

INITIATIVE OF EXCELLENCE
Designing an innovative university



HUMANTICIPATION[®]
Ecotechnologies to improve life and the environment

FOUNDING PREAMBLE

The IDEX¹ call for proposals comes at both a crucial and ideal time for the PRES Bourgogne Franche-Comté.

Since 2007, we have been engaged in a sustained and ambitious effort to design **a major Federal University** at the heart of a vast region between Paris, Lyon and Switzerland. This commitment is groundbreaking in several respects:

- It is interregional, involving Burgundy and Franche-Comté, and will possibly extend to Switzerland.
- It is an undertaking vital to supporting the economic and social development of a vast region in France whose population exceeds 2.8 million.
- It hosts world-class research institutes that hold tremendous promise for international research on ecotechnologies to improve life and the environment, and more generally, our entire ecosystem.
- It promotes synergies with competitiveness clusters that are gaining international recognition. Together, they are creating a seamless public-private continuum of teaching, research and innovation within our society that spurs lasting socioeconomic development.
- It has designed an effective, engaged and responsive model of governance that gathers research institutions and business within a Foundation for Scientific Cooperation. This approach, unprecedented in our country, is comparable to those of many international universities, including the University of Göttingen, winner of Germany's *Excellenz Initiativ*.
- It aims to be a laboratory for experimentation and innovation in terms of how universities in our country are governed.

Choosing this IDEX proposal in 2011 would serve as the perfect catalyst, boosting a process that is already well under way. It would dote France with **a world-class excellence Centre** for Research and Graduate Education to further the region's economic development and support the country's competitiveness and influence on the world stage. It would allow French research in the competitive realm of development technologies to achieve international recognition in the specific field of *ecotechnologies to improve life and the environment*.

We have chosen *humanticipation* as the slogan to define the focus of excellence of our proposal: **human**, because our research programmes and their related technologies target preserving and developing life and society. And **anticipation**, because this project aims to achieve breakthroughs in research and innovation. These research and development programmes spur developing important markets for our businesses in the critical field of risk prevention – in healthcare, agriculture and energy.

We have made important strides in developing close ties between our two regions and our two universities. We have nurtured vital relationships among our research centres and laboratories, promoted joint endeavours between excellence clusters and business and built bridges among the sciences, cultures and society. We are committed to the project we propose and place great hope in being selected as this "Initiative of Excellence".

The extended region's local authorities, competitiveness clusters and businesses will participate together in funding "Initiative of Excellence" projects. They will match the funding granted by the French Commissariat Général à l'Investissement **on a 1 to 1 basis**.

¹ IDEX: *Initiatives d'excellence des investissements d'avenir*



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1. VISION: DESIGNING AN INNOVATIVE UNIVERSITY AT THE CROSSROADS BETWEEN PARIS, LYON AND SWITZERLAND

1.1. FIVE STRATEGIC GOALS

GOAL 1: JOINING FORCES

"Our vision is to make our PRES² one of the best in France by bringing together all players. Our goals are to promote our excellence clusters, to stimulate the intellectual energies that exist in this vast region between Paris, Lyon and Switzerland and to join international partnership networks. Our PRES will be built along the lines of a major Federal University."

The PRES Bourgogne Franche-Comté was founded by decree on 15 December 2010 as a Foundation for Scientific Cooperation gathering all players: universities, engineering schools, teaching hospitals, national research centres (CNRS, INSERM), business concerns and regional and local authorities.

We have created a powerful alliance within a single structure (our foundation) to design and develop an influential PRES in this vast region located between Paris, Lyon and Switzerland.

GOAL 2: LEVERAGE OUR EXCELLENCE TO ADDRESS A MAJOR SOCIETAL CHALLENGE

"Throughout 2010, we have worked together to articulate the strategy for this PRES and overcome familiar scientific and technological obstacles. By combining transdisciplinary approaches, world-class teams, one-of-a-kind know-how and public-private partnerships, we are able to leverage our intellectual capital to address our ambitious societal and scientific goal: developing 'ecotechnologies to improve life and the environment'."

Our slogan is *humanticipation*. **Human**, because our research programmes and their related technologies target preserving and developing life and society. And **anticipation**, because this project aims to further research and innovation; our programmes and technologies spur developing important markets for our businesses in the critical field of risk prevention – in healthcare, agriculture, energy (such as nuclear energy) and transport.

If our proposal is selected and granted the "Initiative of Excellence" label, we will be able to take our scientific and educational excellence clusters to a new level. We will ensure that our best teams are able to produce new knowledge and develop new skills to support society's transformation. Indeed, we need to evolve from an information society to an action-oriented society – action that is well thought-out, effective and controlled. We need to move from a consumer society to a society that preserves life, the environment, natural resources and territories. These seminal shifts are the cornerstone to building a society of sustainable development.

GOAL 3: ESTABLISH A MAJOR FEDERAL UNIVERSITY

"We have the vision, the road map and the agenda to set up a major Federal University within the next 4 years. Our Federal University will merge 2 universities and 2 engineering schools, host over 50,000 students (equivalent to the University of Strasbourg), including 2,500 doctoral candidates, 5,000 international students and 3,500 researchers and research professors."

If our proposal for this "Centre of Excellence" is selected, we will transform our graduate educational system and establish a **major Federal University** in this vast region located between Paris, Lyon and Switzerland. Our

² PRES: Pôle de recherche et d'enseignement supérieur > Centre for Research and Graduate Education (NdT)



comprehensive vision will give birth to a world-class international university where cultural diversity and mobility will be hallmarks of our student body and doctoral candidates. All players in higher education, including the future Interregional Technical University, will work together. They will push to adapt curricula to support the evolution of knowledge and the needs of society. They will design elite programmes and practical continuing education opportunities for all our students – French and international, young and employed. We will be designing an education for the 21st century, complete with digital tools, alumni networks, and lifelong learning professional and continuing education programmes.

GOAL 4: BECOME A DRIVING FORCE IN THIS VAST REGION

“Our region has a tremendous advantage: our public and private actors are all within reach. We will thus be able to develop a vibrant and responsive innovation ecosystem and make available new tools that will contribute to our territory and our society’s development.”

We will take the necessary measures to make our PRES a powerful force in spurring world-class knowledge locally. These include: ensuring basic research is relevant to society and businesses’ needs for innovation; promoting existing clusters; and facilitating innovation in our region’s industries and encouraging new ones to develop - specifically in service industries focused on well-being and quality of life. We will also work toward greater collaboration between SMB and corporations to spur employment, create value and stimulate our economic base. **Our innovation ecosystem is on the move.**

We wish to underscore this point: built on the IDEX’s highest standards, our Federal University will also aim to ensure a fluid harmony among different economic players (SMB and corporations).

If our proposal for this “Initiative of Excellence” is selected, we will have the world-class university and innovation and excellence clusters to respond to the major concerns facing our country, our society, our businesses and our citizens. We will bring answers and solutions to these concerns through training, original research, and innovations we will develop in our laboratories. We will leverage transdisciplinary approaches and benefit from the geographic proximity of key players. Our responsiveness will enable us to break free from the typical boundaries that separate disciplines and institutions and to respond creatively to the societal challenges of sustainable development.

The extended region’s local authorities, competitiveness clusters and businesses will participate together in funding “Initiative for Excellence” projects. They will match the funding granted by the French Commissariat Général à l’Investissement **on a 1 to 1 basis** (excluding Labex funds).

GOAL 5: COMPETE ON AN EQUAL FOOTING WITH MAJOR EUROPEAN REGIONS

« We will have the resources to match international hosting and hospitality standards. We will expand our strategic partnerships with Asia, Latin America, Europe and the Mediterranean countries. We will benefit from our cross-border partnerships with Swiss institutions in Lausanne, Neuchâtel, Fribourg and Geneva to raise our PRES’ profile and attractiveness and to compete with Europe’s major regions.”

With our “Initiative of Excellence”, we will bolster our international relations, relying on the overseas offices of research institutions (such as CNRS), State agencies, and university associations (CPU and CDEFI for example). We will develop international curricula and university units abroad. We are committed to making our PRES attractive to international students from our partner countries (China, Malaysia, Indonesia, Thailand, Chile, and the countries of Eastern Europe and the Mediterranean). We will strive to meet the highest standards in all respects, from the quality of our educational offering to the attractiveness of the lifestyle, hosting and housing we shall provide. We aim to boost our international appeal: from 12% in 2010, we want our foreign student population to reach 16% in 2015 and 20% in 2020. We will leverage our assets to attract foreign researchers and involve them in



scientific partnerships as well as in international curricula. Our PRES' appeal will reach beyond our region, gaining a reputation throughout Europe and beyond.

1.2. THREE KEY ASSETS

ASSET 1: AN EXPLEMPARY MODEL OF GOVERNANCE

“Our system of governance is already in place. As a Foundation, its structure is innovative, open to the business community, compelling to research institutions, credible to other partners and efficient. Already, many businesses have responded positively to our invitation (a distinct advantage in France) and the CNRS and INSERM have joined our governing body.”

Besides our inherent talents and strengths, the **system of governance** we have already put in place is one of our main assets. All those involved in research, in higher education and in innovation have united around a shared vision. We are used to working together. We are geographically close to one another. We are responsive and are accustomed to spearheading public-private industrial partnerships together. We have chosen to work within one single structure – a Foundation – that is open to all, including businesses. We have convinced national research institutions (CNRS, INSERM) of this system of governance's value and advantages and they have come on board.

ASSET 2: ROAD MAP 2010 - MOVING FORWARD TOGETHER

“Today, after 3 years of preparatory work, we have all the necessary levers to set up our PRES and to achieve, phase by phase, our Centre of Excellence's goals within 10 years.”

Our project is the result of a collective process under way since 2007.

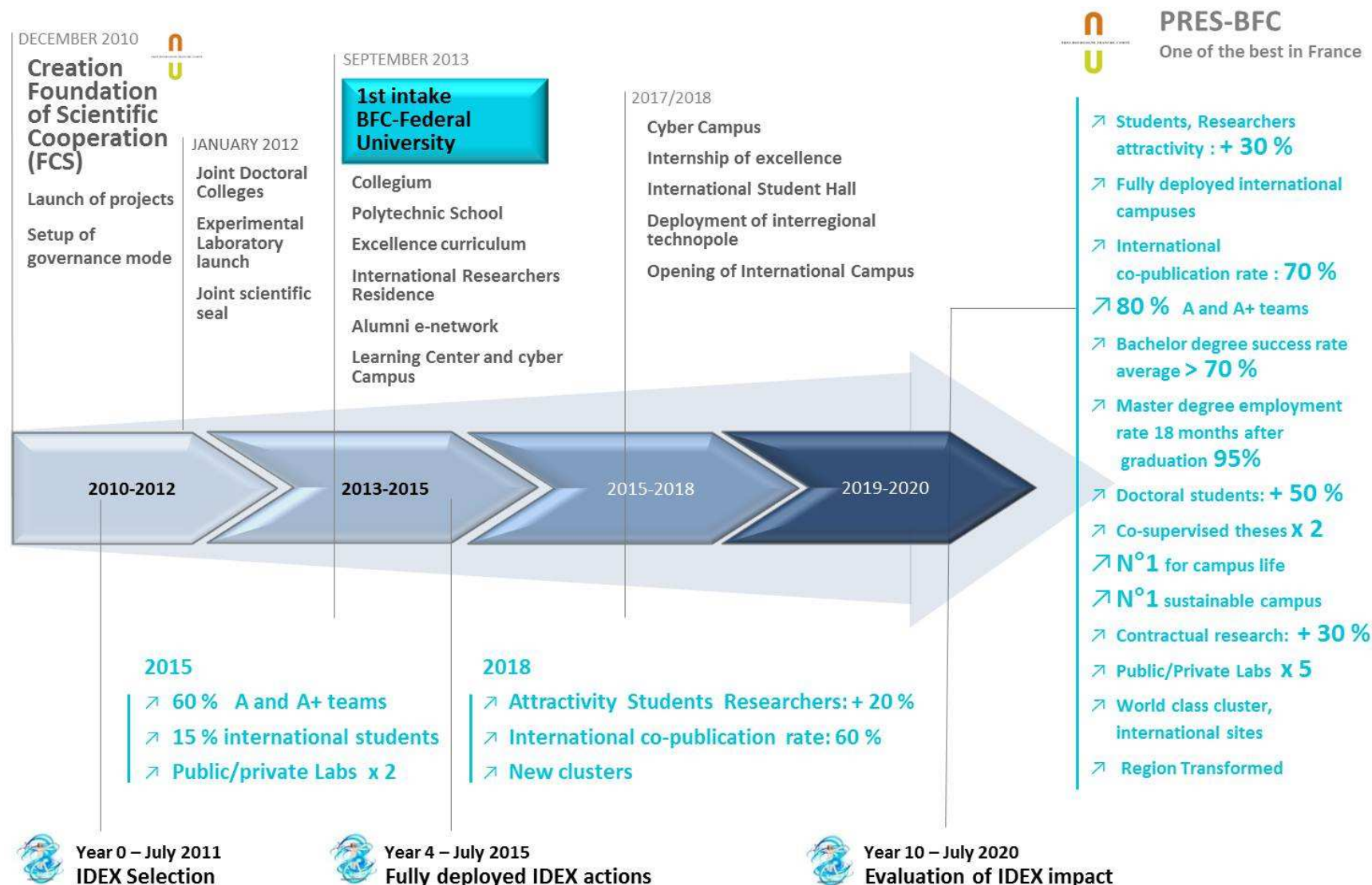
Today, all the necessary conditions to launch this PRES have been met. This centre already ranks high in France for research and development (a national ranking between 7th and 12th place depending on the indicators used).

