



APPENDICES

APPENDIX I - Mission, vision and values 5

APPENDIX II - Thesis Charter 6

1. Introduction 6

2. General organization of the doctoral thesis 7

A thesis is a step forward in a personal project and a professional career 7

Subject matter and feasibility of the thesis..... 7

Supervision and monitoring of the thesis 8

Duration of the thesis work..... 8

Thesis publication and promotion..... 8

After defense of the thesis 9

Mediation procedures..... 9

3. Respective commitments of the parties involved in the doctoral thesis..... 9

Thesis director 9

Doctoral student..... 10

The director of the hosting research laboratory 10

The head of the doctoral program 10

The head of the Doctoral school 10

Appendix..... 11

Staff 11

Thesis funding..... 11

Duration of thesis and derogations..... 11

Specific supervision conditions 11

Defense of thesis 11

APPENDIX III - Charter for the signature of scientific publications 13

APPENDIX IV - The Labex and Equipex as part of the University’s strategy : analysis and perspectives 15

APPENDIX V - Focus on Feroscan, a start-up created by PSL 18

APPENDIX VI - Engineering in the heart of Paris: Towards a PSL Graduate School of Science in Engineering..... 19

1- Summary 19

2- Pooling a number of means and functions..... 20

3- The pedagogical convergence of the three schools of engineering..... 21

Convergences between engineering training 21

New masters programs for the 2016 academic year 21

4- Towards the PSL Graduate School of Science in Engineering..... 22

The opening of the International Master of Science in Engineering for the 2017 academic year 22

The insertion of the engineering schools into the research of PSL..... 22

Attractiveness of a PSL Graduate School of Science in Engineering managed by the three schools 23

APPENDIX VII - PSL Student Initiatives 25

- 1- **Uniting the PSL student community..... 25**
- 2- **Student participation 26**
- 3- **Innovation and technological sciences..... 28**
- 4- **Cultural awareness 30**
- 5- **Artistic practice and creation 31**
- 6- **Sharing knowledge 34**
- 7- **Sports 36**
- 8- **Sustainable development..... 37**
- 9- **Support for young researchers 38**

APPENDIX VIII - Note on the organization of reflection, teaching and academic innovation in research universities 39

- 1- **The Committees Model: MIT/NYU/JHU..... 39**
- 2- **The Institutional Research Model: Harvard..... 40**
- 3- **The Innovation Lab Model: HLUST/Maastricht University 40**
- 4- **Summary 41**

APPENDIX IX - The P X L programme: People Excellence Leadership 42

- 1- **Plan 42**
- 2- **Introduction: for innovative and efficient support services..... 42**
- 3- **6 Findings and points of attention 43**
- 4- **2 complementary schemes which could unite and support development..... 44**

APPENDIX X - The Digital Development Plan (DDP) 50

- 1- **Achievements 50**
- 2- **To be deployed between 2016 and 2018:..... 50**

APPENDIX XI - Paris Sciences et Lettres’ real estate and urbanisation master plan 52

APPENDIX XII - First Report of the PSL Strategic Directions Committee 58

- Background: PSL Strategic Directions Committee (SDC)..... 58**
- Introduction..... 58**
- PSL as an institution 59**
- Innovation and interdisciplinarity..... 60**
- Strategic development 63**
- Identity and image 65**
- Attracting and retaining talent 67**
- Conclusion 68**
- Appendix..... 69**

APPENDIX XIII - 2nd Report of the PSL Strategic Directions Committee 70

- Background: Strategic Directions Committee (SDC)..... 70**
- Context..... 70**
- Developments over the last two years 71**
- Feedback from PSL to the first SDC Report..... 71**

Governance 72
Community-building..... 73
Research..... 74
Public engagement..... 74
Education and Training 76
Identity and image 77
Conclusion 78
Appendix..... 79

APPENDIX I - Mission, vision and values

Our mission

- To bring together the arts, knowledge and knowledge transfer to create a university model for the 21st century.
- To produce first-rate scientific knowledge, ensuring the widest dissemination possible and the most rapid transfer to innovations that contribute to the public good.
- To train artists, entrepreneurs, senior executives, and experts to work with intellectual rigor, aware of the importance of culture, conscious of their social, individual and collective responsibility, and open to the opportunities of a globalized world.
- To build a leading university that is exacting with respect to academic quality and admission requirements.
- To promote convergence: between the *grandes écoles* and the universities, between disciplines, between teaching and research, and between the academic and business worlds.

Our vision

- To rank among the global players in higher education, in the world's Top 30 research universities, a magnet for faculty, students and organizations at the international level.
- To play a crucial role in the transformation of the French higher education and research landscape by breaking down the barriers between sectors and institutions, and by improving coordination between teaching and research at all stages in the curriculum.
- To be recognized and sought after as an experimental and innovative institution, both in terms of methods and content, both in initial training and life long learning.
- To hold its own as an intellectual hub whose expertise is sought after and whose scientific and cultural contributions are valued by the private and public sectors.

Our values

- Excellence: scientific rigor is a virtue; we do not compromise on the level of fundamental knowledge required as this is the foundation of professional expertise and intellectual rigor. We train our students *for* research and *through* research. We dare to promote emulation through competition.
- Team spirit: individual ambition is both necessary and stimulating, and it should also contribute to the public good. We encourage and support campus life and a commitment to solidarity by its stakeholders.
- Diversity: we promote the diversity of student profiles and showcase individual talents regardless of socio-economic background, gender or country of origin. We instill a respect for the plurality of opinions.
- Integrity: both of scientists confronted by the uncertainties of the research process and of professionals in their relationships with stakeholders. Ethics should be their foremost skill.

APPENDIX II - Thesis Charter

1. Introduction

The working methods for writing a PSL doctoral thesis at one of its member institutions depend first of all¹ on a mutual agreement between the doctoral student and the thesis director, concerning both the subject matter and the working conditions required to do the research. **Therefore, the thesis director and the doctoral student respectively have both rights and duties with regard to high achievement levels.**

This charter sets out those reciprocal duties reflecting the code of ethics that underpins applicable regulations and already tried practices, respecting the diversity of the disciplines at the Paris Sciences et Lettres Research University (PSL). The purpose thereof is to guarantee high-quality scientific research.

This charter concerns the preparation of a thesis under the auspices of a Doctoral school co-accredited by PSL. Such accreditation must comply with evaluation and academic training conditions applicable to the Doctoral school where the student is registered. Furthermore, the doctoral training is part of the general framework of PSL's doctorate policy, coordinated and implemented by the PSL Doctoral College, which regroups all Doctoral schools co-accredited by latter, plus its doctoral programs. The PSL Doctoral College contributes to the sharing of experience, good practices and promotion of PSL doctorates.

When registering for the first year of a thesis program, the doctoral student signs this charter along with the thesis director, the assigned research lab director and the director of the Doctoral school, in compliance with the principles set forth below and the code of ethics applying to the field of research².

Students under doctoral co-supervision have the same rights and must meet the same conditions set out in the agreement entered into for this purpose.

This charter was drafted in accordance with applicable laws and regulations: Decree dated September 3, 1998 concerning Thesis Charters (NOR (French standard): MENR9802320A), Decree dated August 7, 2006 concerning doctoral training (NOR (French standard): MENS0602083A), Decree dated January 6, 2005 as amended by Decree dated August 7, 2006 concerning international co-supervision of theses – and it sets forth the conditions governing the PSL Doctoral College.

The PSL charter comprises a general framework (para. 1, 2 and 3) plus a specific appendix for each Doctoral school that is part of or co-accredited by PSL (para. 4), setting out the specific rules applying to supervision, training and financing. This last paragraph is an integral part of the PSL charter associated with that particular Doctoral school, to be validated by the school and by PSL.

¹ This agreement assumes that the doctoral student's host laboratory, where the thesis director teaches, is able and willing to admit the student; this aspect is not addressed herein, nor are relationships with the student's Doctoral school.

² See "Un guide pour promouvoir une recherche intègre et responsable", A Guide for Promoting Ethical and Responsible Research" by the Ethical Committee at CNRS (<http://www.cnrs.fr/comets/spip.php?article91>).

