were organizational and marketing; product innovation appeared less represented than in mainland France.

% of innovation by category		
Type of innovation	**La Réunion**	**France**
Product innovation	17	24
Process	19	23
Organizational	43	36
Marketing	27	25
Total	53	53

Though regional and national scores appear very similar, this study does not reflect the reality of the innovation effort, for the sample considered excludes 95% of the productive system. 3 kind of entreprises dominate the innovation scene :

- established family firms, focused on the local market, that will develop organizational, processes, marketing and to a lower extent product innovations to preserve the relative market share
- ICT firms, which mobilize the digital transformation to propose new services to businesses and, to a lesser extent, to households
- Small high technology businesses, usually ran by an individual possessing a scientific background. Most of these firms are easily identified since they constitute the core user groups of the innovation-support system. They also frequently take part in local and national challenges, such as "I-lab", organized by the Ministry for Research and Innovation. Since 1999, 33 firms have been primed, 28 in the "emergence" category, 5 in "Development" phase. Most of them concentrate on computer sciences and engineering.



2) Limited and fragmented innovation efforts

Despite the efforts engaged to structure the regional innovation system, its performance remains limited, whatever the criteria considered. Such situation stems from the conjunction of three phenomenon: reduced human and financial resources dedicated to R&I, a high thematic fragmentation which inhibits the emergence of critical masses, and a marked lack of cooperation and coordination among stakeholders.

a) Limited capacities and efforts

The transition toward knowledge economy is first conditioned by the general education level of the population. Yet, the recent introduction of a modern and universal education system and its lack of adaptation to the postcolonial, multicultural and diglossia context, has

generated a persistent illiteracy issue. More than 116 000 people (23% of the 16-65 year old) do not read or write easily. Such phenomenon is not a temporary, generational matter, but a structural characteristic : more than 11% of the 18 years old are concerned, compared to 3,6% of the overall French population[1].

Despite the presence of the University and several graduate schools, welcoming each year more than 20 000 students, only 20,8% of the 25-64 year old have successfully completed tertiary studies, 10 points lower than the average NUTS2 score. La Réunion thus belongs to the 20% least performant regions in terms of tertiary education. Like illiteracy, this gap is not generational, but stronger for the 30-34 year old.

	Tert. Educ. 25-64 (%)	Tertiary educ. 30-34 (%)
La Réunion	**20,8**	**28,7**
Average EU 27	**31,0**	**39,1**
Decile	**2**	**2**
Ranking (274)	**228**	**233**

The lack of training impacts the research and innovation capacities. With 115 000 people with tertiary education and/or employed in science and technology, La Réunion belongs to the 10% least endowed European regions. This represents 29% of the active population, 10 points less than the European average score.

	Persons with tertiary education (ISCED) and/or employed in science and technology	% of active population
La Réunion	**115**	**29,08**
Average EU 27	**377,16**	**39,77**
Decile	**1**	**2**
Ranking (274)	**233**	**236**

Moreover, the tertiary educated workforce is for the most part not engaged in research or innovation activities, which mobilize only 755 people on the island (447 working for public or semi-public research institutions). In 2015, high-technology and researchers represented respectively 4 and 0,3% of the total jobs, which makes La Réunion one of the 20% least active regions.

[1] INSEE Réunion. *116 000 personnes en situation d'illétrisme en 2011 à La Réunion*. Octobre 2013

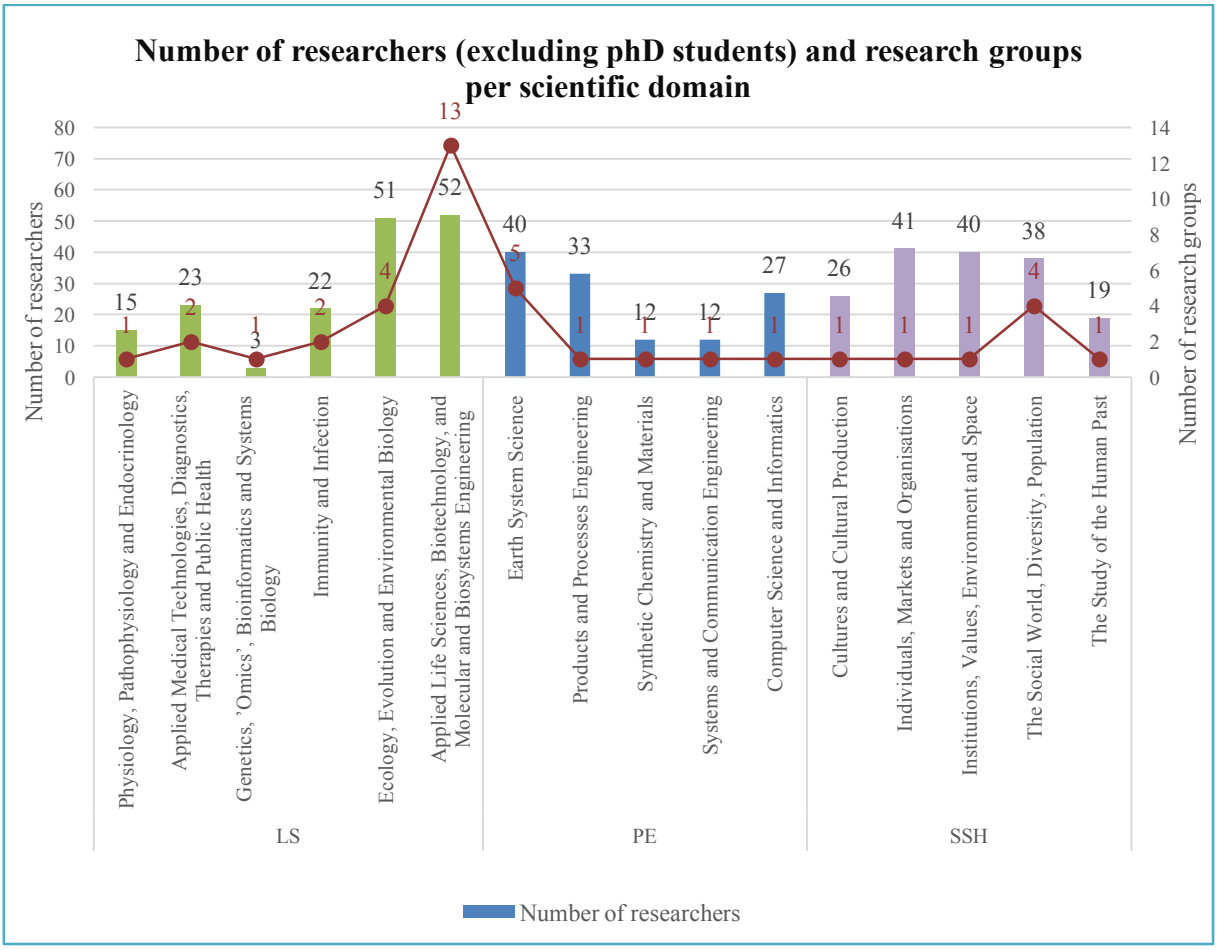
	Researchers (%)	High tech jobs (%)
La Réunion	**0,30**	**4**
Average EU 27	**0,66**	**1,7**
Decile	2	2
Ranking (274)	**185**	**243**

The limited implication of the workforce reflects and contributes to the reduced financial resources dedicated to R&I, which represented 0,58% of the GDP in 2013, compared to an average 1,48% in NUTS2 regions. The private sector represents only 20% of the effort, a consequence of the limited size of businesses and their orientation toward a protected local market, which requires a low level of innovation.

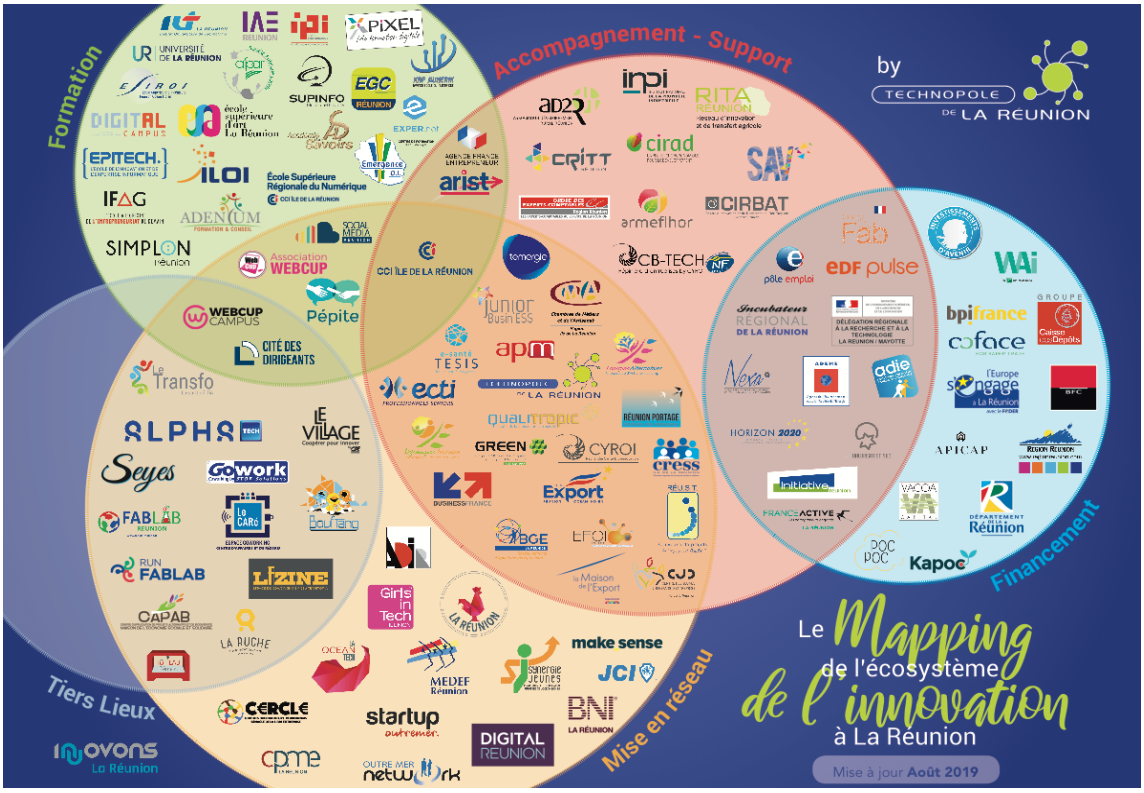
	R&D expenditures (%GDP)	Share of private R&D
La Réunion	**0,58**	**0,2**
Average EU 27	**1,48**	**0,5**
Decile	3	2
Ranking (274)	**182**	**256**

b) Fragmentation

Despite the limited resources mobilized on research and innovation, the effort is fragmented on a broad number of "priorities", which for the most part, lack the required critical mass to produce distinctive knowledge, know-hows and innovations. Such dispersion may be considered a consequence of the non-cooperative strategies engaged by stakeholders and institutions, nurtured by the lack of coordination and priorization by public authorities, whose intervention focus on the distribution of the ERDF envelop across the most pressing lobbies.



This phenomenon can also be witnessed in the innovation-support system, composed of at least 30 structures, which propose close services to the same kind of stakeholders and share a common objective : extend rapidly their perimeter of intervention to increase their negotiating position toward funding authorities. Such superposition is not only detrimental to the final users, who regularly complain on the complexity of the system, but also to the structures themselves, which more the most part struggle to comply to the European regulation on state-aid that limits the public support to 50% of the budget.



3) Impact on H2020 participation

Though the regional capacities and involvement in R&I remain weak, they alone cannot explain the very limited participation in Horizon 2020. Like for socio-economic indicators, La Réunion was compared to a series of region which present a similar profile in terms of tertiary education, R&D expenditures, or researcher number. Whatever the criteria considered, this analysis confirms the existence of an abnormal situation.

a) Tertiary education

On the 95 NUTS2 regions, with 20 to 35% of their 30-34 year old population engaged in tertiary education, La Réunion (28,7%) occupies the 90th rank in terms of H2020 per capita, per year. It is also part of the bottom 20% of the sample in terms of net EU contribution, with 1,8 M€ compared to an average 65 M€.

	Net EU Contrib. /Y.hab.Nuts2 (Euro)	Net EU Contribution (Euro)
La Réunion	0,44	1 879 192
Average	5,49	65 190 659
Average Nuts 2	12,89	135 880 529
Average +/- 20%	INF	INF
Decile	1	2

Such gap cannot be explained by economic conditions, since these regions share a close GDP per capita. Yet, La Réunion presents a peculiar profile, marked by a very low

population (almost half of the sample average) and the limited number of students involved in tertiary education. Combined to this size effect, the number of people holding a tertiary degree and/or employed in science and technology (HRCT) is almost three times higher in the other regions (314 000 vs 115 000). With the same level of tertiary education, La Réunion seems less engaged in the knowledge economy: research and innovation accounts for 0,58% of its GDP, and 1,1% in the sample. This could lead to a lesser participation in Horizon 2020.

b) Active population in R&I activities (%)

The island was then compared to 71 regions with a close level of HRST (15 to 25% of their active population). This group includes many island or outermost regions such as Baleares, Corsica, Guadeloupe, Guyane, Notio Aigaio, Voreio Aigaio, Sardegna, Sicily, Madeira. All of these regions have in common a globally weak participation to Horizon 2020 (with 3,8 euros per capita per year), that confirms the determinant impact of human resources. Yet, among them, La Réunion distinguishes itself with a much higher GDP (top 20%) and a relatively large investment effort (top 40%). Once again, its small population (bottom 30%) and limited tertiary education affects the human capacity, measured by HRST expressed in thousand people (20 041 vs. 49 999). Though the gap is less critical than the previous sample, La Réunion belongs to the 3rd decile in terms of EU contribution and to the 2nd per capita.

	Net EU Contrib. /Y.hab.Nuts2 (Euro)	**Net EU Contribution (Euro)**
La Réunion	0,44	1 879 192
Average	3,81	35 277 350
Average Nuts 2	12,89	135 880 529
Average +/- 20%	INF	INF
Decile	2	3

c) Active population in R&I activities (nb)

To neutralize the size effect of the two previous samples and better reflect the human capacities (potentially) engaged in research and innovation, the analysis of HRST expressed in number of people is instructive. The 33 regions with 80 to 150 000 people holding a tertiary degree and/or engaged in scientific and technological activities, are for 90% of them less populated and dense than La Réunion. Yet, their tertiary training effort appears significantly higher (in 80% of the considered regions) with 40% of the 30-34 year old versus 29% in La Réunion. They also dedicate a much larger share of their GDP (1,25 vs. 0,58%) to research and innovation. Despite their limited size, these regions thus show a strong R&I orientation which leads to a higher performance than the average Nuts2 regions in terms of EU contribution per inhabitant. Once again, La Réunion belongs to the bottom 10% regions using this criteria and the bottom 20% in net EU contribution.

	Net EU Contrib. /Y.hab.Nuts2 (Euro)	Net EU Contribution (Euro)
La Réunion	0,44	1 879 192
Average	13,48	37 219 659
Average Nuts 2	12,89	135 880 529
Average +/- 20%	INF	INF
Decile	1	2

d) Researchers in the active population

Once again, the 68 regions with a close share of researcher in their active population (0,2 to 0,4%) comprise many islands such as the Azores, Baleares, Canary, Cyprus, Malta, Sicily. This group presents very similar performances to La Réunion in terms of tertiary education (24 vs. 20,8%) HRST (33 vs. 29%); R&D intensity (0,68 vs. 0,58%) and GDP (21 158 vs. 20 400€ per capita)

Yet, despite these similitudes, the regions obtain on average 13 more H2020 funds and 8,5 per capita.

	Net EU Contrib. /Y.hab.Nuts2 (Euro)	Net EU Contribution (Euro)
La Réunion	0,44	1 879 192
Average	3,76	24 523 351
Average Nuts 2	12,89	135 880 529
Average +/- 20%	INF	INF
Decile	1	2

e) Research and innovation expenditures

The 81 regions that dedicate 0,3 to 1% of their GDP to R&I share many common points with La Réunion : a close GDP (21 488 vs 20 400), a close proportion of researchers (0,36 vs. 0,29% of the active population). However, they tend to invest more in higher education (36 vs. 29% of the 30-34 year old). In this sample, La Réunion constitutes the 2nd least H2020 beneficiary per capita, and the 4st least globally, far away from the average scores of 5,71€ per capita and 40 M€ per region since 2014.

	Net EU Contrib. /Y.hab.Nuts2 (Euro)	Net EU Contribution (Euro)
La Réunion	0,44	1 879 192
Average	5,71	40 122 710
Average Nuts 2	12,89	135 880 529
Average +/- 20%	INF	INF
Decile	1	1

f) Profile of other EU regions presenting the same H2020 participation

To better understand the singularities and blocking points faced by La Réunion, the reverse comparison with regions that present a close level of H2020 participation is particularly instructive. Compared to the 33 regions which obtain less than 1 euro per inhabitant, per year, the island presents a much higher GDP per capita (20 400 vs. 15 625 €) which makes it one of the 20% richest. It also lies in top 10% in terms of researchers employed and R&D expenditures. Yet, even compared to this sample, La Réunion presents a low performance in terms of tertiary education, and a slightly above average percentage of the active population holding a tertiary degree and/or employed in scientific or technological activities.

g) Synthesis

The comparative analysis of demographic, socio-economic and innovation-related indicators highlights the cumulative effect of a set of factors. Physical, deterministic approaches which consider small size and insularity as key obstacles to participate in Horizon 2020 are not confirmed by the analysis: these regions present a performance slightly inferior to the average Nuts 2. As mentioned earlier, regions with very limited tertiary educated active population (in absolute numbers) even participate more than average.

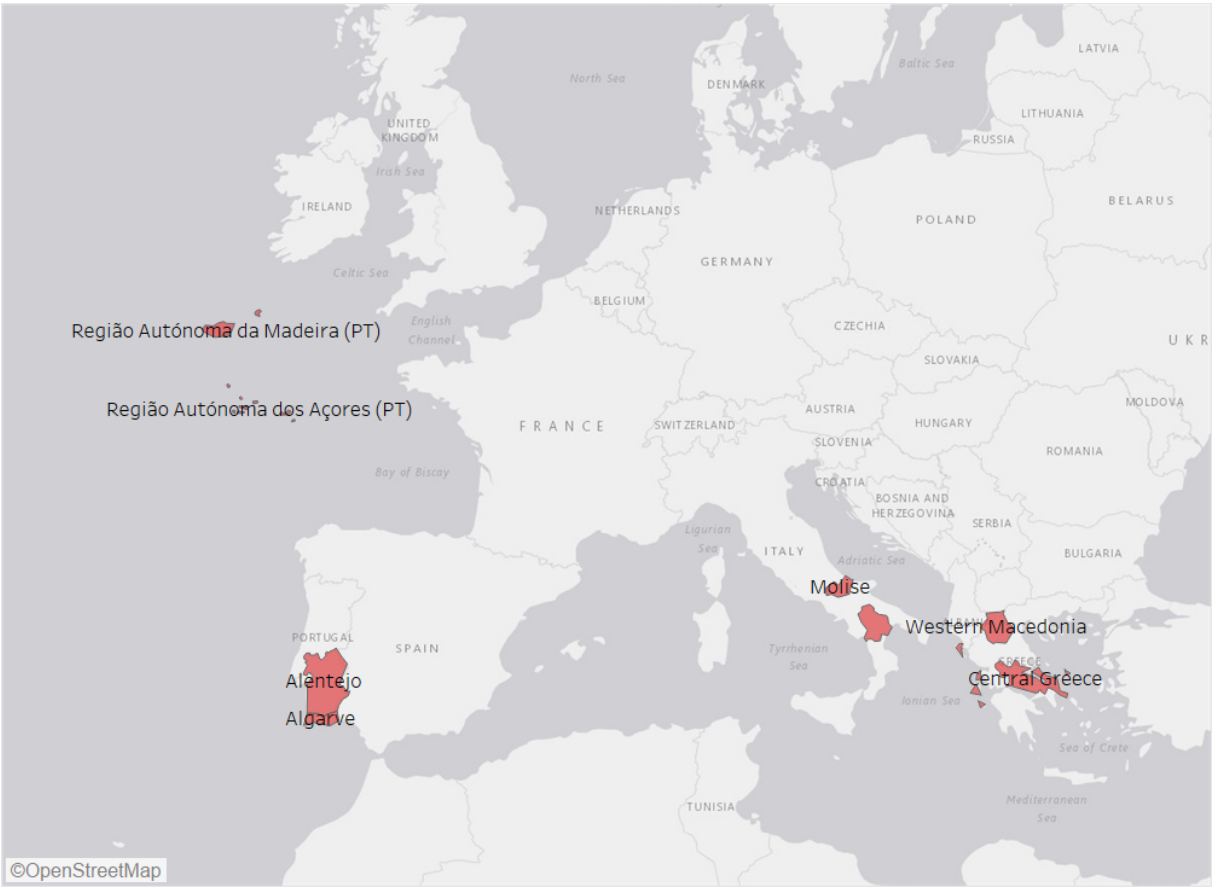
	Criteria	EU contribution per capita per year	La Réunion position
Physical	Islands	10,51	2
	Population 600 to 1 M	10,67	1
Socio-economic	PIB 18 to 22 k€	5,13	1
	Employment rate < 60%	9,27	2
	Unemployment rate 18 to 27%	5,53	3
Education	Tert 30-34yr; 20 to 35 %	5,49	1
Research and innovation	HRST 25 to 35% pop active	3,81	2
	HRST 80 to 150 000	13,48	1
	GERD	5,71	1
	Researchers 0,2 To 0,4	3,76	1
Average NUTS 2		0,44	1
La Réunion		12,89	

Conversely, La Réunion participation appears to be first undermined by its relatively low GDP, a phenomenon common to most convergent regions and confirmed by the analysis

conducted by the Joint Research Council on the Widening Program[1]. This economic obstacle is reinforced by the small proportion of the people benefitting from tertiary education and above all by the very limited importance of knowledge economy on the island. The global lack of involvement of the private sector in the research and innovation effort (80% of which remains public), the strong focus on local and protected economic activities lead to an underuse and misuse of this human potential. As a consequence, the economy remains trapped in low added-value specializations, and does not reach the required critical masses of financial and human effectively mobilized resources.

Yet, the characteristics of the regional innovation system do not, by themselves, explain the limited participation in Horizon 2020, which remains abnormal. The compilation of 4 major indicators – a GDP between 18 and 22 k€ per capita, a HRST between 20 and 35% of the active population, a R&D effort inferior to 0,6%, a population between 200 and 1 M€ inhabitants – constitute a group of 9 regions :

- 3 Greek (Dytiki Makedonia; Ionia Nisia; Sterea Ellada)
- 2 Italian (Molise and Basilicata)
- 4 Portuguese (Algarve, Alentejo, Açores, Madeira)



[1] PONTIKAKIS et alii. *Mobilising European structural and investment funds and Horizon 2020 in support of innovation is less developped regions. 2018*

3 of these regions are islands and/or Outermost regions the rest occupy a peripheral position, with frequently mountainous landscapes. With similar characteristics, they have obtained on average 3,84 euros per capita, representing 7,9 million euros.

	GDP	HRST	HRST %PA	Intramural R&D expenditure (GERD)	Net EU Contrib. /Y.hab.Nuts 2	Net EU Contribution
	PPS per HAB	**Thousand**	**%pop active**	**% of GDP**	**Euro**	**Euro**
Dytiki Makedonia	**18 792**	**32,9**	**27,3**	**0,33**	**1,99**	**2 794 219**
Ionia Nisia	**19 925**	**21,1**	**21,7**	**0,27**	**1,10**	**1 137 631**
Sterea Ellada	**18 875**	**56,0**	**23,1**	**0,39**	**4,70**	**13 110 235**
Molise	**20 342**	**43,4**	**31,8**	**0,51**	**0,99**	**1 556 207**
Basilicata	**19 725**	**70,0**	**29,8**	**0,60**	**2,14**	**6 178 712**
Algarve	**21 783**	**52,2**	**25,2**	**0,36**	**6,19**	**13 672 326**
Alentejo	**19 400**	**81,2**	**24,7**	**0,54**	**4,54**	**16 936 151**
Azores	**19 008**	**24,1**	**22,7**	**0,42**	**4,41**	**5 435 166**
Madeira	**20 433**	**27,3**	**23,9**	**0,35**	**8,49**	**11 102 508**
Average	**19 809**	**45,3**	**25,6**	**0,42**	**3,84**	**7 991 462**
La Réunion	**20 400**	**115**	**29,08**	**0,58**	**0,44**	**1 879 192**

C - Regional policies, the unfindable synergies ?

One of the explanations to this abnormal participation, almost 9 times inferior to reference regions, may be found in the way regional policies for research and innovation have so far been implemented. In 2013 and 2014, to counteract the major dependencies and sources of vulnerabilities exposed on (A) more than 200 people took part in the design of the smart specialization strategy. This exercise was then considered an opportunity to collectively question the development model inherited from the departmentalization and to turn the high ecologic, energetic, economic and social challenges into new opportunities of prosperity and resilience. Such strategy relied on a strong outward looking orientation, notably through the proclaimed will to reintegrate La Réunion in the European research and innovation ERA to reach critical masses and position the island as a European knowledge hub in the Indian Ocean, exporting innovative solutions to third countries. Despite the efforts and resources mobilized, the experiences developed, the participation in FP has registered a sharp decline between FP7 (3,6 M€) and Horizon 2020 (1,8 M€). Largely because the established habits and behavior detrimental to H2020 remain and have been encouraged by the management of ERDF funds dedicated to research and innovation.

1) S3, a transformation challenge

The elaboration of the smart specialization strategy occurred few years after a crisis that revealed the very vulnerability of the economy, whose growth and sustainability mostly relies on massive and regular financial, material and energy flux that supports the population growth and a solvable, internal market, protected from imports. If the 2007 crisis constituted a first alert, major phenomenon threatens the pillars of this model in the medium term. The global ecological crisis, biodiversity collapse, soils exhaustion and material depletion will lead in the coming years to a critical reduction of the imported flux necessary to maintain the island metabolism. Meanwhile, the critical demographic and economic growth on a small territory, dominated by vulnerable endemic ecosystems, has led to major ecological challenges, which need to be urgently addressed. The import-substitution economic model is itself threatened by the progressive saturation of the local market, the European liberalization dynamic and free-trade agreements, as well as the downturn of public transfers due to budgetary constraints.

Facing such threats, the first reaction stands in the traditional "insularity fatality" syndrome : due to its limited size and resources, its negligible bargaining position and the lack of economy of scale, La Réunion would be condemned to suffer passively such evolutions and to ask for more protection and help. The alternative approach, promoted by the S3, calls for a paradigm shift on the way island characteristics are considered: the so-called "handicaps" are naturalized disadvantages induced by the import of a mass-production/consumption economic system that relies on fossil fuels and economies of scale. Such model is currently collapsing, challenged by revolutions like the ecological economy, digitalization and 3-D printing, the return of territories and proximity economy, the shift of the global economy toward Asia and Africa. All these revolutions offer the opportunity to reconsider island singularities as valuable assets rather than handicaps to be suppressed. Indeed, because of its characteristics – a densely populated, resource-consuming remote island with vulnerable ecosystems – La Réunion faces a challenge that will concern tomorrow most the territories : invent an economy respectful of the capacities and rythms of natural ecosystems, which constitute its main asset. This represents a unique opportunity to turn the island into a European living lab for ecological transition and develop knowledge, know-how and exportable solutions for other territories in Europe and elsewhere in the world.

The actualization of such ambition is dependent on the ability to strengthen research and innovation capacities to connect to other European and international research and innovation ecosystems. In an era of globalization, marked by the concentration means and talents in a few global hubs, peripheral territories risk to be trapped in a vicious circle, where the lack of resources hinders the emergence of a performant and attractive RDI ecosystem, which in turn inhibits the development of critical masses. To counteract this dynamic, La Reunion thus combines smart specialization with smart connections with European and worldwide partners.

2) Priorities

The S3 priorities were defined according to their capacity to contribute to a more resilient region through the development of innovation solutions exportable to other regions

and the creation of critical mass of singular knowledge and know-hows. Globally, 5 priorities emerged : tropical bio-economy, energy transition, healthcare solutions hub, experiential eco-tourism, and social innovation.

a) Solutions for a tropical bioeconomy

To secure the productive basis in a coming era of scarcity, the first imperative remains the conservation of the islands' ecosystems, which condition all social and economic activities and play a key role in the development through the production of ecological services such as climate regulation, rainfall, fertile soil, raw materials and energy. This challenge is especially relevant in a small region of 2 500 km² where 30% of the surface is covered by slopes with an incline greater than 30% and facing a growing conflict of land use. The effects of anthropization, climate change and the proliferation of invasive species put these habitats at risk. This constraint can be treated as an incentive to develop an ecological economy, that addresses the need of a fast growing population while preserving thriving ecosystems. Such opportunity incorporates not only products but also expertise, built along a coherent value chain made of 5 segments :

- Ecological monitoring, conservation and restoration solutions for tropical insular environments
- Marine biodiversity conservation and management
- Agro-ecological practices and production
- Active ingredients and agroproducts from local biodiversity

Sectorial mapping in tropical bio-economy

Innovation-market pairs	Research centers	Transfer & innovation support	Other public bodies	Business clusters
Ecological conservation and restoration solutions for tropical insular environments	CIRAD Botanical Conservatory of the Mascarene Islands University of La Reunion Research groups : PVBMT, OSU-R,	ARMEFLHOR (agricultural technical institute) 3P	National forestry commission County council National Park of Reunion Island	Qualitropic horticulturists association
Agroecological practices and production	CIRAD University of La Reunion eRcane (sugar cane private center)	Chamber of Agriculture ARMEFLHOR (agricultural technical institute) 3P (plant protection plateforme) RITA (Networks for agricultural innovation and technology transfer)	National Park of Reunion Island	Qualitropic Farmers's associations (AROPFL,AVAB, GAB), Sugar producers' union, Medicinal plant producers associations (ADPAPAM, APLAMEDOM, CAHEB)
Marine biodiversity conservation and management	IRD IFREMER University of La Reunion Research groups : ENTROPIE ESPACE DEV	CITEB	Regional blue institute Reunion natural marine reserve	Qualitropic Maritime cluster
Active ingredients and agroproducts from biodiversity and tropical resources	Academic labs (LCSNSA, DETROI, PIMIT, PVBMT) eRcane	CYROI CRITT SAS Eco-ex CITEB		APLAMEDOM ADIR (Association for Reunion 's industrial Development) AROPFL (Federation of fruits and vegetables producers' associations) Qualitropic

b) Energy transition in islands

The departmentalization marked the entry of La Réunion into the"thermo-industrial" era, where techniques, knowledge and practices relied heavily on fossil fuel exploitation. If this change has triggered a clear improvement in life conditions and a substantial growth in population, it also led to an exponential increase of the carbon dependency. In a time of global declining resources, this shift has tremendously increased the vulnerability of a small and isolated island that lacks fossil fuel resources, and thus imports up to 800 M€ yearly. The

decarbonization challenge is thus an ecological and economic opportunity, which considering the absence of connection to a continental grid, necessitates to adapt the energy demand to local production capacities. . This ambition raises technological, economic and social issues : in a centralised but non-interconnected power system, dealing with intermittent energy sources makes the management of supply and demand a real difficulty and constitutes an obstacle to the integration of RES on the grids. Moreover, in a tropical humid and warm climate, thermal comfort solutions and industrial heat/cold needs rely on carbon-intensive electricity sources. In addition, large-scale renewable energy plants generate use-conflicts with agricultural land, essential to food security, or natural habitats providing ecological services... These constraints are actually opportunities to strengthen knowledge and know how in energy transition in tropical islands that will be exported in territories facing tomorrow our today's challenges. Three innovation-market pairs constitute our research&innovation priority in energy transition:

- Tropical bioclimatic eco-building
- Renewable energies production
- Smart and small grids in non-interconnected system

Sectorial mapping in Energy transition

Innovation-market pairs	Research centers	Transfer & innovation support	Other public bodies	Business clusters
Tropical eco-building	University laboratories (LE2P, PIMENT)	CIRBAT	Ademe EDF CAUE	Consular chambers ADIR FRBTP CerBTP
Renewable energies production	University laboratories (LE2P, PIMENT)		Ademe EDF SPL Energie Reunion Nexa	Temergie
Smart and small grids	University laboratories (LE2P, PIMENT)		Ademe EDF SPL Energie Reunion Nexa	Temergie

c) Regional healthcare solutions hub

During the last 50 years, La Réunion has undergone a health revolution, accompanied by an epidemiological change : infectious diseases which were responsible for almost 50% of the deaths in 1950s, now accounts for less than 2%. 2005. As a result of rapid and massive changes in lifestyles and environment, Reunion is now exposed to metabolic, diabetic and cancer risks. The most frequent diseases encountered in Reunion are related to the circulatory system and tumours (30.3% and 20.6% of deaths, respectively) as in mainland. In addition, the subtropical climate and geographical proximity with Africa's estearn coast puts Reunion & Mayotte at risk for new infectious diseases, espacially vector-borne epidemics (Dengue, Zika). Therefore, the health system has to become “glocal”, in order to respond to local and

global issues. La Reunion needs to manage health hazards caused by the local specifics, which were catalysed by departmentalisation : metabolic diseases, diabetes, obesity, kidney disease, hypertension, birth but also monitor and eliminate tropical hazards which affect the Indian Ocean area. In this context, two innovation-market pairs have been identified :

- Prevention of metabolic and infectious diseases in insular tropical context
- Innovative integrated & customised diagnostics and therapies

Sectorial mapping in Health

Innovation-market pairs	Research centers	Transfer & innovation support	Other public bodies	Business clusters
Metabolic and infectious diseases prevention in insular tropical context	University of La Reunion CHU INSERM IRD CIRAD Research units : DETROI, ICARE, IRISSE, MIVEGEC,	CYROI CIC-EC	ARS	CB tech Qualitropic
Innovative diagnostics and therapies	University of La Reunion CHU INSERM IRD CIRAD Research units : DETROI, IRISSE, PIMIT, DSIMB, MIVEGEC	CYROI CIC-EC Eco-Ex	ARS	CB tech Qualitropic Aplamedom GIS TESIS

d) Experential eco-tourism

La Réunion holds remarkable comparative advantages for tourism : exceptional natural heritage (protected by a National Park, part of the Unesco World Heritage, thanks to its Cirques, Pitons and Remparts, its Volcano, biodiversity hotspot, Marine Park), tropical climate, diverse recreational activities, cultural, religious and gastronomic culture, modern equipment in a safe health and political environment, and, finally, its status as a French island at the heart of the Indian Ocean. In total, tourism already makes up almost 8% f the island's GDP and creates 6,750 direct jobs. Thus, tourism is a regional priority, as it has an immense growth potential to create diverse jobs and support the development of other sectors through an integrated approach (development of farming, traditional and industrial productions; services; commerce; digital solutions; environment; developing the island's highlands, etc.). The goal of S3 is to focus on innovating the island's tourism offering, by emphasizing differentiation, capturing high-value market niches (which are characterized by a relatively inelastic demand due to transportation and accommodation costs), proposing appealing solutions, and maximizing economic spin-offs. Innovation also seems to be the key to

reducing the tourism industry's exposure to current risks (international competition, natural hazards, such as sharks) and future risks (increase in transportation costs, emergence of new destinations, etc.).The tourism innovation strategy relies on emphasizing differentiation and capturing high-value market niches in tropical multicultural environment.