A shared vision and collective process, excellence in support of economic development, a strategy founded on a novel positioning and on an innovative governance. These are the foundations for the “Centre of Excellence” the PRES Bourgogne Franche-Comté spearheads through a Foundation officially created on 15 December 2010.

We are moving forward quickly and we will complete our transformation over the course of the next few years. The Federal University will be set up within four years, and within ten years, we will fulfil our international goals.



TRAJECTORY OF OUR INITIATIVE FOR EXCELLENCE



ASSET 3: ORGANISATION OF OUR PRES

PRES BOURGOGNE FRANCHE-COMTE PROFILE

Status: Foundation for Scientific Cooperation (FCS)

Partners:

2 pluridisciplinary universities: Bourgogne University (uB) and Franche-Comté University (UFC)
 2 engineering schools: AgroSup Dijon and ENSMM
 4 teaching hospitals and healthcare centres: CHU Besançon and CHU Dijon, Anti-cancer center CGFL, French Blood Establishment
 Technological universities of Troyes and Belfort Montbéliard, ESC Dijon, Arts&Métiers Paris Tech Cluny
 National research institutions (CNRS, INSERM)
 Economic actors: The extended region's 5 clusters, businesses
 Local and regional authorities: The Burgundy and Franche-Comté Regions, extended urban communities (such as Dijon, Besançon, Belfort and Montbéliard)

2010 Key figures:

- 54,000 students, including:
 - 7,000 Masters students
 - 6,000 engineering students
 - 2,200 doctoral candidates
- 69 research teams
- 800 education and training programmes
- 3,500 instructors/research professors
- 2,200 administrative and technical staff

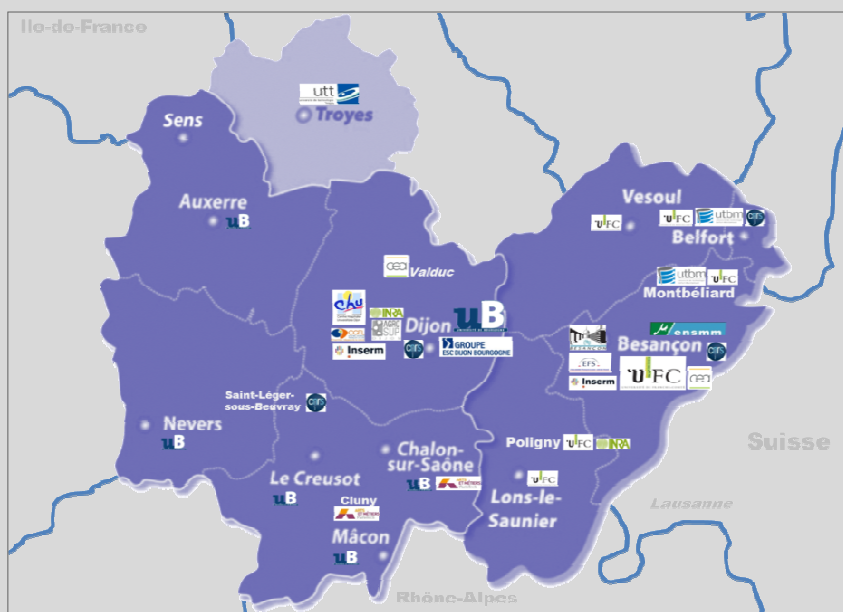


Figure 1: Research and Graduate Education institutions in Burgundy Franche-Comté



OUR SCIENTIFIC POSITIONING

The extended region's scientific production compared with national production

Research staff: 3.0 % 8th place
 Scientific production (OST)³ 2.4 % 12th place

Development

Technological production (OST): 3.2 % 7th place
 ANR⁴: €9.3 million 13th place
 10 research awards won in 15 years
 16 IUF winners⁵ 10th place

Key disciplines

National ranking (see Annexe 4):

According to the number of researchers in units ranked A and A+:

1 – Engineering sciences 6th place
 2 – Agroecology 7th place
 3 – Physics 8th place
 3 ex aequo – Mathematics 8th place

According to the share of publications and two-year impact indicators (Wos)⁶:

1 – Applied biology and ecology: **32% growth in five years, with a national average of 18%**
 2 – Engineering sciences **61% growth whereas the national average is 1%**
 3 – Medical research
 4 – Mathematics

Rate of international copublishing: 36%

OUR MAIN ASSETS

Professional success and employability: an absolute priority

Educational innovations and proactive measures spearheaded with employer organisations
 30 months after graduation, more 9 out of 10 Master degree graduates are employed (2009)

Quality of life on campuses: a daily commitment

Sports, culture, clubs and associations, student services
 The PRES campuses are among the top three in France for their standards, activities and infrastructures.

Doctoral programmes: our first responsibility

2,200 doctoral candidates, including 170 PhD under joint supervision
 Joint doctoral programmes between Burgundy and Franche-Comté starting on 1 January 2012
 International partnerships for doctoral training, notably with Swiss universities

Public/private partnerships: a given with many advantages

1 public-private laboratory ☐ Participation in 7 clusters
 77 patent families ☐ 16 licences ☐ 34 start-ups
 Industrial contracts: €6.5 million ☐ Collaborative contracts (ANR, Europe, FUI): €3.9 million
 A subsidiary for applied development of research (created as an SAS, in preparation for the future SATT legal structure)⁷

Internationalisation is a given

5,000 foreign students ☐ 500 international partnerships
 Among the top 3 university centres for post-graduation mobility
 Strategic partnerships: China, Malaysia, Indonesia, Thailand, Eastern Europe, the Mediterranean countries, Chile, Latin America
 Close scientific ties with the Ecole Polytechnique Fédérale in Lausanne (Switzerland)

³ OST: *Observatoire des sciences et techniques*, an R&D monitoring institute.

⁴ ANR: *Agence nationale de la recherche*, the national research agency.

⁵ IUF: *Institut universitaire de France*

⁶ WoS: *Web of Science*

⁷ SAS: *Société à actions simplifiée* ; SATT: *Société d'accélération de transfert technologique*





THE VAST REGION

BOURGOGNE FRANCHE-COMTE

Population:

2.8 million ~ 9th place in France

Area: 9% of France

GDP: €72,154 million ~ 9th place

Number of students enrolled in higher education:

72,900 ~ 11th place

Research staff:

11,570 (FTE) ~ 8th place

including 5,930 researchers (FTE) ~ 9th place

1,900 researchers engaged in government research (12th place)

and 4,030 researchers within companies (6th place)

Scientific production (excl. human and social sciences)

12th place*

Technological production (European patent requests): 7th place*

Local spending on R&D: €1,050 million ~ 7th place

* Source: OST

An accessible territory

- High-speed train Paris-Dijon-Lausanne and Paris-Dijon-Besançon
Travelling between Dijon and Besançon will take 25 minutes in year 4
- Airports: Dijon, the Basel-Mulhouse-Freiburg International Airport (65 km from Belfort)
- A6 motorway (called "Autoroute du Soleil"): connects Paris, Dijon, Lyon and Marseille
- A36 motorway (called "La Comtoise"): connects Dijon, Besançon and the main cities in Franche-Comté to Germany, Alsace, Lyon and Marseille
- A39 motorway: connects Dijon and Besançon to Geneva
- Borders Switzerland along 230 km

5 national competitiveness clusters within the partnership

Businesses, research laboratories, training institutions, economic development partners, local authorities: **nearly 1,000 actors are involved and 427 projects recognised**



Microtechnics cluster:

Franche-Comté – 106 members – 74 projects

Advantage: a major national and European economic player in microtechnics



21st century automotive cluster:

Alsace/Franche-Comté – 200 members – 160 projects

Advantage: the objective is to make this region a reference in Europe for urban and periurban mobility.



Burgundy nuclear cluster:

Burgundy – 129 members – 46 projects

Advantage: an internationally recognised European reference for nuclear equipment

Initiative: The International Nuclear Academy, an institute of continuing education specialised in nuclear engineering



Vitagora® cluster:

Burgundy and Franche-Comté – 138 members – 124 projects

Advantage: one of the first European clusters developing projects related to taste, nutrition and health



Plastics processes cluster:

Rhône-Alpes/Franche-Comté – 200 members – 23 projects

Advantage: focuses on technological innovation to support the French plastics industry



2. STRATEGY: SIX LEVERS FOR ACTION

The strategy behind our IDEX candidacy responds to the goals presented supra. It has been developed throughout 2010. The Foundation for Scientific Cooperation has presented all our projects. This strategy enables us to show the “Centre for Excellence” is the pivot of this transformational process. It is also the necessary requirement to implement fully of each of our projects and to build this ambitious PRES that is to become the driving force to develop this territory into one of the most attractive in Europe.

LEVER 1: A WORLD-CLASS OFFER FOUNDED ON A SOCIETAL VISION

The union of all the PRES’ partners places us at the forefront of French universities (*please refer to the key figures in the PRES’ profile*).

These solid bases allow us to take part in the IDEX competition and to carry out what would have taken at least two decades under normal circumstances. The transverse and transdisciplinary approaches that characterise our universities confirm the distinctiveness of our positioning and aim to create an attractive campus in the field of “*humanticipation, ecotechnologies to improve life and the environment.*”

The excellence of our project relies on 5 complementary excellence clusters working together to support life, humankind and the development of a sustainable society:

- Smart and secured systems
- Materials and energies for the future
- Environment and territories
- Agroecology and healthy food
- Biotechnologies and health

The first seeds of our success have already been planted: a **recognised excellence** in fields such as agroecology, engineering sciences, human sciences, physics, mathematics [within the top 8 universities in the country], CNRS award-winning laboratories [10 times in 15 years] and an important track record of international copublications [36%] (*please refer to Annexe 1*).

The label “Initiative of Excellence” will enable us to structure our offering in a manner that will heighten our efforts to spur controlled societal innovation. Sharing this common goal and setting up a continuum of creative innovation will allow our talents to express themselves fully and forcefully. This is the goal we have set for this project.