2. General organization of the doctoral thesis

A thesis is a step forward in a personal project and a professional career

Preparing a thesis is training both *for* and *through* research. The goals and high standards required must be clearly defined, as part of a personal life project and a professional career. This implies clearly defining the objectives and the specific means of achieving them.

The thesis director, the Doctoral school and if applicable the head of the doctoral program concerned inform the candidate of possible funding opportunities to finance a thesis (a "doctoral contract", private company financing – in particular CIFRE agreements – or financing by regional governments or associations, among others). Any specific financing conditions are mentioned in the appendix for each Doctoral school.

Once registered with a Doctoral school, the student must comply with its regulations and obligations, particularly as concerns courses, conferences, seminars, etc. (the information on these activities are distributed by the Doctoral school and, if applicable, the head of the doctoral program concerned).

The student receives information about academic and non-academic opportunities in his or her field. The Doctoral school laboratory and the host laboratory make available national statistics on the future of young PhDs and information about the careers of their PhD graduates.

The doctoral candidate should specify the professional career desired as soon as possible. The student should be concerned with life after the PhD, and manage the doctoral work in such a manner as to facilitate future career opportunities. The doctoral staff is there to help the student clarify his or her career ambitions, to study feasibility, to advise, and to help the student through administrative processes and career searches. Depending on the discipline and the research center, it could be useful to offer an array of additional training programs such as a teaching experience, a corporate internship for a few weeks, working in a laboratory abroad, and so forth.

Subject matter and feasibility of the thesis

Registration for the doctoral program shall specify the thesis subject, the context, the host environment (research laboratory and, if applicable, the research team) as well as the appropriate doctoral program for the subject (Sacre, ITI or others).

The subject matter of the doctoral thesis should constitute valid training and lead to an original body of work, and be feasible in the allotted time frame. The thesis subject is formally agreed on by the student and the thesis director at the time of registration. The thesis director, with recognized expertise in the field of research concerned, should help the student to uncover the unexploited aspect of the thesis subject in the scientific context, and verify its relevance. The director should also seek out the spirit of innovation in the student.

The thesis director must define and ensure the means necessary to accomplish the work. To do this, the doctoral student must be fully part of the hosting research laboratory, where he or she has access to the resources required for such research (for instance: documentation resources, equipment, computer technology, documentation, access to seminars, colloquia and conferences, presenting work in seminars, conferences and colloquia, etc.). Host staff members require the student to adhere to

rules concerning scientific ethics, and to respect the collective environment that they all share. The doctoral student is actively engaged in the life of the host laboratory where he or she is being trained, but cannot be assigned tasks that interfere with the progress of the thesis.

The doctoral student has a commitment to a given time frame and working pace. He or she must inform the thesis director of the progress made on the thesis and any difficulties encountered. All doctoral students must demonstrate initiative in their research work.

Supervision and monitoring of the thesis

The doctoral student is entitled to personal supervision by the thesis director, who shall consent to devote a significant amount of time to that purpose. Regular and frequent scheduled meetings are necessary, to be set out in the initial agreement and maintained throughout the thesis work.

The doctoral student agrees to submit as many progress reports as necessary to the thesis director, and to make presentations of the thesis work in internal seminars or outside the host institution. The director undertakes to follow the work progress regularly and to consider new directions for the thesis in light of the results achieved. Up to completion of the thesis, the director must inform the student of any positive observations or objections or criticism of the work. Any specific provisions applying to an individual Doctoral school for monitoring theses may be set out in an appendix.

Duration of the thesis work

As in the spirit of all doctoral studies, under the law and in the interest of the doctoral student, a thesis is a research process subject to a schedule and programmed deadlines. Specifically, working on a thesis implies annual renewal of the student's registration at the school. Such renewal must comply with assigned deadlines, with exceptions made for duly documented reasons.

Under applicable regulations (Article 15 of the 2006 decree), the time allotted to complete a thesis is three years. Exceptions may be granted, in the name of PSL, by the director of the institution where the thesis is accomplished, on the recommendation of the head of the Doctoral school. The request for exception is submitted to the Board of the competent Doctoral school, accompanied by a reasoned request of the doctoral student, following a reasoned opinion from the thesis director.

Thesis publication and promotion

The quality and impact of the thesis can be measured by publications, patents and industry reports involving the work, be it the thesis itself or articles published during or after preparation of the manuscript. The position of the doctoral student among his or her co-workers should reflect the student's investment in the work, in so far as it is compatible with the practices proper to each discipline. Rules pertaining to publication and industrial property shall be those applying to the host laboratory or the institution where the thesis is carried out.

As an author, the doctoral student is solely responsible for the content of the thesis. In particular, the student must be sure to secure all authorizations to reproduce excerpts of works from other authors appearing in the text. Such authorizations must be requested from authors or publishers.

As an exception to this rule, only short citations as defined in the French *Code de propriété intellectuelle*, shall be authorized, crediting the author or the source.

After defense of the thesis

A diploma or proof of the diploma shall be delivered only after filing the final version of the thesis manuscript and documents submitted for defense and distribution of the thesis.

To provide future doctoral students with information on job opportunities, all students must keep the Doctoral school abreast of their professional careers for five years after the PhD is awarded. Such information may be distributed, for instance as responses to surveys carried out by the Doctoral school. The PhD shall undertake to consult such surveys for five years, and to communicate the information requested by electronic mail to the Doctoral school.

Mediation procedures

In the event of a conflict between the student and the thesis director or the laboratory director, a mediator shall be appointed by the head of the Doctoral school if it operates in one sole discipline, or by the head of the doctoral program if it covers several disciplines. The Doctoral school Board may be called upon to rule in the following cases:

- if the conflict continues after mediation;
- if the mediator deems it necessary;
- in a conflict between the doctoral student and the head of the doctoral program concerned, or the head of the Doctoral school.

If the Doctoral school Board considers that, due to its position, it cannot guarantee the required neutrality, it shall submit the case to the Board of the doctoral College, which refers it to an *ad hoc* committee. Should such mediation fail, the doctoral student or one of the other signatories of this charter can request a ruling from the head of the institution where the thesis work is carried out.

3. Respective commitments of the parties involved in the doctoral thesis

In view of the principles set forth in this Charter, the parties hereto subscribe to the following undertakings:

Thesis director

The thesis director undertakes to inform the doctoral student of the number of theses currently under his or her direction. As mentioned hereabove, the thesis director provides the student with personal and appropriate guidance, committing to regularly scheduled meetings. The director may intervene to correct the student's work in order to channel it in a more scientifically favorable direction. Should the student embark on thesis work without funding, the thesis director must support the student in seeking financial backing. The director must inform the student of the resources available for his or her thesis work.

Doctoral student

The doctoral student shall comply with all rules and regulations, particularly referring to ethics, as well as charters and health and security regulations applicable to the host laboratory. He or she must submit progress reports to the thesis director as often as necessary. The doctoral student has an obligation to inform the thesis director of the progress made on his or her thesis and any difficulties encountered. All doctoral students must demonstrate initiative in their research work.

The doctoral student undertakes to make presentations of the thesis work in seminars at the hosting research laboratory or Doctoral school, or outside the institution and particularly at venues within the PSL scope. He or she must participate actively in the life and activities of the host research laboratory. The doctoral student must also follow the organization of the Doctoral school, particularly concerning proposed training sessions and, if applicable, the organization of the doctoral program in which he or she is registered.

The director of the hosting research laboratory

The director of the hosting research laboratory guarantees the material means and access to resources made available to the student. The lab director undertakes to integrate the student into the host laboratory from the beginning, by ensuring the appropriate facilities to accomplish the research work, in so far as the laboratory has the means necessary. The director also undertakes to inform the student of the life and activities of the laboratory.

The head of the doctoral program

In a pluri-disciplinary Doctoral school, the head of the doctoral program is the guarantor of the quality and relevance of the doctoral training proposed to the student. He or she undertakes to inform the doctoral student of the content and methods of the training concerned. The head of the doctoral program shall be a primary interlocutor for the doctoral student for the entire duration of the doctoral training.

The head of the Doctoral school

The head of the Doctoral school shall oversee compliance with the Charter, recruiting conditions and follow-up of the doctoral student. He or she shall implement a doctoral training plan and ensure professional and career monitoring for the PhDs graduating from the school.