Sectorial mapping in Eco-tourism

Research centers	Transfer & innovation support	Other public bodies	Business clusters
University of La Reunion **IRD** **CBNM** **Research group :** **OIES, CEMOI**		Park national of La Reunion National forestry commission Regional council Departemental council SPL Musées régionaux DAC OI	Tourism Club FRT Sports federations

e) Social innovation for a responsive and smart territory

Through its history, La Réunion has been stricken by numerous shocks and crises, overcome thanks to the resilience of its inhabitants. Today, new challenges are emerging and the society needs to adapt at accelerated rythms, despite the dissappereance of several social "shock absorbers" through the "modernization processes". The island's resilience, agility and, capacity to bounce back can no longer be considered a lifetime warranty. They must be renewed, strengthened, and adapted to new challenges through the mobilization of regional stakeholders to better address non-covered social needs, notably adapted education and effective illiteracy programs, stronger community relationships, promotion of self-organization, etc.

Sectorial mapping in Social innovation

Research centers	Transfer & innovation support	Other public bodies	Business clusters
University of La Reunion **IRD** **Research groups :** **ICARE, LCF, OIES**	CRESS Couveuse reusit Boutique de Gestion	AGORAH Regional council	

3) Innovation system action plan

In addition to these thematic priorities, the S3 proposes on a structural, cross-cutting action plan designed to facilitate the entrepreneurial discovery process, i.e. reveal through a trial and error process the precise activities that will forge the new knowledge economy and hold a competitive advantage. To do so, the S3 pursues one objective: to increase the quantity and quality of innovative projects developed on the island. This objective itself depends on the ability to produce and absorb knowledge and skills and mobilize effectively such

resources to generate new activities and prosperity. To support his endeavor, five axes have been determined:

a) Strengthening and mobilizing talents

To address the relatively limited regional capacity and will to innovate, the first priority focuses on capacity-building through :

- the development of excellence research and innovation infrastructures and programs, as well as investments in tertiary education (notably through higher education infrastructures, doctoral and post doctoral scholarships)
- the stimulation of a culture of innovation and entrepreneurship, through a regional promotion strategy and training programmes adapted to all key audiences (students, PhD students, entrepreneurs, employees, established firms, public stakeholders) supported by a common programme of conferences, prizes and competitions
- the mobilization of businesses and business support entities through advanced training on innovation methods and new business models; the detection of potential innovations and the support for innovation management.

b) Developing fruitful proximity and efficient collaborative support services

Proximity plays a major role in the innovation process : it facilitates the production and exchange of knowledge and their combination into innovation, as well as the constitution of critical masses. To encourage such fruitful interactions, several type of initiatives are supported : the development of research and innovation networks and clusters, the promotion of collaborative projects, the mobilization of regional stakeholders in prospective and territorial intelligence activities. Collaboration is also key lever to increase the quality of the support services provided to entrepreneurs and innovators, which suffers from the high fragmentation depicted supra. To counteract these tendencies and propose clearly identified, accessible and effective services, a strong focus is paid to the structuration of a regional, mutualized and coordinated support service, that relies on two principles : the specialization of each support structure on a specific field of activity or service, the mutualization of generic services (like financial engineering, access to competitive funds, expertises, etc.).

c) Encouraging international connections

The lack critical mass, attributed to the island's small size and remoteness, is no fatality. In a world of large communication networks, its isolation appears less physical than relational : La Réunion narrowly focuses on itself and mainland France and limitedly exploit the opportunities offered by both the Indian Ocean basin and the European Union. In order to take advantage of these opportunities, a strong attention is paid to the integration in promising networks, through a double orientation.

On the one hand, the reinforcement of the region's attractiveness, to attract and preserve resources and talents that will condition its innovation capacities and competiveness.

Such attractiveness strategy is based on a clear positioning: make La Réunion known as a European hub for ecological transition in tropical island context. A selected promotion strategy is thus implemented to identify and attract strategic partners in the S3 sectors, exploiting the strategic position, the quality of the ecosystem and the privileged funding conditions proposed.

On the other hand, a large emphasis is put on the international development of local businesses through the export of high quality, singular, products, services and concept. This is achieved through the development of knowledge – on target markets, on the island's competitive positioning, on potential stakeholders and regions with which synergies can be established – as well as a support of business clusters, the participation to business meetings and the organization of export missions.

d) Promoting the integration within European research and innovation area

To accompany the economic transformation of the island, and accelerate the construction of competitive advantages, the connection to global networks of excellence is a prerequisite. Besides the creation of new knowledge and the increased scientific productions through cooperation, such integration constitutes an opportunity reach critical masses through networking and to play a role in the global knowledge economy. Since the latter is conditioned by agglomeration effects, it encourages – coupled to globalization – the concentration of resources and talents in a few dynamic hubs, which becomes more attractive and competitive… At the opposite end of the spectrum, small and remote region face a risk of marginalization, for they don't present the required critical masses. To break this vicious circle, the S3 thus dedicates means to reinforce the integration in the European research and innovation area, through the development of H2020 projects.

To that end, in 2014, the regional innovation agency – Nexa, and the University of La Réunion created a mutualized European office whose goal is to connect Reunionese research groups and innovation stakeholders to European centres of excellence in strategic areas. It thus presents an original organization compared to other European support services, traditionally integrated in one organization and accessible for its members only. Having a common EU support services at a regional level presents many benefits: all organisations can refer to the same support service and offer a global vision of the various project opportunities; resources can be pulled and engineers fully dedicated to the development of projects; it also encourages cooperation.

Funded by the Structural Funds, the State and the Regional Council, the European office provides support to the setting up of projects responding to calls of proposals launched by the European Commission. It offers free services to researchers and innovators from the University, research centers, regional institutions and SMEs to help them develop projects in Horizon 2020, Interreg Europe and other EU funding opportunities such as the Life and best programmes. Two projects engineers originally the European Office which mobilizes an average 55 000 euros per year to finance the activities carried out. Since 2016, the office is

restricted to Nexa, as the University redirected its personnel to the development and management of ERDF projects.

The services proposed have been adapted to the large proportion of "new comers" in Horizon 2020. For these users, having a successful first experience in project submission is decisive to avoid a perceived waste of time and resources which may results in increasing self-selection behaviour. Yet, their probability to succeed remains limited. To combine these two objectives, a specific process of project development has been developed with the help of "Key Innovation". Composed of 9 steps, this process aims at qualifying the maturity and success potential of the project, allowing the candidate to stop the development if the chances or resources are too low.

Type of services	Description
Interface with European commission, NCPs…	The European Office, shares with the European institutions (Commission, Parliament) and other national intermediaries (ministries, NCP's) propositions to better include OR in Horizon 2020, promote research capacities and important research fields for Reunion Island in the EC work programmes. It also informed local researchers of important EU decisions in their fields.
Horizon 2020 Awareness raising	The European Office is the local contact point to the Reunionese research and Innovation community; it maintains a certain level of understanding of the framework programmes in the community and promotes opportunities and in participating in H2020.
Detection of potential regional project leaders	The European office identifies potential H2020 successful participants and proposes adapted support to empower them with the correct skills, network, processes…
Horizon 2020 training	Training on Horizon 2020 development process from the selection of the call to the submission of the proposal.
Detection of funding opportunities	The European Office screens Horizon 2020 opportunities to share with potential H2020 candidates.
Consortium building and networking support activities	The European office identifies the right partners and networks in order to enter collaborative projects. When detecting a strongly relevant call the European office produces a promotion document presenting the added value of local partners. This is sent out to European networks and actors potentially developing a proposal. This has led to the participation of Reunion in the REACT project.
Proposal development cycle	Support in proposal conception, partners search, proposal writing, budget consortium coordination, drawing up budget, proposal submission
Supporting implementation of successful projects	information point and support for the implementation of the project

Since 2014, a total of 27 projects have been financed by EU funds (all competitive programs considered). 25 of them benefited from a support from the European Office. 92% of

the Horizon 2020 successful projects were supported by the office and only 64% for other types of competitive programmes (LIFE, COSME, Interreg Europe, BEST etc…). The prevalence of Horizon 2020 in the support provided to successful project may be the result of an internal policy to concentrate the European office effort on research and innovation programmes which resulted in hiring project engineering more specialised on FP programmes. In 2019, Nexa hired another project engineer to further develop projects in conservation oriented European programmes such as LIFE and BEST.

On the 13 successful H2020 projects developed on the island, 12 have been supported by the European Office. This indicates a strong visibility induced by the organization of many awareness sessions and regular encounters with regional stakeholders. On this 12 projects, 2 have beneficiated from support during the proposal development phase only; 2 at the implementation phase only and 8 during both steps. Thanks to the awareness sessions organized and the regular encounters with regional stakeholders, the office benefits from a strong visibility : only 2 projects were submitted during Horizon 2020 without any support

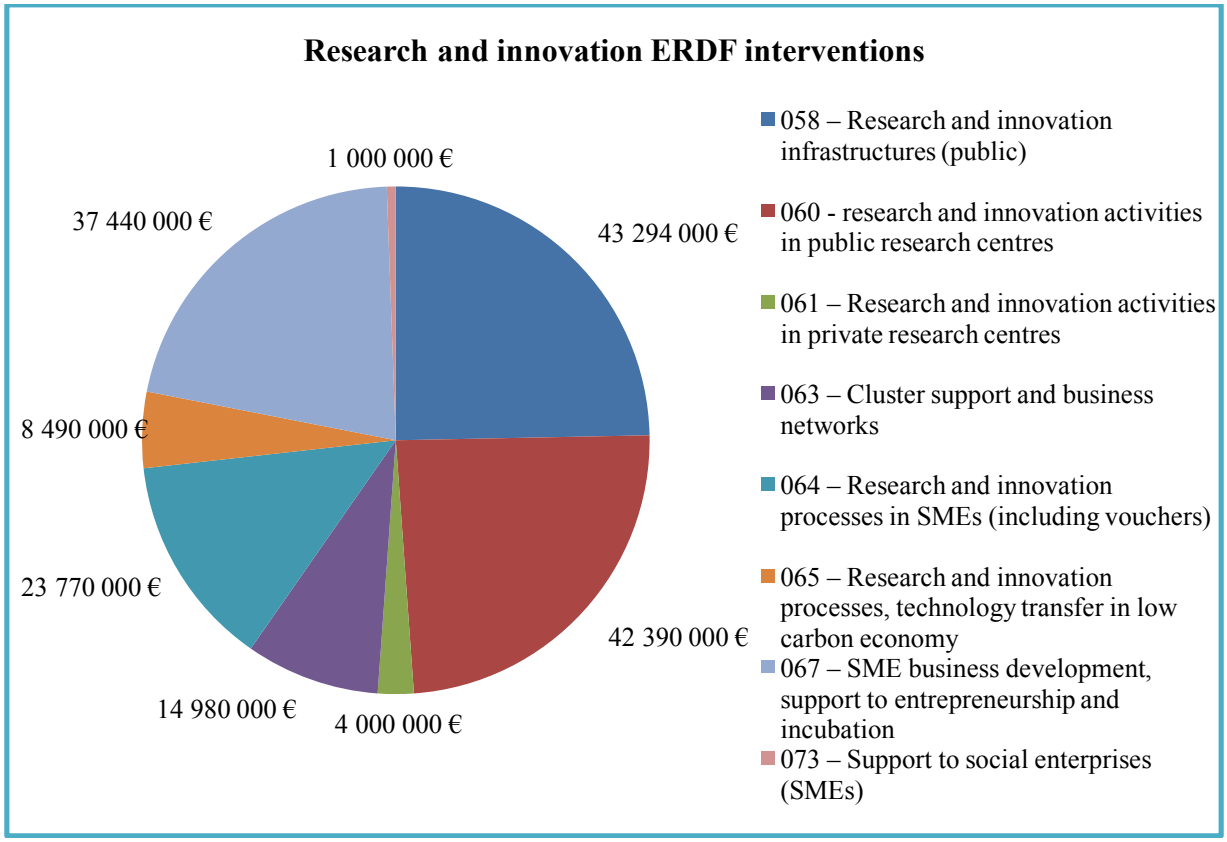
3 of the successful projects (SCREEN, REACT, FORWARD) as well as 1 Interreg Europe (REPLACE) included regional partners thanks to the connections of the European office, which highlights the importance of consolidating and developing relations with European networks such as ERRIN or Eurada, to increase the participation of Outermost regions.

4) The ERDF complex

Though the regional smart specialization strategy conditioned the access to and was supported by structural funds, their impact on H2020 participation remains ambiguous.

a) A large ERDF endowment for research and innovation, with limited H2020 impact

The Thematic Objective n°1 of the 2014-2020 ERDG programme mobilizes 136,9 €. If one enlarges the budget to the categories of intervention contributing to the development of research and innovation, the efforts sums up to 175 M€, distributed as follow :



To ease the comparison, the relevant categories of intervention were aligned on those selected by Pontikakis & al in their 2018 report on less developed regions[1]. Half of this budget is dedicated to public research infrastructures and projects, 15M€ for cluster and business networks and 61 million for SME business and innovation development.

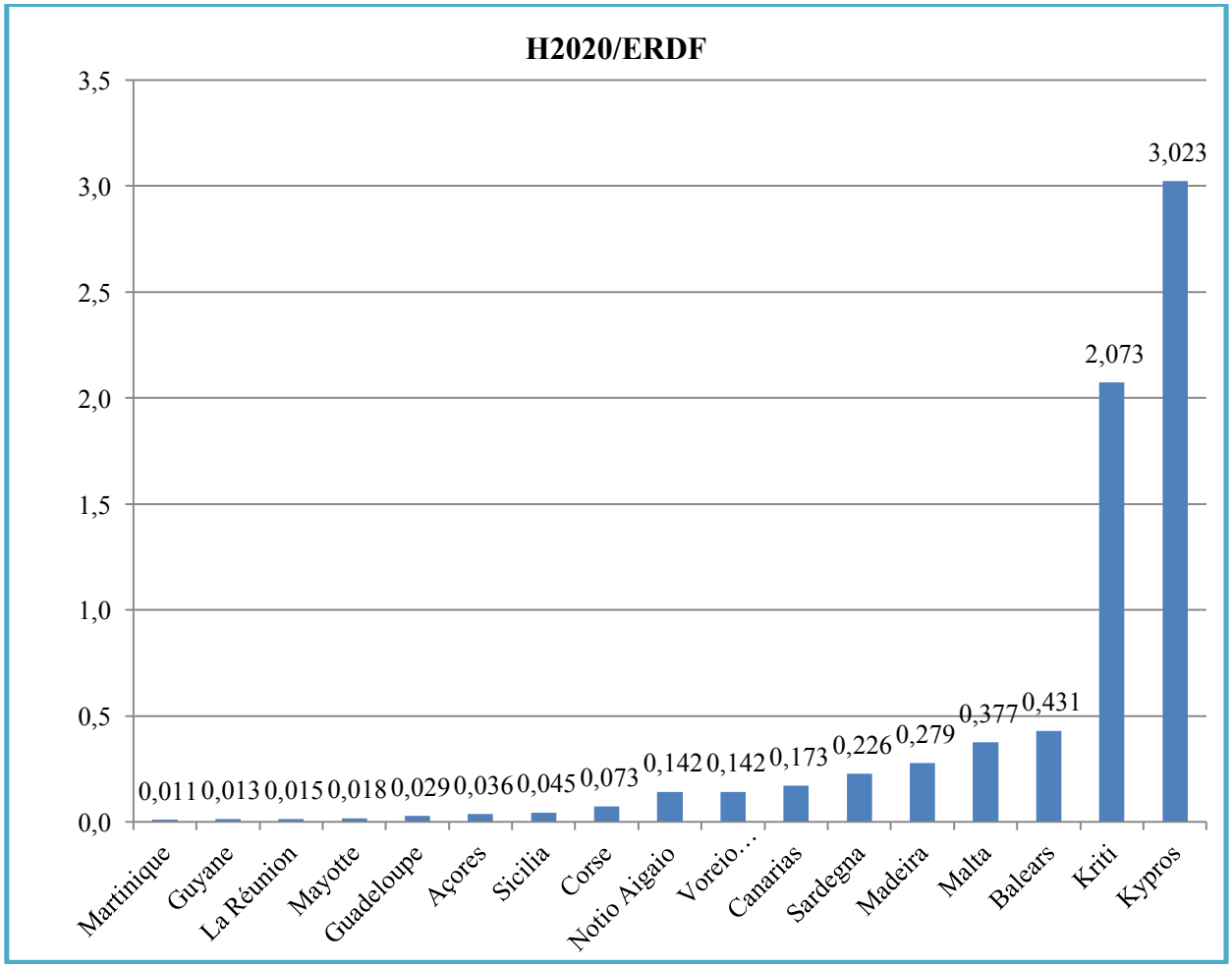
Thanks to the "ESIF viewer" tool developed by the JRC on the S3 platform, data on regional innovation expenditures per capita, per year, were extracted on 124 NUTS2 regions (the initial list of 194 included 70 NUTS1 regions). Such effort represents an average 23€ per inhabitant. With 32€, La Réunion lies among the 20% regions that dedicates the highest amount to research and innovation. This performance is largely due to the large ESIF obtained by the island (1,66 billion euros).

The comparison between the amounts of ESIF and H2020 obtained confirms the singularity of La Réunion, and its abnormal participation. Among the 40 regions that dedicate between 20 and 50 € ESIF to research and innovation, the island belongs to first decile either in terms of net EU contribution (4,2M€) or per capita, per year (0,7€). Measured by capita, its performance appears to be 10 times lesser than the average NUTS2, though these regions present a close GDP per capita (19 561 vs 20 400 €), level of R&I effort (0,8 vs 0,58% of the GDP), tertiary education (34 vs 29% of the 30-34 year old) and percentage of active population

[1] Pontikakis et al. *Mobilising European Structural and Investment Funds and Horizon 2020 in support of innovation in less developed regions*. JRC Technical Report. 2018

	Net EU Contrib. /Y.hab.Nuts2	Net EU Contribution
	Euro	Euro
La Réunion	0,44	1 879 192
Average Nuts 2	4,41	30 730 922
Average +/- 20%	INF	INF
Decile	1	1

This gap highlights the critical difficulty faced by La Réunion to turn ERDF investment in research and innovation into Horizon 2020 participation. Indeed, the island presents the 15 lowest H2020/ESIF ratio of the 193 regions analyzed[1] : 0,014, demonstrating a substitution effect between the two sources of funds. Even among EU islands Region, the intensity of this phenomenon appears particularly striking:

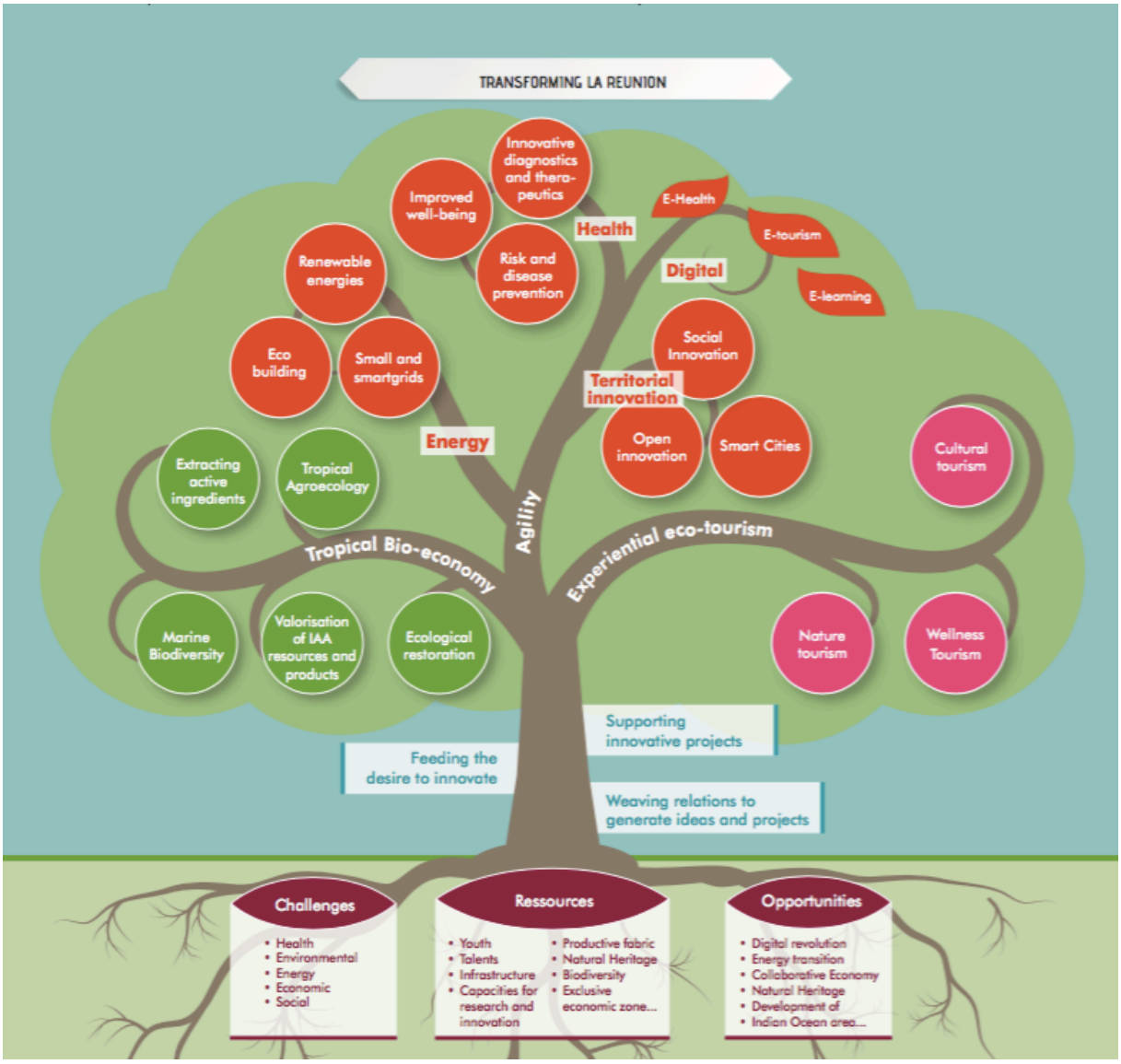


[1] The method used is based on PONTIKAKIS & al (2018); data on ESIF R&I expenditures were extracted from the «R&I regional viewer" tool provided by the Smart Specialization Platform; data on Horizon 2020 were extracted from the H2020 dashboard in July 2019 and divided by the population of these regions in 2015.

b) A large substitution effect

Such difficulty to establish a synergy between the two funds can be explained by three main phenomena.

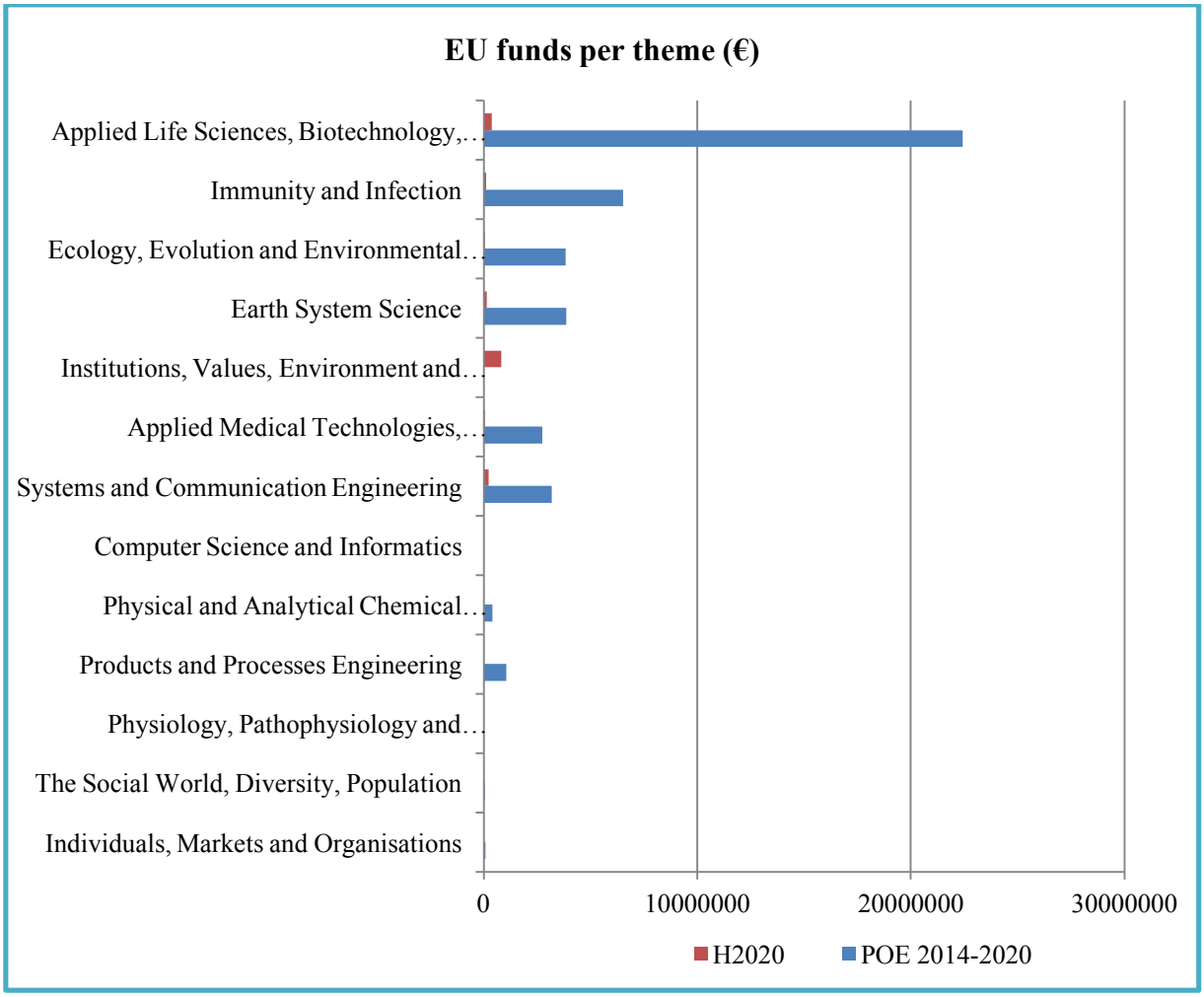
First, despite a proclaimed ambition to concentrate resources on the island competitive advantages the S3 adopted a very broad perspective which embraced almost all research and innovation activities developed on the island. This perspective is itself the consequence of the exacerbated influence of interest groups induced by insularity and strong social bonds. Paradoxically, the introduction of conditionality criteria, thought to increase the effectiveness of the S3, annihilated its very foundation, in the sense that all themes were to be made priorities, whatever their potential, to ensure their eligibility to structural funds.



Secondly, the island suffered from a clear disconnection between the strategy (handled by the Regional Innovation Committee) and the management of the funds allocated to the Thematic Objective n°1 (piloted by the Regional Council as ERDF managing authority). Not only did the institution in charge of S3 not orient the funds, but worse, the latter were distributed in ways that contradicted the very objectives of the strategy. For instance, research projects were funded through two series of calls for projects (2015 and 2019) based on the same format: research centers were offered the opportunity to submit projects, financed up to 1 M€, based on the analysis of a single expert.

Contrary to the proclaimed objective of critical masses, such method led to the fragmentation of the research effort across regional organizations (different and rival organizations working on close thematic) and inside laboratories (which sometimes obtained 2 or 3 grants). Contrary to the proclaimed objective of long term planning and effort, such method led to the multiplication of short-term, opportunistic projects, not inscribed in a strategic plan. In 2019, the urgency to spend the credits even led the managing authority to limit the projects to a 2 year length… Contrary to the proclaimed objective of internationalization, such method encouraged parochialism for it offered easily accessible and less competitive funds that limited the will as well as the capacity to submit H2020 projects, research teams being focused on managing and implementing their ERDF-funded projects. The latter thus led to a typical "dutch-disease syndrome", where the financial flux induced by a rent conduct stakeholders to concentrate their effort on capturing to this profitable source, at the expense of long term strategic investments in future competitive advantages.