LEVER 2: A TRANSDISCIPLINARY APPROACH TO ACHIEVE EXCELLENCE AND BREAK FREE FROM LIMITING BOUNDARIES

Our proposal for this “Initiative of Excellence” is designed to spur innovations that transcend classical boundaries. To do so, we have nurtured the synergies among 5 excellence clusters and set in motion a **transformational process** that will simplify exploiting applied research in ecotechnologies:

- 1. Exploitation of medical bioresources by cutting-edge nanosciences in medical bioresources:** All international road maps anticipate that a strong potential impact is expected from exploiting biobanks by frontier of knowledge nanotechnologies. This activity will capitalise on the biobank of the Dijon Campus that belongs to the limited set of French biobanks matching European standards. The related projects aim at developing new diagnostic procedures and therapies for cancer, heart and neuronal diseases. In the framework of European



and national projects, natural science (biology, chemistry, physics) and medical teams of PRES Bourgogne Franche-Comté are already working together on this challenge. For the first time in France, Humanticipation plans to extend this concept to the exploitation of vegetal and animal biobank hosted in both universities.

2. **The foundation of a one-of-a-kind scientific cluster in France, combining molecular chemistry, computer sciences and imaging to advance healthcare.** It will use, develop and define biomarkers able to monitor the effectiveness of treatments and to identify more active molecules, such as in the fight against cancer. A continuum is in place, from potential health applications to treatment protocols. A cluster in Burgundy (CHU, Anti Cancer Center GF Leclerc (CGLC), GIE Pharmimage, businesses) and a public-private preclinical research centre in France-Comté will lead these programmes. **Biomechanics, prolongation of life and autonomy** are included in our focus. Our PRES will be a centre where basic sciences and human and social sciences combine to further quality of life.
3. **The use of basic sciences and microtechnics will support a secured industrial revolution employing smart systems and alternative energies.** By directing scientific teams with proven high records in photonics, micro nanotechnologies and material sciences on objectives of interest to the socio-economical development of the region, Humanticipation will accompany the shift from an information society to an action-oriented society at various levels: industry (reducing technologies' ecological footprint), biotechnologies (new methods to treat and monitor patients), energy (smart technology grids) and alternative energies within a public-private partnership with Switzerland (solar fuels).
4. **Calling on human, social and environmental sciences to analyse the sustainability of territories** at various points in time. It will allow, in fine, to link humankind's action with the environment. Just as basic sciences contribute to advances in medicine and energy, human, social and environmental sciences **will help think ahead and consider humanity's well-being**. This pluridisciplinary and multiscale approach (archaeology, environmental sciences, economics, territorial sociology) will modelise the interactions among human beings, the environment and health to help streamline local government policies. This cluster will also act as an internal resource to analyse our "Initiative of Excellence's" impact and the ROI for our territories.
5. **The development of a one-of-a-kind continuum in France among environmental sciences, agroecology, biodiversity, food, sensoriality, nutrition and health**, based on existing local specificities (agroecology, sensoriality-food, nutrition-health). This continuum combining food, sensoriality, nutrition and health is recognised by the Ministry of Agriculture as unique in France. It will spur notable advances and the connection with socioeconomic and ethical approaches to innovation in this field will allow considering upstream the societal challenges inherent in this area. Such a multifaceted approach is the only way to ensure sustainable advances that will benefit the national community.

Each of these processes contributes to a shared and unified approach centred on a common vision. Each one takes part in building a strong university centre focused on putting ecotechnologies to work to support humankind's quality of life and our environments' sustainability. In line with our PRES' strategy, we have created the synergy among our excellence clusters **in concert with the extended region's competitiveness clusters** (Vitabora, Burgundy's nuclear cluster, 21st century automotive cluster, microtechnics cluster). This strengthens our contribution to the region's socioeconomic development.

Key success factors rest on the transverse and transdisciplinary approaches within each cluster and among them. We will promote these interactions by continuously rebalancing resources to support change and our researchers' creativity. These key factors also depend on an effective and responsive system of governance that includes socioeconomic actors to boost public-private interaction and strengthen our contribution to developing a harmonious society.

We will orchestrate, in a way unmatched in France, the energy borne from interdisciplinary approaches and barrier-free themes, the geographical proximity of players and responsive governance. This will guarantee that



the ambitious international centre we are building performs with creativity, inventiveness and in concert with our society.

LEVER 3: BUILDING A WORLD-CLASS RESEARCH AND EDUCATION CENTRE FOR STUDENTS

Our project also embarks on a process to transform graduate education.

Indeed, our Initiative of Excellence proposal will create **a major Federal University** that will combine our regions' 2 pluridisciplinary universities and 2 professional schools. Our PRES' structure will be coherent and influential.

Combining our graduate education institutions in this manner makes sense and avoids redundancy that could lead to pointless competition. Students, instructors, researchers and businesses will easily understand our structure and its appeal.

It aims to help our training programmes evolve thanks to transverse approaches, dual expertise or joint degrees. This is key to responding to shifts in knowledge and in society's needs, especially in the areas our excellence clusters specialise.

We also wish to develop individualised courses of study or of specialisation for those who show great promise. This would facilitate access to scientific or engineering degree programmes and help all students, especially those from modest backgrounds, to succeed. Today, over 50% of our first-year students benefit from financial aid or grants. The best candidates will be invited to engage in selective courses of study under the umbrella of a novel structure, combining student housing with group and individual academic, social and extracurricular activities and support. In sum, we will support all the players within our territory in their pursuit of excellence. This IDEX is the vehicle with which to achieve this noble and ambitious vision.

The Federal University of Bourgogne Franche-Comté will gather over 50,000 students and 3,500 instructors and research professors (equivalent to the University of Strasbourg). Its 2 main campuses (Dijon and Besançon, only 100 km apart) and several community campuses will be the focal points through which to stimulate developing this vast region. It will federate:

- Two pluridisciplinary universities that are already developing close ties (through shared leadership of doctoral programmes, for example)
- Two affiliated engineering schools, ENSMM in Besançon and AgroSup in Dijon

Setting up the Federal University will provide the opportunity to transform our education and training offering: individualised courses of study, cross-disciplinary curricula, technological training provided by IUTs as well as pluridisciplinary Associate and Bachelor degrees, Masters, engineering specialisations, scientific curricula and management training, and doctoral programmes.

Moving toward a real cyber university will transform teaching methods and the social networks we will create for students and alumni will help students enter the labour market.

Setting up transverse modules (economic intelligence and entrepreneurship) will help train and sensitise future managers and employees to fundamental issues in economic development and protection of intellectual capital.

The Federal University will become **an international university**. Mingling cultures and ease of mobility will be tremendous assets for our students and doctoral candidates. The PRES is the vehicle through which we will carry out this international vision.

The Federal University will be complemented by the Technical University of the eastern part of France (borne from the merger of the technical universities in Troyes and Belfort-Montbéliard). This will bring additional resources to engineering and scientific curricula.



The Technical University of the eastern part of France will host around 2,500 students and nearly 350 research professors in year 1. The goal is to welcome 5,000 students in year 4. Merging these structures will free up resources because we will be leveraging synergies and eliminating redundancies while preserving 2 campuses (Troyes and Belfort-Montbéliard) and 2 forward-looking themes: “risk management” and “energy and mobility”.

Within the PRES, the Federal University and the Technological University will share in this international vision, be involved in collective world-class projects (on topics such as “secured intelligent systems” and “materials and energies for the future”), use platforms shared with businesses and be partners in the interregional Burgundy–Franche-Comté–Lorraine SATT.

Creating the Federal University of Burgundy Franche-Comté within 4 years will provide the necessary framework to achieve our goals of excellence and attractiveness for students and researchers, in France as well as internationally. The Federal University is at the heart of our PRES and the strategic lever to achieve our scientific vision.

LEVER 4: AN ECOSYSTEM OF INNOVATION AND EXCELLENCE FOR BUSINESSES

Our project aims to promote a wide array of economic sectors, ranging from traditional ones, which are essential to preserving our independence in developing priority applications, to growth-oriented high-tech sectors.

This transformational process will take place at several levels:

- **Revitalising our economic fabric**, whether large companies or SMB, through partnerships akin to what has been created around the company Oncodesign. This R&D start-up, launched within the university, co-leads an EquipEx and a LabEx, already has a staff of around 100 and is gaining international recognition.
- Anchoring our PRES within its geographic environment thanks to an **even more meaningful participation in clusters** that combine national and international contractors (such as Alstom, Valinox, Seb, Solvay...) and a tight network of SMB. **Other clusters**, nourished by our excellence clusters (and resulting from our “investments for the future” projects), will rise to the fore and will invent new industries, particularly in the service sector (such as the gerontology cluster).
- Strengthening the specificities of our local facilities with the economic fabric. Reinforcing already strong local anchoring aims to nurture economic actors’ ability to innovate.

Our goal to position the PRES as a driver for innovation for businesses compels us also to take the necessary measures to **strengthen our students, our future business leaders or our managers’ performance**: immersion units, learning network and economic intelligence.

Our goal is to innovate for and with businesses. We have thus also included in the IDEX framework the creation of 2 **public/private Excellence Institutes** (a shared platform project and an IEED8 project), 3 **Carnot Institutes** (Femto-Innovation, Qualiment, Arts) and an **SATT Grand-Est** that comprises Burgundy, Franche-Comté, Lorraine and Troyes (in the Champagne-Ardenne region). This SATT will rely on uB-Filiale’s experience. This is the university subsidiary that promotes Burgundy’s research and already accompanies projects in their development and research partnerships.

This deep reform in higher education is made possible because of who we are, the context in which we work and especially our talents and our potential. It is thanks to this reform that we are moving towards world-class achievements and innovation, with the same vital spirit found in “investments for the future”.

⁸ IEED: *Institut d’excellence des énergies décarbonées*



We can thus claim to meet top-flight teaching and research standards throughout our territory, with strong local anchors linked to the economic specificities of our facilities and a clear transdisciplinary coherence.

We wish, at the same time, to spawn a federating vision focused on a theme that is nourished by the main fields of excellence for which this vast region is known.

Excellence, thus, isn't some lofty conception. It is rooted in our territory, feeds off our economic activity and nourishes it in turn. We are indeed in a living ecosystem where ecotechnologies of the future are at the heart of this world-class project.

LEVER 5: INTERNATIONAL BENCHMARKING AND CROSS-BORDER PARTNERSHIPS

To ensure excellence in our projects, we are constantly involved in an **international benchmarking**. When we designed the structure of our PRES, we looked at the Quebec model of federal universities and at several of our European neighbours' models of excellence. Two core tenets of our PRES project can be found in other countries' strategies to achieve university excellence: interregionalism and the choice of a foundation.

- Developing interregional PRES comprising universities from neighbour regions is an approach our European neighbours have tested successfully. Projects similar to that of the PRES Bourgogne Franche-Comté exist in Northern European countries that are well regarded for the quality of their educational system and of their research. Over the past decade in these countries, programmes to group universities have created the University of Southern Denmark, the Mid Sweden University and the University of Eastern Finland. The latter put interregionalism on the map by showing up in international rankings.
- The PRES Bourgogne Franche-Comté's choice of a foundation is similar to a well-honed strategy in Germany where, as in France, this status remains novel. Yet it has proven its relevance for the centre of excellence project the University of Göttingen proposed, deciding right from 2003 to spearhead the project via a Foundation. Well-regarded for the quality of its research, the University was chosen as one of the 9 elite universities by Germany's *Exzellenz Initiativ*.

Inspired by these references, the PRES Bourgogne Franche-Comté has adopted an organisation that is coherent and attractive in European graduate education and research.