Appendix

Specific features of XX Doctoral school

Staff

Standard ratio: % doctoral students/thesis director

Staff members: thesis co-directors, changes in thesis director

Thesis funding

Obligation (yes/no)

Specific features of Doctoral school

Duration of thesis and derogations

Number of hours or ECTS training credits

Committee end 1st year, 2nd year, thesis committee

Pre-defense

Number of authorized re-registrations

Funding beyond 3 years

Specific supervision conditions

Defense of thesis

Prerequisites (courses and training completed, publications, conferences, etc.)

Committee honors: Doctoral school recommendations

Agreement

The undersigned hereby declare having full knowledge of the provisions contained in the Thesis Charter applicable within the Paris Science et Letters Research University (PSL), in accordance with the Decree dated September 3, 1998, the Decree dated August 7, 2006 concerning doctoral training, and the Decree dated January 6, 2005, approved by the PSL Board of Directors on the proposal of the Academic Council and the Doctoral College of PSL.

They hereby undertake to comply with the provisions herein.

Done in Paris, on

DOCTORAL STUDENT

Name, surname, signature:

THESIS DIRECTOR

Name, surname, signature:

**RESEARCH LABORATORY
DIRECTOR**

Name, surname, signature:

**HEAD OF DOCTORAL
PROGRAM**

Name, surname, signature:

HEAD OF DOCTORAL SCHOOL

Name, surname, signature:

APPENDIX III - Charter for the signature of scientific publications

The adoption of a joint signature policy for scientific publications within PSL is critical to strengthening the reputation and visibility of our research community. It will facilitate identification of the scientific output of our institutions and will associate the publication of research results with all institutional partners involved, notably the parent bodies of research units.

The reference to PSL in the signature is a clear and firm commitment to the PSL Index and the site's 5-year contract.

This Charter sets out the requirements for the implementation of the joint signature.

The joint signature takes the form of an explicit reference to PSL, immediately after the name of the institution as follows:

Name of institution, PSL Research University

The signature is to be found in the **Affiliation-Address fields** and in the **Acknowledgements** (at the end of the article or in a footnote).

(i) **AUTHOR AFFILIATIONS** are preferably written in single line format, in descending order so as to facilitate tracking by bibliographic databases (references in square brackets are optional):

Name of institution, PSL Research University, [institute or department], EPST, [number of the joint unit], co-supervising university, laboratory, [team], [address], postal code, city, France

Note: it is possible to use the non-abridged version of PSL: *Paris Sciences et Lettres Research University*, or, for articles in French, *Université de recherche Paris Sciences et Lettres*. The use of the joint research unit (UMR) number is optional.

Example 1:

Ecole Normale Supérieure, PSL Research University, Department of Cognitive Studies, Inserm, U960, Cognitive Neurosciences Laboratory (LNC), F-75005 Paris, France

Example 2:
Chimie ParisTech, PSL Research University, CNRS, Institute of Research of Chimie Paris (IRCP), F-75005 Paris, France

If the editor and/or the author prefer to use an ascending order, the following wording can be used:

[Team name], Laboratory name, [department or institute], [joint CNRS or Inserm unit], Name of institution, PSL Research University, postal code, city, France

For joint research units (UMRs) belonging to several COMUEs (typical case: a non-PSL university that co-supervises the joint research unit), it is possible to use a multi-line format (one line for each COMUE). This is notably recommended by Sorbonne Universities, Sorbonne Paris Cité and Paris Saclay

University.

The full postal address is usually reserved for the "**corresponding author**" field. *Example:*

Corresponding author: Surname initials, ESPCI ParisTech, PSL Research University, CNRS, Institut Langevin, 1 rue Jussieu, F-75005 Paris, France

(ii) **Acknowledgements, at the end of the article or in a footnote**, are used for fields relating to funding or contracts, and for any additional information. The following reference number is applicable to PSL IDEX: ANR-10-IDEX-0001-02 PSL.

For example, for a Labex that is financed by IDEX, the following wording would be used:

In English: **Acknowledgements:** This work has received support under the program "Investissements d'Avenir" launched by the French Government and implemented by ANR with the references ANR-10-LABX-XXX and ANR-10-IDEX-0001-02 PSL.

In French: **Remerciements:** Ce travail a bénéficié d'une aide au titre du programme des "Investissements d'Avenir" lancé par l'Etat et mis en œuvre par l'ANR portant les références ANR-10-LABX-XXX et ANR-10-IDEX-0001-02 PSL.

A working group has been set up to answer any questions or comments with respect to the application of this Charter. Provisional contact: daniel.egret@univ-psl.fr

APPENDIX IV - The Labex and Equipex as part of the University's strategy : analysis and perspectives

The Labex and Equipex programs have been decisive drivers in the development of the Idex. Beyond the Labex' very positive evaluation by the Labex jury³, they have contributed to the structuring of the University in several ways and are thus the buttresses of its research strategy. Firstly, the Labex have structured departments or even whole institutions, as is the case with the three Curie Labex, which have been at the basis of the reorganization of the Institute's research department. Another striking impact of the Labex and Equipex is their role in the emergence of major research poles for the University, combining already strong existing forces to develop associations with impressive potential. Of course, the Labex have structured whole research fields within PSL, like IEC for cognitive sciences, or IPGG for microfluidics, and developed new fields and approaches, such as WIFI for the physics of acoustics and optical waves gathered in one institute. Many (such as DCBIOL or ENS-ICFP) have been commended by the Labex jury as positioning research centers at the very top of their field, others have been described as outstanding Labex which pave the way to what new research centers or Labex should be (IEC, DEEP, TransferS). Further, TransferS, gathering forces throughout PSL, will benefit from the arrival of EHES, EPHE, Ecole des Chartes and EFEO, and the already strong axis of research will be further developed, should the submitted IRIS programme on "Etudes Globales" be selected, to become a strategic pole for PSL. Equally impressive is the emergence of an outstanding axis around physics, biology and chemistry, with the combined potentiality of such Labex as DEEP, DCBIOL, CelTisPhyBio, WIFI, IPGG, ENS-ICFP and MemoLife, to which one can add the Equipex Ultrabrain, Equi@Meso, IPGG or Dynamo, and the infrastructure France Génomique. The possibilities for promising emergent new research fields and developments are already obvious and have been evidenced by the submitted IRIS programs (IRISes) (Strategic initiative of interdisciplinary research) on Origins of Life, Interfaces of the Living and the many collaborations between Labex that have been described. The development of the Data Science axis should also prove extremely useful to the unfolding of new research. This pole is witness to the structuring effect of the Labex and Equipex on the University through the intensification of collaborations within its member institutions (including the new members): to name a few, TransferS or ENS-ICFP have strengthened the relationships of ENS and Collège de France; and so has MemoLife, which benefits also from the fruitful collaboration of Institut Curie and ENS, contributing to the development of the Medecine/science track; IPGG gathers ESPCI, ENSCP, ENS and the Curie Institute. Last but not least, the Labex have enormously contributed to a stronger integration between the national research agencies, (CNRS, INSERM and INRIA) and the other members of PSL. INSERM is essential to the Labex of the Curie Institute or IEC; the participation of INRIA in Equip@Meso is important to develop its outreach; and the CNRS is central to all projects through its governance, planning, and of course, the human resources devoted to these projects. The ongoing process of association of the Institut Pasteur to PSL is part of the same trend.

³ ESEP is the only Labex which has been somewhat negatively evaluated. The report by the Jury includes inexplicable assessments, including the fact that PSL has absorbed all the funds or that it is impossible to identify the impact on the funding on the publication rates or the research, while recognizing that the publications numbers themselves are impressive, and that the doctoral program is outstanding.