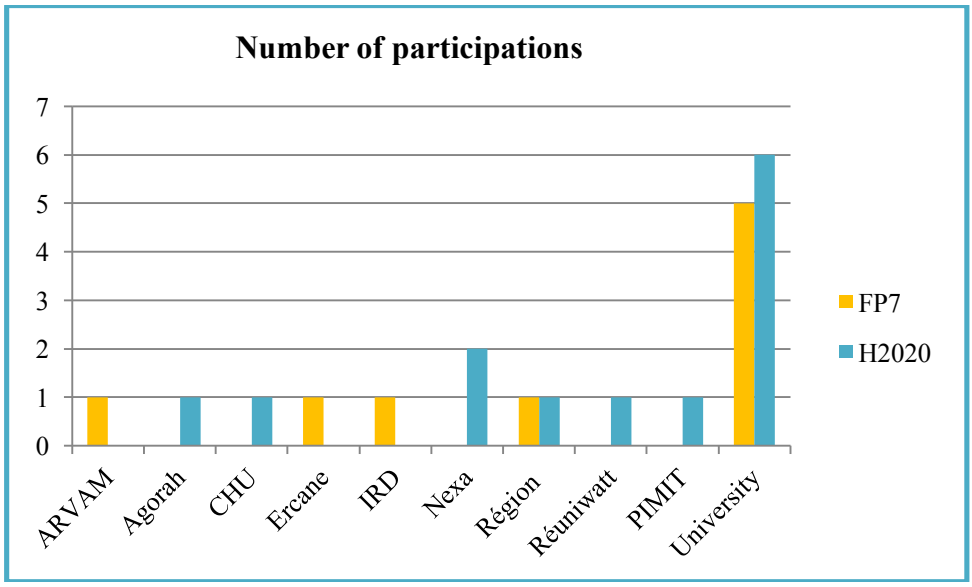
This phenomenon is easily illustrated by the relative weight of ERDF and H2020 in the development of research projects. At the exception of social sciences, which were not granted access to ERDF, no field of expertise presents a positive lever effect.



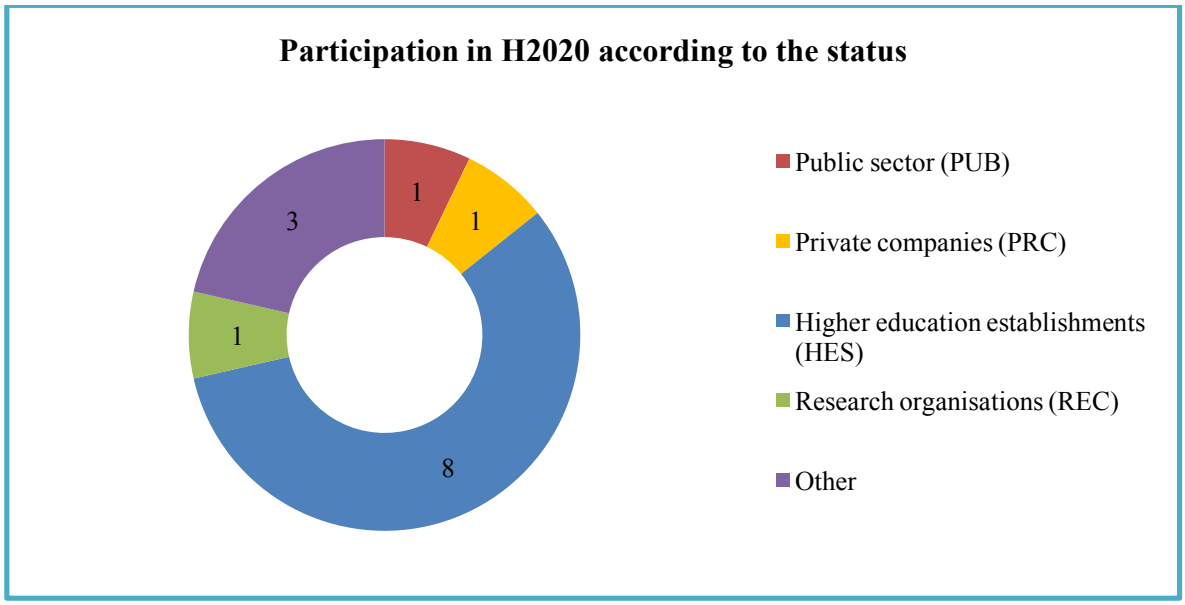
Far from reorienting stakeholders' behaviors and lack of interest for H2020, the broad, unstrategic use of ERDF confirmed a tendency exacerbated by the very strategies of the regional organizations.

Regional organizations

Organizational characteristics and orientations play a significant role in the regional participation in framework programmes. In La Réunion, such participation is highly concentrated on a limited number of stakeholders: 6 active in FP7, 7 in H2020, representing a total of 9 institutions.



Though the 5 five categories of stakeholders mapped by CORDIS are represented, higher education establishments account for more than half of the H2020 projects developed on the island. With 3 projects, the second main category, labelled "Other", regroups the regional agencies for urbanism (Agorah) and for development and innovation (Nexa). Private companies, public sector and research organizations complete the description with 1 project each.



A - The University of La Réunion

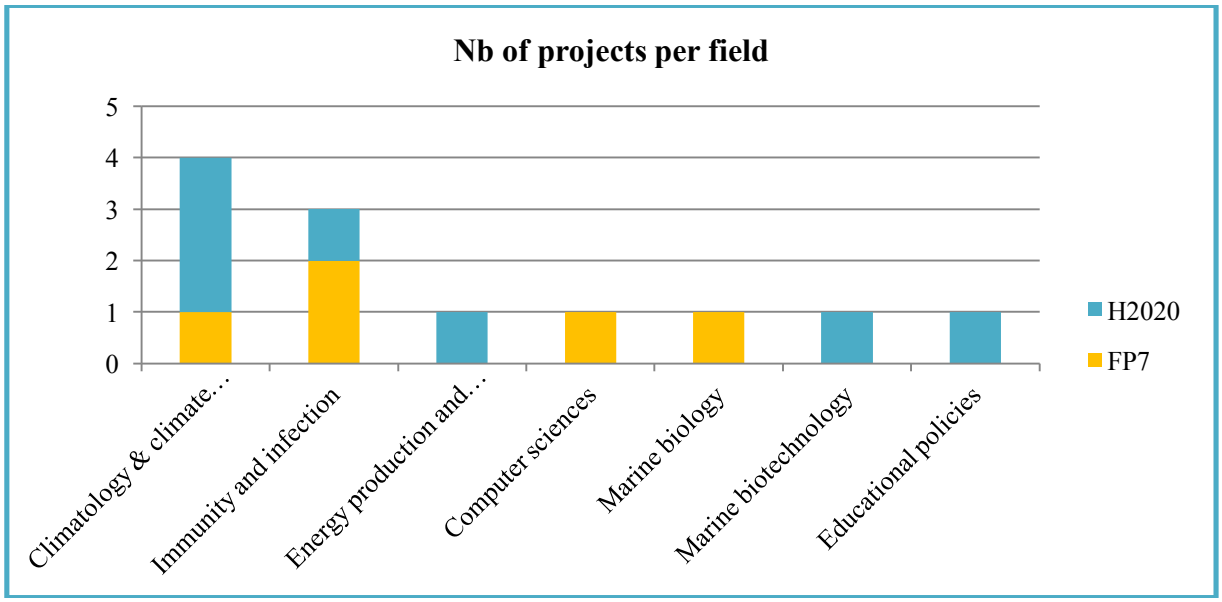
In respect to this marked concentration and to its weight in the regional research & innovation system, this report proposes a strong emphasis on the University of La Réunion (UR).

1) Description of the University of La Reunion

a) FP participation

Between 2007 and August 2018, the University of La Réunion has been part of 5 FP7 and 8 H2020 projects. 6 out of these 13 projects were financed under "research infrastructures" work programmes. Such proportion stems from the critical role by played by "OSU-R", the joint Earth System observatory operated by the CNRS and the UR, which conducted these 4 infrastructure-related projects.

The importance of OSUR is also reflected in the topics explored, dominated in terms of project numbers by Climatology and Climate change. The second field of interest – immunity and infections – is composed of 3 projects (incl. one Regpot); while the five other themes have been only active once in FP.



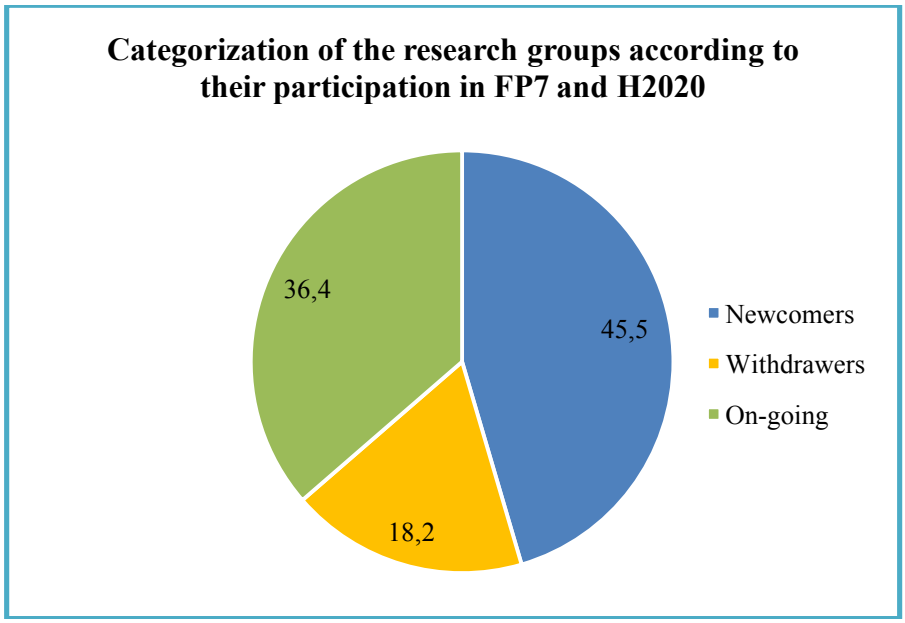
To evaluate the success rate of the institution, 4 projects where UR entered as a third party of the CNRS (Actris, Actris 2, EnvriPlus, Zikalliance) were excluded.

	Number or proposals	Number of grant signed	Success rate %
FP7	15	4	26,7
H2020	23	5	21,7

With 37,8% of active laboratories, submission to FP appear to be more concentrated in the UR than in most French universities, where 70% of research groups directors (141 on 200) declare having submitted a proposal[1].

	FP7	H2020
Number of applying research groups	6	9
Total number of research groups[2]	18	22
% of research groups applying to FP funding	33,3	40,9

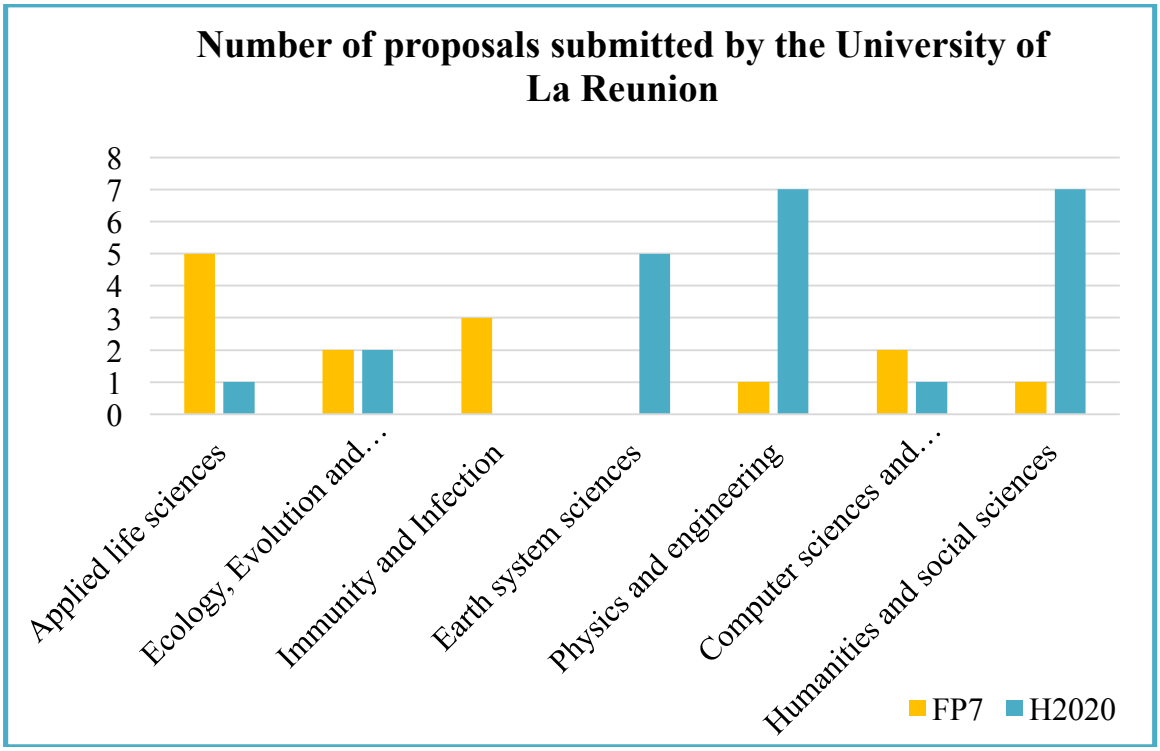
Not only do research groups submit less projects, but their mobilization is unequal through time. Only a third of them have submitted proposals in both FP7 and H2020; 5 newcomers joining in the last period.



In terms of topics, a marked growth of social humanities, physics and engineering (related to energy transition) and earth system sciences may be noticed. The research groups involved in the latter were already active in FP, as third-parties. In the same time, immunity and infection which constituted an important field of FP7 projects for the University (thanks to the Regpot "RunEmerge") is no more represented. The proposals in applied life sciences have also decreased, since the "Taskmar" project, submitted 3 times on FP7, has been accepted.

[1]Secrétariat Général pour la modernisation de l'action publique – *Enquête auprès des entreprises et des unités de recherche publiques sur leur perception du Programme Cadre de Recherche et de Développement Technologique de l'UE.* Octobre 2015

[2] Between 2010 and 2018, some research groups have merged and new ones created. The allocation of a proposal to a specific research group is based on the researcher's affiliation.



The observation of proposals and signed grants by H2020 pillars reveals a strong concentration on societal challenges and excellent science.

	Number or proposals	Number of grant signed	Success rate %
Excellent science	8	2	25
Industrial leadership	1	0	0
Societal challenges	13	2	15
Other – Science with and for society	1	1	100
Total	23	5	22

In terms of funding schemes, candidatures to individual fellowships (ERC & MSCA) have remained so far unsuccessful; most projects mobilizing coordination and support actions, research and innovation actions and innovation actions' schemes.

	Number or proposals	Number of grant signed	Success rate %
ERC	3	0	0
MSCA-IF	3		0
RIA	9	2	22,2
IA	5	1	20,0
CSA	3	2	66,7

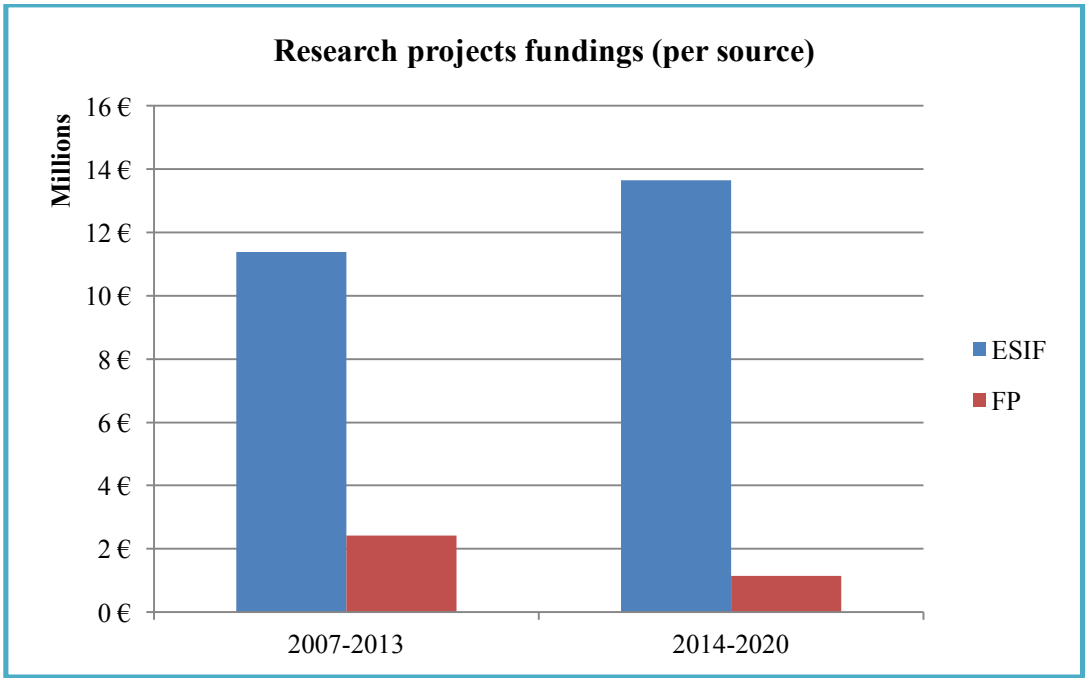
Compared to rejected proposals, signed projects turn out to be much larger either in the grant amount or the number of partners, with a more limited role of the University of La Réunion, which confirms the necessity to cooperate with successful H2020 players to integrate the program.

	Number	Mean duration (in months)	Total Requested Grant	Participant Requested Grant	% participant funding request (compared to total requested budget, excluding mono-beneficiary proposals)	Number of Partners (excluding mono-beneficiary proposals)
All proposals	23	40	3 742 023 €	393 333 €	9,7	15,0
Rejected proposals	18	41	3 404 265 €	485 547 €	12,8	12
Signed projects	5	37	4 687 748 €	208 904 €	6,0	19,0

b) UR's vision and actions for H2020

To better understand the vision of the University, an interview was conducted with the President of the Academic Council and the Officer for Innovation. According to them, increasing the participation in FP constitutes one of the key objectives of the University's strategic plan (the "Source"), as a means of increasing research capacities and excellence through new collaborations, and the internationalization of the institution.

Yet, such ambition is not supported by a defined strategy or objectives. More, since 2016 and the election of a new governance a marked reorientation toward ERDF can be witnessed : H2020 accounts for 7,8% of the European funds (ESIF + FP) supporting research projects vs. 17,7% on the 2007-2013 period.



Since 2016, excepting Forward only two projects have been financed by the European Commission:

- One dedicated to research : REACT (Renewable Energy for self-sustainable island communities) which begun on January 2019 which involves the LE2P laboratory
- One dedicated to science promotion : STORIES (European Researchers' Night in France) involving the administration

This shift is also illustrated by the evolution of support services proposed to researchers. In 2013, UR and Nexa, the regional agency for development and innovation, set up a mutualized "European office", whose mission was to promote, train and support all kind of stakeholders in the development of FP proposals. Such office was composed of two fully dedicated agents, mobilized by the two partners, and an action plan financed by ERDF and the Regional Council. From 2016, UR reallocated the working time of its agent to the development and management of ERDF projects, at the expense of the Horizon 2020 support. Such reorientation and the lack of adequate support services by the University is now pointed out by many researchers interviewed as one of the most pressing blocking points for H2020 access.

2) Characteristics

To better understand the participation of the University and the obstacles encountered, the characteristics of the institution have been analyzed according to the 5 main determinants that, according to the literature, influence higher education establishments:

- size, measured by the number of academic staff; i.e. personnel dedicated to education and research (such as professors, associate professors, instructors, lecturer
- orientation, defined by the relative importance of research activities vis à vis training in the institution

- scientific excellence, characterized by scientific productivity and impact
- international openness and integration in the major research networks
- prior participation in FP.

In the absence of contribution of the University of La Réunion to the Work Package 2 of Forward, the data were gathered from three sources: the "bilan social 2015-2016", the reports produced by the "Observatoire des Sciences et Techniques"[1] and the "Haut Conseil de l'évaluation de la recherche et de l'enseignement supérieur"

a) Size

The University presents a modest size in terms of personnel: 496,5 academics (in full time equivalent – FTE) and 615,3 administrative staff[2].

Staff composition		
	Number	Full time equivalent
Academic staff (permanent and non permanent)	514	496,5
Administrative staff (permanent and non permanent)	638	615,3
Total staff	1152	1111,8

Evolution of staff composition at University of La Reunion					
		2013	2014	2015	2016
Academic	Number	509	495	498	515
	FTE	492,7	476,8	481,5	497,5
Administrative	Number	555	555	535	638
	FTE	549,2	544,2	526,9	615,3
Total	Number	1064	1050	1033	1153
	FTE	1041,9	1021	1008,4	1112,8

Academic staff accounts for 45% of the total staff, a notably low share at the European level.

[1] Observatoire des Sciences et Techniques – Rapport sur les publications scientifiques 2012 à 2017
[2] Université de La Réunion – Bilan social 2015 & 2016

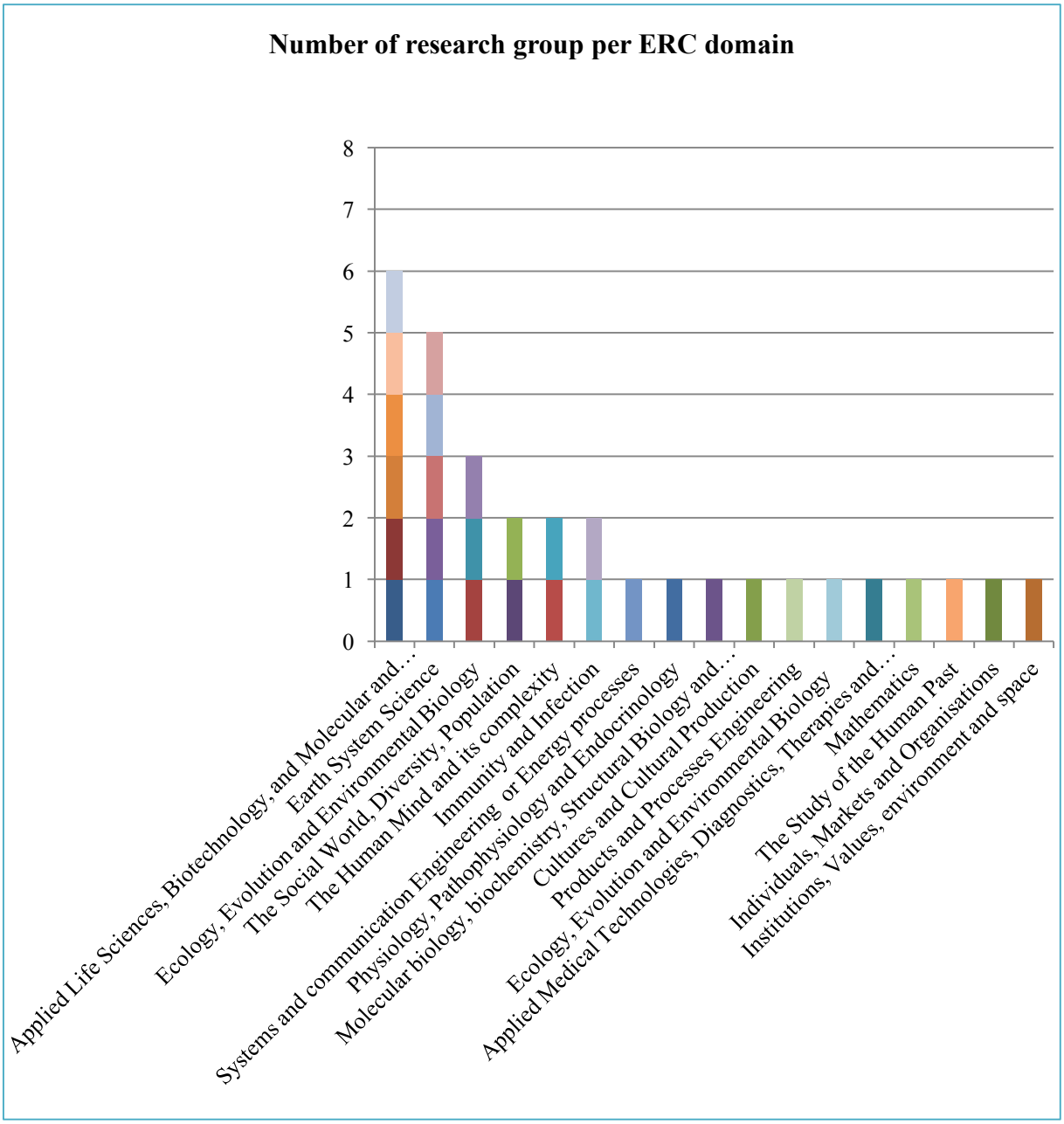
b) Research intensity

The University of La Réunion is composed of 412 permanent and non-permanent researchers, including 216 “maîtres de conference” and 94 full professors. Since the latter dedicate part of their time to teaching activities (50%), the theoretical research capacity of UR reaches 217, 9 full time equivalents. To determine how much research-oriented the University is, we restrict the analysis to the permanent academic staff (to reduce yearly variations induced by PhD candidates).

Permanent academic staff			
	Number	FTE	Research dedicated FTE
Researchers (with teaching activities)	326	324,4	162,2
Teaching only personnel	113	11,6	
% dedicated to research	74,26	4,40	37,20

In theory, researchers represent 326 FTE and account for 74,3% of permanent academic staff. Yet, after deducting the time dedicated to teaching, the overall staff focusing on research activities equals 162,2 FTE. That is to say, 37,2% of the academics, expressed in full time equivalent; which highlights a strong training-orientation of the UR. 26% of the academic staff is composed of teachers with no research activities.

This limited research capacity is aggravated by a strong fragmentation. The 397 researchers are divided into 21 research groups and 37 sub-groups which embrace very diverse fields.



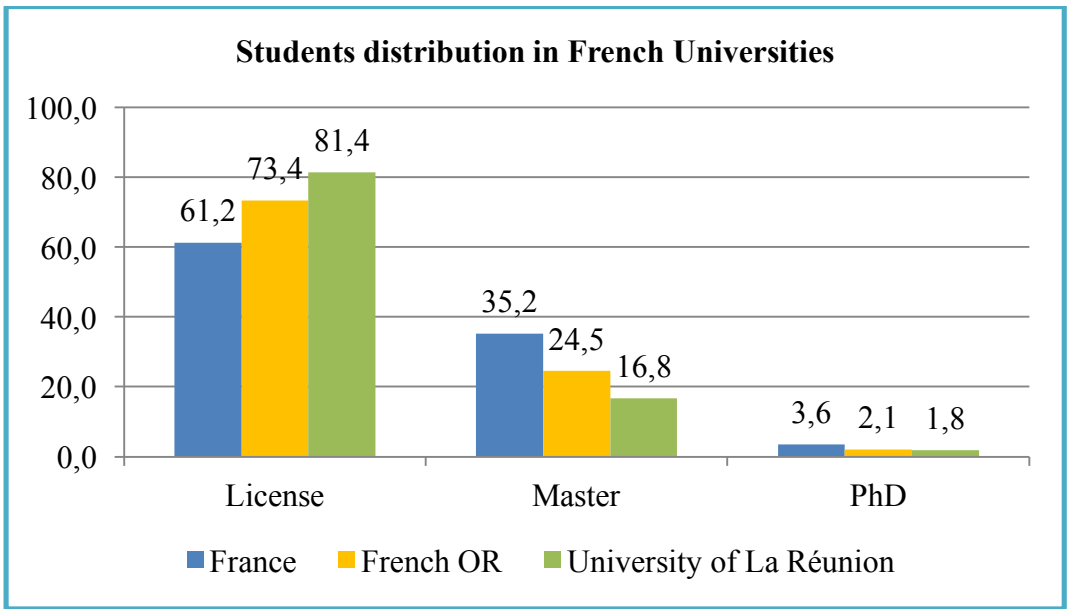
As a consequence, the average group aggregate 19 researchers and no group exceeds 43. A ratio 10 times lower than in mainland France, where the average size reaches 131 FTE. The limited number of researchers cannot be compensated by non-academic staff (engineers, technicians, etc.) since only 11 % of them are working in research teams[1]. Such orientation can be confirmed by evaluating the PhD intensity of the institution, i.e. the ratio between the number of PhD students and the total number of students involved in License and Master degrees[2].

[1] Bilan social 2016 : Répartition des personnels BIATSS titulaires par composante en ETP

[2] ETER Handbook, p.68

PhD intensity according to ETER handbook (page 68)	
Number of phD students	245
Number of students in Licence & Master degrees	13227
phD intensity	0,019

As explained in supra, this PhD intensity appears to be very limited, compared to other European institutions. The strong focus on license and master can also be illustrated by a comparison with other French Universities: 81% of the student population is pursuing a first degree, 20 points higher than in mainland France[1]



c) Scientific excellence

The scientific level of research organizations can be evaluated by their productivity (measured by the global number of publication per full time equivalent) and their impact (determined by the average number of publications' citations). In terms of productivity, an independent report from the Observatoire des Sciences et Techniques, based on the Web of Science database provides the following data

[1] Repères et références statistiques – enseignements, formation, recherche 2017

	2012	2013	2014	2015	2016	2017
Number of publications (all sciences)	173	189	263	300	309	370
Ratio number of publications (all sciences) / FTE academic staff*	0,35	0,38	0,53	0,60	0,62	0,75

	2012-2014	2013-2015	2014-2016	2015-2017
Number of publications per year on a 3 year period (all sciences)	208,3	25,7	290,7	326,3
Ratio number of publications over 3 years (all sciences) / FTE academic staff	0,42	0,05	0,59	0,66

These data were compared to the largest bibliometric database on universities' publications – the CTWS Leiden Raking. On the 308 European universities listed, UR occupies the 266th rank in terms of number of publications, and belongs to the bottom 20% European universities. Such performance may be overrated since the Leiden Ranking is based on English publications, registered in Web of Science, while the data for UR encompass French-speaking publications.

	Number of publications (2014-2017)
D1	1164
D2	1361
D3	1600
D4	1915
D5	2322
D6	2855
D7	3629
D8	4933
D9	7758
University of La Réunion	1242

The limited importance of UR in the overall publications is partly explained by the fact that 25% of the permanent researchers do not publish research articles[1].

The evaluation of the impact of such publication proved to be impossible by the time of the analysis, since the publications of UR are neither analyzed by the Leiden Ranking, or by the OST.

[1] AERES 2014

d) International openness

In the absence of data on foreign staff members, students, PhD candidates and post-docs, the evaluation of the internationalization of the UR is compromised. One clue lies in the evaluation of international collaborations leading to scientific publications. With 52,9% of its 2014-2017 publications written with an international partner, UR belongs to the top 30% European universities mapped by the Leiden Ranking. However, such co-publications are essentially developed with non-European partners: EU28 represents only 10,7% of the total publications of the university and 20% of its international publications, 10 points less than French universities. Such score reflects the inscription of UR in its geographical basin and the priority awarded to regional collaborations.

	University of La Réunion	French universities
% of the publications with international partners	52,95	52,95
% of EU28 copublications	10,75	16,85
% of EU28 on international copublications	0,20	0,29

3) Comparative analysis

Based on this description, a comparative European analysis has been conducted with the help of 4 sources of data:

- The ETER database, 2019 edition which compiles information on European Higher Education institutions
- The Leiden Ranking, mentioned above
- The H2020 dashboard, "H2020 funded project" extracted on July 2019
- The Observatoire des Sciences et Technologies report on the University of La Réunion

The list of all "higher or secondary education" (HES) establishments active in H2020 was extracted from the H2020 dashboard. It specifies for each institution the net EU contribution as well as the number of participation.

From this list, 968 H2020 active institutions were identified on ETER. 12 indicators were then selected based on the main determinants of HES FP participation, mentioned in the literature:

- The size of institutions measured by personnel expenditure, current expenditure (€), the total number of academic staff (expressed in full time equivalent), number of full professors, the total staff, the total number of students enrolled (ISCED 5-7), students enrolled in ISCED 8 (PhD & postdoc),

- The research orientation measured by the PhD intensity, and full professors /academic staff, academic staff/total staff ratios.
- International openness, measured the share of foreign students (ISCED 5-7), the share of foreigners academic staff, the share of mobile PhD students
- The participation to FP, expressed by the number of participation, the EU contribution, FP researchers mobility, FP staff mobility and FP research training cooperation.