This policy of international benchmarking ensures our global positioning is visible. It also relies on ambitious measures, particularly where developing our network of powerful international partnerships is concerned.

Key partnerships with Switzerland

Swiss universities are important and natural partners for the PRES Bourgogne Franche-Comté in many fields.

The partnership **with EPFL** is especially important, as it is one of the most prestigious graduate teaching institutions in Europe. The PRES and EPFL have already launched many successful collaboration programmes, particularly to spearhead European research projects.

Our PRES is engaged in an ambitious strategy for change inspired by the Ecole Polytechnique Fédérale in Lausanne's model. As a privileged partner, this prestigious Swiss institution is a source of inspiration for our Federal University project in Burgundy Franche-Comté, particularly in:

- Coordinating technical and academic education within one single institution;
- Structuring in a practical manner joining several institutions thanks to a federal architecture

The Federal University of Burgundy Franche-Comté shares not only projects, but also values with the Ecole Polytechnique Fédérale in Lausanne and it benefits from geographical proximity with and quick access to



Lausanne. Selecting our “Initiative of Excellence” project will enable us to evolve quickly towards a solid and structured partnership with our counterpart in Lausanne.

LEVER 6: A COLLECTIVE PROCESS AND AN EFFICIENT, FLEXIBLE AND RESPONSIVE GOVERNANCE

Our candidacy for the “Centre of Excellence” is founded on a tradition of cooperation among graduate education and research institutions, economic actors and local authorities throughout our vast region. This tendency to cooperation developed because of the strong interaction between research and economic development. The public and private sectors here team up naturally, probably because in a region such as Burgundy and Franche-Comté, we are able to leverage the human dimension.

A collective process built in three years

2007: The first convention between our two universities is signed.

2008: The “Opération Campus” programme, which aimed to identify which campuses should receive national funding, awarded Dijon the “Innovative Campus” label.

2009: The PRES Bourgogne Franche-Comté’s launch is announced.

2010:

- The Foundation for Scientific Cooperation, the driving force behind the PRES Bourgogne Franche-Comté, is created.
- The association that is to be the scheme for the Federal University of Burgundy Franche-Comté is created.
- Our candidacy for the “Initiative of Excellence” is submitted.

Effective and open governance

Within our PRES, the Foundation for Scientific Cooperation (FSC) will drive our “Initiative of Excellence” project. It is designed to include all partners and research, graduate education and innovation contract holders: universities, public and private schools, teaching hospitals, research centres, businesses and local authorities.

This system of governance, which is a first for a PRES in our country, invites businesses and involves public and private actors. This enables the alliance of universities, schools and teaching hospitals and promotes research institutions’ efforts to coordinate their local strategies and national policies









This governance is designed to be responsive and effective. And it is already in place and operational, the FCS having been founded on 17 December 2010.

Today, the PRES Bourgogne Franche-Comté is considered unanimously as one of the most vibrant and effective interregional structures in France. We already have the support of businesses, national research institutions (CNRS, INSERM) and local authorities. Their active participation in preparing this candidacy and the many letters of support received are a testament to the widespread backing our proposal has gained (*please refer to the appendix3*).



















PROJECT'S FOUNDERS AND PARTNERS

FCS Founding membres

	Université de Bourgogne
	Université de Franche-Comté
	AgroSup Dijon
	Ecole Nationale Supérieure de Mécanique et des Microtechniques
	Centre Hospitalier Universitaire de Besançon
	Centre Hospitalier Universitaire de Dijon
	Etablissement Français du Sang
	Centre Georges François Leclerc de lutte contre le cancer

FCS Associated membres






	Université Technologique de Troyes
	Université Technologique de Belfort-Montbéliard
	Centre national de la recherche scientifique
	Institut national de la santé et de la recherche médicale
	Ecole nationale supérieure d'arts et métiers
	Ecole nationale supérieure des Beaux Arts de Dijon

	Groupe ESC Dijon Bourgogne		
	Conseil régional de Bourgogne		Grand Dijon
	Conseil régional de Franche-Comté		Grand Besançon
	Dijon Céréales		Caisse d'Epargne Bourgogne Franche-Comté
	Seb		EDF Bourgogne
	Crédit Agricole Champagne-Bourgogne		

FCS and project Partners

	CRCI de Franche-Comté		Agglomération/Ville de Nevers
	CRCI de Bourgogne		Ville d'Auxerre
	Commissariat à l'énergie atomique et aux énergies alternatives		Agglomération de Chalon-sur-Saone
	Institut national de recherche agronomique		Agglomération du Creusot
	Caisse des Dépôts		Agglomération de Montbéliard
	Solvay		Société générale Bourgogne Franche-Comté
	Alstom		Eurogerm
And many others (please refer to appendix 3)			

Competitvity Clusters

	Pôle Vitagora		Pôle des Microtechniques
	Pôle Nucléaire de Bourgogne		Pôle Véhicule du Futur
	Pôle Plasturgie		

3. THE INITIATIVE OF EXCELLENCE

3.1. Our perimeter of excellence

Positioning at “interfaces” to ensure innovation

The PRES Bourgogne Franche-Comté forms a **strong, vibrant and multidisciplinary hub**.

The socioeconomic context of our large region and the evolution of research at the service of social development have led the PRES to launch projects based on a **continuum of excellence and creation**. Getting fundamental disciplines to work in synergy has generated original interfaces that give meaning to the perimeter of our Initiative of Excellence.

This capability to anticipate has already resulted in original approaches:

- Combining **sciences and technologies** (optics, physics, chemistry, nanosciences, materials sciences, ICTs, etc.) and **health**, to spur synergy between the teams of Bourgogne and Franche-Comté:
 - The European FP7 project SPEDOC (Surface Plasmon Early Detection of Cancer) combines the latest advances in nano-optics, optic manipulation and microfluids with recent discoveries relating to heat shock proteins (HSP) to develop individualised cancer diagnostics and treatment monitoring devices;
 - **The pharmaco-imaging cluster**: a multidisciplinary project (pharmacology, chemistry, computing, electronics, physics, biology, nanotechnology, medicine, etc.) oriented to the use and development of tracers and the determination of biomarkers to monitor the efficiency of treatments and the selection of the most active compounds, including an inter-region on proteomic platform active since 8 years. There are applications in every field of health (oncology, cardiology, neurology, immunology, sensorial research);
 - The **Institut des Sciences de l'Autonomie** (Institute of Sciences of Personal Autonomy) cluster, focused on an integrative approach with the interaction among all the actors in health (health establishments, university hospitals, university teams, public institutional and private partners), to ensure a multidisciplinary approach on cooperative platforms dealing with characterisation, preclinical investigation (in vivo and in silico modelling, simulation), multimedia and telemedicine. The themes developed target public health: Risks, Infections and the Environment; Biotherapy, Human-Transplant-Cancer relations; Innovations and Autonomy.
- The **AGRALE** cluster (AGriculture, ALimentation, Environment), one of 6 agronomic research clusters recognised in France, brings together the environment, agroecology, biodiversity, foodstuffs, sensorial research and nutrition in a continuum of excellence that stretches from "the plough to the fork", linked with the cluster Vitagora.

The societal vision of our project

To ensure the success of this twofold challenge, namely strengthening the excellence of research in our region and contributing to societal development, we have chosen to position our approach in terms of "*humanticipation, ecotechnologies to improve life and the environment*". "Humanticipation" means the will to consider ahead of time the future of humankind through innovation and getting the forces at play in the region to work together in synergy.

This policy is based on the National Strategy of Research and Innovation (SNRI), which recalls the contemporary world is a globalised entity in which people, ideas and goods circulate on the scale of the planet. Risks linked to climatic change, the need to procure energy, the challenge of producing enough food for a world population of 9 billion human beings by 2050, the increase of pathologies relating to environmental changes and ageing populations are all intertwined challenges that require adapting managing risks and uncertainties.



The reconfiguration of national and international balances is occurring quickly. The imperative for change is giving rise to rapid recomposition in every field, causing upheavals in social, political and cultural stability, and leading to a trend in which individuals, groups and entire societies live in structural uncertainty.

However, these changes are also opportunities to be seized upon to link scientific advances with social progress, and transform fundamental discoveries into innovations (social, technological and applied). The Initiative of Excellence project is intended to act as an accelerator for our universities, driving them in the direction of this necessary global societal progress.

3.2. Projects selected in the service of an ambition

Our projects are structured around the main direction of "*humancipation, ecotechnologies to improve life and the environment*". They place humankind at the heart of our concerns and they aim at seeing innovations as sources of societal progress.

Creating the conditions of innovation

We have built a genuine candidacy strategy, with selection criteria, assistance to project contributors, and project analysis and phasing. **The projects submitted are our best in excellence, overall consistency, and maturity.** We have also selected our projects to strengthen our assets, to have the freedom to develop sustainably afterwards.

The selection criteria of our projects aimed at setting up the conditions for innovation:

- Excellence (support for unique competences and to teams A and A+);
- A cross disciplinary approach, and interfaces between disciplines, capable of breaking through scientific deadlocks;
- Implementing a strategic continuum of fundamental research for transferring technologies and concrete applications;
- Contributing to regional development and clusters that bring together major companies and a dense fabric of SMBs.

« Investissement d'Avenir » projects

In all, we have submitted (*please refer to appendix 2*):

- 6 LabEx projects selected: 4 submitted including 1 in a network and 2 in preparation,
- 2 Health Biotechnology infrastructure projects including 1 in a network contributed by the INRA,
- 9 EquipEx projects including 2 managed by the CNRS,
- 1 project for a joint innovation platform (PFMI) and IEED,
- 1 SATT project pursued jointly with the PRES Lorraine,
- 3 Carnot Institute projects.

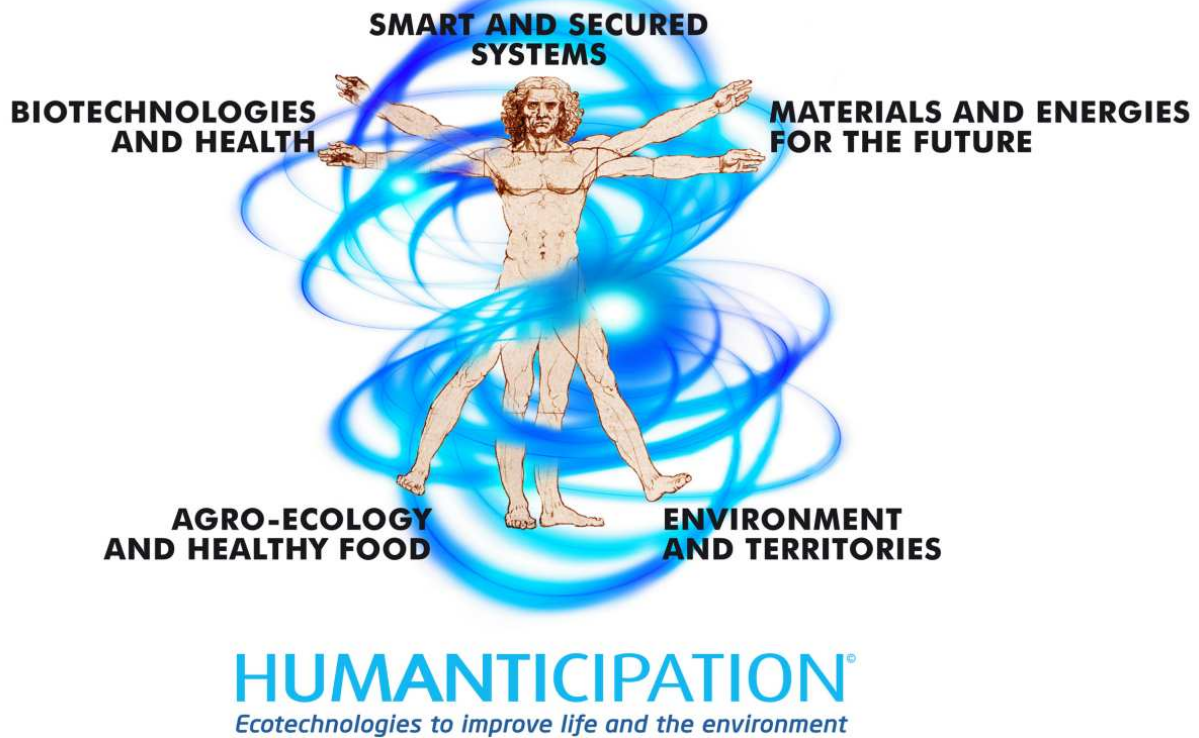
The consistency of our clusters of excellence

Our perimeter of excellence is based on 5 additional clusters, in an overall design that links humankind, its environment and technologies:

- Smart and secured systems
- Materials and energies for the future



- Environment and territories
- Agroecology and healthy food
- Biotechnologies and health



Our projects of excellence, the interfaces and synergies

Our originality stems from our will and capability to forge links between disciplines, and create innovative and scientifically, economically and socially exploitable interfaces.