The Labex and Equipex are decisive in strengthening and structuring the backbone of PSL's of research. The first dimension is the development of the core PSL component of innovation. Notably, there is a strong axis around technology transfer: the Labex jury described IPGG and WIFI as models of "valorisation", commenting that they are some of the best investments in French science. IPGG has led to no less than 12 start-ups since 2011 and WIFI to 8. Memolife has also led to 36 patents, and 2 start-ups are already underway. These are examples of leverage effects for PSL for which FCD and BEDOFIH represent different models (partnership research or commercialisation of data access) which can be reproduced across other PSL components. Those are notably interesting leads to ensure the future of the Equipex and Labex after the end of the PIA funding. The Labex and Equipex are also part of the definition of the PSL DNA through their training component: they contribute tremendously to the dynamic of PSL as a research university. Without being comprehensive, they have participated in many major MOOCs (ICFP, FCD, OSE), e-learning activities (ESEP) and other training within the masters programs of several PSL members (IEC, OSE, First-TF); they can be platforms for training (PLANAQUA); they have been at the core of the development of PSL-ITI (WIFI and Ultrabrain, as well as ESEP and IPGG); MemoLife has greatly intensified the Medicine/Science track and ENS-ICFP has designed a major international master. Last but not least, as part of the PSL mission, the training component of the Labex is contributing to the building of the first PSL masters (like "Chimie aux frontières du vivant").

Of course, the strong ties between the Idex and the Labex and Equipex go both ways. PSL offers an important breeding ground for innovation that enhances the potential of the Labex and Equipex. First, coexisting in the same institution, the Labex themselves are enriched by each other's vitality and innovation. Amongst many examples, the collaboration between MemoLife, IEC and OSE leads to exciting new research that could not have been anticipated. IPGG contributes to bringing its knowledge in microfluidics to such projects as DCBIOL. Further, as part of the transition to the new stage of its research strategy, PSL has aimed at developing the interactions between the Labex and the other research teams through a specific call for proposals "At the Frontiers of the Labex". Currently under evaluation, the projects are promising. The HR component is, of course, a critical axis for mutual reinforcement. It goes without saying that the recruitment policy of the Labex per se is a major asset for the intensification of the scientific power of PSL. The doctoral policy is of course shared across PSL including the Labex, as part of the development of the research strategy. However, more importantly, on top of the participation in many calls for proposals set up by PSL, the structures funded by the PIA have greatly benefited from the recruitment tools offered by PSL to recruit leading researchers through the Excellence Chairs and high potential young researchers through the New Teams call (no less than 5 Excellence Chairs recruited directly for Labex, 3 New Teams and 2 New Teams currently under evaluation).

Given the many organic ties between the structures funded by the PIA and the current tools offered by PSL, they have been very naturally at the core of the development of the new phase of the research strategy. The research programs, both disciplinary programs or through the IRIS offer a transition for many Labex which could bring in the results of their research and rise to a new more integrated phase where they combine their forces with other complementary research. Thus, "Analysis of the Transitions" is conceived, partly, as an evolution of FCD. Similarly, "Interface of the Living" integrates the leads offered by CeTisPhyBio. Scripta, now in exploratory phase, is being constructed in coordination with HaStec (a Labex which is expected to be integrated within PSL, see chapter 2).

The integration of the Labex is going to be largely accelerated in the new phase that PSL is entering. The scientific monitoring is going to be greatly intensified with the setup of conferences and meetings to enhance the already existing interactions between PIA funded projects (Labex, Equipex and Infrastructures); enable best practices to be identified and shared within the PIA and throughout PSL; share the findings to foster new research ideas and crystallise the potential, thus creating a stronger holding environment for innovation as part of PSL's DNA. The role of the PIA structures in the research strategy is going to be strengthened as they integrate into their own dynamic or renew themselves through, when relevant, the upcoming IRIS programs. The integration into PSL of three Labex (Corail, HaStec and TEPSIS), resulting from the membership of the EPHE, EFEO, EHESS and ENC, is also a milestone in the development of the University's research strategy, including regarding the strategic interdisciplinary research initiatives. The strong relation between Corail and PSL Environment is clear: it will bring into the project a crucial dimension on ocean studies through corals; the flow between both projects will be facilitated by the fact that Serge Planes, director of the Labex, is also the newly-appointed director of PSL Environment, translating the success of the Labex into the new research thematic for the whole of PSL. Of course, the funding tools that are currently available to the Labex within PSL will continue to play an important role in their development and evolution: Excellence chairs, New teams, calls for proposals will contribute to fulfill specific needs and increase the structuring effect for research fields and institutional relations alike. Thus a balance will be maintained between bottom-up (calls for proposals, HR funding tools, including recruitment of post-docs and doctoral contracts) and top-down (research programs including IRIS projects). The new dimension created by the IRIS programs for the Labex is also envisioned as complementing and enhancing the cross disciplinary interaction of these programs. In addition, the definitive integration of Labex into PSL will also be part of a larger reflection on the diversification of resources for the University. The role of Equipex models like BEDOFIH or Labex models like FCD has already been presented. Paris-en-résonance, Equip@meso and PLANAQUA also present interesting opportunities. Finally, the arrival of the recent members will also strengthen the existing dynamics of PSL. For instance, the center of gravity for OSE has now shifted to make PSL an even stronger partner in this programme.

APPENDIX V - Focus on Feroscan, a start-up created by PSL

Feroscan is a biotechnology company in the business of developing new treatments for currently untreatable cancers, especially ovarian cancer. The company's competitive advantage is the exclusive access to a novel, safe and patented series of compounds that significantly reduce incurable cancer cells viability both in vitro and in small animal models through a novel mode of action, therefore creating a novel targeted therapy.

Feroscan's proven and patented technology was developed by the team of Professor Gerard Jaouen at Ecole Nationale Supérieure de Chimie de Paris (ENSCP), a world-class leading expert in the field of organometallic chemistry. Exclusive access to the technology was granted by Paris Sciences & Lettres (PSL) in exchange for equity in Feroscan. In November 2014, Feroscan became the first start-up created by PSL-Valorisation, the technology transfer arm of Paris Sciences & Lettres.

Feroscan is developing its therapy with an emphasis on ovarian cancer in partnership with the Institut Curie (a founding member of PSL, as is ENSCP) and the Sanger Institute in the UK. Both research institutes are working jointly with Feroscan to stratify and identify the genetic signature associated with the best outcome for Feroscan's therapy, bringing organometallic chemistry into personalised oncology. Contract Research Organisations specialised in preclinical oncology were selected to provide the fastest development of Feroscan's molecules into deliverable drugs for the patients. This innovative therapy is formulated with FDA approved ingredients, and tested on patient-derived mouse xenografts. Feroscan is aiming at starting the first human trials of this exciting potential treatment in mid 2017.

APPENDIX VI - Engineering in the heart of Paris: Towards a PSL Graduate School of Science in Engineering

1- Summary

A true pole of engineering is emerging within PSL, which must be made visible and provide a focus for development (both for the three schools of engineering and for the entire Paris Science et Lettres).

- *Make the proposals of organisational synergy currently being developed by the ENSCP and the ESPCI a concrete reality, with the financial support of PSL.*
- *As of 2016 and building on the masters programs currently in development, structure the PSL Graduate School of Science in Engineering, where students will come to find a concrete response to the challenges of training the engineers of the 21st century. With its ability to harmonise engineering, life and material sciences, formal sciences, social sciences and arts, PSL will clearly assert its originality with respect to Saclay and Sorbonne Universities. The PSL Graduate School of Science in Engineering will be a major factor for the international attractiveness and development of the PSL brand.*
- *The potential for innovative training of the three schools of engineering within PSL is considerable. It is expressed both in the programs that are common to the three schools as well as in the participation in other schools that are being developed within PSL, such as the PSL Fashion School.*
- *The lines that structure the research of ENSCP and the ESPCI, as well as that of Mines Paris Tech, enable the three schools of engineering to weigh heavily on the definition of the research strategy of Paris Science et Lettres.*

Introduction: the environment

Paris Science et Lettres now includes three high level engineering schools, each with its own specificities (in terms of programs, objectives and teaching methods) but also a strong propensity towards interdisciplinarity and, at the same time, the capacity to anchor its training in fields of research developed at a high level. Ecole Nationale Supérieure de Chimie de Paris (ENSCP) thus deals with areas of research in which chemistry plays an essential role: energy, health, materials, cosmetology, etc. Research at ESPCI is conducted within a triangle formed by Chemistry, Physics and Biology. MINES ParisTech has also developed a very wide spectrum, including the sciences of organisation and social sciences.