HES for which ETER offered no data or which presented extraordinary characteristics (such as a very limited number of students or full staff) were suppressed, constituting a sample of 789 institutions.

a) Relative position of the University of La Réunion

The University of La Réunion was first compared to the 789 institutions, according to the 12 criteria listed above. For each of them, we determined the distribution by decile, the ranking of UR and the average performance of European institutions. If terms of size, UR is in line with the median of European HES:

	Total Current expenditure (M€)	**Total students enrolled ISCED 5-7**	**Total staff (FTE)**
Average	173,1	14797	2097
University of La Reunion	106,6	13227	1111,8
Decile	6	6	5
Ranking	465	348	514

Yet, the analysis of staff-related indicators reveals some striking facts :

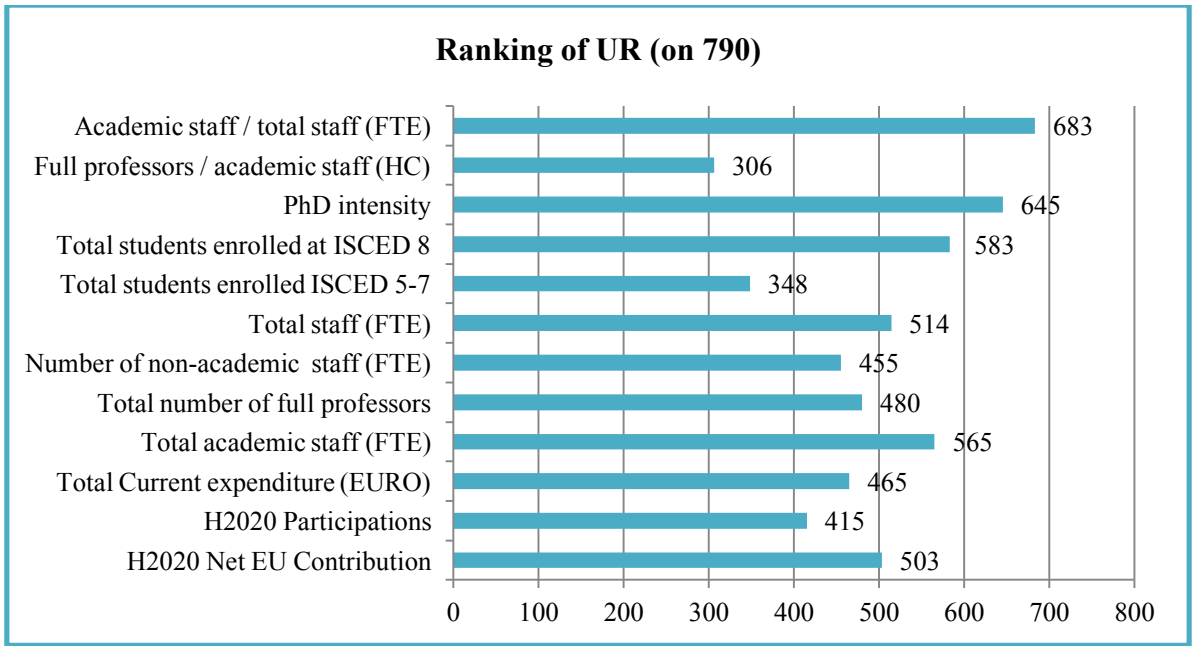
- With only 496,5 academic staff for 13 227 ISCED 5-7 students and 245 PhD candidates, UR mobilizes less than 3,7 academic staff for 100 students. Such ratio makes it one of the 40% less endowed institutions of the panel.
- On the contrary, UR is situated among the 40% highest non-academic staff effectives. It thus presents a severe disequilibrium between academic and non-academic staff, which makes it one of the most “administration-oriented” institution of the panel
- Though academically understaffed, UR hosts a relatively large number of full professors, which places the institution in the 20% HES with the highest share of professors in the academic staff.

	Total academic staff (FTE)	Number of non-academic staff (FTE)	Academic staff / total staff (FTE)	Total number of full professors	Full professors / academic staff (HC)
Average	1097	1002	0,57	176	0,148
University of La Reunion	496,5	615,3	0,45	94	0,1800
Decile	4	6	2	5	8
Ranking	565	455	683	480	306

The comparative analysis also confirms a marked teaching orientation of the institution: UR welcomes only 245 PhD candidates for 13 227 license and master students, which represent a PhD intensity of 0,019; a score that places UR in the 30% less research-oriented institutions of the panel.

	Total students enrolled at ISCED 8	PhD intensity
Average	808	0,061
University of La Reunion	245	0,019
Decile	4	3
Ranking	583	645

In terms of H2020, the University of La Reunion has been active in 7 H2020 projects for a total EU contribution of 1,042 M€; far away from the average score of 34 participations for 16,3 M€. This gap confirms the fact that La Réunion usually plays a minor roles in the projects to which it participates. Finally, like 80% of the sample considered, the University of La Réunion enjoys no FP-financed researcher or staff mobility of research training cooperation.



b) Comparison to organizations which present similar characteristics

To deepen the analysis, the University of La Réunion was compared to 9 groups of institutions, sharing a common characteristic, like an approaching number of H2020 participation or staff. For each of these groups, the average score and the distribution (measured through deciles) of the members were determined for the 12 indicators mentioned above. We then calculated the relative position of UR to underline its singularities and common traits.

- **Close participation in H2020 (5 to 8 projects)**

UR was first compared to 111 HES which have been active in 5 to 8 projects. Such institutions are generally smaller than their homologue, which is part of the top 30% in terms of current expenditure and students ISCED 5-7. They also appear to be more implicated in the H2020 projects they develop, with an average EU contribution of 1,6 M€ compared to 1,02 M€ for the UR (which is part of the 40% least beneficiaries). The sub-performance of UR can be explained by the allocation of human resources, characterized by a marked academic understaff and non-academic overstaff. It also stems from a neat teaching orientation, induced by the large number of students and a limited number of PhD students.

	H2020 Net EU Contribution (M€)	Current expenditure (M€)	Academic staff (FTE)	Full professors	Non-academic staff (FTE)	Total staff (FTE)	Students enrolled ISCED 5-7	Students enrolled at ISCED 8	PhD intensity	Full professors / academic staff	Academic staff / total staff (FTE)
Average score	1,6	76,2	656	105	573	1229	9528	345	0,038	0,139	0,558
University of La Reunion	1,04	106,6	496	94	615	1112	13227	245	0,019	0,180	0,450
All HES	16,35 €	173,0	1 097	176	1 002	2 097	14 797	808	0,061	0,148	0,565
Average +/- 20%	INF	SUP	INF	-	-	-	SSUP	IINF	IINF	SUP	-
Decile	4	8	5	6	7	5	8	5	4	8	1

(Red indicates that UR presents a score 20% below the average and/or belongs to deciles beneath the median (5); Green a score 20% above the average and higher than 5 deciles; Yellow a score equal to the median.

- **Close H2020 contribution**

The comparison with 138 HES that obtained between 700 k€ and 1,5M€ in H2020 confirms the previous analysis. Despite a much larger size which should normally lead to an increased H2020 participation, UR shows close results and occupies a minor role in such projects. The over-representation of full professors and non-academic staff is confirmed.

	H2020 Participations	Current expenditure (M€)	Academic staff (FTE)	Full professors	Non-academic staff (FTE)	TTotal staff (FTE)	Students enrolled ISCED 5-7	Students enrolled at ISCED 8	PhD intensity	Full professors / academic staff	Academic staff / total staff (FTE)
Average score	4	71,0	578	96	456	1 024	10 138	267	0,029	0,136	0,581
University of La Reunion	7	106,6	497	94,0	615	1 112	13 227	245	0,019	0,180	0,450
All HES	34	173,08	1 097	176	1 002	2 097	14 797	808	0,061	0,148	0,565
Average +/- 20%	SUP	SUP	-	-	SUP	-	SUP	-	INF	SUP	INF
Decile	9	9	5	6	8	7	8	6	5	7	1

- **Close number of full professors**

The 96 institutions which host an approximate number of full professors (80 to 120) are globally more engaged than UR in H2020, be it in terms of number of projects (18,6 vs. 7) or funds obtained (7,7 vs. 1,04 M€). Such gap indicates that the number of full professors working in UR does not equal its potential for H2020 project development. They are indeed over-represented in an academic staff, which is one-third smaller in La Réunion. Research efforts cannot either be sustained by PhD candidates; UR being among the 20% institutions in terms of ISCED 8 students.

	H2020 Net EU Contribution (M€)	H2020 Participations	Current expenditure (M€)	Academic staff (FTE)	Non-academic staff (FTE)	Total staff (FTE)	Students enrolled ISCED 5-7	Students enrolled at ISCED 8	PhD intensity	Full professors / academic staff	Academic staff / total staff (FTE)
Average score	7,7	19	113,0	742	649	1391	12138	493	0,035	0,140	0,543
University of La Reunion	1,04	7	106,6	497	615	1112	13227	245	0,019	0,180	0,450
All HES	16,35 €	34	173,08 €	1 097	1 002	2 097	14 797	808	0,061	0,148	0,565
Average +/- 20%	INF	INF	-	INF	-	IINF	-	IINF	IINF	SUP	-
Decile	4	5	6	3	6	3	7	2	4	8	2

- **Close number of academic staff**

Though they share an approximate number of academic staff (400 to 600 FTE), the 83 HES and UR diverge a lot in terms of size. The latter belongs to the 10% biggest institutions in terms of current expenditure, total staff and students enrolled at ISCED 5 to 7. Yet, despite their limited size, such establishments benefit twice more of H2020 (2,5 M€ vs. 1,04). The difference may stem from a more research-oriented strategy and flexible approach, while UR dedicates many resources to the administrative and pedagogic responsibilities engendered by its greater number of students.

	H2020 Net EU Contribution (M€)	H2020 Participations	Current expenditure (M€)	Full professors	Non-academic staff (FTE)	Total staff (FTE)	Students enrolled ISCED 5-7	Students enrolled at ISCED 8	PhD intensity	Full professors / academic staff	Academic staff / total staff (FTE)
Average score	2,52	7	69,49	122	378	878	9824	308	0,033	0,144	0,589
University of La Reunion	1,04	7	106,6	94	615	1112	13227	245	0,019	0,180	0,450
All HES	16,35 €	34	173,08 €	176	1 002	2 097	14 797	808	0,061	0,148	0,565
Average +/- 20%	INF	-	SUP	INF	SUP	SUP	SUP	INF	INF	SUP	INF
Decile	6	8	9	7	9	9	9	4	4	8	1

- **Close number of total staff**

Compared to the 63 institutions of the panel that employ between 900 and 1 200 full time equivalent, UR enjoys a larger budget, which is related to the higher number of license and master students trained. The analysis highlights once again the imbalance between academic and non-academic staff : UR is situated among the 10% institutions that present the lowest numbers of academic staff and the 10% institutions with the largest non-academic staff personnel. Due to this allocation of resource, UR trains a fewer number of PhD students. In terms of H2020 participation, UR shows an average performance, yet the EU Contribution obtained remains very limited (1,04 M€ vs. 4, 08), which reveals the little role played in the projects.

	H2020 Net EU Contribution (M€)	H2020 Participations	Current expenditure (M€)	Full professors	Non-academic staff (FTE)	Academic staff (FTE)	Students enrolled ISCED 5-7	Students enrolled at ISCED 8	PhD intensity	Full professors / academic staff	Academic staff / total staff (FTE)
Average score	4,08	8	80,67	150	454	607	10 903	337	0,038	0,138	0,573
University of La Reunion	1,04	7	106,6	94	615	497	13 227	245	0,019	0,180	0,450
All HES	16,35 €	34	173,08 €	176	1 002	1 097	14 797	808	0,061	0,148	0,565
Average +/- 20%	INF	-	SUP	INF	SUP		SUP	INF	INF	SUP	INF
Decile	6	7	8	7	9	7	8	4	4	9	1

- **Close number of students**

Excluding their close number of students (11 to 15 0000 ISCED 5-7), UR and the 98 institutions which compose this group have little in common. The latter are way bigger, in terms of financial and human resources. UR is academically under-staffed with 496,5 academics compared to an average score of 1011 people; which places it among the lowest 10% establishments. UR presents a strong teaching orientation with only 245 PhD candidates, versus an average 807. It thus belongs to the bottom 30% in terms of PhD intensity. Due to

the concentration of limited resources on teaching activities, UR involvement in H2020 is almost 20 times lower than its counterparts (1,04 M€ vs. 19,26 M€)

	H2020 Net EU Contribution (M€)	H2020 Participations	Current expenditure (M€)	Academic staff (FTE)	Full professors	Non-academic staff (FTE)	Total staff (FTE)	Students enrolled at ISCED 8	PhD intensity	Full professors / academic staff	Academic staff / total staff (FTE)
Average score	19,26	38	202	1011	171	903	1914	807	0,052	0,131	0,556
University of La Reunion	1,04	7	106,6	497	94	615	1112	245	0,019	0,180	0,450
All HES	16,35 €	34	173,08 €	1 097	176	1 002	2 097	808	0,061	0,148	0,565
Average +/- 20%	INF	INF	INF	INF	INF	INF	INF	INF	INF	SUP	-
Decile	3	4	5	2	4	6	3	3	3	9	2

- **Close number of PhD students**

The 55 institutions of this panel share similar characteristics to UR. Their reduced number of PhD students (200 to 300) contrasts with a high number of license and master students (12 273 on average), which mobilize the same level of financial and human resources. Yet the latter are concentrated in UR on non-academic staff, at the expenses of academic staff. This lack of research potential is thus reflected in H2020 participations : in a group limitedly implicated (3,5 M€ vs. 14,4 for all HES), UR belongs to the bottom 30% institutions with 1,04 M€.

	H2020 Net EU Contribution (M€)	H2020 Participations	Current expenditure (M€)	Academic staff (FTE)	Full professors	Non-academic staff (FTE)	Total staff (FTE)	Students enrolled ISCED 5-7	PhD intensity	Full professors / academic staff	Academic staff / total staff (FTE)
Average score	3,56	11	120,68	751	110	563	1273	14402	0,036	0,106	0,589
University of La Reunion	1,04	7	106,6	497	94	615	1112	13227	0,019	0,180	0,450
All HES	16,35 €	34	173,08 €	1 097	176	1 002	2 097	14 797	0,061	0,148	0,565
Average +/- 20%	INF	INF	-	INF	-	-	-	-	INF	SUP	INF
Decile	3	4	6	4	7	7	5	7	4	9	2

- **Close number of publications**

Through the Leiden Ranking, a list of 61 universities with 1000 to 1 500 publications from 2014 to 2017 was constituted. Their characteristics were specified with the help of ETER and the H2020 dashboard. Through this comparison, UR appears to be a very scientific productive institution, which rivals with much larger institutions in terms of academic staff, full professors, students and PhDs Yet this analysis overestimates the performance of UR, its publications number integrating French journals. Despite this bias, UR belongs to the bottom 10% institutions in terms of H2020 contribution (1,04 vs. 4,7 M€).

	H2020 Net EU Contribution (M€)	H2020 Participations	Current expenditure (M€)	Academic staff (FTE)	Full professors	Non-academic staff (FTE)	Total staff (FTE)	Students enrolled ISCED 5-7	Students enrolled at ISCED 8	PhD intensity	Full professors / academic staff	Academic staff / total staff (FTE)
Average score	4,72	20	155,9	844	83	782	1626	10855	544	0,071	0,083	0,516
University of La Reunion	1,04	7	106,6	497	94	615	1112	13227	245	0,019	0,180	0,450
Average +/- 20%	INF	INF	INF	INF	-	INF	INF	SUP	INF	INF	SUP	-
Decile	1	1	4	1	2	2	1	4	2	1	9	2

c) Conclusions

Whatever the criteria considered, UR presents an abnormally low participation in H2020, especially in terms of EU contribution.

	H2020 Net EU Contribution
EU contribution 700 to 1,5 M€	-
H2020 participation 5<8	INF
	-
400 to 600 academic staff	INF
	-
80 to 120 full professors	INF
Total staff : 900 to 1200	INF
Students ISCED 5-7, 11 to 15 k	INF
Students ISCED 8 200 to 300	INF
Publications (1000 to 1500)	INF

Such performance cannot be explained by a limited size, expressed by the number of people employed, the budget or the number of students. The latter are indeed largely superior to institutions with similar characteristics:

	Total Current expenditure (EURO)	Total staff (FTE)	Total students enrolled ISCED 5-7
EU contribution 700 to 1,5 M€	SUP	-	SUP
H2020 participation 5<8	SUP	-	SUP
		-	
400 to 600 academic staff	SUP	SUP	SUP
		-	
80 to 120 full professors	-	INF	-
Total staff : 900 to 1200	SUP		SUP
Students ISCED 5-7, 11 to 15 k	INF	INF	
	-	-	-
Students ISCED 8 200 to 300	-	-	-

On the contrary, the human resources may be considered a critical factor. Globally understaffed, the University privileges the recruitment of non-academic staff. It is part of the 10% institutions with the lowest academic/non-academic staff ratio, whatever the criteria of comparison considered. It also belongs to the low 10% in terms of academic staff when compared to same size institutions (in terms of total staff and student numbers).

Such disproportion may also be noticed at the national level. According to the French ministries for "National Education" and for "Higher education, research and innovation"[1], the share of academic staff in La Réunion was 10 points lower in La Réunion compared to other universities.

	Higher education institutions	Universities (excl. Medical faculties)	Universities (incl. Medical faculties)	University of La Réunion
Academic staff (FTE)	97 381,7	72 514	31 270	496,5
Non academic staff (FTE)	83 776,5	59 145	22 548	615,3
Academic staff / Total staff	0,54	0,55	0,58	0,45

The lack of academic staff is aggravated by the over-representation of full professors, systematically above the average score, which mobilizes important financial resources.

[1] Bilan social du ministère de l'Éducation nationale et du ministère de l'Enseignement supérieur, de la Recherche et de l'Innovation - 2016-2017

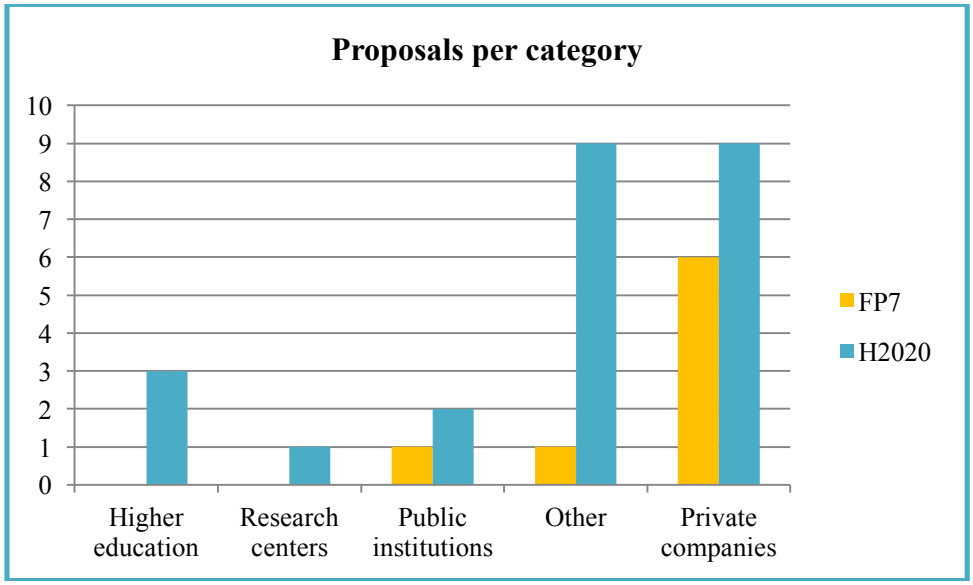
	Total academic staff (FTE)	Number of non-academic staff (FTE)	Academic staff / total staff (FTE)	Total number of full professors	Full professors / academic staff (HC)
EU contribution 700 to 1,5 M€	-	SUP	INF	-	SUP
H2020 participation 5<8	INF	-	-	-	SUP
	-	-	-	-	
400 to 600 academic staff		SUP	INF	INF	SUP
	-		-	-	
80 to 120 full professors	INF	-	-		SUP
Total staff : 900 to 1200	-	SUP	INF	INF	SUP
Students ISCED 5-7, 11 to 15 k	INF	INF	-	INF	SUP
	-	-	-	-	
Students ISCED 8 200 to 300	INF	-	INF	-	SUP

Internal resources being dedicated to training and handling the challenges posed by more 13 000 license and master students, research remains a secondary priority; despite the high ratio of titular professors. Such orientation is revealed by a very low level of PhD students and intensity.

	Total students enrolled at ISCED 8	PhD intensity
EU contribution 700 to 1,5 M€	-	INF
H2020 participation 5<8	INF	INF
	-	-
400 to 600 academic staff	INF	INF
	-	-
80 to 120 full professors	INF	INF
Total staff : 900 to 1200	INF	INF
Students ISCED 5-7, 11 to 15 k	INF	INF
	-	-
Students ISCED 8 200 to 300		INF

B - Other organizations

Excluding University, 18 regional organizations have been submitting proposals and 9 successfully participating in FP:



Such restricted mobilization contrasts with the dense network of organizations that constitute the innovation ecosystem. To explore this paradox, we propose an overview of the experiences, motives and obstacles of the different categories of stakeholders.

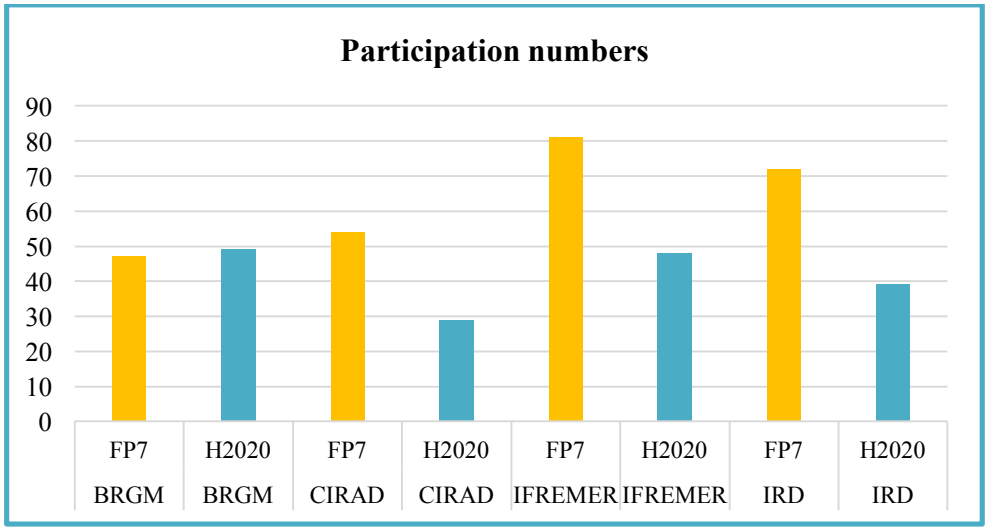
1) Regional representations of national research centers

Besides the University and the University hospital, the public research effort of the island is concentrated in local representations of national research centers:

- The *Centre de coopération internationale en recherche agronomique pour le développement* (CIRAD)
- The *Bureau de recherches géologiques et minières* (BRGM)
- The *Institut français de recherches pour l'exploitation de la mer* (IFREMER)
- The *Institut de recherche pour le développement* (IRD)

a) FP participation

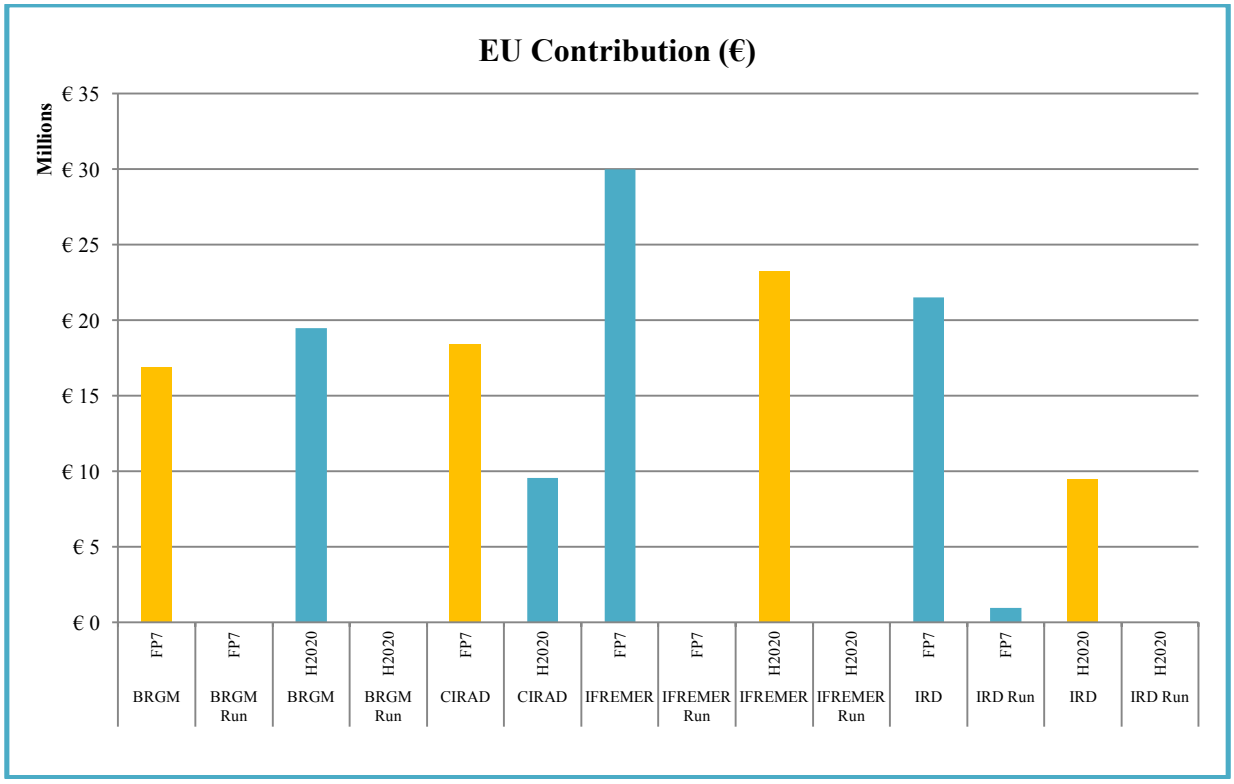
On a national level, these institutions show a marked interest for FP.



According to a Cordis extraction, dating from July 2019, they occupy high ranks, BRGM and IFREMER belonging to the top 300 on 9 864 organizations.

Organizations	Participation	Rank
IFREMER	45	268
BRGM	41	290
CIRAD	21	567
IRD	31	388
UNIVERSITE DE LA REUNION	7	1956

Yet, local teams are seldom integrated in such projects. Between 2007 and 2019, BRGM and IFREMER have submitted no proposals, CIRAD and IRD one. The latter remains to this day, the only participant through the Run Sea Science project, financed through a Regpot scheme under FP7, which represented 4,3% of the EU contribution obtained by the IRD.



Such limited participation cannot be explained by the inadequacy of the thematic call for projects. At least 7 H2020 projects involving the CIRAD and IRD present close connections with research activities conducted on the island:

- TROPICSAFE ("Insect-borne prokaryote-associated diseases in tropical and subtropical perennial crops") coordinated by CIRAD
- LEAP Agri (dedicated to the "sustainable intensification of African food systems), including CIRAD and IRD
- PROIntensAfrica ("Towards a long-term Africa-EU partnership to raise sustainable food and nutrition security in Africa") including CIRAD
- BlueBRIDGE ("Building Research environments for fostering Innovation, Decision making, Governance and Education to support Blue growth") with IRD
- RINEA ("Research and Innovation Network for Europe and Africa) with IRD
- INFRAVEC2 (""Research Infrastructures for the control of vector-borne diseases") with IRD

Three times, researchers based in La Réunion were not involved in projects in which the island was represented by another local partner:

ACRONYM	Project	Local partner	National institution
MADE	Mitigating ADverse Ecological impacts of open ocean fisheries	University of La Réunion	IFREMER
MADE	Mitigating ADverse Ecological impacts of open ocean fisheries	University of La Réunion	IRD
Envri Plus	Environmental Research Infrastructures Providing Shared Solutions for Science and Society	University of La Réunion	IRD
Zikaliance	A global alliance for Zika virus control and prevention	PIMIT	IRD

b) Analysis

To understand why local capacities are seldom turned into FP participations, the strategies of such institutions should be questioned. To that end, three semi-structured interviews were conducted with the representatives from the CIRAD, IFREMER and IRD. Despite several attempts, the BRGM did not respond positively to our invitation.

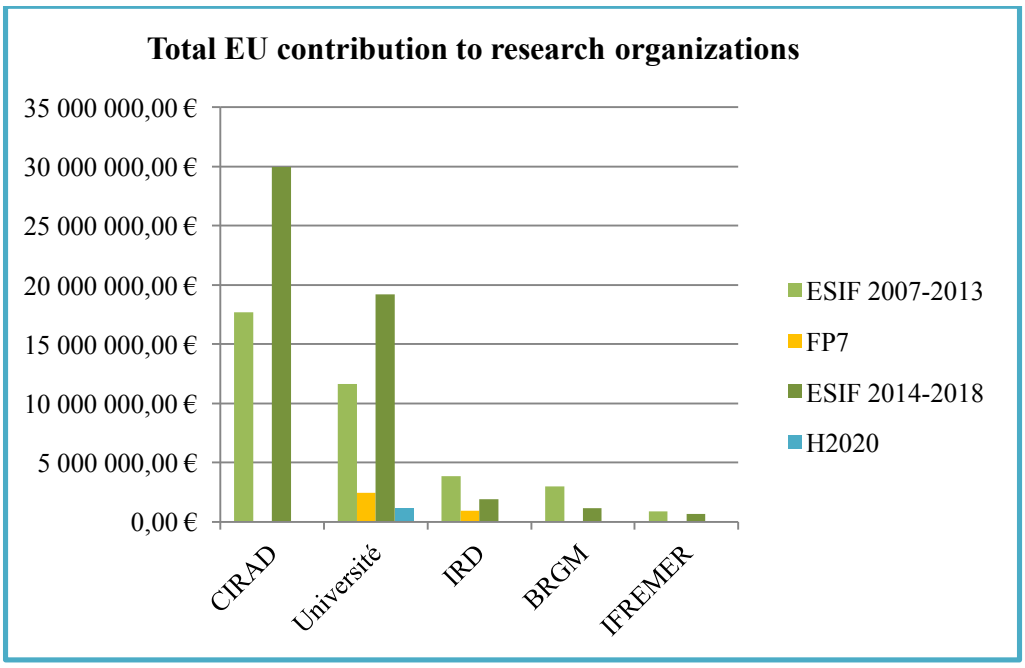
2 out of 3 delegates mentioned H2020 as a major priority of their local representation, with very different motives. As a consequence of its status (a public body engaged in commercial activities) and its large implantation in La Réunion (170 employees, representing a tenth of the national staff), the CIRAD is looking for financial resources to support the operational costs and secure its economic model. Up to day, those are covered by a 2014-2020 agreement with public authorities, supported by structural funds. In times of uncertainty, H2020 is seen as considered an instrument for economic diversification and consolidation. Such viewpoint reflects the national position expressed in the "Contrat d'objectifs Etat-CIRAD" 2014-2018, which describes H2020 as a lever to "develop, consolidate, optimize financial resources to stabilize the economic model of the institution on the long-term"[1]. For the IRD, FP participation is seen as a lever to develop international collaborations, essential to avoid a local tendency to isolationism which can be prejudicial to research activities. H2020 is thus approached from a scientific point of view. Promoting such collaborations is also considered a way to position the institution as an European leader in the field of development studies.