- **Applying fundamental sciences and microtechnologies in the service of a secured industrial revolution with smart structures and alternative energies.**

The transformation from an information society to one of intelligent action is a major industrial challenge: systems must be capable of acting and interacting automatically, autonomously and transparently with the environment of their users, providing the latter with comfort and quality. We are setting up a unique group of leading edge and complementary teams (photonics, micro and nanotechnologies, mechanics and materials sciences), which allows us to work on studies ranging from **self-adaptive and reconfigurable information systems** (for optical communication or analysis of complex data) to **smart structures** (massive integration of sensors in mechanical structures) for their health monitoring.

When instrumented, these structures can become "aware" of their condition and environment, and automatically trigger preventive or corrective actions. This makes it possible to improve the safety of both persons and machines, remove ambient acoustic noises, improve vehicle aerodynamics, etc. The applications resulting from this field of excellence can be used in applications ranging from manufacturing, which is strong in the region, to biotechnologies for health (new concepts of monitoring / support / treating patients) and energy management (smart grid technologies).



The research in micro and nanotechnologies is supported by two large technology platforms, of which one belongs to the national nanotechnology network "Renatech" managed by CNRS.

> **Projects submitted:** LabEx ACTION + 4 EquipEx, including two submitted in a network via the CNRS (CLOVIS, Oscillator IMP, Robotech and MIND).

● **Applying fundamental sciences for more environmentally friendly technologies in the transport and energy sectors according to two directions:**

- An **IEED project solar fuels** at national level (CNRS, Collège de France, ENSCP, ENS) and with Switzerland (EPFL) **with the production of fuels by photosynthesis**. The development of a new type of chemistry based on molecular catalysis and the development of photocatalytic nanomaterials for designing original industrial processes and setting up, in the long term, a new sector for supplying synthesized fuels such as hydrogen, methanol and methane.
- The second direction is strongly linked to the region's industrial fabric (nuclear engineering, transport, automobiles) and is structured around 2 **EquipEx** (METAMAT metallurgy and a project for 2011 relating to energy efficient transport).

● **Applying sciences and technologies in the field of health is a promising path in which our contribution will be decisive:**

- Associating **nano-sciences and medical bioresources** to develop new diagnostic methods and therapies for cancerous, cardiac and neuronal pathologies.
- The low-level of interaction between these two fields of research in France as in Europe contrasts with the high expectations raised by this coupling. The application of the results stemming from fundamental research in medicine requires that they first be validated by clinical studies. To alleviate this problem, it is possible to work on human biological resources stored in biobanks, according to strict quality conditions, data management and respect of patients' rights. For the first time in France, Humanticipation features a plan to bridge the gap between nanotechnology research and development and clinical studies by a unique infrastructure dedicated to the production of the appropriate amount of lab on chip samples to be used for clinical studies within the large human tissue biobank hosted on the Dijon campus (project Nanobioressources submitted to call "infrastructures Biology/Health"). This methodology will be extended to environmental biobanks to build a unique infrastructure in France.
- Linking **molecular chemistry, computing and health**: designing a field of scientific excellence for the use, development and determination of **biomarkers capable of tracking the efficiency of treatments and the selection of the most active compounds, especially against cancer**. In Bourgogne, this approach relies on a cluster of private and public partners structured around platforms that bring together a complete array of radiolabeling and preclinical imaging tools (public/private partnership is a strong point of the IMAPPI and C2SMIM projects with partnerships with Bioscan, PharmImage, Oncodesign, Chematech, NVH Medicinal); in Franche-Comté it relies on a characterisation platform and a preclinical investigation centre that work in public-private synergy. A continuum has been created, running from upstream of health applications to therapeutic stages, thanks to the presence of University Hospitals and the CGFL Anti-Cancer Center in Dijon. Extending this approach to **biomechanics, prolonging life, autonomy**, etc. will make the PRES a place where fundamental sciences will interact with human and social sciences (SHS), at the service of the quality of life and well-being as part of an ethical approach.

> **Projects submitted:** a Health-Biotechnology and NanoBioResources infrastructure project; LabEx C2SMIM + 2 EquipEx (IMAPPI, NCIPC).



- The contribution of Human and Social Sciences and Environmental Sciences to the analysis of the sustainability of territories** is one of our major and original clusters of excellence. It focuses on the impact of man on the environment and the construction of territories over the short and long terms. Multidisciplinary programs, integrating multiscale approaches, allow linking the evolution of human societies to mechanisms relating to the anthropisation of ecosystems. This interdisciplinary programme (archaeology, environmental sciences, economy, sociology, etc.) will provide to all the clusters of our project, as well as to companies and local authorities, the basic elements required to analyse their transformation by studying: the location and development of agricultural, craft and industrial activities, the construction of networks, the strategy underlying the settlement of towns, patterns of social and political organisation, the rural/urban interface and landscape dynamics, the spread of contaminations and their effects on soil, flora, fauna and man, desertification, massive unemployment, the upheaval of demographic equilibriums, the expansion of industrial wastelands, etc. The results obtained will contribute towards formulating predictive models concerning the rationalisation of territorial policies relating to the environment, urban and rural planning, and the enhancement of "terroirs", and towards implementing regional policies and governance by considering the three dimensions of sustainable development: economic, social and environmental.

In the same way that fundamental sciences participate in the advance of medicine, energy technologies, human and social sciences and environmental sciences allow anticipating the well-being of humankind and place the ethical stakes involved in perspective.

> **Projects submitted:** 1 Pergaud LabEx: Anthropization and sustainability of territories + 2 EquipEx (CRNTA2IS, ODT)

- The environment, agroecology, biodiversity, healthy food, sensory research, nutrition and health** represent a continuous ensemble in which socioeconomic and scientific approaches complete each other. This continuum, unique in France, is based on the specific characteristics and scientific strengths of the site: agroecology, sensory research/healthy food, nutrition/health.

The link between the environment and biodiversity is a major stake for society. Understanding biotic interactions should lead to the design of agricultural systems with low agricultural input use, and thus ensure high-quality and environmentally friendly production including reducing the negative impact of propagating human pathogens. The relations between agriculture, food processing and human health must satisfy the requirements and concerns of society relating to the quality of agricultural products and the microbiological, sensorial and nutritional properties of foods. The latter point is especially important since current food related behaviour leads to the emergence of diseases such as obesity, atherosclerosis, diabetes, hypertension and cancer. The consortium we have set up is unique as it allows dealing with every step linking nutrition with health, successively involving the determinants of food related behaviour, the detection of nutrients, the intestinal absorption of lipids, their transport, their intravascular and tissue metabolism and, lastly, their consequences in terms of metabolism, inflammation, immunity, cardiometabolic risk and carcinogenesis.

> **Projects submitted:** Health-Biotechnologies - high throughput phenotyping infrastructure project submitted by the INRA

> **Projects envisaged for 2011:** 1 EquipEx project ("Analysis, observation, ecological, environmental, and evolutionary experimentation") and 2 LabEx projects (one dealing with "nutrition/health" and a second one that remains to be defined dealing with "the environment, agroecology, biodiversity, healthy food and health").



An integrating University Hospital system (IDEX operation)

Aware of our relative weight at national level, we did not respond to the call for University Hospital Institute projects (IHU). However, confident of our **synergies between universities, university hospitals, the Anti-Cancer Centre, the French Blood Establishment, and research organisations (CNRS, INRA, INSERM)**, we have decided to set up an **IHU system** focused on **prolonging life, autonomy and dependence**. Its pertinence strengthens our strategic orientations in the field of cancer, nutrition-sensorial research and health risks (food/nutrition, infection/environment).

Research teams investigate these themes with recognised expertise in epidemiology, clinical research, fundamental biology, health technologies and human and social sciences, thereby allowing the development of multidisciplinary translational research. They belong within a continuum of competences unique in France and Europe, linking expertise in the environment, biodiversity, agroecology, food, biotechnology and health. What is more, they benefit from the contributions of sciences and technologies (nanosciences, photonics, chemistry, imaging, etc.) in the development of new therapies and human and social sciences in economics, sociology, philosophy and ethics in particular.

Extending lifetime, autonomy and so forth involves the field of health: with fundamental, biological and physiological and biotechnological approaches in the field of instrumental, supportive and substitutive repair; and with the analysis of functional exploration and the technical concepts to be applied. These dimensions must be developed to improve the well-being of healthy human beings and generate spin-offs in terms of technological innovation and economic development, especially in terms of jobs.

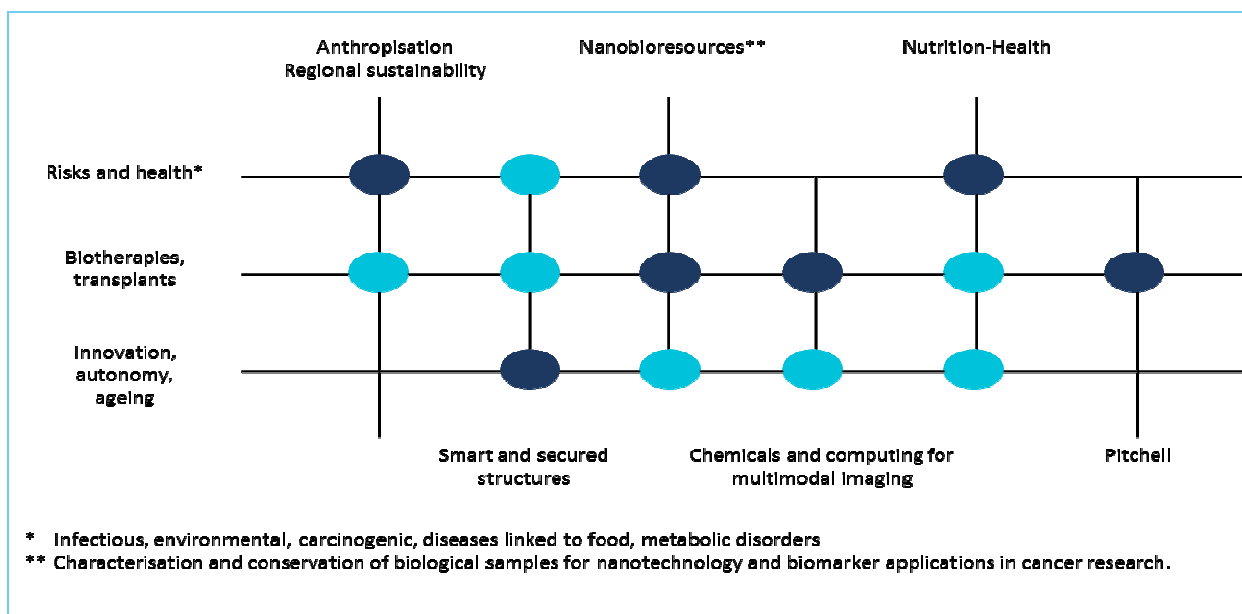


Figure 2: Matrix identifying the links between the LabEx themes and projects and the Health-BioTechnology infrastructures

Through time, **this "IHU system" will allow our PRES to exploit transversal and original competences and disseminate its developments to companies** in the health sector, thereby enabling them to respond to the challenges they face with innovative products, adapted procedures and technologies, and personal care services, and to the new needs related to loss of autonomy and prolonged lifetime, via **links with Gérontopôle, a cluster now in the process of construction**.