Even if they have different supervisory authorities, structures and organisation, the three schools have some things in common:

- a. The challenge to train engineers through research or in strong connection with research (at least twice as many graduates go on to write a thesis than the national average).
- b. strong contacts with industry
- c. the objective of training engineers of innovation.

The appearance of new technologies, the tremendous recent progress in the field of life sciences, and the new societal issues that are emerging (climate change, collaborative economy, new forms of work, etc.) are causing an upheaval in the role of engineering in our societies. Far from the traditional categories of this discipline, the engineer of tomorrow will have broad, multidisciplinary scientific knowledge, increased awareness of the societal and human issues related to the evolution of technologies, and will evolve in a rapidly and constantly changing environment that is highly global and open, where innovation will be the key to entrepreneurial success.

It is in this spirit that the three engineering schools have created, in conjunction with Ecole Normale Supérieure, the Institute of Technology and Innovation of PSL (PSL-ITI), whose originality is to unite doctoral programs with innovation training. Several other institutions of PSL participate in ITI: Collège de France, ENSAD, the Observatory of Paris and Paris-Dauphine.

Beyond ITI, the year 2015 marked a turning point during which the foundations for a PSL Graduate School of Science in Engineering were laid.

2- Pooling a number of means and functions

The choice of joining Paris Science et Lettres has led ENSCP to separate completely from UPMC. This entailed a loss of means in a number of supporting functions. In the 2016 budget, the shared services of PSL help ENSCP to redeploy its support functions in the framework of the construction of an organisation that is mutualised with the surrounding institutions on the Montagne Sainte Geneviève in Paris, among which ESPCI is in the front line. Mutualisation in terms of security and maintenance has already been discussed specifically with ESPCI, as well as the sharing of premises and services (e.g. for glass work or preventive medicine). As of the 2016 budget, the shared services of PSL will support the convergence of the two schools in these areas and the problem of the premises will be considered in the context of the Real Estate Strategy of PSL.

3- The pedagogical convergence of the three schools of engineering

Convergences between engineering training

The construction of PSL has created a strong demand from students to be able to "navigate" between the different schools, which was confirmed by the success of the "**PSL week**", which opens each school to the other two. This event was also an opportunity to welcome students of the art schools that are members of PSL, in particular La Femis and ENSAD. Other common events have already been envisaged, such as the night of the "start-ups".

The scope of the programs that are rapidly deployable between the schools has already been set out for the 2016 academic year:

- the possibility of double degrees, similar to the Mines – ESPCI degree, will be extended
- the Biotechnology track of ESPCI will be open to students of ENSCP;
- access to the courses in chemical engineering at Chimie ParisTech will be open to students of the ESPCI;
- pre-academic year courses will be shared for students from other streams of admission (ENSCP, ESPCI, Mines). A common platform for the assessment of the level of students admitted on qualifications will be set up (depending on the SPIF3 project supported by the three schools), prior to a common recruitment of these students.

To enable students to navigate more easily from one institution to another for the 2017 academic year, the three schools have started to work on the **semestrialisation of courses**. This is essential in the context of the "study contract" that will be established for all the students of PSL. This will also be an essential point for an offer on the international level.

New masters programs for the 2016 academic year

The appearance of new technologies, the tremendous recent progress in the field of life sciences, and the new societal issues that are emerging (climate change, collaborative economy, new forms of work, etc.) are causing an upheaval in the role of engineering in our societies. Far from the traditional categories of this discipline, the engineer of tomorrow will have broad, multidisciplinary scientific knowledge, increased awareness of the societal and human issues related to the evolution of technologies, and will evolve in a rapidly and constantly changing environment that is highly global and open, where innovation will be the key to entrepreneurial success.

The three schools have begun to develop some new M1/M2 pathways at PSL. The lines of force have been:

- themes in which the laboratories of PSL excel
- original angles of attack
- added value thanks to the multidisciplinary of PSL

Thus, in autumn 2016 three PSL masters programs will be launched and managed jointly by the engineering schools:

- "chemistry at the frontiers of the living,"
- "sciences and engineering of materials"
- "energy"

4- Towards the PSL Graduate School of Science in Engineering

The opening of the International Master of Science in Engineering for the 2017 academic year

The three engineering schools of PSL will set up (for autumn 2017) an "International Master of Science in Engineering" which will propose an M1/M2 type of training in the field of engineering in the broad sense. It will build on the existing and future PSL masters degrees in the field of science and engineering and on the PSL Schools of Engineers. It will propose disciplinary and multidisciplinary pathways and shared modules, particularly in the areas of management, innovation and start-ups. Specific courses in Human and Social Sciences in relation to technological development and its societal consequences will be given. An awareness of design and artistic aspects will be proposed.

Enhanced cooperation with one or more foreign establishments will be established for student exchanges, particularly in the form of shared summer schools. Selective international recruitment will be organised by PSL. The courses will be delivered in English.

Parallel recruitment in the second year for the engineering schools will be shared and integrated into the recruitment for the Masters programs. This will provide greater strength for recruitment on the international level. The students thus recruited will obtain their engineering degrees under the same conditions as today. Logically, this means that second year courses in the engineering schools will be given in English.

The insertion of the engineering schools into the research of PSL

Two developmental poles appeared when the PSL Chimie programme emerged:

- "Chemistry at the frontiers of the living" corresponds to a dynamic of research that is already well established on Montagne Sainte Geneviève, at the interfaces between biology, physics and chemistry, and already implemented by Institut Pierre-Gilles de Gennes. It places ENSCP and ESPCI within a particularly dynamic cluster of research, which also benefits from the participation of ENS, Institut Curie, CNRS and INSERM.
- "Chemistry for a sustainable city" enables Paris Science et Lettres to invest itself in an original way in one of the major themes of the 21st century, that of "smart territories". In the last three months, Paris has hosted two high-level international conferences on "Smart Cities" (the Smart3C Forum in early September and the Smart Cities Forum of Greater Paris in late November). It is quite obvious that, proudly bearing the name of Paris in its brand, PSL cannot ignore such a theme. The axis of PSL Chimie, the research conducted at MINES ParisTech, and also the structuring of PSL Environment will enable our group to play a leading role in the research on "smart cities in smart territories" at the interfaces between chemistry, life sciences, medicine, data science, management, social sciences and the arts.

Another way to describe the potential for interdisciplinary research in engineering at PSL: the five themes which bring together the research centres within Mines Paris Tech - Sciences of the Earth and the Environment; Energy and Processes; Mechanics and Materials; Mathematics and Systems; Economics, Management and Society. The PSL Fashion School project, in which Mines Paris Tech participates along with Dauphine and the ENSAD, from the outset will start with a research project on "sensory design", to which the ENSCP and the ESPCI will naturally be associated.

Attractiveness of a PSL Graduate School of Science in Engineering managed by the three schools

The International Master in Engineering that we have just mentioned, but also the "chemistry at the frontiers of the living", "science and engineering of materials" and "energy" masters, the schools of engineering degrees, the pre-doctoral and soon the ITI doctoral school invite us to reflect on the creation of a very powerful pole of training within PSL managed by the three schools of engineering, a true "Graduate School" in the American sense of the term, highly visible at the international level and based on the specific characteristics of engineer training at Paris Science et Lettres.

It will in no case be a closed structure nor one that will undo the existing:

- The specificities of engineering degrees "à la française" will be respected, based on the harmonisation and semestrialisation of the training to be generalised in PSL.
- The PSL PhD students in engineering, attached to the 4 different inter-ComUE doctoral schools, will find the Graduate School to be a specifically fertile place, with "advanced training".
- The PSL Graduate School of Science in Engineering has been thought out in the spirit of the organisations of the digital era (complexity, openness, "liquid spaces") and is essentially a place of convergence, a home port for the students-engineers of PSL from where they can go on to other training: for example the PSL "environment" master which will not fail to emerge or the forthcoming PSL Fashion School.
- This Graduate School is also a place of convergence for students from other programs within PSL and who wish to undertake engineering training. Students from Paris Dauphine, Ecole Normale Supérieure or the art schools will feed the great diversity of engineering students of PSL thanks to the original pathways laid down by the Graduate School.