Unanimously, the three institutions point out the availability of large structural funds dotation as the number one obstacle to the development of H2020 projects. In the case of CIRAD, human resources and research activities are entirely centered on the objectives defined by the 2014-2020 agreement which leaves no time for researchers to engage in other type of projects, despite their interest. Though more flexible and project-oriented, IFREMER and IRD concentrate their efforts on the mobilization of more accessible and less competitive

[1] CIRAD, *Contrat d'objectifs Etat-CIRAD, 2014-2018*, p.21

regional (European Maritime and Fisheries Fund; ERDF and INTERREG) or national funds that can support their orientation, respectively the development of blue economy and the Millennium Sustainable Development Objectives.

Such orientation is confirmed by the analysis of the European funds (ERDF + FP) mobilized by these institutions between 2007 and 2019. IRD remains so far the only institution engaged in a FP project, which accounts for 13,8% of the total EU budget obtained.



Though most interviewees expressed the will to increase the local participation to H2020 and to design and implement an internal and regional strategy, they enjoy a very limited autonomy in decision making processes. Local heads of office mostly focus on the day to day management the structure, the identification of financial resources to support the activity, the relation to policy makers, the collaboration with local institutions and project follow-up. H2020 is managed directly by national services / directions, which design the institution's strategy, conduct lobbying activities at the national and European level, and determine the relevant calls for projects and the team involved in the proposal drafting. Local researchers / units may thus be excluded from projects which are in line with their research thematics, as seen earlier. The dependence on the mainland is reflected in the project development process. Local representations fully rely on a national "European office" to promote and support H2020 participation. These offices centralize the organizations of information sessions and trainings, identify the calls in line with the strategy and fields of interest, and relay information to research teams. Interested researchers are then taken in charge, by a support program which varies from one organization to another: administrative & financial support (CIRAD & IRD) by staff trained to FP specificities; proposal review, budget development, expert analysis (IFREMER)

2) Indirect participation through Joint research units

In contrast to the BRGM, CIRAD, IFREMER and IRD, other national research organisms are indirectly represented through their contribution to joint research units with UR such as:

Acronym	Name	National partners
DéTROI	Reunion, Indian Ocean Diabetic atherothrombasis therapies	INSERM
Entropie	Pacific an Indian Ocean tropical marine ecology research centre	CNRS, IFREMER, IRD
Lacy	Atmosphere and cyclones research lab	CNRS, Météo France
LGSR	Réunion geosciences laboratory	Institut de physique du globe de Paris
PIMIT	Infectious Processes in tropical island environments	CNRS, INSERM, IRD

The major played by the CNRS and INSERM in European R&I networks and H2020 (through respectively 1036 and 239 projects) could be a powerful driving force to increase the participation of La Réunion. Yet, so far, the integration has remained modest and indirect. As mentioned earlier, through the example of OSUR, local organizations are positioned as third-party of the CNRS, with minor contribution to the project.

Acronym	Project title	Organization involved	Requested EC contribution (€)	% of the total requested EC Contribution
ACTRIS	Aerosols, Clouds, and Trace gases Research Infrastructure Network	OSUR	45486	0,58%
ACTRIS-2	Aerosols, Clouds, and Trace gases Research InfraStructure	OSUR	38657	0,41%
ENVRI PLUS	Environmental Research Infrastructures Providing Shared Solutions for Science and Society	OSUR	9584	0,07%
ZIKAlliance	A global alliance for Zika virus control and prevention	PIMIT	110000	0,92%

3) Research and innovation platforms

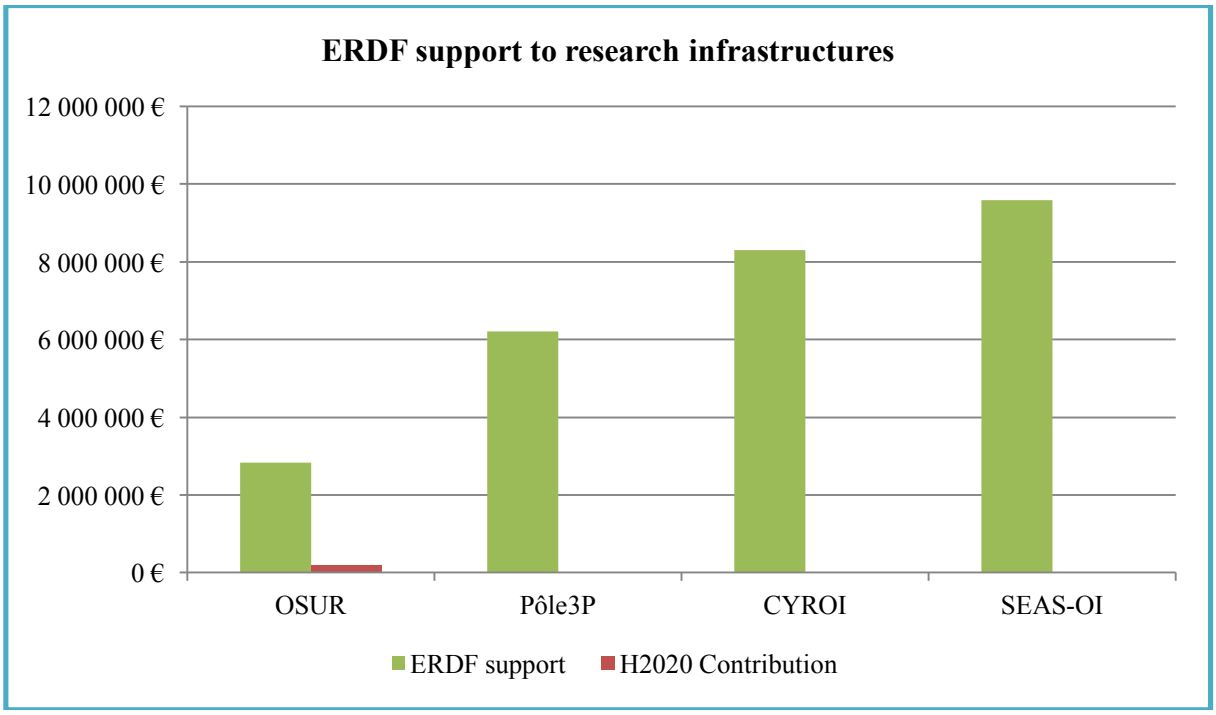
Research and innovation platforms propose mutualized technical equipment and well trained staff to support scientific and economic stakeholders in their activities. As described earlier, La Réunion benefits from a dense network of high quality infrastructures which, combined to its exceptional location and singular conditions, can be seen as strong assets to integrate H2020 projects. Once again, the actualization of such potential remains difficult. Between 2007 and 2019, only two platforms have been participating in FP :

- Ercane, a sugarcane resource development center owned by TEREOS, which conducts research on plant breeding, cultivation techniques, green chemistry and industrial processes.
- OSUR, the environment and climate change monitoring observatory.

Three other platforms remain out of the scene:

- 3P (Plant Protection Platform), described as the Indian Ocean resources center for agronomy
- CYROI, a medical and biotechnology platforms organized around a Cyclotron
- SEAS-OI, a satellite and remote-sensing monitoring platform

Their lack of involvement may be explained by a conjunction of factors. First, these platforms have been designed to address the needs of local stakeholders and contribute to regional cooperation in the Indian Ocean basin. Such self-centered orientation reflects in an assumed dependency to direct or indirect public support, through the delivery of services to local stakeholders, such as research groups or innovative companies, themselves subsidized.



Finally, excepting the 3P run by the CIRAD, these structures are operated by a weak governance, with various and sometimes antagonistic interests, who have high difficulties to define a strategic roadmap. As a consequence, no international strategy of promotion and integration to the major European infrastructures network has been elaborated and these structures remain largely unknown to potential partners.

4) Other kind of stakeholders

Organizations other than higher education establishments and research institutions represent 42% of the Horizon 2020 proposals of the island. According to the frequency of their participation, two kinds of stakeholders can be identified: one-time candidates who are trying to seize an opportunity or invited to join an already well established consortium; and enduring organizations that consider H2020 in integral part of their strategy and dedicate time and resources to increase their participation. Such behavior appears to be independent from the status of the organizations : 5 out of 7 companies are regular participants, 1 out of 2 public body and 1 out of 5 "other" institutions. To better understand the profiles and motives of these organizations, face to face interviews were conducted with the person in charge of their project.

a) Private companies

As seen in the analysis of the regional innovation system, private efforts remain so far very reduced due to the very nature of an economy, centered on a protected regional market which hinders the incentive to invest in perceived risky activities. As a consequence, the larger companies, ran through a financial logic, show no interest in H2020. SME's participation remains equally limited: only one company has been submitting a proposal, the Groupe Dijoux. This 120 people company realizes a global turnover of 22 M€ through the installation of solar water systems, solar panels and self-consumption solutions.

The 4 other companies that submitted proposals on FP7 (1) and H2020 (3) presents a very homogenous profile : technology-oriented, they have been recently founded by former researchers or technology expert, maintain close ties with local research teams and the innovation support system and are aiming external markets. Considering their high capital-intensity and the vivid global competition that characterize their activities, such firms are currently engaged in fundraising, public and private. For the two companies that have been regularly submitting proposals to SME instruments (STEMCIS and REUNIWATT), the benefits are twofold: financial and reputational, a successful application being seen as a "seal of excellence", which will reinforce their visibility & credibility vis à vis potential investors and public authorities managing ERDF.

All of the 4 present an extensive track record of participation in regional and national "innovation challenges" and dedicate a large share of their limited resources (excluding REUNIWATT, none of them employ more than 5 people) to such promotion activities.

Name	Domain	Activity	Nb of proposals	Nb of projects
PEACCEL	Bioinformatics	Protein engineering for chemical and medical applications	2	0
REUNIWATT	Renewable energy	Forecasting solutions for solar enenergy production	5	1
STEMCIS	Biotechnology	Valorization of stem cells from adipose tissue for regenerative medicine	2	0
TORSKAL	Biotechnology	Green chemistry production of nanotheranostics for oncology application	1	0

b) Innovation support services & clusters

On the 3 technical centers of the island (CRITT, CIRBAT and Hydro-Réunion), only the latter has been implicated in H2020. This structure, closed in 2018, was created by the merging of two formerly independent structures: ARDA (marine and terrestrial aquaculture) and ARVAM (valorization of marine biodiversity and biotechnologies) which were part of a common FP7 project : ECSAFESEAFOOD - *Priority environmental contaminants in seafood: safety assessment, impact and public perception.* They were invited to the project by one of the partner, which constituted an opportunity to consolidate and expend their European network. Such participation remained exceptional, and considered a bonus, vis à vis the core activities of the structure, which necessitates time and resources.

Only one business cluster, Témergie, did unsuccessfully take part in the same proposal as Groupe Dijoux, which at the time occupied the presidency. Such lack of implication may look surprising for structures, specializing in innovation projects development and fundraising such as the “pole de compétitivité” Qualitropic, dedicated to tropical bioeconomy. Once again, they reflect the limited appetite for innovation and internationalization of the well-established firms that make of their adherents. Moreover, in a context of easily accessible ERDF funds, H2020 is neither seen as an attractive funding source for the projects developed, nor for the clusters themselves, whose costs of operation rely heavily and structurally on public subsidies.

c) Regional agencies

In contrast to private entities, three regional agencies have been active so far. One unsuccessfully : the local public company “Energies Réunion”; and two successfully : the regional agency for urbanism (Agorah) and the regional agency for development, innovation and investment, Nexa.

Agorah contributed to a CSA project dedicated to urban strategies for waste management in tourist cities, which brought together several local authorities and agencies involved in urban planning. Its implication was made possible through the outermost regions

network, the project being coordinated by the Canary islands, which invited other partners. Currently, Horizon 2020 does not constitute a priority for the agency, which focuses on "its regional objectives"

The implication of Nexa in H2020 has been progressive. As mentioned earlier, since 2013 the agency promotes and supports the participation to framework programme, as a mean to integrate La Réunion in major European research and innovation networks and reach the critical masses necessary to build competitive advantages. Though Nexa had been developing an expertise in project development & management and strong connections with potential EU partners, it did not candidate until 2016. The shift was motivated by the will to reinforce collaborations with other policy makers to accelerate the island's transition toward a more resilient and ecological development model. To that end, Nexa's been part of a CSA dedicated to the development of regional synergies for circular economy (SCREEN) and candidate to two other proposals. Its implication in Forward is a mean to expand and deepen collaborations with outermost regions and to design public policies and support services which can lead to a significant increase of La Réunion participation in Horizon Europe.

d) Public bodies

The participation of the Regional Council of La Réunion is focused on political cooperation with Outermost Regions and Territories to preserve and manage biodiversity. Since the beginning of the century, numerous initiatives were developed to that end :

- the BIORUP consortium Initiated by the French C3I group (gathering the CIRAD, INRA, IFREMER and IRD) and involving the regional governments of the Açores, Canary islands, and Madeira, this network was setup in 2002 to increase cooperation between France, Spain and Portugal and promote singular scientific assets from Outermost regions, mainly Biodiversity and Natural ecosystems conservation. The consortium produced an expression of interest in response to the call launched by the european commission in june 2002 to identify projects that could match the new instruments developed for the 6th FP (such as the ERA-NET) ;
- the ERUP study "Mieux connaître la place de la recherche et développement technologique dans les régions ultrapériphériques (RUP) de l'Europe et mieux les intégrer dans l'espace européen de la recherche" (Rapport Lengrand, Juillet 2002, http://www.erup.org/) ;
- the plan d'action pour la recherche commun aux 7 Régions ultrapériphériques européennes (Juin 2003)
- several international conferences in the Indian Ocean (2003), Amazonia (2003), Pacific (2004), …
- the 2004 Communication from the Commission on "a stronger partnership strengthened for the outermost regions: assessment and prospects" which encouraged *"Projects to promote cooperation and the coordination of research activities and innovation (ERA-NET), a new feature of the sixth framework programme, are open to participation by at least three countries, which should*

encourage participation by the outermost regions and their integration into the European Research Area"

In response to this opportunity, the Regional Council submitted a proposal in 2005, which was not selected. Yet in 2006, the EC invited the consortium for a negotiation. During this negotiation phase, the Regional council received the help of the BIODIVERSA consortium (ERANET project aiming at "Consolidating the European Research Area on biodiversity and ecosystem services" funded in 2005). The NETBIOME project (2006-2012) which emerged from these discussions, brought together regional bodies from 5 member States, with the objective of structuring a network of regional research policies on biodiversity in the European tropical and subtropical regions and territories (Guadeloupe, Martinique, Guyane, La Réunion, Nouvelle-Calédonie, Polynésie Française, Canary Islands, Madeira, Azores, UK Overseas Territories, Netherlands Antilles),through improved knowledge and funding of both basic and applied research.

The core team of the consortium then developed a follow-up, the FP7-NETBIOME-CSA (2013-2016), a coordination and support action project led by FRCT from the Azores. In this second project, the Regional Council of La Reunion was the leader of the WP6 related to the sustainability of the network.

In 2015, the NETBIOME group joined the BIODIVERSA consortium for the 3rd phase of the project. Funded under the ERANET COFUND scheme of the Horizon 2020 programme, Biodiversa3 gathers 39 of the main biodiversity research funders in 24 different countries, both from the European mainland and overseas and aims at developing a sustainable mechanism to promote strategic cooperation in biodiversity research and related disciplines at a European scale. In this project, the regional council of La Reunion is co-leading a task in the workpackage 2 dedicated to OR and OCTs (WP led by REG GUA).

Individual's factors and representations

Most studies on FP participation focus on network, systemic or organizational determinants and privilege quantitative analysis based on large databases like CORDIS and ECORDA. Yet, the sum of individuals' profiles, strategies and (mis)perceptions can have a major influence on the regional performance taken as a whole. Taking advantage of the small size of OR innovation systems, Forward thus offered the opportunity to investigate three elements at the individual scale:

- the determinants of researchers' implication in FP, through semi-structured interviews questioning the patterns of success and failure as well as self-selection behavior;
- the perceptions of the regional participation through an online survey to better understand the beliefs and fears expressed by stakeholders as well as potential gaps with the facts highlighted through this analysis;
- the barriers and levers identified by the individuals questioned during both interviews and survey to design an action plan adapted to users' needs.

A - Analysis of participation determinants at individual level

To increase the regional participation in Horizon 2020, a critical attention must be paid to the factors that influence individuals' decisions and capacities to apply. Based on the common methodology developed to conduct regional analyses, Nexa deployed 2 qualitative, interview-based, analyses.

The first investigated the existence of regularities and common traits among successful individuals and the characteristics of unsuccessful candidates to highlight the potential existence of a pattern of success or failure and prerequisites which could lead to a more effective supported service, concentrated on the candidates that present the highest chances of success.

The second questioned the "self-selection phenomenon" through which individuals decide not to submit proposals, either because of their perceived weaknesses and limited chances to be funded, or because they concentrate their efforts on other funding sources, despite their capacities to develop successful projects.

To that end, three groups of individuals from local research institutions and companies were constituted:

- Group A composed of researchers that participate or have participated to FP projects (FP7 and H2020)
- Group B composed of unsuccessful candidates to Horizon 2020
- Group C composed of not participating actors (self-selection) with high scientific production and/or with faculty responsibility (such as research group management)

21 face-to-face and semi-structured interviews were conducted, 9 with FP successful participants, 5 with FP unsuccessful candidates and 7 with FP non-applying candidates. The groups' characteristics are detailed below:

Interviewees' characteristics :

Group	Number	FP7/ H2020	Organisation	Average number of years since phD graduation
Group A	9 2 Females, 7 Males	3 FP7 6 H2020	University : 4 Research centers : 2 Private companies : 1 Other : 1	22,4
Group B	5 1 Female, 4 Males	0 FP7 5 H2020	University : 5	16,2
Group C	7 : 3 Females, 4 Males	0 H2020 / 0 FP7	5 from university 1 from IRD 1 from CIRAD	NA

1) Patterns of success and failure

The first sets of interviews aimed at better understanding the patterns of success and failure (group A and B) by questioning two families of potential discriminative traits. On the one hand, individual capacities, measured by :

- scientific excellence, quantified by the total number of publications and the H index
- mobility profile, described by the fact that the candidate has or not obtained her/his PhD in the institution (s)he currently works for, and (s)he has or not a national and/or international experience (for a short (1-2 years), medium (2-5 years) or a long period (>5years))
- FP knowledge, determined by the number of FP projects the candidate was involved in during her/his career, the fact that (s)he is registered as an expert in the EC database and has participated to proposal evaluations for the EC

On the other hand, the way the project development was conducted:

- built or not on an existing network
- central/secondary role taken by the candidate in the proposal building,
- implementation of lobbying activities
- support from a public service or private consultant

The results of such interviews appeared insufficient to determine whether the determinants identified by the literature apply or not; since the two groups shared many similarities. Successful and failing candidates indeed show a close level of scientific productivity measured by the rates of publications and H-index. Little difference can also be found in terms of mobility experiences: 1 of the 5 unsuccessful candidates obtained its PhD in its current organization, compared to 2 out of 7 successful candidates. In both groups, such experience rarely led to the development of FP projects: only 2 candidates were involved in projects developed abroad, 1 from each reference group. The knowledge of FP procedures could not be tested, since none of the interviewees registered as an evaluation expert for the European Commission or contributed to the evaluation of a FP project in their career.

The comparison of the two groups is instructive on the impact of networks. Indeed, 80% of the unsuccessful researchers built projects with their preexisting networks, compared to 55% of the successful group. This shows that relying on existing networks is not a sufficient condition to ensure participation, if such network does not include highly successful organizations which are likely to develop more projects. The gap may also illustrate the capacity of regional stakeholders to integrate existing consortia, and thus to be recognized as valuable, competitive partners.

Two main differences were identified between the two groups. First, a larger number of successful candidates played a more prominent role in the development of the projects (87%) than failing participants (40%). Secondly, successful candidates mobilize more frequently support services (56% vs 20%) and lobbying activities (78% vs. 20%), that unsuccessful candidates; confirming the hypothesis according to which many unsuccessful proposals are the consequence of late-stage project development, lacking the required preparation time.

2) Analysis of self-selection behaviors

The second set of interviews, conducted with group C, aimed at testing frequently invoked causes that prevent researchers from applying to FP. Based on a previous survey conducted by the Nexa in 2018 with 60 respondents and also on regular feedbacks from researchers, a questionnaire with 16 direct questions was built investigating the:

- interest for EU level cooperation
- perception of one's own capacities (and English level)
- level of FP knowledge
- interest in FP
- access to resources and support

For each question, interviewees were to indicate if they agree or not with the statement. The selected group for self-selection presented an average citable citations of 47,7 +/- 30 and an average H index of 20,8 +/-11,9[1], it included 3 Research group directors and 1 Master

[1] * The number of citable publications and the H index of the non-applying candidates are not statically different from the successful or failing individuals (T-Test).

degree teaching manager. Interestingly, the 7 individuals have a number of citable citations and an H-index similar to the groups of successful and failing candidates. Further characteristics are detailed in the table below:

Self-selection group characteristics :

M/F	Scientific Domain	Panel	Organisation	Number of citable publications*	H index*	Connected to international network
F	Life Sciences	Health	IRD	32	18	Yes
M	Life Sciences	Ecology	University	85	27	Yes
M	Life Sciences	Ecology	CIRAD	95	38	Yes
M	Physical sciences and Engineering	Physics	University	16	8	No
F	Social Sciences and Humanities	Literature	University	40	NA	Yes
F	Social Sciences and Humanities	Education	University	26	13	Yes
M	Social Sciences and Humanities	Sociology	University	40	No	Yes

The 16 questions were precious to better understand the motives and the obstacles encountered by local researchers. They first deconstruct established representations, according to which researchers are not willing or capable to engage in FP projects.

First, all interviewees share the importance of developing collaborative research at European level. Such position contrasts with the high dominance of mainland France in existing partnerships as well as with well-established discourses and policies which consider that the priority should be put on regional integration, to make La Réunion the "European knowledge hub of the South-West Indian Ocean". Only 1 of the 6 interviewees mentioned that "*La Réunion shared more common interests with organizations from the Indian Ocean zone than with European mainland partners*"; and only 2 "*preferred working with high level organization outside Europe*".

They also question a common stance, often reaffirmed to explain the limited participation of La Réunion in FP: the lack of appropriate calls in line with the singular fields of interest/expertise of the island. Only one researcher agreed with the statement "*my research fields do not represent any interest for Europeans or my scientific domain is not represented*

in FP programmes". Such surprising result may stem from our sample or from the interview conditions (face to face interview with a European project manager).

According to the interviews, the limited involvement in FP projects does not come either from a lack of capacities. Only 2 out of 6 respondents considered her/his level of scientific excellence insufficient regarding the global competition to integrate a consortium. Interestingly the 2 positive answers came from researchers involved in humanities and social sciences. The ability to connect to promising consortia was not supported either : only 2 of the 6 respondents (once again in HSS) agreed with the proposition “I do not have the right networks for this type of projects”.

Conversely, the analysis highlights some key obstacles.

First, the level of English may still contribute to explain individual reluctance to apply to FP. On the 6 respondents (one did not answer the question), 3 considers that English is problematic and 3 not.

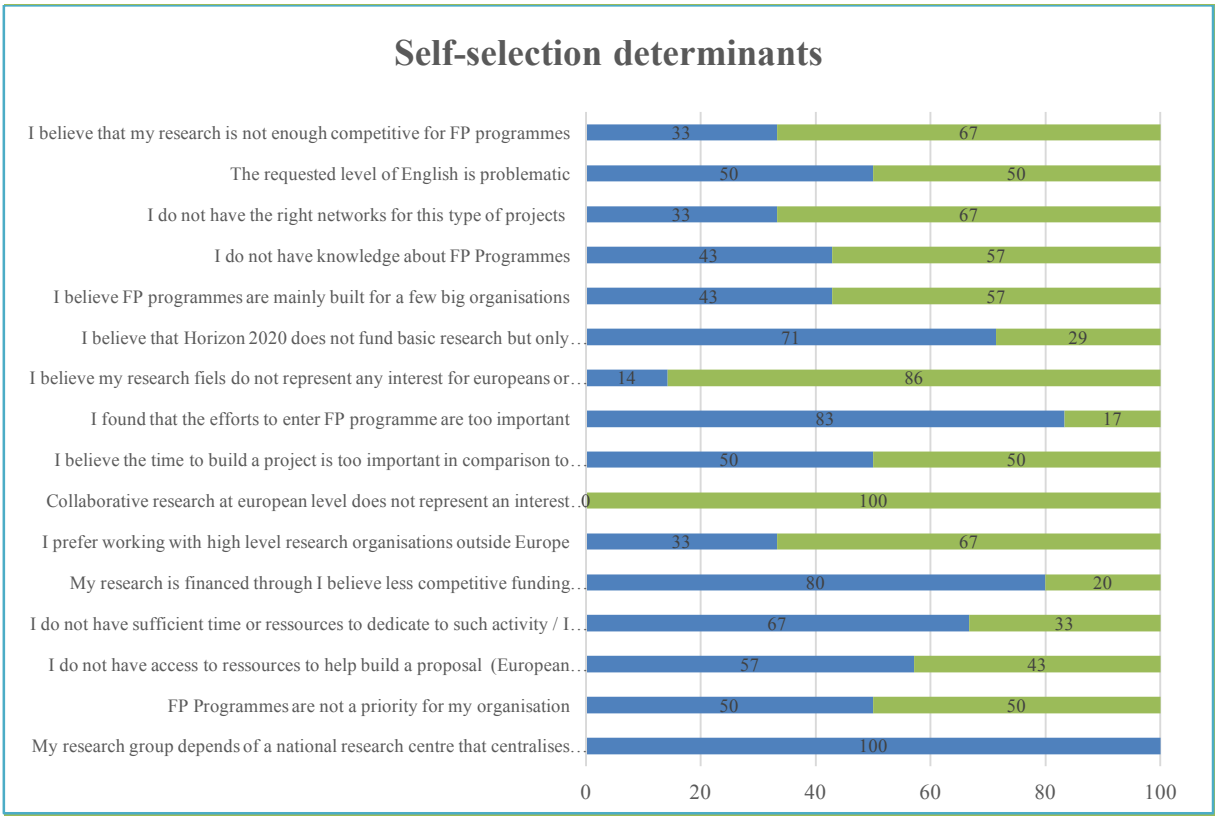
Second, a global lack of knowledge of FP, which was already pointed in an internal survey conducted in 2018 which showed the pervasiveness of preconceived ideas. On the seven respondents, 3 consider not to have sufficient knowledge on FP. These three individuals also think that H2020 is only built for big organizations, and two of them agreed with the statement that "*Horizon 2020 does not fund basic research but only applied research*". Interestingly, out of the four people considering having knowledge on FP, three also think that H2020 does not fund basic research. Third, FP may not be the adequate tool for some scientific fields. One sociologist explained that his field of research is divided into geographical schools, leading francophone sociologists to publish mainly in French with their homologues from France, Canada Switzerland. Moreover, he indicated that, at the national level, the career development is based on publications in francophone reviews and on the ability to get competitive national funds. This researcher even acknowledged that he wasn’t aware if an active European network existed in his field.

Fourth, FP are facing the competition of large, easily accessible, less competitive regional funds, supported by ERDF. Though only half of the interviewees consider that the time dedicated to build a project is too important in comparison with the chances of success, 5 out 7 people indicated that the efforts required to enter FP (mastering the programme, building a winning consortium) are too demanding. One researcher mentioned that entering FP must be seen as a real research-behavioral change with an important conversion cost, particularly for "elder" researchers. Five interviewees totally agreed on the idea that the access to other less competitive funds such as ERDF, ANR (national funds) or CIR prevent them from applying to FP.

Fifth, researchers consider that the organization they work for do not ease the participation with adequate resources and supports. Five respondents reported not having sufficient time or being overworked. The lack of time is indeed a very common barrier evocated to explain the weak participation to H2020 (85% of the survey respondents on Norwegian participation in Horizon 2020). Besides the lack of resources or institutional choices which reduce the available time for research activity, the very attention paid to FP

should be questioned. Four respondents affirmed that FP projects do not constitute a priority for the organization at the institutional level (governance); among them, 3 considered that they don't have access to the appropriate resources, needed to apply. Interestingly, on the 3 respondents estimating that FP participation is a priority for their organization, 2 mentioned to be too overwhelmed to participate, disconnecting their relative overwork from their organization's strategy. As specified by one of the interviewee, *"FP participation is actually encouraged by my institution, [but] it is in addition of what I already do on ERDF funding and the latter takes a majority of my time"*. One researcher explained that "*There are not a lot of incentives to support researchers effort to develop European collaborative programmes*" while another stated "*The support I receive for the running of my ANR research programme is absent and the requested internal administrative effort is extremely time consuming"*. Finally, the 3 interviewees that are connected to national research centers (one of them belongs to a joint research unit with a national organization and the other two are agents of a national organization) agreed that their participation depend on the national strategy and to a national centre that centralizes all proposal initiatives.

One last hypothesis to be tested concerned the potential lack of resources and support.



Share of respondents agreeing to the statement (%)

Share of respondents disagreeing to the statement (%)

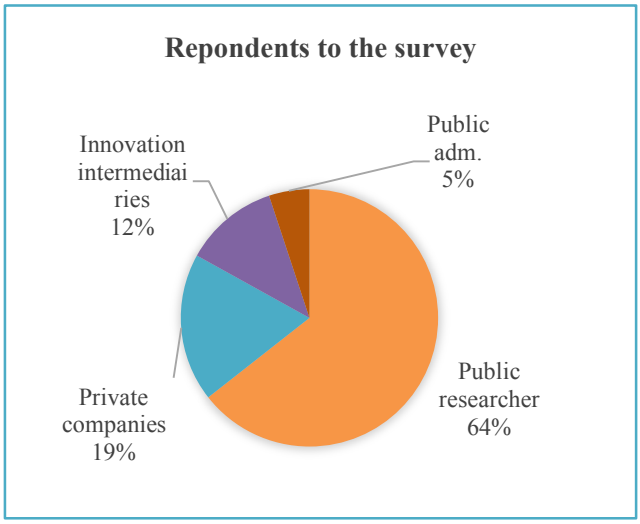
To summarize, we can note that the 3 categories of stakeholders express the same will to collaborate and present similar characteristics (or non-significant differences) in terms of: scientific capacity, international connections / mobility, English level, knowledge of H2020.

These individual characteristics can influence the participation to FP, however and according to the above analyses, the patterns of success & failure and self-selection behaviors seem to be mainly and largely determinated by extra individual settings or causes influencing the decisions of the individuals. Indeed, our analyses seem to show that inadequate work organizations, a lack of institutional strategy in favor of Horizon 2020 and adequate support services may deter individual from applying, since do not feel like they enjoy the means and support to succeed and manage their projects. The lack of ambition, means and incentives to conduct competitive research projects and integrate competitive networks, at research organization's level as well as at territorial level, also prevent individuals from acquiring the necessary will and ways for a competitive participation. These extra individual causes hence appear to take a more important role, nurturing self-selection mechanisms and driving the components of the individual's patterns of success & failure more than individual stories or characteristics themselves.

B - Questioning regional representations, lessons learnt from the survey

In addition to the interviews, a consultation was conducted to map and assess perceptions on FP participation and regional performance through an online survey. Such survey questioned both the representations of stakeholders on the factors that influence the participation in the Framework programmes (taken globally) as well as the specific factors that affect the performance of La Réunion. The survey was a self-administrated questionnaire submitted to actors through internet and was composed of 15 closed questions on the perceived performance of La Reunion in FP participation and on knowledge about the determinants that affect FP participation. Respondents were also asked to freely express themselves on the main obstacles and levers to FP.

59 people provided their inputs: 38 public researchers, 11 private companies (CEO or employee), 7 employees of facilitators/innovation intermediaries, 3 members of public administration.