> Projects submitted related to this IHU system : the 3 LabEx and 4 EquipEx projects are related to this IHU system (IMAPPI, NPCIPC, CLOVIS, ODT) and the PRES platforms are mobilised (Clinical Investigation



Centre, Biological Resource Centre, the cellular therapy platform of the French Blood Establishment, Nano2Bio, etc.).

Transversal digital platforms for the PRES and at national level

Calculation mesocentre: This EquipEx project will be submitted in 2011. It is intended to considerably increase high performance calculation resources, which will represent a key component in developing research and innovation. This project aims to equip the PRES with medium-heavy infrastructures and facilities capable of reaching a calculation power of 30Tflop/s, which is the target set for the "tier-2" level (university/regional mesocentres) whose architecture is defined in the framework of national and European strategies (European Strategy Forum on Research Infrastructure).

National licence for consultation of scientific publications' Archives: The PRES Bourgogne Franche-Comté supports setting up a digital acquisition system at national level. Driven by the PRES Lorraine, this project will rely on the competences of ABES, INIST, CINES, and Couperin.

3.3. Projects to ensure a continuum of innovation with businesses

The need for rooting our establishments in their environment naturally links us with the business world.

A large number of researchers participate in the supervisory and steering committees of clusters, regional innovation support structures and several national consortia. This practise of listening to needs leads our establishments to design tools that satisfy the expectations of companies, especially SMB.

Our responses to calls for "Investment in the future" projects relating to exploitation reflect our determination to become a powerful driving force in territorial development.

- **Carnot Institutes:** 2 projects have been labelled in the field of materials (**Arts** driven by Arts & Métiers ParisTech) and engineering sciences (**Femto-Innovation**). Their perimeter will be extended to new teams of the PRES and an addition is expected in the field of agro-sciences with the **Qualiment** project, driven by the INRA.
- **The "Smart and secured structures" public-private development platform** (to be submitted in response to the second IRT call or to the PFMI call). Dedicated to experimenting with and validating structures incorporating automated systems for assisting and securing users, the **"Smart and secured structures" platform** (SIS) is aimed at developing innovative projects in the sectors of transport (communicative vehicles), energy (securing sites at risk NRBC), agri-foodstuffs (intelligent packaging, secured industrial processes, etc.), civil engineering and health (telemedicine). By integrating both sensors and ICTs, the SIS provides new R&D perspectives in terms of prognostics, diagnostics and health monitoring of complex structures in severe environments. Supported by an existing pilot line for quartz sensor production, the project involves the participation of major groups (**ALSTOM, AREVA, PSA and SEB**) with the support of the 5 competitive clusters and it strengthens the link between public research and industry, completing the **EquipEx** and **LabEx** involved in this interface.
- **Institutes of Excellence for Carbon Free Energies** (IEED) in **artificial photosynthesis for developing solar fuels**. This IEED project is composed of two additional sections: the production of hydrogen by artificial photosynthesis and the capture of CO₂ at source for producing carbonated fuels by recycling CO₂; the development of industrial energy storage processes (absorbing surplus wind power and solar energy production to supply fuel cells; storing energy by electrosynthesis of fuels). **Air Liquide** is the industrial partner of this project.
- **SATT:** the founding of **SATT Grand Est** (PRES BFC, PRES Lorraine, UTT in Champagne-Ardenne and UTBM in Franche-Comté). This SATT will benefit from the experience of its partners and especially uB-Filiale (subsidiary



of the uB that brings together the Welience[®] research partnership and the Synerjinov[®] joint technology transfer system) and the SAIC of the UFC. Its objectives are as follows:

- Professionalise the strategy and management of Intellectual Property (IP), especially patents, by specialising competences and by bringing them closer to a market oriented vision;
- Improve the transformation of the IP portfolio into licences that generate revenues, by setting up a pool of patents in major themes, and take a proactive commercial approach in order to exploit this portfolio;
- Privilege the exploitation process by improving project maturation. This process of professionalisation will enable establishments to fuel start-up incubators with more fully defined projects. Incubation is focused on setting up companies and not on defining products;
- Support the development of the local economy, by privileging exploitation that generates value linked with the regional fabric and local authorities;
- Strengthen the link between academic research and industries/services, link research and civil society through a single counter. The SATT will favour setting up global offers from the PRES to the business world.

Promoting our clusters for excellence on a year 4 and year 10 Trajectory

The Initiative of Excellence will be the key to transforming our existing centers for excellence. Thus we shall become leaders in the areas of excellence within our regional domains while deploying truly innovative and daring applications for the economy and society.

	Year 0	Year 4	Year 10
BIOTECHNOLOGY AND HEALTH <ul style="list-style-type: none"> - chemistry, imaging, health - nanosciences, health - fundamental biology, health - independence and aging 	Clearly identified emerging clusters Pharmaco-imaging and chemistry/computer science clusters already formed Operating platforms (radiolabeling, imaging,...) being implemented Developing clusters 1 st biomedical and nanoscience resources link	International rise of the pharmaco-imaging and chemistry/computer science clusters Operating platforms (radiolabeling, imaging,...) implemented and fully operational Continuum : chemistry-imaging-clinical studies Creation of an "hotel for projects" for hosting national and international, academic or private teams in chemistry/computer science/imaging Biomedical and environmental banks continuum Participation in the Carnot Arts Institute (imaging)	N°1 Centre in France for pharmaco-imaging International demonstration centre for multimodal μ PET/MRI imaging / international hotel for projects First clinical trials Start-up x2 / Bioscience Park. Impact publications x3 Deployment and acquired leading positions Results for both medical research and practical applications 2 start-ups and deployment of Bioscience Park. Transformation of the first start-ups into sustainable medical high technology companies
AGROECOLOGY, FOOD, NUTRITION, HEALTH	Key disciplines: Agroecology, sensory studies Acknowledged Agricultural Research and Higher Education Centre (Agrale Cluster) Asset / industrial development National Vitagora competitiveness cluster	Platform strengthening Relocating package for scientific community leaders Official labelling of Carnot Qualimnet Strengthening of the competitiveness cluster	Leading cluster in Agroecology and sensory-taste-nutrition publications Labelled European platforms Innovations in agriculture and food industry International Vitagora cluster recognition. Strengthening the links between laboratories, federal university, the corporate world to see our companies competing internationally: new products, new processes, new markets A transformed regional image: sustainable and modern agriculture combining biodiversity, health and well-being through food Scientific continuum: Health, nutrition and basic sciences



	Year 0	Year 4	Year 10
SMART SYSTEMS AND STRUCTURES	High-level (A & A+) recognised large laboratories (in engineering sciences, materials & nanosciences and biomedical engineering), federated on innovative projects such as Smart Systems.	New up-to-date high-level platforms and equipments. Fully operational Carnot institutes. Implementation of new public-private joint development platforms.	Highly active competitive clusters through a reinforced support of joint public-private infrastructures for the development of technologies or products.
FUTURE MATERIALS/ENERGIES	Nationally recognised institutions for education in the field of engineering (microtechniques, energy & transportation) 15 startup companies (representing more than 100 jobs) were created in the last 10 years. Several existing active industrial clusters	Elaboration of smart materials for their usage properties, their sustainability, and their easy deconstruction, developed in the frame of our Carnot institutes & competitive clusters. New energy systems, and solar fuels developed within the IEED. Newly developed intelligent products and embedded systems, for ambient intelligence and assistance to human requirements and security. Future vehicles platforms at Belfort-Montbéliard and Nevers. Application of cloud computing to system engineering.	Development of new start-up companies (on smart structures, solar fuels, energy systems, biomedical systems or transportation technologies) Maturation of new high-potential industrial projects, linking basic technology, social sciences, health and environment technologies. Transformation of the region industrial positioning with emerging new specificities on Smart Systems or Security, dedicated to the sectors of transportations, energy, buildings, food industry and biomedicine. Transformation from a traditional manufacturing mechanical industry toward high-tech industry aiming at high added-value products, through merging with ICTs.
ENVIRONMENT AND TERRITORIES	Recognised Human Sciences and Environmental Sciences Laboratories (A and A+) as well as multidisciplinary ones "Planning and Development" research axis unique among the competitiveness clusters of the Ministry of Agriculture	Deployment of PERGAUD Institute (LabEx ADT) joining skilled teams Deployment of transdisciplinary projects: public health and the environment, demography and agronomy... Economic and social development of the region A solution for the vision of our IDEX : control human impact on the environment and improve territories development Anthropisation studies	Unique national jurisdiction in France on the appraisal of territorial sustainability Publication rate x3 Strong bond with local institutional and economic instances Jurisdictional experience used to assess the impact of our Initiative of Excellence on the greater region. Permanent benchmark at the disposal of the aforementioned instances Attractive for French and international researchers

Table 3: Trajectory of our clusters of excellence

3.4. A major Federal University

Our project for higher education relies on developing a new model for French universities, namely the Federal University (FU) gathering the universities of Bourgogne and Franche-Comté, the ENSMM (Besançon) and AgroSup (Dijon). Although this model is inspired by those already in existence abroad, such as the University of Quebec, it has also been designed in answer to a strong requirement for adaptation to the French university landscape and our regions.

The PRES Bourgogne Franche-Comté announced its desire to set up a Federal University as early as November 2009, a structure that would initially take the form of a preliminary association. This federal structure has since been used in other national projects.

The method used to build the Federal University

The Federal University, which brings together two multidisciplinary universities, a school and a major educational establishment, can be built by:

- Setting up a federal government: each establishment will retain its autonomy but transfer some of its competences to the federal level. This transfer, based on accepted subsidiarity, will be carried out according to an agenda that shares the following point;



- Organising the Federal University into “Collegiums” in order to ensure internal clarity within the establishment.

The members of this project undertake to achieve the creation of the Federal University at the end of the probationary period at the latest. The purpose of the preliminary association, which has already been set up, is to build the project and define the conditions of its perpetuation. These conditions require the involvement of the university community: although the association's Scientific and Pedagogical Committee already provides a collegial structure and an arena of debate for the different establishments, a **constitutive assembly** gathering the board of the different establishments will be set up.

Founding principle: Unity in diversity

The federal option is understood as a union based on four principles:

- **Distribution:** the competences are distributed between the establishments and the federal level; the aim here is to make a very precise choice regarding the best level of efficiency, the very principle of subsidiarity.
- **Autonomy:** each member of the FU is autonomous regarding their prior commitments (especially to local authorities and companies).
- **Participation:** the federated establishments are represented at the federal level and participate in federal decisions.
- **Solidarity:** the federated establishments receive their own funds to carry out their assignments, and jointly ensure the competences delegated at federal level.