In all, the PSL Graduate School of Science in Engineering will be a real pole of attraction around which other dimensions of engineering training will naturally develop. It is still too early to answer the question of whether PSL will one day create a bachelor's degree in engineering, but the question is on the table. Similarly, we can only try to imagine the huge potential for continued training that the engineering pole of PSL could develop one day, of which ITI or the soon to be created Institute of Advanced Studies in Innovation and Entrepreneurship are the first manifestations.

APPENDIX VII - PSL Student Initiatives

Since September 2012, PSL Research University has included three completed "PSL Student Initiative" calls for projects for a total amount of € 265,362. These three calls for projects have helped to select 116 student projects, of which two-thirds are new projects each year.

AAP No. 1, year 2012/2013	25 projects selected	€ 82,500
AAP No. 2, year 2013/2014	45 projects selected	€ 82,600
AAP No. 3, year 2014/2015	46 projects selected	€ 93,262

1- Uniting the PSL student community

In 2014, the PSL students banded together to form the **PSL Union**, an organisation which had the purpose of bringing students from the different PSL institutions together; facilitating discussions between them; and promoting all of their activities on campus. CNSAD (Conservatoire national supérieur d'art dramatique [National Academy of Dramatic Arts]), ENSAD (École Nationale Supérieure des Arts Décoratifs [Higher Education Institute for the Decorative Arts]), Beaux-Arts (École nationale supérieure des beaux-art [Higher Education Institute for Fine Arts]), ESPCI (École Supérieure de Physique et de Chimie Industrielles de la ville de Paris [City of Paris Industrial Physics and Chemistry Higher Educational Institute]), Ecole des Mines [Mines ParisTech Graduate School]), ENSCP (École nationale supérieure de chimie de Paris [National Institution for Chemistry in Paris]), CPES (Classes Préparatoires privées aux Etudes de Santé [Private Preparatory Classes for Healthcare Studies]), ENS (École normale supérieure [Higher Education Institution for Sciences and Humanities]), École des Chartes and Fémis (Fondation Européenne pour les Métiers de l'Image et du Son [European Foundation for Image and Sound Professions]) are already represented there.

Activities:

- Organising the "Apéro PSL" Forums at ENSCP in November 2013, at Ecole des Mines on 28 November 2014 and on 16 December 2015: stands run by winners of the PSL Student Initiative call for projects and more than 400 students were present,
- Running the "Antenne média PSL" website, together with the Latitude organisation and with feed from the Facebook page,
- Creating a directory of the PSL institution organisations,
- Updating a meta-directory combining all the student contacts,

The PSL student community also established its own communication network in 2014 with the founding of "Les périodiques du quartier latin" organisation which publishes the monthly magazine **Latitude**, dedicated to cultural and student events in the Latin quarter. The magazine is distributed free of charge in the PSL institutions. This information is principally relayed by the students themselves. The organisation will develop a student guide at a later stage, also designed in a participatory manner. This project is also a winner of the *Kit-à-se-lancer (Striking out)* in Paris competition. In 2014 it helped to finalise the graphics and to publish the first issue of the magazine. The organisation runs in partnership with the PSL Union the 2013 initiative "Antenne Médias" (a community website designed and hosted by PSL students) with the aim of centralising and sharing student information on campus.

Radio PSL is the PSL student radio. It aims to bring together all students in the PSL network who wish to engage in all types of radio programs.

Radio PSL is available via its Facebook page (link: <https://www.facebook.com/RadioPSL/>), via its SoundCloud Radio PSL (link: <http://soundcloud.com/radio-psl>) or even on the antenne-média PSL website (link: <http://media-psl.fr>).

The web radio station "TrEnsmision", based at ENS, continues to open up on the PSL campus due to its **Battements** programme, whose recordings, outsourced to various PSL institutions, have been increased this year: ENSBA (Institution of Fine Arts), ESPCI, but also Paris-Dauphine University with coverage of the student festival "Music to rock the nation." The TrEnsmision team has also covered the "Play Sport" day organised by the PSL Sports Association on 26 October 2014 at the CROUS de Paris (Paris Student Welfare Organisation) Jean Sarrailh Gymnasium. Other notable and original events: coverage of the Cannes Festival and participation in "Radio Day" in partnership with the Sciences Po (Paris Institution of Political Studies) and ENS Lyon student radio stations.

2- Student participation

Citizen initiatives (mentoring, social advancement)

The **Discovering Classical Antiquity Days (JDA)** are five themed days provided each year to an audience of secondary school students from all over France, allowing them to discover Greco-Roman classical antiquity from different aspects (mythology, theatre, history of the sciences, etc.) This year, the JDA students also met the secondary school pupils through the "Ancient Horizons" project which provides a series of talks directly in class.

Originating from the previous initiative, the **Discovering Literature Days (JDL)** work on the same principle, but this time have a major literary theme as the subject. It is a question of opening up the discipline, getting it out of the academic setting, and publicising research in literature to people who are kept away by their young age, geographical location, or their social background.

FOCUS ON 2014

The JDA received 445 pupils at ENS and at the Paris Observatory, for the following days:

Everyday Life in Rome Day, 4 February 2014

The Orpheus Myth Day, 5 February 2014

Comedy Day, 20 March 2014

Discovering Classical Antiquity Day, 17 July 2014

History and Historian Day, 24 March 2014

Sciences in Classical Antiquity Day, 25 March 2014
in partnership with the Paris Observatory

The Ancient Horizons programme has resulted in about ten talks by mentors in class.

For their first programme, the 3 days organised by the JDL involved 6 classes aged from Year 7 (Grade 6) to Year 12 (11th Grade):

Shake Shakespeare Day, Friday 9 May 2014

Surrealism Day, Do it yourself, 26 May 2014

Mediaeval Literature Day, 30 May 2014

The organisation, **Les Agitateurs**, was founded by a group of social sciences students from Paris-Dauphine University and ENS. Their first project is called "Tintin en Banlieue" (Tintin in the Ghetto) after the article by the sociologist, Jérôme Berthaut, which appeared in *Le Monde diplomatique* in September 2013. The article will be the starting point for writing a play about the media portrayal of the socially-deprived areas known as the *banlieues*. Hence, this play is intended to be performed before an audience of middle or upper secondary school pupils in the Parisian *banlieues* and helps to stimulate and spark the ensuing discussion in the classroom.

Focus 2015: first performance on 16 April at Bobigny before a Year 12 (11th Grade) class studying Economic and Social Sciences, on 23 April, and 1 June.

The **PariDance** project brought by students at MINES ParisTech and Chimie ParisTech who are dance enthusiasts allows a class from a technical secondary school to discover and practice dance in all its diversity for a semester. On the programme: discovery of dance and its history with a teaching kit, a visit to great places of dance, dance courses given by dancers from the Atelier de Paris, as well as a session at the National Conservatory of Music and Dance in Paris, accompanied by a meeting with students from the Conservatory.

The organisation, **Les Handinattendus**, resulted from the meeting of several PSL disabled and able-bodied students, researchers in the field of disability or not, connected by a strong wish to shake up the perceptions of disability. They were committed to:

- creating an area for discussion and reflection on the topic of "disability",
- promoting the exploration of different forms of artistic expression opening up innovative perspectives on disability, mainly through the joint work of disabled and able-bodied artists,
- promoting accessibility to knowledge and culture for everyone, and taking on a role of awareness regarding accessibility issues that students are likely to encounter.

WoMines PSL is a student organisation for the promotion of gender equality in PSL. Its goal is to conduct interviews, discussions, and debates on gender diversity around contentious issues and prejudices related to this topic. More specifically, it organises lectures and debates, workshops, and awareness weeks, always promoting meetings between PSL students. Finally, WoMines PSL is a link between professional organisations, networks, and other existing groups with the same values.

Focus 2015: Thursday 21 May 2015: interview /debate with Nathalie Loiseau, Director of ENA (École nationale d'administration [National School of Administration])

Solidarity initiatives

61% of Togolese do not have access to drinking water. The **EVEA** organisation, Volunteer Students for Water and Sanitation, made up of students from MINES ParisTech joined by students from CPES, has mobilised to provide access to drinking water to an entire village in Togo. For two years and in partnership with a local NGO, JKSDS (Youth of Kozah for Socio-Economic Development), the EVEA students worked on **the construction of two wells** which now enable nearly 800 inhabitants in the village of Yadé, 500 km north of Lomé, to be supplied with drinking water throughout the year.