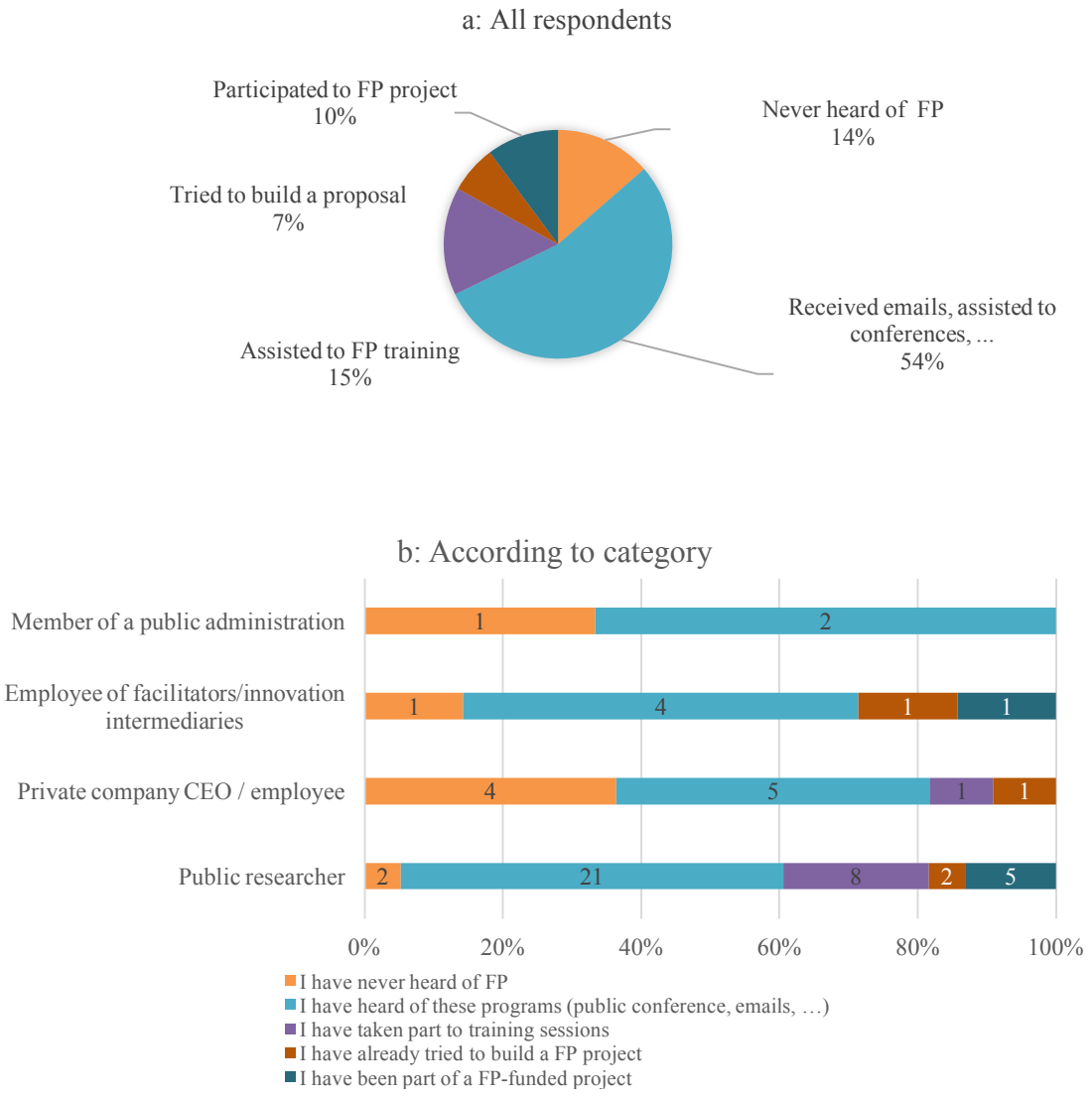


1) Level of FP knowledge in the respondents

The first question of the survey reveals the level of FP knowledge in our sample. Most of the respondents know about FP programmes: 69% of them have received emails, assisted to conference or participated to training sessions on FP (41 people) and 17% had tried to build or been part of a FP project (10 people). Only 8 people (14% of the respondents) had never heard of FP (4 out of 11 the private and 2 public researchers out of the 38 participating to the survey).

This reflects a similar situation pointed out at national level (France). Indeed, as shown in the "*Rapport sur la participation de la France au PCRI*": French public researchers are mostly aware of the opportunities offered in FP (>90% of research groups considered to have sufficient information about FP) but not the private sector (>50% of the private companies have never heard of FP programmes).

FP knowledge of the respondents to the survey



2) Knowledge on the factors influencing FP participation

As described in the determinants section, FP participation is conditioned by different factors: access to competitive networks, R&I system performance, synergy/complementarity in public funds, organization's strategy and size... The survey was a great opportunity to question whether the actors were acculturated to this knowledge. 12 potential factors corresponding to 4 types of determinants (Regional system, networks, Organization, individual's capacities) were submitted to the respondents who were asked to assess whether each factor was influencing or not FP participation.

List of potential factors tested in the survey

Family	**Factors**
Regional system	Regional research performance (Scientific excellence)
	Attractiveness towards foreign researchers of the regional research system
	Implication of business sector in R&D expenditures
	Use of ERDF or regional policies as a lever for encouraging and building capacities for Horizon 2020 participation
Networks	Connection to the most Horizon 2020 successful institutions/networks
Organization	Size of research/innovation organizations
	Local organizations strategy and tools to encourage and ease the participation of candidates
	Quality of support services to develop and manage H2020 projects
Individual capacities	Scientific productivity of individual researchers
	International connections of individuals
	Knowledge of candidates about framework programs
	Relative attractiveness of Horizon 2020 compared to other available funding

Overall, the set of factors presented in the survey are considered having a strong or very strong influence by more than 50% of the respondents. However, three categories of factors can be distinguished among the respondents:

1) Determinants considered as strongly influential by more than 80% of the respondents:

- Quality of support services to develop and manage H2020 projects (83%)
- Regional research performance - Scientific excellence (81%)
- Connection to the most successful Horizon 2020 institutions/networks (80%)

2) Determinants seen as strongly influential by between 60 and 80% of the respondents:

- Attractiveness towards foreign researchers of the regional research system

- International connections of individuals
- Knowledge of candidates about framework programs
- Local organizations strategy and tools to encourage and ease the participation of candidates
- Use of ERDF or regional policies as a lever for encouraging and building capacities for Horizon 2020 participation

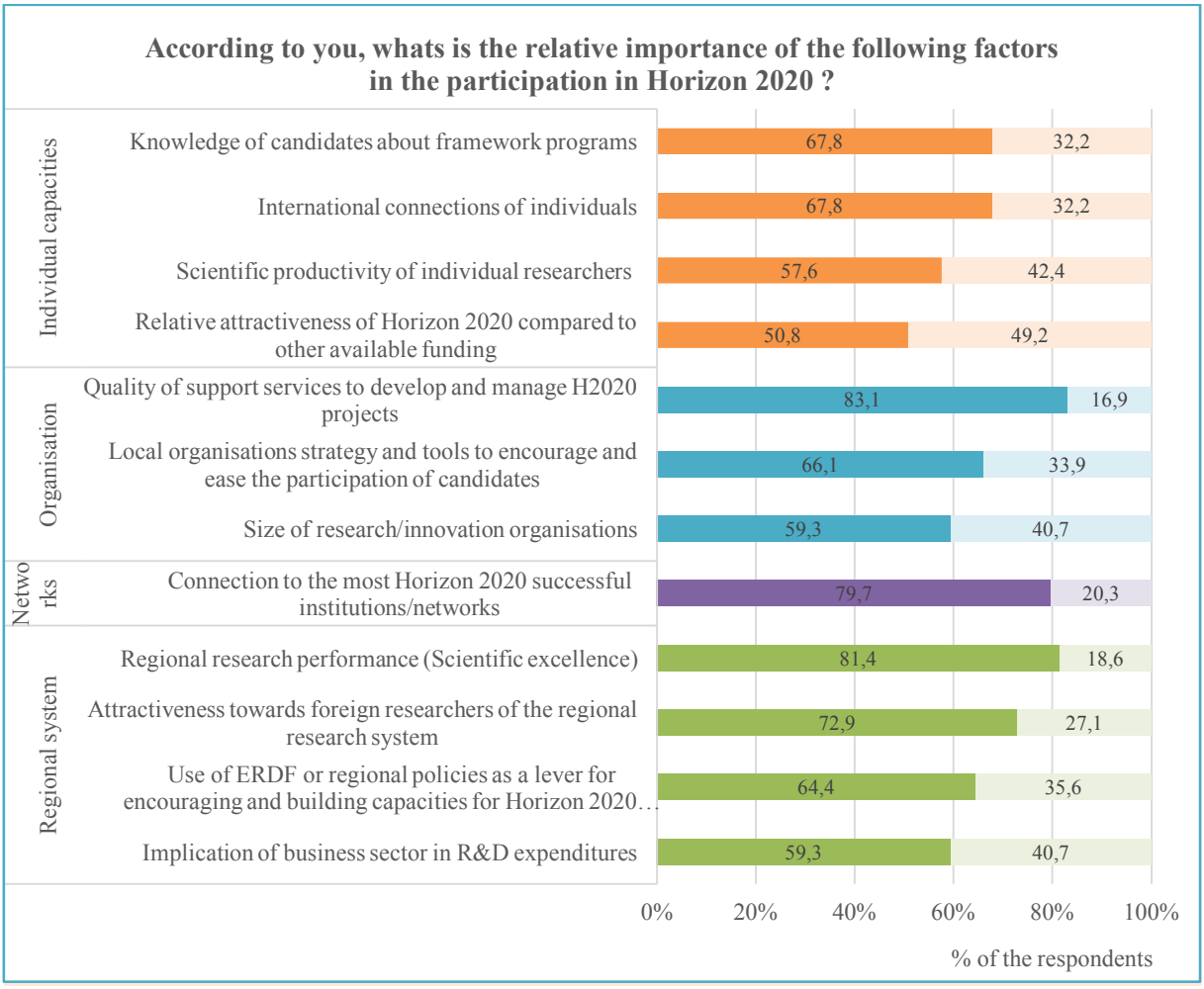
3) Determinants considered as less influential :

- Size of research/innovation organizations
- Implication of business sector in R&D expenditures
- Scientific productivity of individual researchers
- Relative attractiveness of Horizon 2020 compared to other available funding

Such results show that while some determinants underlined by the literature are clearly identified as important by the respondents (regional research system performance, connection to successful networks, etc.) others critical challenges remain out of the scope (size of the organizations, private sector implication in R&I, funds synergy, etc.).

The survey also reveals a marked tendency to preferentially point out systemic factors (regional system, networks, organizations) rather than individual factors. For instance, only 58% of the respondents considered "scientific productivity at individual level" as a determinant.

According to respondents, the most important factor (83%) is the quality of the support services. Considering the very low submission activity of La Réunion in Horizon 2020, such position may reveal the existence of strong self-selection behaviors, confirmed by the interviews : in response to the competitiveness of FP, stakeholders feel a strong need for efficient support, which according to the interviews is lacking in organizations that do not place Horizon 2020 at the core of their strategy.



If the quality of support services is underlined by both researchers and private companies, the latter also insist on the use of ERDF, while researchers predominately point out "*the performance of the regional system and its attractiveness*" (79%) and "*the institutional strategies of organizations* (75%)"

TOP 3 of factors for public researchers and private companies

We also analyzed if knowledge or experience in FP could modify how the actors perceive the level of influence of each factor. Interestingly, out of the 12 factors tested, 4 are particularly influenced by the level of FP knowledge:

1) Use of ERDF or regional policies as a lever for encouraging and building capacities for Horizon 2020 participation

If in principle, people believe that ERDF can be a lever (100% of respondents that never heard of FP agrees with this stand), having an experience with H2020 modifies such opinion: less than 40% of the FP experienced believe ERDF can be an important determinant in accessing Horizon 2020. This may either indicate that respondents did not perceive a positive synergy between the two funds, or that they perceive a potential substitution effect induced by the time and resources needed to manage an ERDF funded project.

2) Relative attractiveness of Horizon 2020 compared to other available funding

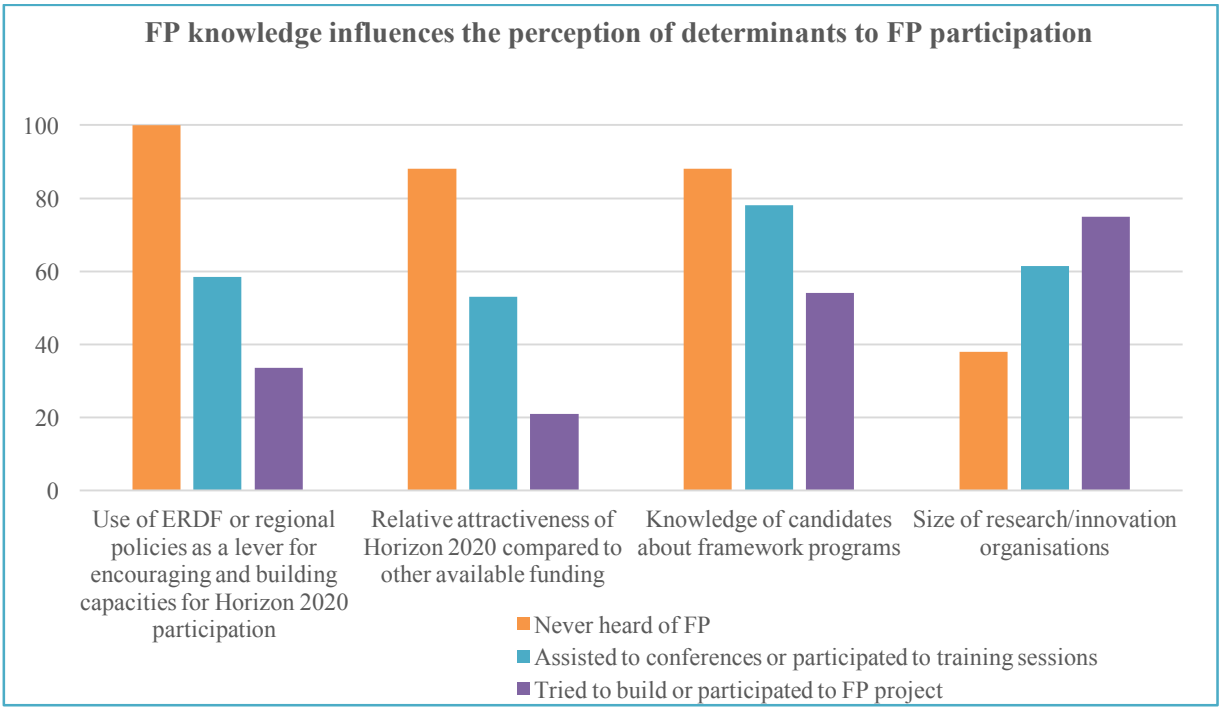
Most of individuals that do not know FP (90%) believe that the relative attractiveness of Horizon 2020 compare to other funding is an influential factor, unlike the respondents experienced in H2020 (only 20%). The latter thus appear to perceive the intrinsic value of the programmes. This shows that it is important to pursue the promotion of FP advantages and added-value in comparison to other funding to encourage participation.

3) Knowledge of candidates about FP

Near 90% of the respondents with no FP experiences and almost 80% of the one having followed trainings or heard about the programmes in some ways believe that knowing the programmes is crucial to increase participation. This is not the case for more than half of the experienced respondents. This illustrates self-selection behaviours preventing potential candidates from participating because they do not fully understand the programmes or feel like they have few chances to succeed.

4) Size of research/innovation organizations

60% of actors that do not know Horizon 2020 believe that the size does not matter, when they are 75% to believe so for experienced respondents.



3) Perception of the participation of La Reunion in FP

Besides testing the FP culture of regional stakeholders and its influence on participation, the survey offered the opportunity to evaluate their perceptions of the performance of La Réunion. To that end, two questions were introduced : "*According to you, how many Horizon 2020 funded projects include from La Reunion?*" "*Compared to average European regions, do you think this number of FP funded projects in La Reunion is low/in the average/high?*"

Overall, the respondents have a quite clear understanding of the participation and performance of La Réunion in H2020 program when compared to the global European participation. Indeed, less than 10% think that the island does not participate at all to Horizon 2020 and none thinks that the number of projects is above 50. Nonetheless, 66% of the respondents believe that La Réunion has been part in less than 10 projects and 27% estimate this number between 10 and 50. Interestingly, the 4 individuals believing that La Réunion does not participate at all in Horizon 2020 are public researchers.

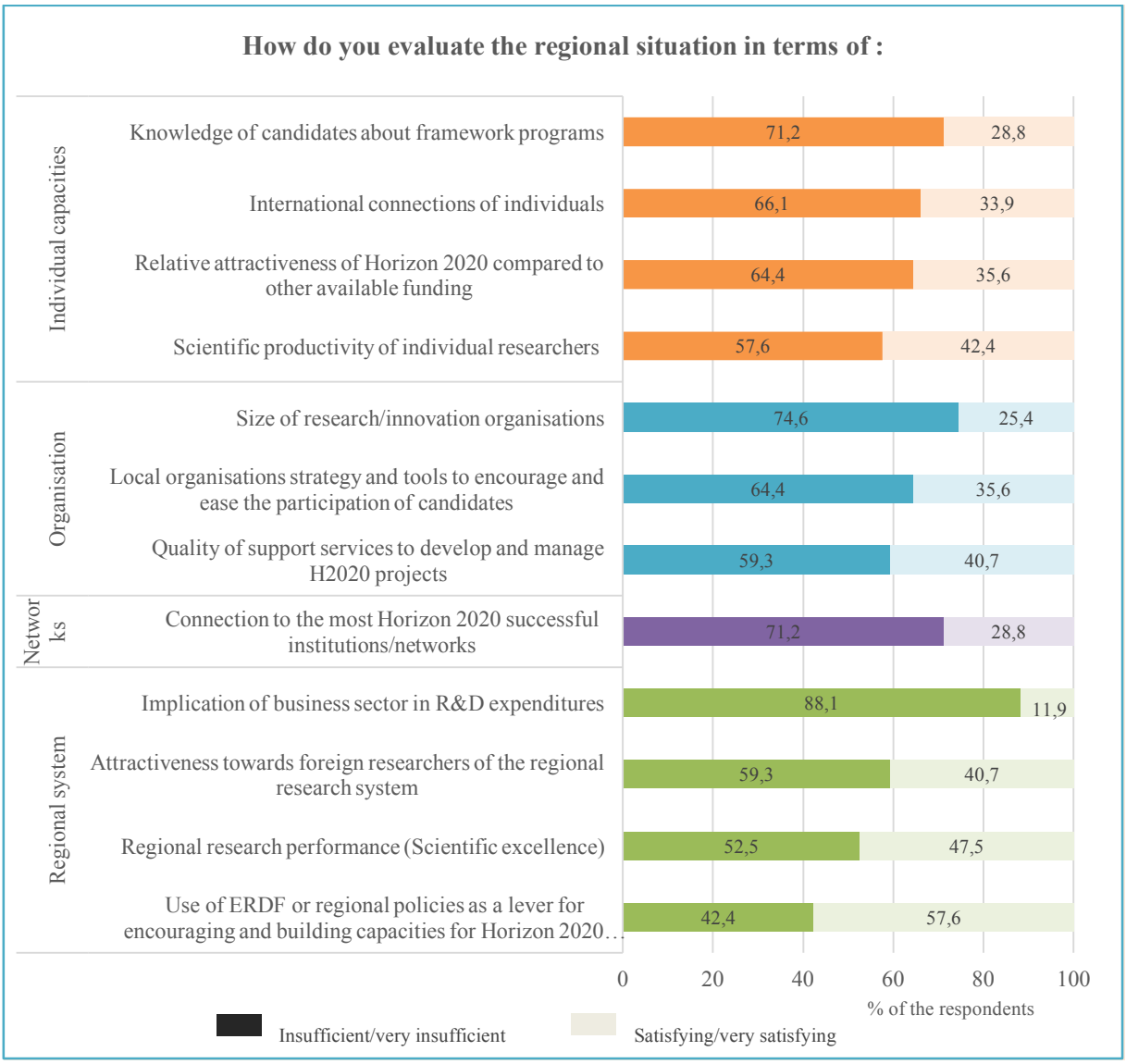
Furthermore, the vast majority of the respondents (68%) believe that the number of projects involving La Réunion represents a « low » or a « very low » participation, 22 % think it corresponds to the average European participation and 10 %, more optimistic, thinks it is above the European average.

4) Perception of the determinants that influence La Reunion's participation in FP

In addition to the global performance, individuals were asked to evaluate the relative position of the island for the different factors that are reputed to condition a regional performance.

For all the factors (except « the use of ERDF ») more than half of the respondents believe that La Réunion is low performing or not performing at all on the main determinants. For the 4 following factors the performance of La Réunion is considered weak or very weak by 70% of the respondents:

- Implication of business sector in R&D expenditures (88% of the respondents)
- Size of research/innovation organisations (75%)
- Connection to the most Horizon 2020 successful institutions/networks (71%)
- Knowledge of candidates about framework programs (71%)

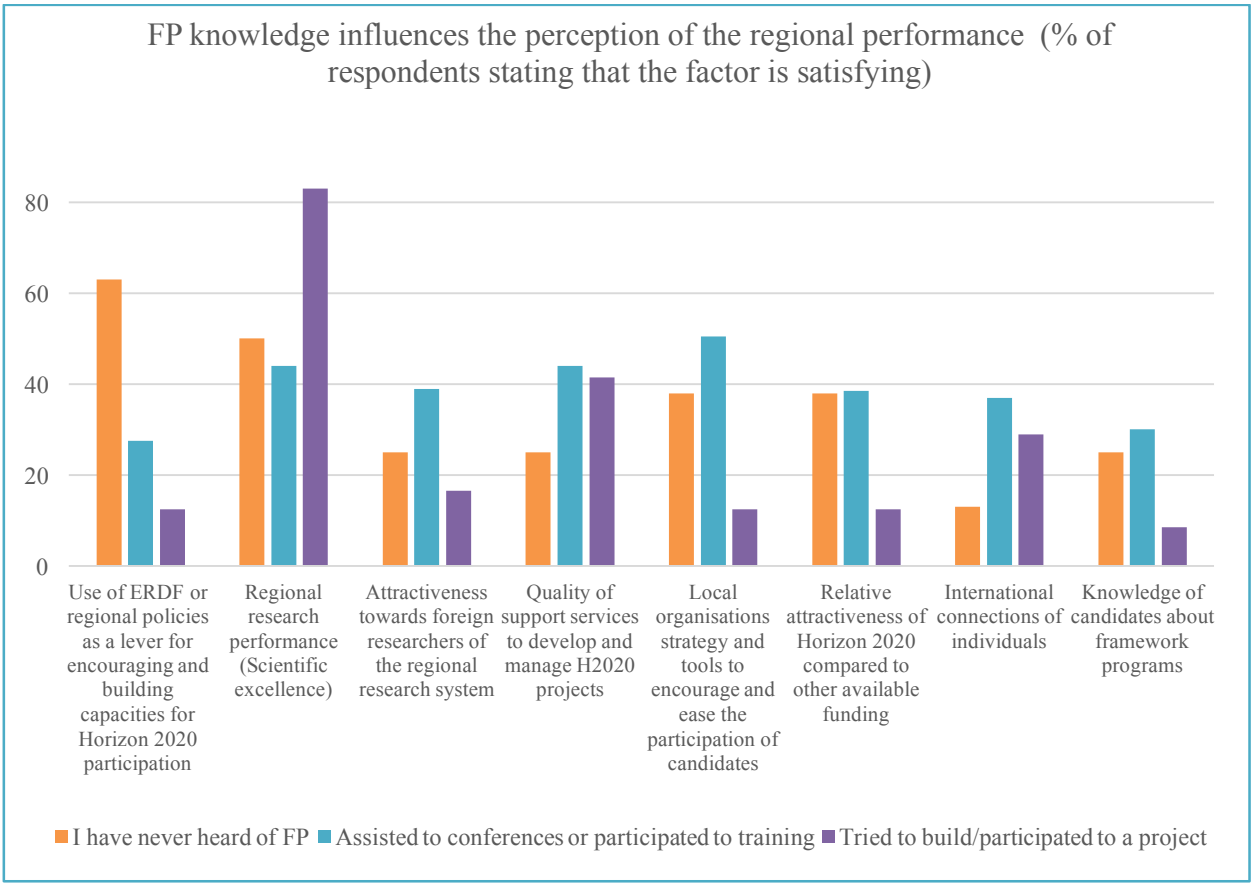


Marked differences can be noticed between the different categories of stakeholders : while respondents from the public administration appear more optimistic (9 of the 12 factors are considered satisfying or very satisfying), private companies stand out as particularly pessimistic. They consider that La Réunion is under performing in all factors (except for « the

use of ERDF »). Companies particularly agree (91%) on the weakness of the performance for the “implication of business sector in R&D expenditures” and the “Connection to the most Horizon 2020 successful institutions/networks”. Researchers present more heterogeneous positions; yet they tend to agree on 4 factors (with at least 70% of approval) regarding the low performance of La Réunion in the “implication of business sector in R&D expenditures” (87%), the “Size of research/innovation organisations” (76%), the “Knowledge of candidates about framework programs” (71%), and “connection to the most Horizon 2020 successful institutions/networks” (71%).

The level of knowledge and experience of FP also strongly modifies the perception.

- The great majority (80%) of respondents with a previous experience in FP indicate that La Reunion is well performing in terms of “regional research performance” (only an average of 40% of the other profiles shares this view). 67% of those H2020 experienced respondents thinks that when it comes to “scientific productivity of individuals researcher” La Réunion is also well performing, while only 35 % of the other profiles agrees with such position.
- These same individuals also state that La Réunion is underperforming in terms of organizations’ strategies (100% respondents within this category agree); on the contrary 67% of the actors with none or little knowledge on Horizon 2020 consider that La Réunion is well performing in this matter.
- Finally, in regards to the « Use of ERDF», 75% of the actors having already developed a proposal and 100% of the ones that participated in a project believe that La Réunion is not performing when it comes to use ERDF as a lever. This is contradictory with the position of actors with no experience in FP, 60% of them estimating that La Réunion knows how to use the ERDF as lever to Horizon 2020.



In essence, the analysis of the perceptions shows that out of 12 factors, 3 are clearly identified as important determinants to FP participation by a great majority of the respondents : regional research performance, connection to the most Horizon 2020 successful institutions/networks and the attractiveness of the regional system. For all of these determinants La Réunion is perceived as low performing: less than one respondent out of two thinks that the research regional system is performing, 7 out of 10 believe that the connection to the important networks is insufficient, and 6 out of 10 that the regional system is not attractive.

Other factors essential for the participation in FP, are less clearly acknowledged, in particular the size of the organizations or the dynamics of the private sector (only 59% and 51 % of the respondents qualify them as influential). Nonetheless, 75% of the respondents deem the size of the organizations as insufficient in La Réunion and 91% of them believe that the implication of business sector in R&D expenditures is not satisfying. This demonstrates a good understanding by the respondents of the gap between the situation in La Reunion and the European standards.

Finally, this study also shows that the synergy between H2020 and ERDF is a relatively badly understood concept. Indeed only 64% of the respondents think synergy can be an influential determinant in the participation to FP and nearly 60% of the actors believe that ERDF is rightfully used as a lever, this falls to 10% when questioning actors with FP experience. The lever effect of ERDF is not thus perceived as an important determinant when developing proposals.

C - Perceived barriers and levers to H2020 participation

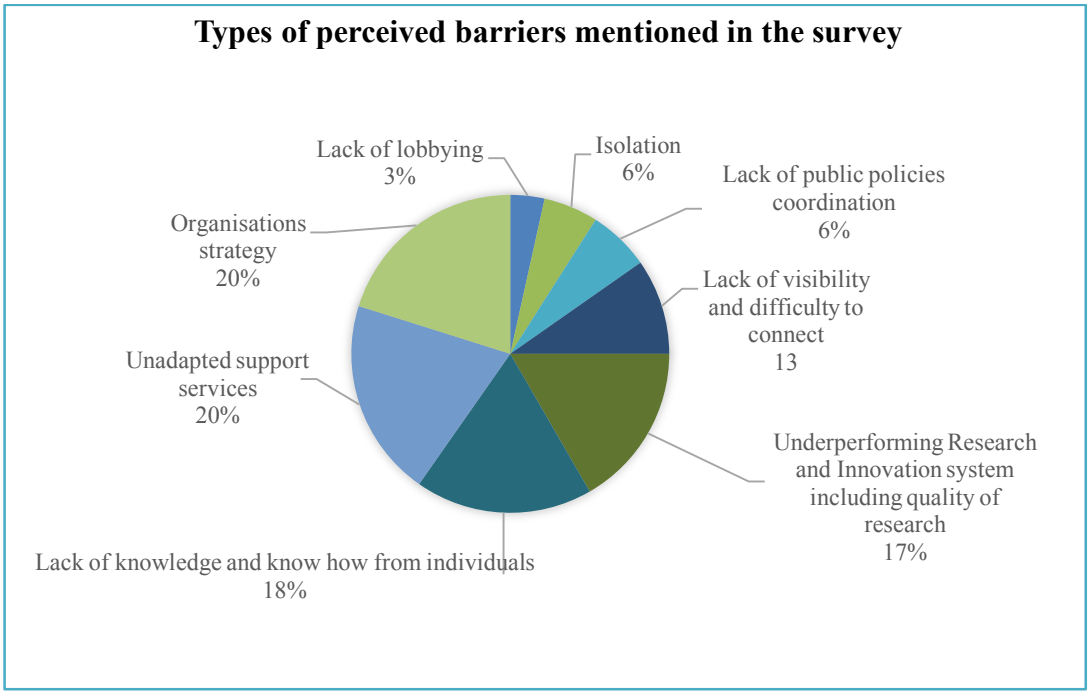
Perceived barriers and levers OR R&I community members often depict FP as too complicated and unsuited to local situations and realities, generating a lack of ambition and involvement. Though poorly studied and often underestimated, beliefs and fears constitute powerful obstacles to H2020 access and overcoming them can be energy and time consuming. They are also critical to adjust design and implement an action plan that addresses the common obstacles identified by stakeholders, which have an immediate impact on their willingness to engage in, and experience of, Horizon 2020. To analyse such obstacles and levers, specific questions were thus introduced in the 21 semi-structured interviews and self-administrated survey.