The Federal University, a project of values

The federal model allows members to gather in a **solid entity acting as the guardian of their missions and their identity**. The members place the following values to the fore through the FU:

- **Unity.** The creation of the FU is a decisive step in the process of bringing the universities and schools of the two regions together. The new establishment springs from the desire of these establishments to unite within a single structure to provide a common future of development and excellence.
- **Respect for diversity.** The federal structure creates a union that relies on the synergy and diversity of the member establishments. Each of the University's "citizens" has a dual identity: their link with their establishment and their membership of the Federal University.
- **Proximity.** The FU maintains links of proximity with students and personnel, as well as with external partners, companies and local authorities. Coexistence between federal and local levels permits ensuring the relevance and efficiency of the projects set up by the FU.
- **Dynamics of change.** The FU proposes a visionary project to revitalise the traditional university model. Its new organisation is a response to the dynamics of change and evolution affecting higher education and research.
- **Efficiency and reactivity.** The federal structure of the new university generates energy through its capability to adapt to new challenges. Its governance modulates the distribution of competences as a function of how the challenges encountered evolve, and provides flexibility in cooperation procedures. The agenda for building the new establishment will be open to all, modular, modifiable, and always "alive".

The federal structure, based on efficient and democratic operation

The FU organises its governance and competences between the federal level and its components around the following orientations:

Sharing competences between federal and local levels: the competences devolved to the FU are set out in the articles of association. The other competences remain the responsibility of the establishments.



- Federal level:** research exploitation policy and the coordination of scientific policies, promoting the University internationally, exchanges with major foreign universities, acting on the international market for masters, PhD and post doctoral students, coordinating training supply, managing doctoral schools, coordinating employment policies, and implementing quality procedures for receiving researchers.
- Local level:** management of courses, human resource management, management of own and local funds, development of partnerships with entities within proximity, setting up quality procedures for receiving researchers, teachers and students, and their local integration in campus life, job training services.

Governance

- Federal Assembly:** Federal governance is ensured by the FU Assembly, composed of the leading elected representatives from the establishments and communities (the definition of the constitutional rules of this assembly will be dealt with in-depth in the project construction phase). It will have regulatory powers. A studies committee is also elected at federal level.
- Executive board:** The FU's executive board brings together the presidents, directors, and vice-presidents or deputy directors of the member establishments (the definition of the committee's competences will be finalised during the next stages of the project).
- "Collegiums":** The major disciplines are gathered in "collegiums" that structure the Federal University. A Strategic Committee meets in each college.
- Board of the member establishments** ensures their governance, in collaboration with the study and research committees.

THE GOVERNANCE OF THE FEDERAL UNIVERSITY OF BOURGOGNE FRANCHE-COMTÉ

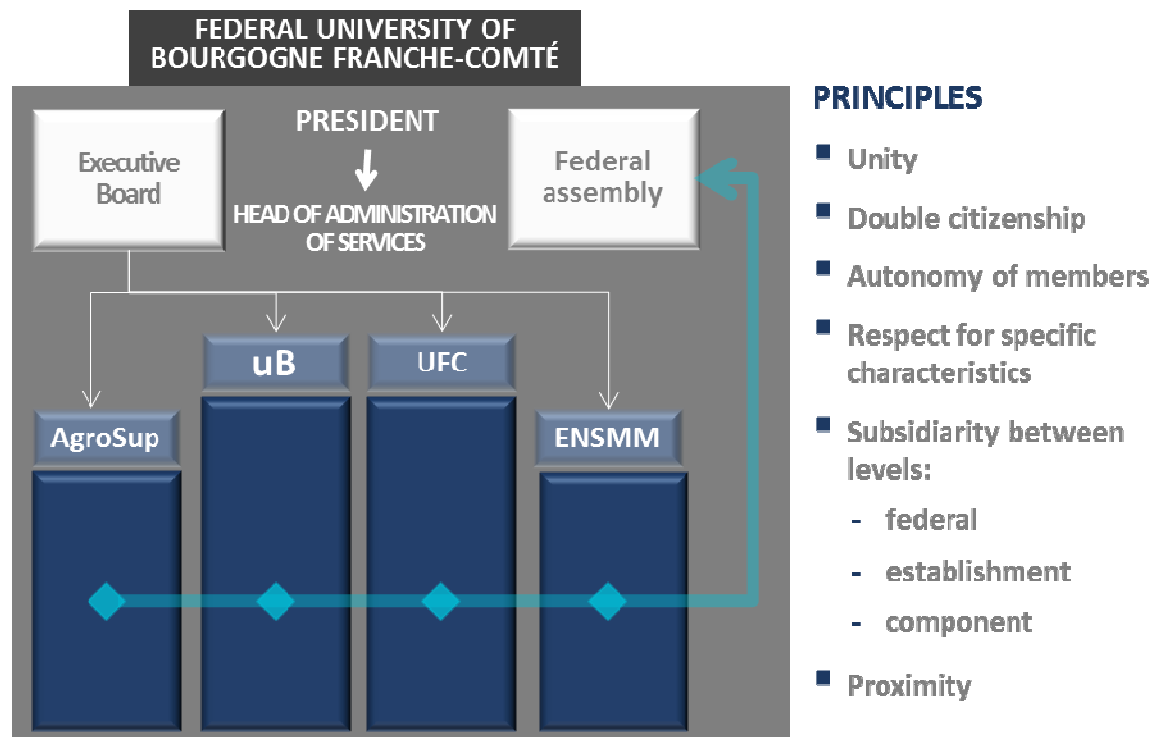


Figure 4: Governance of the Federal University of Bourgogne Franche-Comté

Organisation of the components

The success of the Federal University will be ensured by carrying out ambitious projects, notably in the organisation of its offer of education and its components:

- Organising the mix of disciplines:** one of our FU vision will be to bring together and mix disciplines, leading to new and original scientific approaches that are sometimes audacious and even risky. Here we find ourselves in line with the initial missions of the universities of most major countries, i.e. the birth of new knowledge, the mastery and validation of one's knowledge, and the simultaneous activities of education and transferring knowledge. Our vision resides in this so-called and much vaunted "virtuous" approach. **We intend to be a laboratory for rapid application.** Gathering components and establishments by major field of education into colleges will lead to weaving links between scientific, technological and professional disciplines, by systematically providing a place for the humanities.
- Creating intermediate structures:** the union of engineering schools within the universities in a University Polytechnic School, the federation of IUTs will ensure the horizontal consistency of the Federal University by level of education. The Bourgogne Franche-Comté Polytechnicum provides coherence, consultation and promotion for engineering and management schools, favouring the development of dual competences. These places of consultation/cooperation will permit driving projects of common interest.

Revising the entire higher education system: building the FU will lead to reflection on, and the transformation of, university education, BSc degree courses, technology courses, advanced courses (advanced/specialised university), and will impact on the coherence of the entire higher education system (including its coherence and relations with education given at secondary schools, senior technician certificates and preparatory classes for the "grandes écoles").

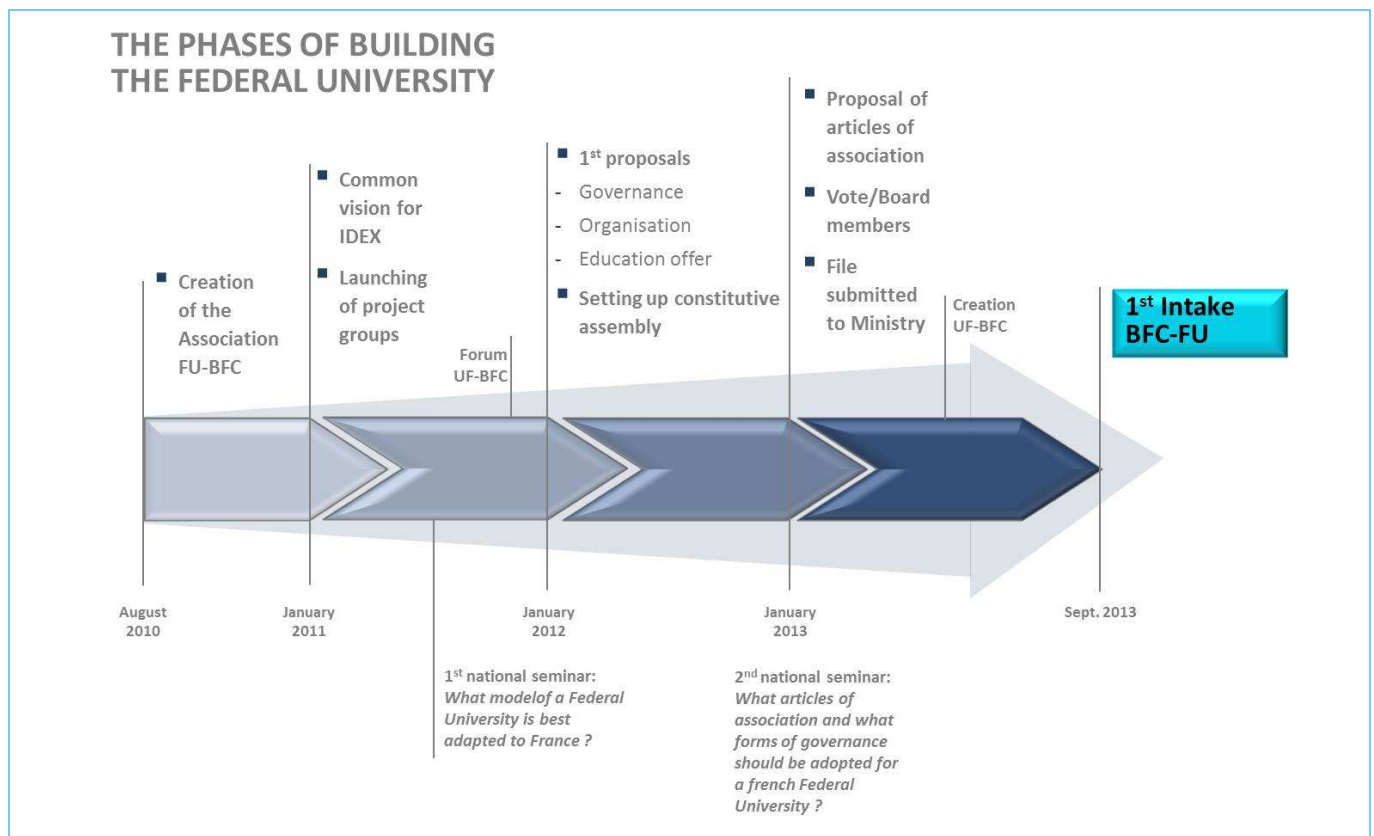


Figure 5: planned schedule of building the Federal University



National and international visibility of the federal model

For its policy of ensuring international visibility the FU model can follow the example of the other higher education establishments operating in federal manner. The Federal University of Bourgogne Franche-Comté takes its inspiration in particular from the **University of Quebec**, founded in 1968 on the basis of a network of establishments gathered in a federal model. Grouping six universities, two schools and a research institute, it is deployed over several campuses. The way in which it is governed permits preserving the diversity of the different establishments composing it. Each establishment has its own legal status, but belongs to the same university, itself having a corporate status. The University of Quebec and the universities composing it distribute the different competences many of which are shared. The University of Quebec is governed by an *Assembly of Governors* that wields regulatory power.

The definition of a new model of French university

Backed by this international visibility, we go further by adapting the federal model to the French university landscape and our regions, by first building open tools. In particular, we shall take care to ensure the germination of university start-ups (young teams, new curricula, simplified transfers from the legal standpoint). Our Federal University will be endowed with an idea incubator, a think tank, sensitive to the region and constantly benchmarking the international scene.

Our vision goes beyond the scale of our project: we want to involve ourselves in building a French model of the Federal University. To this end we shall coordinate a body of consultation and reflection to define a French model of the Federal University, to permit sharing good practices while respecting the specific characteristics of each project. Meetings and seminars will be proposed, especially in the framework of the Conference of University Presidents.

3.5. Projects of excellence for the students

We want to implement a **policy of high-level education** in relation with research. To achieve this vision, we will organise a **policy of multidisciplinary education linked to the perimeter of excellence** within the Federal University, through **innovative, exacting and attractive curricula** and with support for lifelong education.