Students from the **RIVOTRA** organisation are involved with raising awareness of the health risks and the risks related to cyclones among the Malagasy population, including children. The three-week stay in the north of Madagascar helped them to conduct their work in three schools in the city of Sambava and half-dozen bush schools around the village of Bemanevika. So, with the help of the organisation, Sustainable Vanilla Bemanevika and the Alliance Française in Sambava, the students were able to meet nearly 500 children aged 7-15 years. The principle of RIVOTRA is based on the creation and use of two sets of seven families to communicate and speak with the children about cyclones and enable awareness of risky behaviour for their health and that of those around them through play.

The purpose of the **Les ateliers du regard** initiative is to provide young Malians with an introduction to cinema through the production of six short films in three weeks. Each year, three PSL students leave for Bamako to show film clips, present the production chain of a film, introduce the young participants to cinema techniques, etc. Due to the links forged with the Balla Fasséké Kouyaté Conservatory of Arts and Multimedia Professions, les Ateliers enables students from the PSL network to meet Malian

students, as well as major cultural players recognised internationally. The organisation also holds meetings throughout the year to discover Mali, a highly cultural country. <https://www.facebook.com/LesAteliersDuRegard/>

FOCUS ON 2015: Synopsis of the short films

My Mother and I by Balakissa Doumbia (8'37'')

Tensions between a mother and her daughter, whom she suspects of going out with boys late at night.

Fadima by Mariam Kontao (5'31'')

A lonely little girl refuses to play with other girls her age. Until the day when...

The Athlete of the Year by Kadiatou Kouma (8'23'')

It's the last day before the holidays. An unruly pupil persists in challenging his teacher.

Scam and Love by Tagaror W. Mohamed (10'48'')

A couple of con artists plan to do one last job before living the good life. But nothing goes as planned.

Kôdor by Ibrahim M. Touré (11'53'')

A documentary about the difficulties of Diezz D, a young rapper from Gao who has come to Bamako to succeed.

The Red Blade by Natalia F. Sylla (9'35'')

A mother stands up to her mother-in-law as she refuses to have her daughter circumcised. However the mother-in-law seems determined to maintain the tradition by whatever means.

3- Innovation and technological sciences

InnovEns (ENS) and **Start'n Go** (ESPCI), student organisations dedicated to innovation, entrepreneurship, and valorisation have worked together to organise a series of events on these subjects on the PSL campus:

The valorisation of research with Jacques Lewiner and Arnaud Tourin, (video available at:

<http://savoirs.ens.fr/expose.php?id=1669>)

Open science and intellectual property,

Simulation of the founding of start-ups led by Charlotte Hochman

1st MEETUP presentation of technology projects (partner: MINES ParisTech).

Ongoing project: establishment of an online portal bringing together the contacts accumulated by InnovENS during the year.

The goal of the **VECTOR** project is to design an ultra-energy-efficient electric vehicle in order to take part in eco-marathons. The initiative helps to promote the technical and cross-disciplinary knowledge of engineering students at MINES ParisTech and ENSAD, in partnership with pupils at the Louis Armand secondary schools in Nogent-sur-Marne and in Paris.

Results:

- Selected to participate in the Shell Eco-Marathon 21-24 May 2014, which is the European benchmark for eco driving: **15th place in the overall ranking** (out of 50 entrants).

- Participated in the EduEco challenge 29-31 May 2014 and winner of two first Jury special prizes:

- **1st prize for MathWorks Simulation**
- **1st Continental Award** for the eco-driving strategy for its système de rétroversion vidéo et de commande optimale.

The **OGI (OIL & GAS INNOVATION)** project brings together PhD students at PSL with the purpose of promoting, sharing, and spreading research related to the oil and gas industry conducted at PSL. The

first R&D and Technological Innovation workshop was held on 28 April 2015 at ESPCI and brought together students, researchers, and companies.

Programme:

Back to the use of JUMP, a BNP Paribas collaborative innovation platform focused on anonymity Jérôme DUBOIS, Innovation Manager – BNP Paribas CIB

Analysis and sensors: an example of co-operation between Research and Development and Technological Innovation, Isabelle BETREMIEUX, Analytical Methods Research Delegate – Scientific Management TOTAL

Diamond synthesis for sensors and high-performance coatings, Philippe BERGONZO, CEA Research Director – CEA (Alternative Energies and Atomic Energy Commission) Saclay

Benefit of diamonds for sensors in the oil industry: Protective coating and electrodes, Guillaume BERTHET, PhD – CEA Saclay

GCxGC, SFC and SFC–GCxGC for the oil industry, Didier THIEBAUT, Research Director CNRS (National Centre for Scientific Research) – ESPCI ParisTech

A new generation of gas-phase chromatography integrated with silicon-based technology for measurement in the industrial environment, Eric COLINET, Product Development Director – APIX Analytics

Low pressure sampling (L.P.S) and OFCEAS technology, the combination of 2 patented innovations for online gas analysis, Pierre CHOLAT, Chairman – AP2E

New generation of miniaturised GC for online analysis of liquids, Adrien MANIQUET, Ph. D. Student– IDEEL

µGC-MS, the alternative to standardised methods for a fine characterisation of process gases and atmospheric emissions, Guillaume PASCAL, Laboratory Manager – EXPLORAIR

Meloware is a software project designed by students from Ecole des Mines together with students at ENSAD. Their goal was to design an effective and intuitive software solution to help composers and musicians to digitally rewrite scores, and it is a real interactive tool capable of transcribing a score directly from a sound sample, while remaining accessible to beginner musicians. www.meloweb.fr has been posted online.

The **annual conference "Thinking innovation"** was organised on 3 April 2014 under the patronage of Fleur Pellerin, by the Dauph'Innov student organisation in partnership with students at the Ecole des Mines. The conference is open to all PSL students and a video of the day is available on YouTube: <https://www.youtube.com/watch?v=F9cNeVYWNpW&list=UU1BxwPJvmqjSEYRZhpuddwg>

A real laboratory for technological creation, **Langevinium** offers PSL students a set of tools necessary to carry out a personal or team project. Langevinium supports students throughout their project and their feasibility study for making a prototype. A technological workshop, Langevinium is also an actor in innovation funding in the PSL student community.

Several examples of technology projects have already been proposed to us such as:

- the design of a GPS-guided drone;
- the manufacture of a laser harp;
- the use of electroencephalography devices to control an electronic system;
- the production of an "open-source" 3D printer.

Our long-term goal is to contribute to developing the entrepreneurial spirit, but also to serve as a springboard for future start-up founders.

4- Cultural awareness

Arab Week brings together researchers and artists from the North African Maghreb countries, the East Asian Mashriq countries, and Europe to share their research and work on the theme "Border and territories", during a week of discussions and cultural events: exhibitions, cinema evenings (film screening followed by discussion), workshops (writing, calligraphy, cooking); reading stories, concerts, setting up an eastern cafe, and plays. (2013 Programme "Laughter Goes Arabic" and 2014 "Borders and Territories")

Italian Week is held each year at ENS around five main themed meetings to discover the Italy of today with for example in 2014:

Literature, interview with Giovanni Cattabriga,
Art and chemistry, the restoration of Italian paintings,
Dance and anthropology: Folk dances in Italian culture,
Cartoons: Meeting of Italian cartoonists,
Theatre: *Reading-discussion* about the situation on the island of Lampedusa and the case of the refugees in the Mediterranean,
Day dedicated to anti-mafia.

The Silk Roads, a PSL inter-institutional student organisation (Ecole des Mines, ESPCI, ENS, and ENSCP), offers its members cultural exchange sessions between PSL students and large Chinese universities: Peking University, Tsinghua, Nanjing University, Southeast University, Tongji University and Fudan University. The exchanges take place over two weeks, with the first session in January hosting Chinese students who discover Paris and the PSL campus (laboratories and institutions), but also French businesses. The PSL students are hosted in their turn in April in Beijing; Nanjing; and Shanghai for a similar programme.