1) Analysis of the perception of the perception of the respondents to the survey

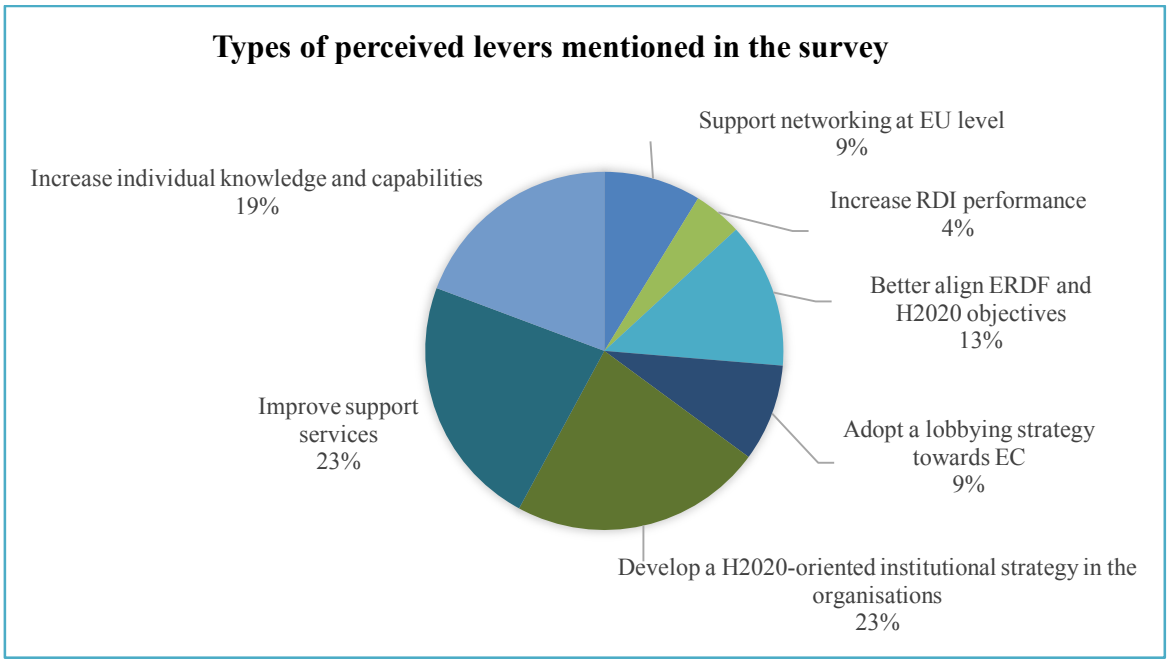
Through two open-ended questions, survey's respondents were questioned about the main obstacles and levers that should be activated in order to increase Horizon 2020 participation. 258 verbatim were collected and analyzed, leading to the identification of 8 types of obstacles (based on 144 ideas extracted) and 7 types of levers (based on 114 ideas). Four types of obstacles are particularly cited by the respondents:

1) The absence of strategies within the organisations towards Horizon 2020 participation (20% of the citations); accurately "lack of institutional supports", "lack of H2020 culture at institutional level";
2) The lack and quality of support (20% of citations) of two different types (1) support for the building of FP projects, (2) administrative and technical support within research groups. This later is a crucial obstacle that was also indicated during the interviews and that should be addressed. Indeed, the lack of support forces researchers to take on those activities (technical and administrative) themselves which leaves them with little time to engage themselves in research.
3) The lack of knowledge and know-how of individuals in terms of H2020 projects (18%) generally expressed along a need for FP support;
4) Underperforming Research and Innovation system (18%) and in particular the quality of research. Indeed, two third of the citations mentioning the low performance of the R&I system concerns the research component).

Interestingly, geographical isolation and the lack of lobbying are often mentioned by governance of institutions and other decision makers however in this survey, those two obstacles are not largely indicated and they only recall for 6 and 3 %.



In an almost symmetrical manner, the main levers mentioned by the respondents are: 1) strong institutional strategies with a clear ambition toward H2020 (23%), 2) improving research support services (23%) especially those allowing researchers to dedicate time for research work and develop research projects; and 3) raising H2020 awareness and proposal development trainings including opportunities watch (19%)



In essence, the survey reveals several important lessons and inter-dependence on the perception of the respondents that needs to be appropriately addressed in order to increase the participation to FP:

1) A strong need for institutional incentives, translated in the respondents answers by more “communication on the interest and objectives” and “practical levers” ;
2) A need for a steady targeted watch and opportunities identification and the necessity to clarify the confusion between FP projects and ERDF projects. This confusion is mainly due to the terminology « European projects » that does not allow to differentiate FP competitive projects financed by the European commission from projects locally funded on European funds such as ESIF. The survey actually collected citations such as « ERDF financing is not adapted to research activities », « it seems as difficult to carry out a H2020 projects as it is to carry an ERDF project », « it should not be required to provide 3 quotations for each foreseen expenditures ». Among the individuals mixing up the two programmes, a fair number report issues with administrative tasks for project development or their implementation. Thus, difficulties experienced with ERDF projects are transferred on H2020 programme even when actors do not have knowledge of FP procedures; this lack of knowledge increase self-selection.
3) A need for empowerment of the researchers: in one hand projects development support and a better knowledge of FP opportunities are perceived as pillars of the participation; on the other hand according to a large number of respondents being aware of FP opportunities, building proposals and identifying networks are not part of their job, as researchers.

2) Analysis of obstacles and levers defined during the interviews

During the interviews, the individuals were asked to freely express themselves about the main obstacles to address and levers to activate in order to increase FP participation of La Reunion. We therefore collected 113 statements corresponding to obstacles and 86 corresponding to levers, which we divided into four types of barriers: “regional policies”; “networks”; “organization”; “individual capacities”.

a) Obstacles mentioned

On the 113 statements, almost half of them (48) concern obstacles dealing with their own institutions’ organizations or support.

Out of those 48, 30 occurrences point out the “*lack of individual’s time due to establishment bad work organization*”. Indeed, two third of the interviewees evoke this problem as a main barrier, speaking about "*administrative burden*", "*having too many responsibilities*", "*too much teaching activity*", "*no time for research*"... and this barrier represents a common and clear concern whatever the interviewee profile (successful, unsuccessful and non-applying candidates). At the organization's level, in this context of "*lack of time* ", interviewees also evoke that the "*lack of FP institutional ambition and strategy*" prevents them from participating, as well the “*in-adaptation of the support services*” and the "*lack of human resources in the lab*".

Most of the successful candidates clearly share that their successful participation was not due to the support of their institutions, which moreover imposed unnecessary burden to such candidates. For them, the major barriers lie within "*in-adapted support services*" and "*lack of FP institutional strategy*". Non applying candidates are fully aware of those barriers : they insist on upstream aspects of the participation with "*lack of adapted human resources*" and "*lack of individuals time due to establishment bad work organization*" preventing them from participating. For them, the feedbacks from colleagues and their own experiences on other competitive calls and projects generate an anxiety on the difficulties they may be facing while carrying out an FP project. Interestingly, unsuccessful candidates do not mention at all "*in-adapted support services*" or "*lack of human resources in the lab*" but more upstream barriers such as "*lack of institutional ambition & strategy*" and "*individual time and institution bad work organisation*". This shows that they think their non-participation is due to systemic problems rather than project's quality.

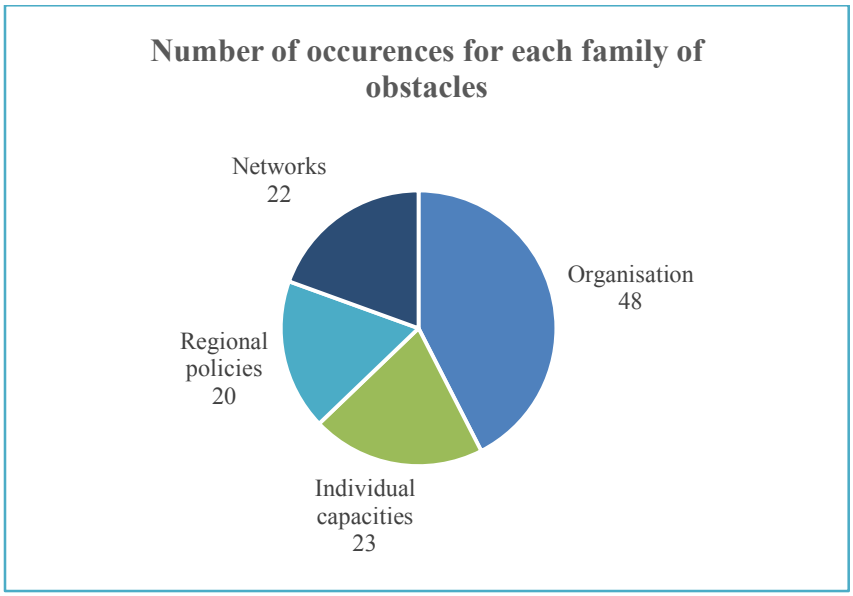
Three other categories of barriers are depicted by the researchers: Individual capacities (23 statements), Network (22 statements) and Regional policies (20 statements),

In terms of individual capacities, interviewees mention (i) the lack of engagement/interest in fundraising of some researchers - and for some, in research itself ("*Only one third of my lab colleagues are interested in doing research, some are focused on teaching activities"*), (ii) the lack of FP knowledge ("*we need to be trained in proposal writing*") and a tendency to self-inhibition ("*we are too small to coordinate*", "*English level is too low*"). They recall they interest to engage in FP, though it is not their number 1 priority at the moment. These barriers are quite well mentioned by the three profiles.

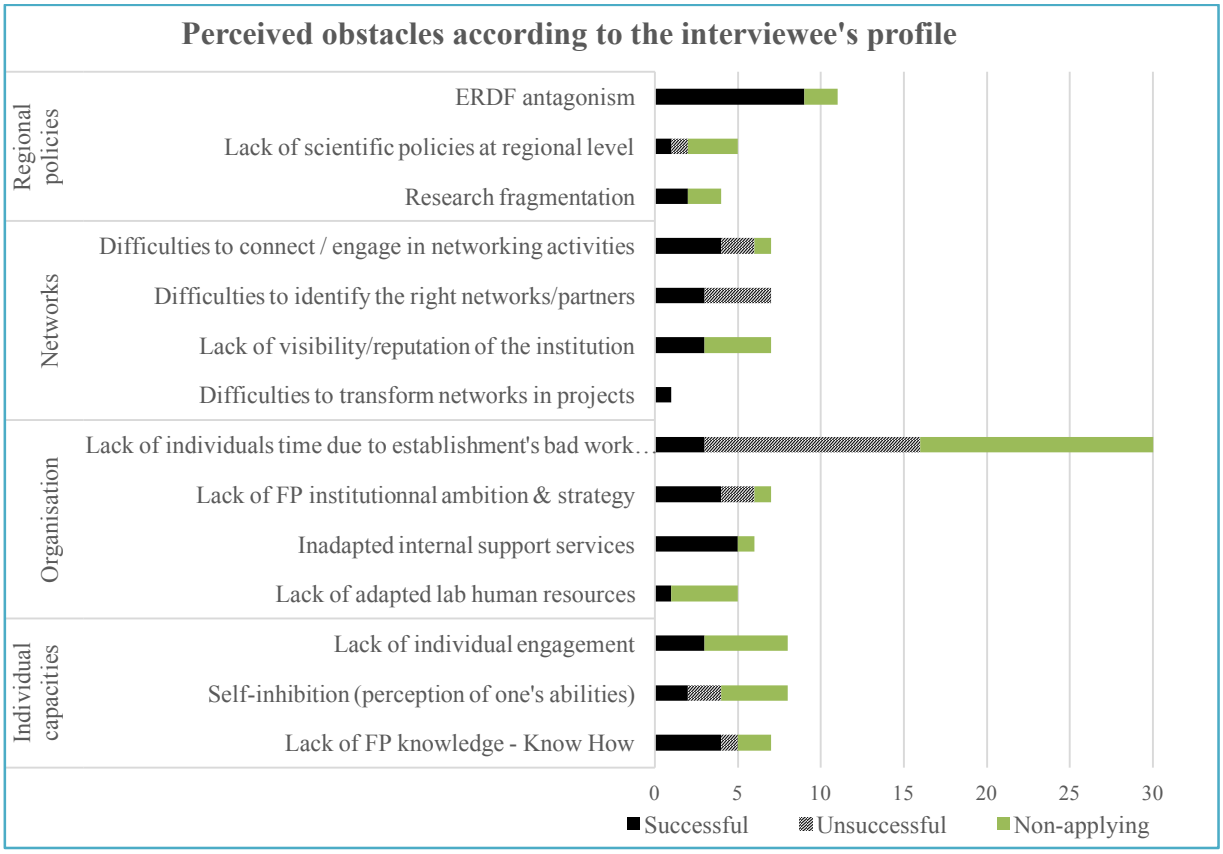
Regarding the barriers related to Network (22 statements), successful candidates depict the successive obstacles to connection: first, the lack of visibility/reputation of the institution, second, the difficulties to identify the right networks/partners, then the difficulties to connect / engage in networking activities and finally the difficulties to transform networks in projects. The other interviewees focus their analysis on the difficulties to connect / engage in networking activities (*physical distance is an obstacle to maintain interpersonnal collaborations)*, showing that less experienced individuals are as aware of the steps to develop distant and foreign collaborations. This is to be linked to the fact that local funds attribution do not depends on the capacity to develop networks, but rather, *local ERDF managing authority does not allow the funding of foreign partners*.

Regional policies are actually fairly mentioned by the interviewees (20 statements). One main political determinant is the "ERDF antagonism effect" (12 occurrences), which is the second main evoked from all barriers with 12 occurrences. Indeed, the lack of synergy between ESIF and H2020 is well perceived by the actors : *"ERDF funded projects induces "un repli sur soi", "it inhibits visibility and collaborations development"*. Many interviewees actually invoked to be too busy working on ESIF projects to start collaborations at EU level (*EDRF funded projects that I'm running now give little time to develop H2020 projects*) and that the abundance of ERDF funds without scientific policy and vision at regional level tends to lead to research fragmentation ("*There is a lack of coordination of research effort in a*

common strategy, we lack critical mass"). Although these "political" barriers are mentioned by all candidates, successful ones particularly insist on such factors.



The profile of the interviewee reveals the influence of a previous participation in FP on the perceived obstacles. Firstly successful candidates identify a larger number of obstacles (on all the families of obstacles) and point out mainly the lack of complementarity between ERDF and H2020 and the competitive approach between the two. Unsuccessful candidates are less aware of the obstacles and only mention 7 barriers out of the 14 extracted and mainly comment on lack of individual time and poor institutional organization. Self-selected or non-applying candidates are fully aware of the wide range of obstacles and like the successful candidates mention most of the barriers (12 out of 14); they are also particularly preoccupied by the lack of individuals' time and bad work's organizations.



b) Analysis of levers

As shown in the following figure, the most important family of levers to activate (most cited by the interviewees) deals with organizations strategy and support (31 verbatims out of 86) followed by networks issues (22), regional policies (15), and individuals capacities (15).

As expected, issues regarding the organizations gather the greatest concerns when it comes to barriers and the highest number of propositions when it comes to levers. Firstly, interviewees ask for adapted supported services ("*an H2020 experienced support team*"), which is the most cited of all levers. This is a call from all kind of profiles. Four other promising levers to activate within institutions are also praised by the interviewees : to have a clear and credible institutional ambition and strategy, to develop incentives to increase FP applications and implementation *("FP participation could be facilitated through tools such adjusted teaching hours"*), to increase academic, technical and European staff in research lab ("*we should have dedicated project manager in the lab"*), to redirect internal mobility tools towards research/FP.

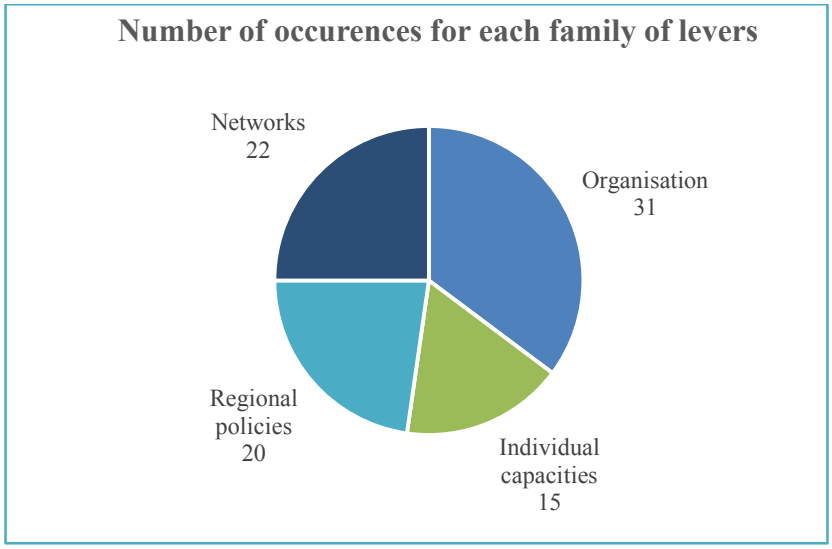
Successful candidates equally support the need for adapted support services and for a clear and credible institutional ambition and strategy favouring research and FP participation, highlighting the fact that participating in FP should not be the effort of a few lucky researchers but a global ambition carry out by all phases of the institutions and providing the appropriate means. This is also largely supported by both non-applying actors and unsuccessful candidates. Unsuccessful candidates in priority mention the need for “academic, technical and European staff in research lab" and "incentives and to increase FP participation and facilitates FP implementation”, this is another reminder of the need to develop a vision

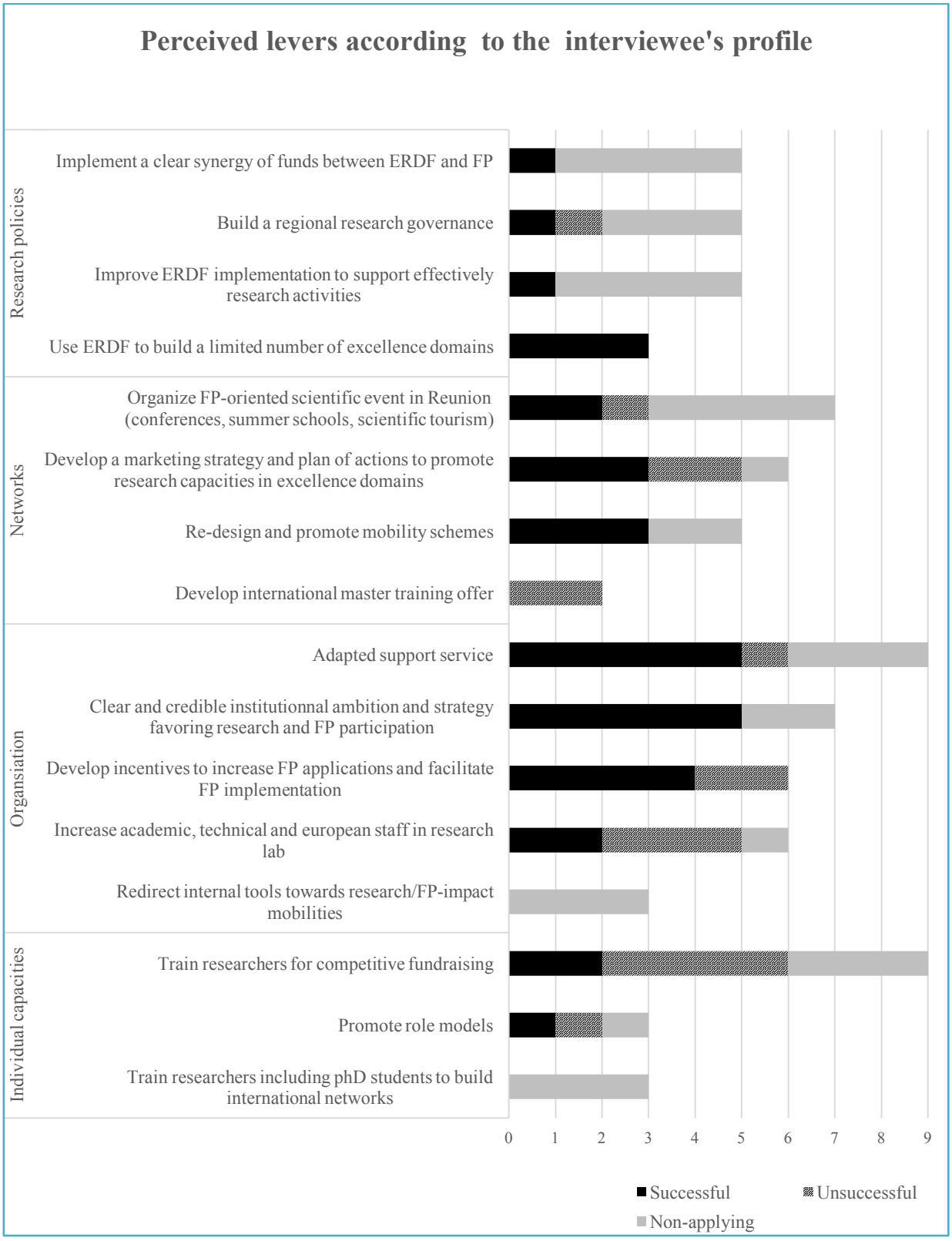
and strategy not only for FP but for research in general at institutional level. Interestingly, only non-applying candidates supported the idea to redirect internal tools towards research/FP impact mobilities, showing that incentives and coherent means can have a strong impact on self-eviction.

The second category of levers most brought up by the interviewee deals with networks issues. Most of them mention the organization of FP oriented event in Reunion ("*summer schools represent a great lever*") and the development of a marketing strategy as interesting levers ("*We need to develop a network of international key opinion leaders promoting reunion's capacities"*). Unsuccessful candidates also propose to develop international master training offers *("We should develop Europe masters"*) acknowledging the fact that networking should be approached globally and include in teaching activities for researchers and futures researchers. Building bridges with other community should be a priority for all academic and research components of the institutions allowing the development of a European networking culture.

Regional policies are the third category of levers identified during interviews. Interviewees request a clear synergy of funds between ERDF and FP, to build regional governance and to improve the ERDF implementation to support effectively research activities (*EDRF should support long-term strategic programme of research groups)*. As one said, *it is crucial to raise awareness on international collaboration and FP of policy-makers and institutions' leaders*. Interestingly, the use of ERDF to build a limited number of excellence domains is identified as the main political lever for successful candidates, showing the impact of FP experiences and European collaborations on the perception of the global dynamics of research.

Within the "Individual capacities" category, developing researcher's skills through training appears to be decisive, for fundraising as well as for networking (train research and PhD students to build international networks). The promotion of role models is also mentioned but quite modestly.




Perceived levers according to the interviewee's profile
Research policies
Implement a clear synergy of funds between ERDF and FP
Build a regional research governance
Improve ERDF implementation to support effectively research activities
Use ERDF to build a limited number of excellence domains
Networks
Organize FP-oriented scientific event in Reunion (conferences, summer schools, scientific tourism)
Develop a marketing strategy and plan of actions to promote research capacities in excellence domains
Re-design and promote mobility schemes
Develop international master training offer
Organsiation
Adapted support service
Clear and credible institutionnal ambition and strategy favoring research and FP participation
Develop incentives to increase FP applications and facilitate FP implementation
Increase academic, technical and european staff in research lab
Redirect internal tools towards research/FP-impact mobilities
Individual capacities
Train researchers for competitive fundraising
Promote role models
Train researchers including phD students to build international networks
0
1
2
3
4
5
6
7
8
9
Successful
Unsuccessful
Non-applying

3) Conclusions

Whether from the interviews or the survey, personal interest for FP is often reaffirmed by individuals but the reasons advanced to explain the lack of FP participation, are often disconnected from individuals will or power. This could be a reflexion of self-criticism difficulties or indeed a consequences of a global system that tent to have become an obstacle to Horizon 2020 and that let very little place for individuals will to change the story.

For all types of questioned individuals whether from the survey or the 3 interview profiles, it emerges a deep craving for more means, and strategy with better organisation and stronger governance. This feeling reflects literature reviews and the findings of our analysis in a sense that good FP participation arises from a web of factors that can only be implemented with strong political will at all level of decisions followed by dedicated measures.

Ambition & Preliminary action plan

The multidimensional analysis conducted during more than six months thanks to Forward has offered a unique opportunity to better characterize and understand the participation of La Réunion in the Framework Programmes. Such participation appears particularly limited : 9 projects under FP7 and 13 under H2020 for a respective EU contribution of 3,6 and 1,8 M€. These scores position La Réunion on the 250th rank out of 274 Nuts 2 European regions. Expressed per capita, this contribution reaches 0,44 € per year under H2020, compared to an average score of 13,7 €, placing La Réunion in the 258th position. The limited participation is also illustrated by the reduced number of stakeholders involved: 3 organizations account for 75% of the proposals submitted by only 18 active organizations; and only 9 of them have effectively taken part in a successful proposal. Excepting 2 Regpot projects and one SME instrument, the role played by these organizations in the projects remain marginal, with no coordination role and 3,2% of the budget awarded to the project.

Such limited participation cannot be considered a natural consequence of an "island syndrome" or of unfavorable socio-economic or research & innovation capacities and results. The comparison with other European and Outermost regions which present close performance in these matters highlight the existence on a critical and so far unexplained under-participation of La Réunion. Considering the resources and capacities available on the island for the development of knowledge economy, the "normal" participation should indeed be 10 times larger : 3,8 € per capita, per year, rather than 0,44€ today.

To explain such paradox, the four main determinants identified by the literature on FP participation have been scrutinized and tested extensively: the integration in the European Research Area and connection to the most successful organizations that dominate the FP scene; the maturity, dynamic and effectiveness of the regional innovation system; the characteristics, strategy and policies of regional research and innovation organizations toward H2020; as well the individual factors which determines the will to apply or not to calls for projects (self-selection mechanism) and the chances of success.

A. Obstacles synthesis

The striking facts identified through data collection and analysis, face to face interviews, benchmarks and qualitative analysis can be summarized in three explanatory factors, inhibiting the participation :

- Public policies do not enough encourage and support the participation in FP
- La Réunion suffers from a lack of connection to major European networks
- Organizations and individual do not have the required resources to build competitive projects.

The causes and sub-causes of these factors as well as their consequences have been summarized in problem trees to facilitate their comprehension and propose a synthetic vision.

uch problem trees, defined through the diagnosis, were discussed with 17 regional stakeholders in a collective intelligence workshop organized on the 25th June 2019.

1) European, national and regional public policies do not enough support the participation of La Reunion in the European Research Area & Innovation Union

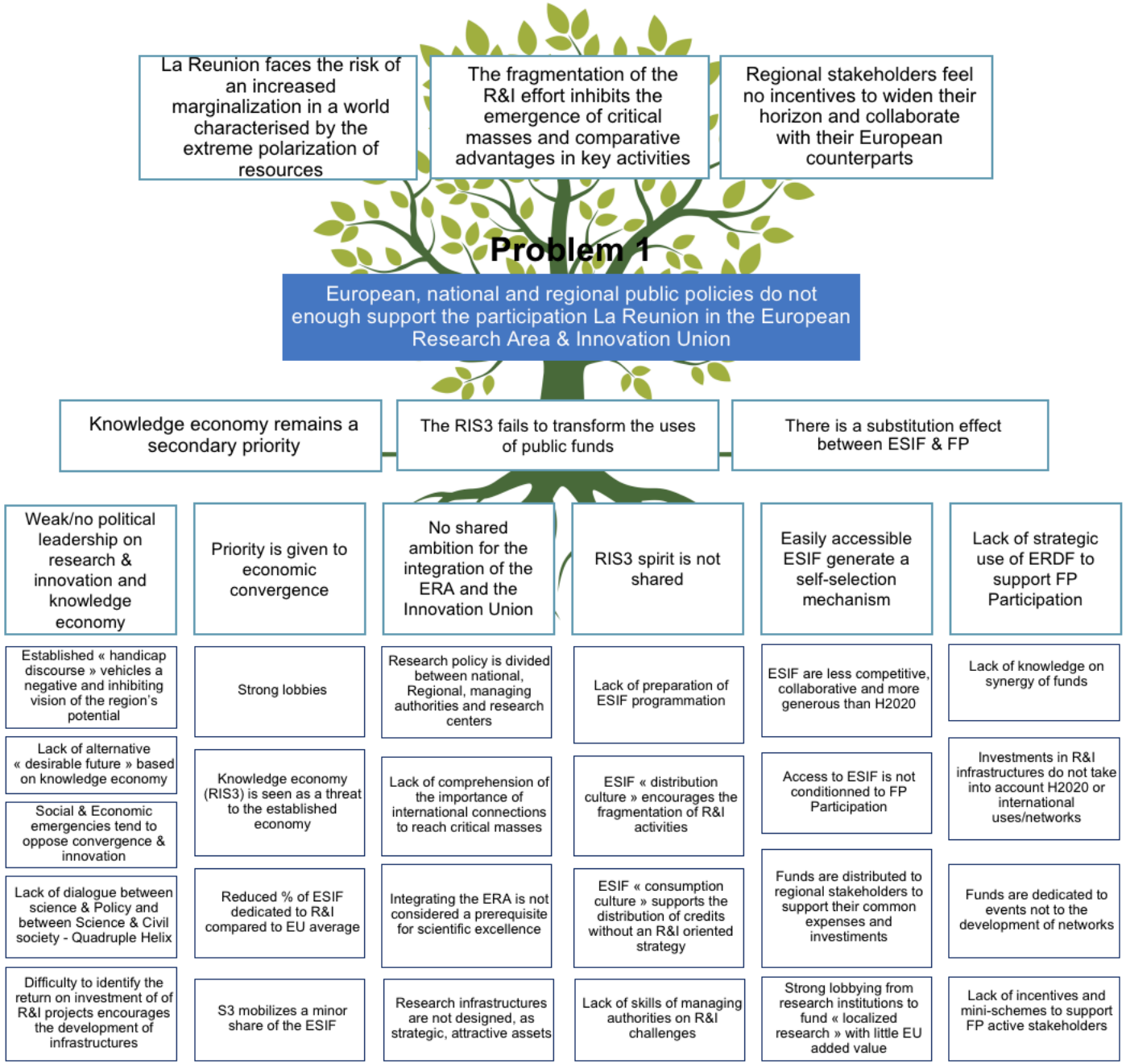
Public policies play a significant role in an economy which mostly relies on public expenditures and support. Yet, such policies so far fail to encourage the participation in Horizon 2020 because of three main factors.

First, knowledge economy remains a secondary priority on the regional agenda, in the absence of strong political leadership supporting the vision of a "smart & resilient island" and as a consequence of the influence of an established discourse which opposes economic convergence and innovation, the latter being seen as a far horizon which will come a reality and a priority, once the convergence with the EU will be achieved. The lack of importance attached to knowledge economy is itself reflected in the limited public resources dedicated to organize and accelerate the transition.

Second, these public resources dedicated to knowledge economy have yet not been transformed by the smart specialization approach. Though the island in engaged in an ambitious RIS3, to turn into an ecological and social resilience living lab, the strategy is not aligned with the allocation of public funds, which do not consider the integration in the ERA a strategic priority and remain allocated through instruments which are sometimes contradictory with the very objectives of RIS3, since they encourage the fragmentation of research and innovation efforts and the focalization on regional funds and activities.

Finally, easily accessible ERDF dotation leads to a powerful substitution effect, deterring organizations and stakeholders to engage in H2020 (self-selection) and are not used strategically to increase the participation, notably through the implementation of synergy of funds strategy.