Competences adapted to the stakes of the future for our students ... and their employers

In order to prepare themselves for professional life, students must be placed in situations in flexible and adapted curricula. Good knowledge of scientific themes, strong curricula, the possibilities of double curricula, opening out to international perspectives and socioeconomic stakes and the development of a participatory culture enable us to achieve this objective. By combining all these possibilities, we will build the competences of each student; what is more, it is the efficiency of this system that will enable us to measure the quality of our regional roots.

Our clusters generate scientific knowledge that can be consolidated through **strengthened curricula** similar to those of the preparatory classes of the "grandes écoles" or, for example, **dual science/technology and humanities curricula**. The **tools for achieving maturity** privileged by us will be those that favour opening out to others.

- Opening out to international horizons with the reception of foreign students (in year 0: 12% of our students come from abroad; our target is 16% in year 4, and 20% in year 10), with mobility for outgoing students and curricula taught in English. Cultural mixing is now a fundamental component for better understanding of our henceforth globalised modern world (*cf. the International University part further on*).
- Opening out to socioeconomic stakes by:



- Inculcating awareness of **economic intelligence** (benchmarking, protection and influence). In France, the scientific community is not nearly aware enough of this stake, dealt with in rare places as a speciality leading to a degree. By teaching economic intelligence in all our courses and by placing it clearly to the fore, we strengthen the **attractiveness** of our degrees and act indirectly on the **protection of the knowledge and know-how** of the companies that will be the future employers of our graduates: **it is the future of these companies, especially SMB, and their international competitiveness that are at stake.**
- The development of **entrepreneurship**. Awareness, identifying projects and assisting them to develop are planned in the universities and engineering schools, with a "headline" pedagogical project that consists of setting up an "entrepreneurship week" in the form of a business game with teams composed of students from different disciplines. Evaluation is performed by partners outside the university (OSEO, the *Entreprendre* network, business incubator, etc.). **Our economic context (95% SMB with many company managers close to retirement) leads us to link creating, taking over and selling companies in our project.**
- **Linking the competences of our students with the needs of the SMB of Bourgogne Franche-Comté** via strategic workforce planning. We will generalise the **Training-Job Portal** experimented with the MEDEF, employers' organisations and job-creation structures to the territory of the PRES.
- Opening out to participatory culture, networks and digital tools with:
 - A **quality of campus life policy**, based on strong involvement of students in both governance and implementation. It will have 5 orientations: the formalisation of the governance of student life at greater regional scale; the development of a feeling of belonging of students and the personnel at greater regional scale; the development of events on the campus and the quality of student life (culture, sport, community life); the development of a health policy at federal level, etc.
 - **Incite, motivate students and make them actors in their education**, with students being encouraged to study more intensive curricula (notably the interns of the "Residences of success") or double curricula, the empowerment of students in their education, in particular with online courses, etc.
 - **Create a contributory and collaborative social network of former students on the web 2.0** to link former and new students, encourage the feeling of belonging to the Federal University with the integration of graduates and university funding.

A new organisation for ensuring the success of our transformation: the collegiums of the Federal University

By grouping components and establishments by major field of education, the colleges of the Federal University will forge links between scientific, technological and professional disciplines and the humanities, thereby organising **a mix of disciplines and cultures, in the image of American establishments (MIT, Caltech and GeorgiaTech) and English colleges (Oxford, Cambridge).**

The Federal University will be composed of **five collegiums**: "Sciences and Engineering", "Health" - "Life, Earth, the Environment, Agronomy and Agrofood", "Humanity, Culture, Education, and Sport", "Law, Economics and Management" (the organisation will consolidated during the project phase of the probationary period).

In the framework of the colleges, **an offer of courses will be formulated in relation with the perimeter of excellence.** This is the level at which will be conceived **innovative high-level curricula open to international perspectives**, in particular for masters and PhD degrees, and also for pre-BSc and IUT. **Lifelong learning** will be organised with resources for creating paths that combine the validation of prior learning, training in work situations and e-training, courses out of hours, summer universities, etc.

IUT training courses will take a place of choice in the Federal University, with an offer of concerted courses at an interregional scale (association of IUTs), thanks to close links with the economic fabric of SMB. Reinforced good teaching practices and integration in professional life will benefit from the entire Federal University.



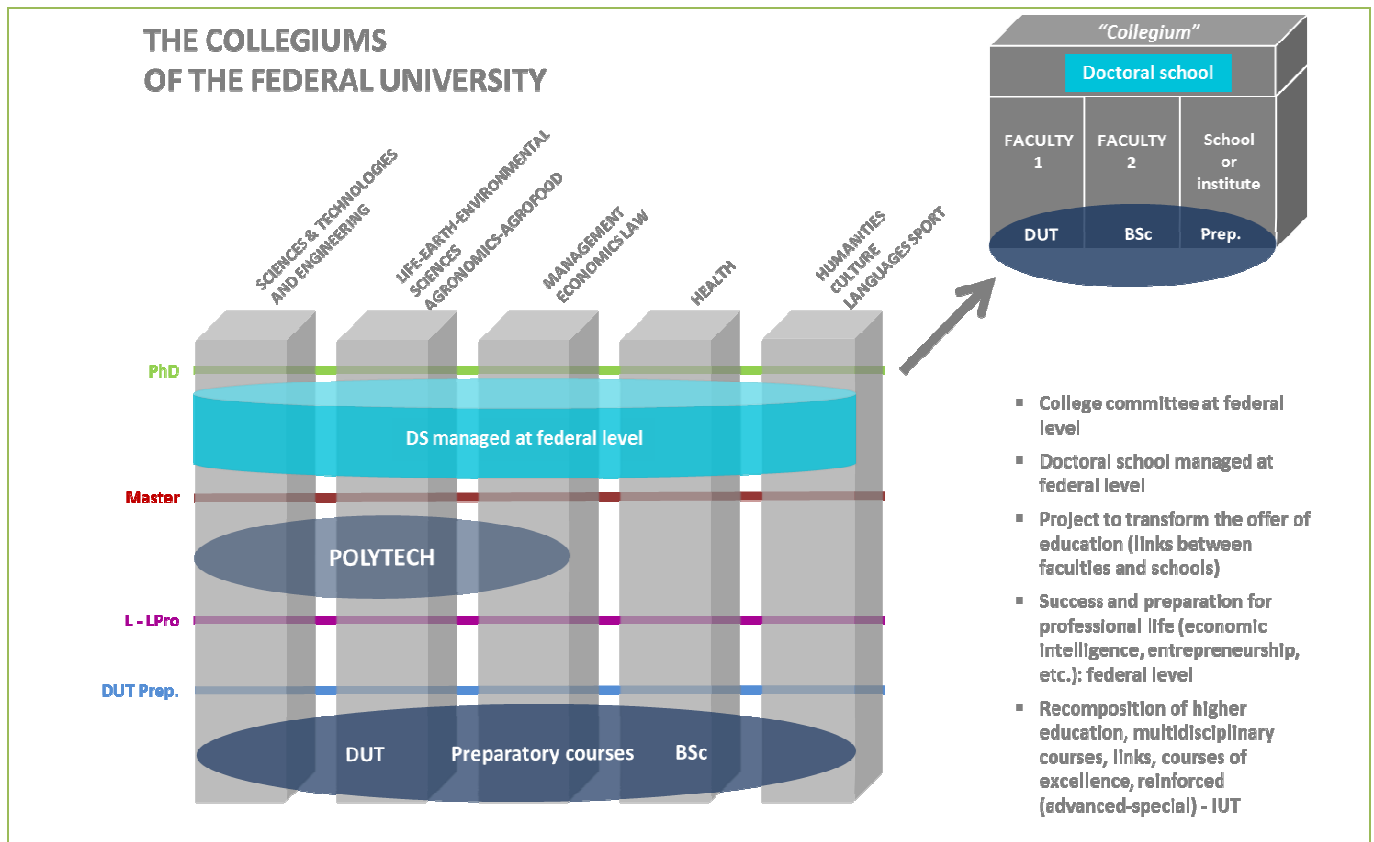


Figure 6: The "collegiums" of the Federal University

Training engineers in our fields of excellence

Polytechnic School of Bourgogne Franche-Comté

The organisation of the Federal University will be the occasion to strengthen the training given to the engineers of the region (with its 6,000 student engineers in year 0).

It entails federating the future Polytechnic School of Bourgogne in the areas of automobiles and transports (Nevers), materials and "computronics" (Dijon) and industrial engineering (ITII - Auxerre). And also with the ISIFC of Biomedical Engineering at Besançon, which strengthen these resources with new sectors focused on interfaces and clusters: human and social sciences-health, data processing and e-health, energy efficiency, for example.

A coherent, broad and diversified offer

The engineering courses' offering at the Federal University will be therefore be coherent and structured with:

- A **polytechnic school within the universities**
- An elite school focused on agronomics and agrifoodstuffs: **AgroSup Dijon**
- A school of mechanics and microtechnologies: **ENSMM**

Furthermore, this organisation will be strengthened by grouping the two technological universities in eastern France: the UTBM of Belfort/Montbéliard and the UUT of Troyes, into one **Technological University** in East France planned for 2011.

The merging of the "**Polytechnicum de Bourgogne Franche-Comté**" also ensures promotion, development and consultation between the region's engineering schools and management schools (ESC Dijon) and favours the



development of double curricula and double competences, likewise for the cooperative projects focused on the clusters.

International Nuclear Academy (member of the international institute of nuclear energy implemented by President Sarkozy in 2010)

This continuing training institute specialised in nuclear engineering has been set up at the initiative of the Nuclear Cluster of Bourgogne. Its objective is to assist the development of competences in the nuclear sector and thus satisfy the needs of the international market relating to the revival of nuclear energy.

The International Nuclear Academy trains different skills: technical manager, quality manager, major project manager, materials manager, strategy manager, sales manager, business development manager, purchasing manager, legal affairs manager, maintenance engineer, development and project engineer, sales engineer for large mechanical systems, etc.

The International Nuclear Academy determines its training offer by calling on the competences of local actors in the nuclear sector working throughout the region: design, fabrication and maintenance of heavy components for nuclear power plants, a network of actors in higher education.

The tools for assisting our transformation

The tools for assisting our transformation take into account the strategy declared. It entails setting up "**residences of success**", **university preparatory classes**, a **cyber university**, etc. Our international positioning will be reinforced to make our PRES a reference in the area of exchanges. In addition, the system will be optimised with the strengthening of our **capability to adapt students to professional life**.

The "résidences de la réussite "

The objective of the "residences of success" (or "internships of excellence") is to help students on grants with high potential so they can enter the different disciplines of excellence, and succeed in obtaining a Master's degree or graduate in an engineering discipline.

Two kinds of assistance are offered: pedagogic (with a reference professor for the discipline) and educational, comprising methodologies, access to ICTs, improving language skills, offers of stays abroad, involvement in student life, sports, and culture to ensure complete fulfillment. Entrepreneurs will support professional adaptation by sponsoring interns.

This effort to assist students will be concentrated on disciplines with numerous job opportunities and where the rate of students receiving grants is very low. Two methods of identification are planned: external in secondary schools during the final year of the Baccalaureate (with specific work for secondary schools that are partners in the "Cordées de la réussite") and in families with invitations for applications; internal for "brilliant" BSc students.

The internship of excellence (a total of 300 places) will be interregional with two installations (Besançon and Dijon). The design of the residences will be the same at both sites, providing the students with the same services and conditions.

The disciplines of excellence: preparatory classes in the universities

It appears pertinent to start up preparatory classes in the universities in view to bringing the universities and elite schools closer together. This addition during the first two years of studies will permit drawing advantage from common cores and facilitate orientation to scientific and academic disciplines or to the schools desired. The fact of having similar curricula should make the passage from one university to another more frequent during studies.