The lack of adapted policies may result in three critical consequences : the lack of incentives to integrate the ERA; the incapacity to develop strong competitive advantages in a limited number of highly singular fields of expertise and as a consequence the risk of being marginalized and excluded from the "innovation market" in a world marked by an extreme polarization, where few highly attractive and competitive knowledge hubs concentrate most of the resources and capacities and peripheries are trapped in a vicious circle where the absence of critical masses hinders their competitiveness, which in turns reduces their attractiveness and their capacity to build critical masses…


La Reunion faces the risk of an increased marginalization in a world characterised by the extreme polarization of resources
The fragmentation of the R&I effort inhibits the emergence of critical masses and comparative advantages in key activities
Regional stakeholders feel no incentives to widen their horizon and collaborate with their European counterparts
Problem 1
European, national and regional public policies do not enough support the participation La Reunion in the European Research Area & Innovation Union
Knowledge economy remains a secondary priority
The RIS3 fails to transform the uses of public funds
There is a substitution effect between ESIF & FP
Weak/no political leadership on research & innovation and knowledge economy
Priority is given to economic convergence
No shared ambition for the integration of the ERA and the Innovation Union
RIS3 spirit is not shared
Easily accessible ESIF generate a self-selection mechanism
Lack of strategic use of ERDF to support FP Participation
Established « handicap discourse » vehicles a negative and inhibiting vision of the region's potential
Lack of alternative « desirable future » based on knowledge economy
Social & Economic emergencies tend to oppose convergence & innovation
Lack of dialogue between science & Policy and between Science & Civil society - Quadruple Helix
Difficulty to identify the return on investment of of R&I projects encourages the development of infrastructures
Strong lobbies
Knowledge economy (RIS3) is seen as a threat to the established economy
Reduced % of ESIF dedicated to R&I compared to EU average
S3 mobilizes a minor share of the ESIF
Research policy is divided between national, Regional, managing authorities and research centers
Lack of comprehension of the importance of international connections to reach critical masses
Integrating the ERA is not considered a prerequisite for scientific excellence
Research infrastructures are not designed, as strategic, attractive assets
Lack of preparation of ESIF programmation
ESIF « distribution culture » encourages the fragmentation of R&I activities
ESIF « consumption culture » supports the distribution of credits without an R&I oriented strategy
Lack of skills of managing authorities on R&I challenges
ESIF are less competitive, collaborative and more generous than H2020
Access to ESIF is not conditionned to FP Participation
Funds are distributed to regional stakeholders to support their common expenses and investiments
Strong lobbying from research institutions to fund « localized research » with little EU added value
Lack of knowledge on synergy of funds
Investments in R&I infrastructures do not take into account H2020 or international uses/networks
Funds are dedicated to events not to the development of networks
Lack of incentives and mini-schemes to support FP active stakeholders

2) A lack of connection of La Reunion to major European networks

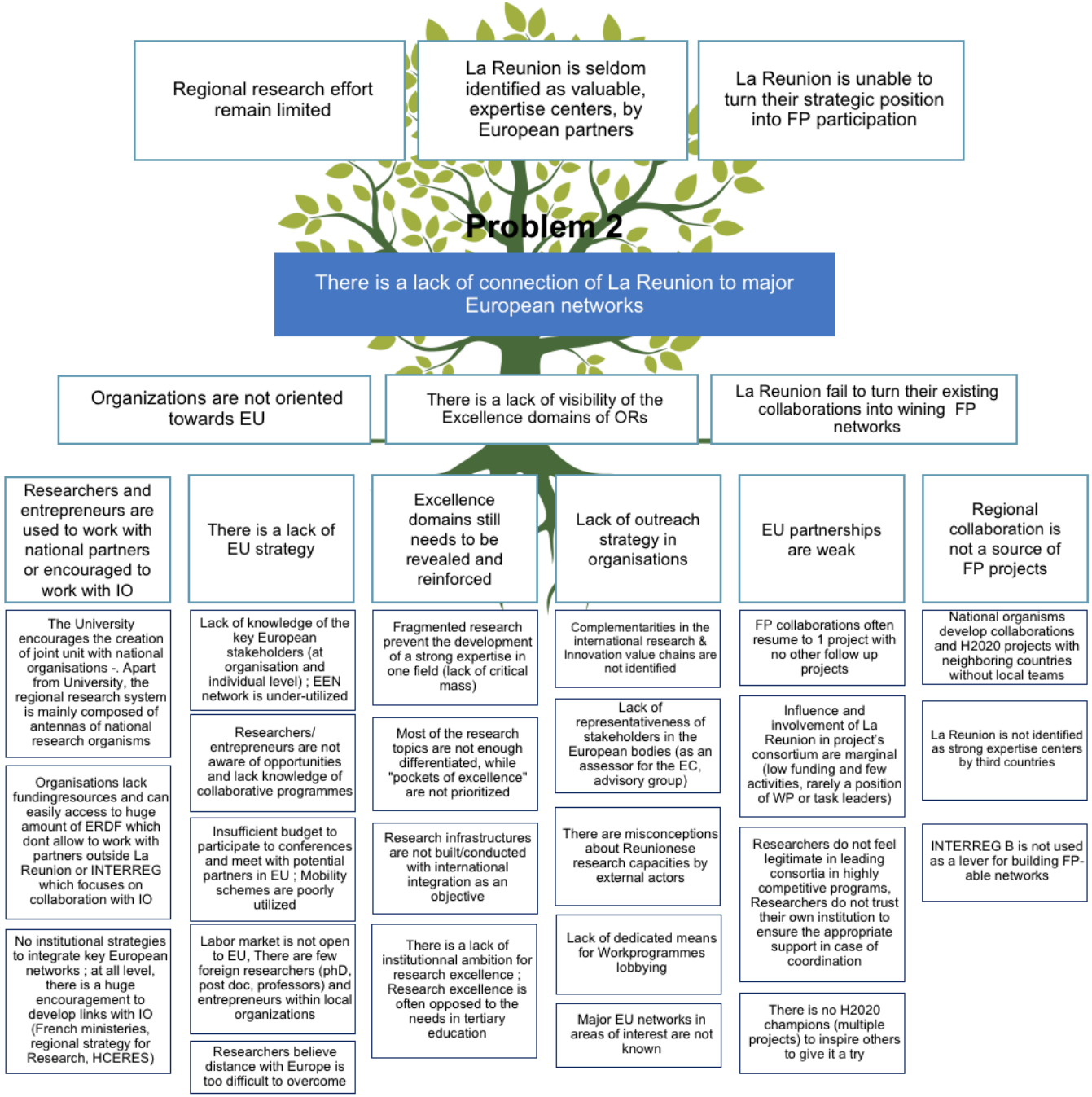
Because of its competitive nature, the participation in the Framework Programme is dependent on cumulative effects : the most successful organizations/candidates present a higher probability to develop new successful projects or to integrate promising consortia, than external stakeholders, which lack the proper reputation. Horizon 2020 is thus sometimes labelled an “oligarchic club”, dominated by a reduced number of organizations. Being connected to such organizations is on the other hand a great lever to increase rapidly the regional participation. Yet at this stage, the connection remains inhibited by three main factors.

First, organizations present a limited interest for European collaborations, because of the historic ties and continuous collaboration with mainland France and the strong emphasis laid on regional collaboration (which itself do not lead to H2020 projects with third countries). Even if European collaborations may appear desirable, they are not supported by a powerful strategy, relying on adequate means and resources.

Second, the fields of excellence of the OR in general and La Réunion in specific suffer from a lack of visibility or recognition in the European Union. This invisibility stems from the difficulty to determine and market a limited number of singular domains (due to the high fragmentation of the research & innovation effort) and from the lack of outreach strategy to promote effectively such expertise.

Third, La Réunion presents a distinctive difficulty to capitalize on preexisting collaborations into effective and successful projects. Though the island is connected to major national and European organizations (3 out of the 6 main partners have obtained more than 100 Horizon projects), 90% of the collaborations developed lead to only one project.

The consequences of such lack of integration are straightforward: it inhibits the attractiveness of the island and thus the creation of critical mass (as described in problem 1); negatively affects the reputation of regional stakeholders who need to demonstrate their added value and dedicate more efforts to integrate consortia ; and compromises the capacity to position La Réunion as a knowledge hub in the Indian Ocean where European stakeholders could develop expertise adapted to tropical context.


Regional research effort remain limited
La Reunion is seldom identified as valuable, expertise centers, by European partners
La Reunion is unable to turn their strategic position into FP participation
Problem 2
There is a lack of connection of La Reunion to major European networks
Organizations are not oriented towards EU
There is a lack of visibility of the Excellence domains of ORs
La Reunion fail to turn their existing collaborations into wining FP networks
Researchers and entrepreneurs are used to work with national partners or encouraged to work with IO
The University encourages the creation of joint unit with national organisations -. Apart from University, the regional research system is mainly composed of antennas of national research organisms
Organisations lack fundingresources and can easily access to huge amount of ERDF which dont allow to work with partners outside La Reunion or INTERREG which focuses on collaboration with IO
No institutional strategies to integrate key European networks ; at all level, there is a huge encouragement to develop links with IO (French ministeries, regional strategy for Research, HCERES)
There is a lack of EU strategy
Lack of knowledge of the key European stakeholders (at organisation and individual level) ; EEN network is under-utilized
Researchers/ entrepreneurs are not aware of opportunities and lack knowledge of collaborative programmes
Insufficient budget to participate to conferences and meet with potential partners in EU ; Mobility schemes are poorly utilized
Labor market is not open to EU, There are few foreign researchers (phD, post doc, professors) and entrepreneurs within local organizations
Researchers believe distance with Europe is too difficult to overcome
Excellence domains still needs to be revealed and reinforced
Fragmented research prevent the development of a strong expertise in one field (lack of critical mass)
Most of the research topics are not enough differentiated, while "pockets of excellence" are not prioritized
Research infrastructures are not built/conducted with international integration as an objective
There is a lack of institutionnal ambition for research excellence ; Research excellence is often opposed to the needs in tertiary education
Lack of outreach strategy in organisations
Complementarities in the international research & Innovation value chains are not identified
Lack of representativeness of stakeholders in the European bodies (as an assessor for the EC, advisory group)
There are misconceptions about Reunionese research capacities by external actors
Lack of dedicated means for Workprogrammes lobbying
Major EU networks in areas of interest are not known
EU partnerships are weak
FP collaborations often resume to 1 project with no other follow up projects
Influence and involvement of La Reunion in project's consortium are marginal (low funding and few activities, rarely a position of WP or task leaders)
Researchers do not feel legitimate in leading consortia in highly competitive programs, Researchers do not trust their own institution to ensure the appropriate support in case of coordination
There is no H2020 champions (multiple projects) to inspire others to give it a try
Regional collaboration is not a source of FP projects
National organisms develop collaborations and H2020 projects with neighboring countries without local teams
La Reunion is not identified as strong expertise centers by third countries
INTERREG B is not used as a lever for building FP-able networks

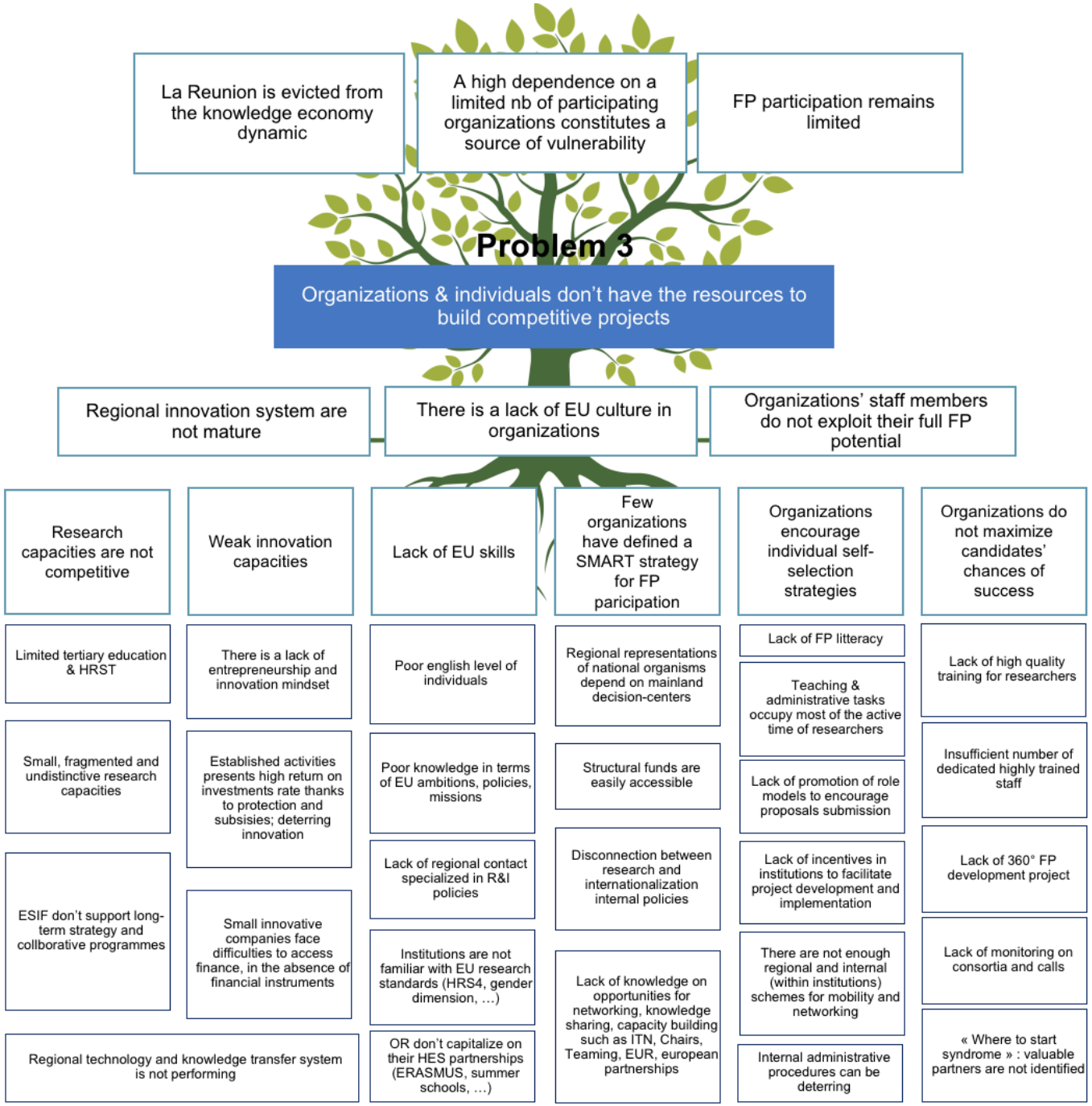
3) Organizations & individuals do not have the resources to build competitive projects

The third obstacle concentrates on the limited capacities of regional organizations and stakeholders to engage in FP projects.

This phenomenon is first of all the consequence of a small and recent innovation system, characterized by a low level of tertiary education and limited resources available, as well as by a limited capacity to turn new ideas into concrete, innovative and competitive solutions.

Internally research and innovation organizations present a critical lack of skills on the European Union policies, standards and priorities and have not defined a smart strategy to support their participation in Horizon 2020. Such phenomenon is illustrated by the very limited number of organization which effectively submitted proposals during the two last periods.

The third explanation has been massively and regularly pointed out by the people interviewed who deplored the lack of fertile atmosphere encouraging the participation in FP. Conversely, regional organizations may encourage individual self-selections decisions and deter potential candidate from applying because their administrative and teaching obligations leave little time for research. Interviewees also insisted on the lack of promotion and incentives to participate in FP projects, leading to a general disinterest. Those who overcome the self-selection temptation have deplored the lack of professional training and support services which reinforce the chances of success.


La Reunion is evicted from the knowledge economy dynamic
A high dependence on a limited nb of participating organizations constitutes a source of vulnerability
FP participation remains limited
Problem 3
Organizations & individuals don't have the resources to build competitive projects
Regional innovation system are not mature
There is a lack of EU culture in organizations
Organizations' staff members do not exploit their full FP potential
Research capacities are not competitive
Weak innovation capacities
Lack of EU skills
Few organizations have defined a SMART strategy for FP paricipation
Organizations encourage individual self-selection strategies
Organizations do not maximize candidates' chances of success
Limited tertiary education & HRST
Small, fragmented and undistinctive research capacities
ESIF don't support long-term strategy and collborative programmes
There is a lack of entrepreneurship and innovation mindset
Established activities presents high return on investments rate thanks to protection and subsisies; deterring innovation
Small innovative companies face difficulties to access finance, in the absence of financial instruments
Regional technology and knowledge transfer system is not performing
Poor english level of individuals
Poor knowledge in terms of EU ambitions, policies, missions
Lack of regional contact specialized in R&I policies
Institutions are not familiar with EU research standards (HRS4, gender dimension, …)
OR don't capitalize on their HES partnerships (ERASMUS, summer schools, …)
Regional representations of national organisms depend on mainland decision-centers
Structural funds are easily accessible
Disconnection between research and internationalization internal policies
Lack of knowledge on opportunities for networking, knowledge sharing, capacity building such as ITN, Chairs, Teaming, EUR, european partnerships
Lack of FP litteracy
Teaching & administrative tasks occupy most of the active time of researchers
Lack of promotion of role models to encourage proposals submission
Lack of incentives in institutions to facilitate project development and implementation
There are not enough regional and internal (within institutions) schemes for mobility and networking
Internal administrative procedures can be deterring
Lack of high quality training for researchers
Insufficient number of dedicated highly trained staff
Lack of 360° FP development project
Lack of monitoring on consortia and calls
« Where to start syndrome » : valuable partners are not identified

During the workshop, each group were encouraged to transform the problem trees into solutions trees, proposing strategic and operational orientations to address the main blocking points and causes identified (The levers identified during the workshop are presented in Annex II).

These orientations were then explored by Nexa to define a roadmap, inspired by the other European experiences and best practices, to increase significantly the participation in Horizon 2020 and Horizon Europe. This roadmap, or preliminary action plan, relies on three pillars: reinforce the efficiency of the regional innovation system, develop a European ambition and culture in regional organizations and make FP participation desirable and achievable. The ambition and pillars have been shared with 16 representatives of the main research and innovation organizations and public institutions of the island in a second workshop organized on the 12th November 2019.

B. Priority 1 : Increase the performance of the regional R&I system

1) Current situation

If the R&I system in La Reunion is relatively young, its rapid development has led to a fragmented system composed of a broad number of research fields gathering few researchers, redundant & nonspecialized support services, and a weak and disconnected political coordination.

In addition, despite the established belief on "small size allows easier interknowledge", cooperation among private companies, among researchers from different areas, as well as between researchers and business sector remain weak. This situation, preventing the development of comparative advantages and innovation, hinders our ambition to turn La Réunion in a resilience living lab, able to produce solutions that not only addresses local challenges to reduce our dependency and vulnerability also the needs of exterior markets.

2) Objectives and actions

In order to structure an efficient research and innovation system, 3 strategic objectives are defined :

<u>OS1.1 Coordinate research system at regional level</u>

- Set up a research coordinating body gathering HEI, research organisations and regional authorities
- Set up a R&I policy lab that monitor and evaluate the R&I policy, provide data and formulate independent and evidence-based propositions to European, national and local authorities to develop adequate funding instruments
- Establish an assessment mechanism for organisations receiving institutional funding, based on core principles of international peer review

OS1.2 Build critical mass and develop excellence domains in research

- Redirect ERDF to fund long-term collaborative research programmes that bring together actors from the quadruple helix and that include roadmap for infrastructures, human resources (doctoral and post doctoral fellowships), mobility and equipment
- Develop a funding scheme to allow the creation of new, distinct research group led by young scientists and dedicated to high level frontier research in excellence domains
- Support participation in European and national calls for projects which allow networking, knowledge sharing, capacity building such as ITN, Chairs, Teaming, EUR, european partnerships, ...
- Support regional infrastructures as regards their participation in the European research infrastructures network (ESFRI roadmap)
- Encourage research governance to develop European standards in research activities regarding researchers recruitement (promote the «Human Resources Strategy For Researchers» labellisation), intellectual property, knowledge transfer, open access, gender equality, integration of gender dimension in research
- Use INTERREG V to build Excellence partnerships with third countries

OS1.3 Increase the involvement of all stakeholders, notably SMEs, in R&I

- Promote research and innovation culture through competitions, awards, exhibitions, workshops with adapted actions plans targeting youth, academics, businesses, consumers, end users, policy makers
- Build a regional technology and knowledge transfer system which focuses on excellence domains and connects to world-class partners
- Promote access of the R&I community to publicly funded research groups and infrastructures
- Further enhance the collaboration between academia and businesses by increasing public aid for collaborative innovative activities involving SMEs & academics

C. Priority 2 : Develop a European ambition and culture within organisations

1) Current situation

Academic and research collaborations are well developed in La Reunion but partnerships are mainly turned towards actors in mainland and from the regional basin (Mauritius, Madagascar, Comoros, South Africa, ...).

This lack of connection with European research centers is really damaging : it increases our remoteness from decision centers, it decreases impacts of our research results and diminishes our attractiveness to world-class researchers, investors and entrepreneurs. In a world where talents and capital are concentrated in a few hubs at global scale, La Reunion is being marginalized.

2) Objectives and actions

In order to break out the vicious circle, organisations must develop a European ambition and culture. To this end, three strategic objectives are pursued :

OS2.1 Develop funding mechanisms which supports connexion to European partners

- Subject public aid to HEI et REC to a clear FP-oriented strategy with quantified objectives
- Co-design and implement a public support for researchers and entrepreneurs dedicated to "in & out" european mobility, for short, mid and long term exchanges

OS2.2 Promote excellence domains and R&I capacities to targeted audience

- Identify the most interesting networks to work with in each Excellence domain and develop a targeted outreach strategy
- Increase the visibility of capacities through a dedicated web portal and the organisation of thematic congress with targeted european partners
- Strengthen the presence of La Reunion's R&I stakeholders in European decision-making circles (ERRIN, EUA, European sectorial federations,...) and actively participate in the FP policy dialogue regarding EU-Africa partnerships
- Support participation to international brokerage events

OS2.3 Support organisations in the definition of an international strategy aiming at integrating performant European networks

- Raise desire for Europe through the promotion of positive experiences and benefits (book of projects, poster campains, ...)
- Support stakeholders in the identification of valuable partners and in a connexion strategy, notably Infrastructures, Research groups, Clusters and SMEs (through the Europe Enterprise Network)
- Train individuals to develop a European culture (European policies knowledge, networking & communication skills, on-line reputation tools,...)

D. Priority 3 : Make FP participation desirable and achievable

1) Current situation

If most of individuals have the will and the capacities to engage themselves in competitive projects, too many barriers stop them from even applying : overwhelming workload, apprehension due to previous experience of inadequate/nonexistent support, lack of incentives, preconceived ideas on opportunities, lack of knowledge on FP project cycle development... This self selection phenomenon dramatically hinders the participation of La Reunion to FP. It is therefore highly important to propose a project development pathway which improves user experience, aligned with their mission and vision.

2) Objectives and actions

To make FP participation desirable and achievable, three strategic objectives are targeted :

OS3.1 Develop and coordinate a Reunion Europe network

- Allocate in each research group a FP-skilled european project engineer
- Coordinate effort and share resources for the promotion and training for FP participation

OS3.2 Anticipate project development

- Empower actors to monitor FP consortia and calls for opportunities
- Take part to key networks to influence calls for proposals and detect emerging consortia in Excellence domains
- Capitalize on existing European networks involving partners from La Reunion to build competitive consortia

OS3.3 Make the project development cycle 100% winning

- Propose a structured, effective and engaging support service maximizing chance of success
- Encourage organisations to develop incentives to facilitate project development and implementation such as reduction of teaching/administrative activities, allowances,
- Fund with ERDF high-quality mono-beneficiary proposals which reached the "Seal of Excellence" but failed to be funded
- Offer a complementary funding to FP successful beneficiaries to be used to increase the project impacts in terms of research potential (10% of the total amount obtained from EC)

To convert this preliminary action plan into S.M.A.R.T. objectives, several redaction committees involving the local R&I community will be set up in the next weeks.

Annexes

Annex I - List of participants to interviews and workshops

AGORAH	David Daniel
ARMEFLHOR	Insa Guillaume
BRGM	Chaput Marie
Centre hospitalier Universitaire de La Réunion	Randrianaivo Hanitra
Centre hospitalier Universitaire de La Réunion	Medjane Samir
CIC-EC	Marimoutou Catherine
CIRAD	Jeuffrault Eric
CIRAD	Rouget Mathieu
CITEB	Turquet Jean
DRRT	Hiol Abel
DRRT	Conruyt Noël
IFREMER	Duval Magali
IRD	Chabanet Pascale
MEDEF	Beton Alexandre
OSU-R / UR	Cammas Jean-Pierre
OSU-R / UR	Duflot Valentin
QUALITROPIC	Grondin Didier
QUALITROPIC	Tostain Graziella
REGION REUNION	Charritat Catherine
REGION REUNION	Irissin Josiane
REGION REUNION	Pothier Jean-Pierre
REUNIWATT	Schmutz Nicolas
Université de La Réunion	Balcou-Debussche Maryvette
Université de La Réunion	Bastide Alain
Université de La Réunion	Benne Michel
Université de La Réunion	Bialecki Anne
Université de La Réunion	Brioude Jérôme
Université de La Réunion	Castaing-Lavignottes Jean
Université de La Réunion	Chabriat Jean-Pierre
Université de La Réunion	Dietrich Muriel
Université de La Réunion	Duboin Corinne
Université de La Réunion	Duret Pascal
Université de La Réunion	Geoffroy Sophie
Université de La Réunion	Lajoie Gilles
Université de La Réunion	Mora Rey Juan
Université de La Réunion	Morel Béatrice
Université de La Réunion	Payet Jean-Philippe
Université de La Réunion	Poussier Stéphane
Université de La Réunion	Roche Marjolaine
Université de La Réunion	Strasberg Dominique
Université de La Réunion	Tortosa Pablo

Annex II - List of levers identified during workshops

GROUP 1 - Increase the competitiveness of Research

Build critical mass in the domains of excellence

- Develop a university policy oriented towards research
- Adopt within the decision bodies of the research institutions clear orientations / priorities concerning research and education
- Design educational programs (especially L1) to make them rely more on teaching oriented profiles than on researchers
- Develop an internal policy with multi annual funding in line with the orientations
- Evaluate the impact of internal policies on research
- Revise the organisation of research support activities (work distribution and recruitment distribution, training in light of the evolution of professional activities etc.…)
- Establish a regional organisation for scientific monitoring scientific research
- Develop a scientific strategy with appropriate means in favour of the development of excellence and critical mass
- Evaluate the impact of research policies of each research institutions in terms of contribution to the development of critical mass in the domains of excellence
- Support the development of a quality control policy for the research produced in the region
- Favour the concentration of means around a few domains of excellence
- Bring up to date the Joint-research units (JRU) development strategy and support research groups in developing excellence according to their status (local research group not integrated in a JRU, research group transitioning to integrate a JRU, established JRU)
- Inspired research group with projects examples they could have developed
- Make compulsory independent scientific councils on a yearly basis for all research groups
- Offer incentive to support concentration (administrative support if merging…) and discourage actions that will participate to the breaking up of the research effort (financial penalty on the allocated fund)

Develop attractiveness policy

- Develop collaborations with existing international excellence networks
- Develop an integrated approach to ease collaboration (short scientific exchange, then longer mobility)
- Revise criteria for the distribution of "authorisation releasing from teaching hours obligations" by integrating a priority for researchers aiming at developing European projects with excellence research centres
- Support the identification of key partners to connect with and coach local actors on networking
- Ease and encourage the recruitment of talented applicants at international level as well
- Establish several tools allowing short incoming mobility to test future potential candidates
- Integrate in the institutions strategy a human resources policy based on excellence
- Integrate more transparency and advance planning in all steps of the recruitment process
- Train and raise awareness staff from the human resources management on recruitment impacts

- Strengthen the numbers and the quality of the publications in the domains of excellence
- Increase support staff within the laboratories, offer training in relation to the evolution of the profession
- Offers solutions to researchers that are not publishing : support to come back in the research pool or adapt the position (PRAG)
- Support research via human resources policy for research (chairs, post doc, ATER…)
- Update equipment of research group to make sure we stay competitive

GROUP 2 - Increase the participation and the involvement of Reunionese actors in European Research network of excellence

Strengthen existing networks and develop collaborative projects

- Strengthen existing networks and encourage/ease the development of new collaborations
- Build adapted financing schemes that will allow researchers to meet with partners at European level to develop collaborations and projects
- Develop a support service action aiming at identifying the right networks with and for researchers, research groups and institutions in their field of expertise
- Develop networking itineraries to ensure existing collaborations are turned into long-lasting work relationships (tools guide for larger cooperation agreements with multi layers collaboration such as co-directed thesis, research projects, research exchanges (erasmus), master programs)
- Free researchers time to develop new collaborations by rethinking administrative and teaching responsibilities distribution. Build tools such as "teaching hours delegations" dedicated to give the time and opportunity to develop collaborations
- Make network development at EU level a priority for the region by integrating it as a key criterion when evaluating and attributing local funds (Open ERDF funding to European partners to initiate new collaborations, prioritise the financing of international co-supervision of thesis etc...)
- Strengthen the capacities and will to connect to European partners among local actors
- Equip institutions with long term strategies with objectives, means and incentives for the development of connections with European research excellence hubs
- Increase the will to develop one's position in network by promoting existing successful local stories (book of project, testimonies os succesful participations)
- Integrate in the contracts biding the different organisations which run a joint research unit the importance to integrate local actors in their European networks and collaborative projects
- Raise awareness and strengthen the knowledge of local actors on the necessity to be connected to international research excellence hubs and on the expected risk with systemic marginalisation (Develop networking culture)
- Strengthen knowledge of local actors about collaborative programmes and networking strategies at individuals or research groups level through trainings
- Strengthen the positioning of Reunion actors in collaborative projects and increase the participation
- Build a longer term vision for projects participation in order to be prepare, have the time to connect with the right networks and propose a qualitative lead and support service to potential partners
- Develop solutions to be more present in important decisions circles of the European institutions (Researchers enlisted as evaluation experts for the commission, or in other projects advisory board,

lobby activities for work programme and projects development, info days participations)

- In the institutions, develop a qualitative and efficient services for the management and implementation of research projects to reassure researchers and encourage them to take the lead on collaborative projects
- Locally initiate qualitative collaborative projects to actively take part in the dynamic and be invited in return
- When invited to participate in collaborative projects researcher should take a more important role (increase funding share, activities and responsibilities such as WP or task leaders)

Strengthen the perception of Reunion as high-quality partners

- Make Reunionese research more visible and attractive
- Design schemes and rethink human resources strategies to attract « key opinions leader » in local institutions
- Develop institutional strategies to promote and disseminate Reunion research capacities to the targeted excellence hubs (Infra, territoire-laboratoire, High impacts publications, flagship projects)
- Organise promotion events in a coordinated manner and according to the objectives of the strategy and ensure maximum visibility
- To increase Reunion recognition and identification highlight the participation of local institutions in collaborative projects (avoid third parties status)
- Strengthen the international reconnection of Reunionese research
- Develop a territorial and global vision for local research organised around key domain of excellence in order to create expertise centres internationally renowned
- Finance chairs of excellence increase critical mass and develop plurisidiciplinary research with key project/demonstrators in the excellence research domains of the territory
- Increase the number of citable citations and projects notably from the excellence pillar (ERC, Marie Curie)

GROUP 3 - Make H2020 a public policy priority

Build a shared ambition for H2020

- Establish a "Regional Research Council"
- Concentrate public support on the most promising research priorities
- Contractualize with research organisms to orient their activity toward H2020.
- Coordinate national, regional and institutions policies
- Promote the added value of H2020 (through storytelling)
- Illustrate H2020 participation through concrete stories, testimony
- Sensibilize local stakeholders to the challenges of European integration / international connection

ERDF as a lever for Horizon 2020 participation

- Create a dedicated ERDF instrument to support the development of H2020 Projects
- Dedicate an ERDF envelope to H2020
- Finance the time needed to develop a project
- Introduce incentives and penalties on ERDF mobilization
- Align the evaluation criteria on H2020 evaluation
- Condition infrastructure support to H2020 participation
- Finance research centres and programs on a long term development plan, which includes a FP participation strategy
- Mobilize European experts / externalize the evaluation to an independent authority

Use public funds to support the integration in global networks

- Increase the synergy between local funds and H2020 (era-net)
- Increase the use of ERA-net type instruments
- Promotion Reunion island research and innovation ecosystem
- Support the mobility and networking of researchers
- Ease the stay of foreign researchers through adapted support
- Short term mobility schemes

GROUP 4 - Provide time to researchers for a better dedication to developing H2020 projects

Create a « European research projects » culture

- Develop incentive measures
- Foster the partnerships within laboratory research units towards a national and European Research & Innovation network

Develop a Human Ressource strategy in order to optimise the setting-up of H2020 research projects

Administrative staff :

- An engineer in project management should be recruited
  An engineer in project management should be recruited
- An executive assistant for research laboratories should be recruited
- The local funding procedures (such as the ERDF) should be reduced

Europe office :

- Increase the staff of the Europe office
- Project engineer should work within research laboratory for the writing-up of H2020 proposal and implementation

Researcher :

- The criteria in recruiting researchers should include an expertise in project write-up
- To reduce time allocated to teaching

Insure a mid to long term vision

- Allocate time to basic research while writing-up H2020 projects (as an applied research)
- To reduce administrative task (to send a request to the Regional Council)