A group of PSL students (ENS, Collège de France and Fémis), who are passionate about Iran and its culture, have come together to provide a series of events (lectures, film screenings, and workshops) under the name **Persl** to introduce Persian culture to the entire PSL community.

In 2014:

- Launch of a weekly Persian conversation workshop
- Lecture by Clément Therme (EHES (École des hautes études en sciences sociales [School for Advanced Studies in the Social Sciences])-IRI (Institut de recherche interdisciplinaire sur les enjeux sociaux [Interdisciplinary Research Institute]) and Serge Michel: " - Iran, a completed revolution, or a future one?" on 26 March 2014.
- Film screening: "Modest reception" by Mani Haghighi, and - - Screening of the short film "Lady Tehran" by Camille Simony on 17 April 2014.
- Afternoon "Persian Tales" on 18 May 2014.
- Film screening "About Elly" by Asghar Farhadi on 1st October 2014.

A series of screenings / debates was organised by Fémis and ENS students to discover cult films on the theme of "**transgressive comedies.**"

- I Married a Strange Person! by Bill Plympton with the director on 11 March 2014.
- The White Sheik by Federico Fellini with Jean Max Méjean, a French writer and author of several books about the film-maker's life and work on 9 April 2014.
- The year 01 by Jacques Doillon on 14 May 2014.
- Daisies by Vera Chytilova on 11 June 2014.

5- Artistic practice and creation

Cinema

The short film **Imago** brings together students from ENS, ENSAD and Beaux-Arts. After a crowdfunding campaign, the shooting which included the actor Dominique Pinon, took place from 20 February 2014 to 1 March 2014 in different places at PSL and in the capital. This project also had support from the CROUS de Paris.

Imago's plot: *"Cesare leads a mundane life which seems to him to be devoid of beauty and meaning. The only escape for the young man: the cinema and its wonderful fictional world. Consumed by a passion for film which puts him out of touch with reality, Cesare will try to pull himself together by seeing Dr Carl Gari. A brilliant psychoanalyst and inventor of a machine for travelling into the subconscious; Gari will enable the young man to cross over the boundary of his own superego. Looking deep within himself, Cesare meets Lilith, a femme fatale who embodies the film buff's most burning fantasies ... Will he be able to resist the charms of the one who incarnates his desires?"*
<https://www.facebook.com/imagothemovie>

The production of the short film, **The Burrow** helped, like the participating students (ENS, FEMIS, ENSAD) wanted, to make PSL a meeting platform for young professionals and to bring talents from its different institutions together. This project also received support from the CROUS de Versailles and won the special award for the screenplay competition at the Nouveaux Cinéma 2014 festival.

Synopsis: The storyline is "very freely inspired" by the Kafka short story called The Burrow.
"Odile lives alone. Fearing that someone might enter her house, she places surveillance cameras in all the rooms and publishes her videos in real-time on the internet: she hopes that internet users will monitor her apartment and inform her of suspicious events. However an intrusion occurs: dark spots appear on her walls. Angry, she decides to leave the community. When she tries to fight against the intrusions, she realises that she is always being watched."
The first public screening of The Burrow takes place on 30 June 2015 at the Ecole Normale Supérieure in Paris (45 rue d'Um).

Exhibitions

" **Future Inventors**": success for the **EPICS (ESPCI ParisTech) student initiative**

Palais de la découverte, from Tuesday 25 February to Sunday 6 April 2014C

Cité des sciences et de l'industrie - 22-27 April 2014

After 2 years of hard work, the EPICS student initiative has just completed its flagship project: the "Future Inventors" an exchange forum at the Cité des Sciences et de l'Industrie. Due to the efforts of ESPCI ParisTech (inventory and explanation of inventions) and Ecole des Arts Déco students (set design, artistic approach to the operation), 5,000 visitors have discovered and enjoyed about 15 technological innovations over 400 m2, originating from the ESPCI ParisTech-CNRS laboratories or developed by ESPCI ParisTech engineers. What it demonstrates to the general public, is that fundamental research studies can lead to practical applications that will soon be usable by everyone.

The **Dauphine Expo exhibition** *Emptiness under the Floor* was put together by the "Dauphine expo" collective from 31 March to 10 April 2014 in the courtyard of the Paris-Dauphine University. This art installation is the result of a meeting between students from Paris-Dauphine University and ENSAD on the theme "A rebellious society" with the goal of making the entire university community aware of artistic creation.

<https://www.facebook.com/dauphineexpo?fref=ts>.

Focus Topic 2015: Dauphine Expo is putting together works on the theme of image in the university courtyard, this time in partnership with the Beaux-arts students.

Event on Facebook:

<https://www.facebook.com/events/1073963229287806/>

As well as the project page:

<https://www.facebook.com/dauphineexpo?fref=ts>

The project, **The Gauls at PSL**, is a joint effort between students from ENS and ENSAD and has resulted in a series of Gaul-themed events at the same time as the BNF Asterix exhibition.

- *The Gauls and Cartoons*: exhibition of caricatures and posters by the ENSAD students.
- *Celtic archaeology*, a photographic exhibition in partnership with AOROC. (Archéologie et Philologie d'Orient et d'Occident [Eastern and Western Archaeology and Philology]).
- Screening of documentaries: 6 February 2014 *When the Gauls lost their heads*, a Court-Jus production
History in pieces: The Gauls, CNRS Multimédias, *The secret of the fibula*, CNRS Multimédias.
- In conjunction with the Cultural Department of CROUS de Paris: *The Gauls since Asterix, researchers answer your questions*, exhibition from 17 October to 19 December 2014, held in the university restaurant at Paris-Descartes University's Boulogne-Billancourt campus.

The mixed media project **Metachronique** aims to bring together and create collectively with students, artists and scientists at PSL and elsewhere.

Metachronique is centralising its activity via its website and has provided a series of multi-faceted events for 2014: radio interviews, presentation of artists' works, joint research with researchers, and talks by professionals.

Events in 2014:

Metachronique – radio interviews / ENS from March 2014:

Escape plan: exhibition event / ENSBA – EHESS/ 4 – 5 and 10 July 2014:

The call of the virgins: collective work / le LAC – Brussels / 18 September 2014

Playful Luddism: art and science workshop / Festival des Utopies Concrètes-Paris/ 28 September 2014.

The "arts and science" exhibitions, **Experiments** and **Minute Images** which were held respectively from 16 May to 31 October 2015 in the garden of the Curie Museum and from 10-24 November 2015 at the Town Hall in the 5th district of Paris, have resulted in a series of artistic interpretations after images taken from scientific corpora, bringing together students from ENSAD, école nationale de Chartres, école normale supérieure, CNSMDP (Conservatoire National Supérieur de Musique et de Danse de Paris [National Conservatory of Music and Dance in Paris]), Institut Curie, and the Beaux-arts.

Since 2014, **the Middle Eastern Express festival** has been bringing together students, artists, and researchers from PSL institutions and higher education institutions in the Mashriq and Maghreb

countries to participate in a series of cultural events with the purpose of developing and understanding contemporary Arab culture in an interdisciplinary approach and that is accessible to the general public.

For a weekend, all the art forms are summoned to move into to the walls of 45 rue d'Ulm! **The 48 hr of Arts** provides an opportunity for all PSL students to present an original artistic project before a large audience in order to promote the practice of the arts within PSL. The aim of this festival is also to enhance artistic practice beyond the academic field, which explains our requirement of free entry. Led by a small team of PSL students, the Festival provides financial support for participating companies, and provides them with the necessary equipment to carry out their project.

Theatre, dance, singing, circus, film screenings, martial art demonstrations, as well as evening entertainment and gourmet buffets fuel the rich programme for the weekend!

Theatre

The foundation of a mediaeval theatre workshop at the initiative of ENS students in partnership with students from ENSAD resulted in the performance of the play, **Heavens, it's the priest! Plays and mystery plays from the Middle Ages**, which are the result of several working sessions, bringing together researchers, artists, and students. The play was performed on 27, 29 and 30 March 2014 at the ENS theatre.

The **El Ánima sola (The Lonely Soul)** initiative, a Spanish language theatre project, provided an opportunity for a group of PSL students (ENS, ENSAD, CNSMDP) to visit Colombia (Bogota and then Cartagena) in the summer of 2014 to lead theatre workshops and to give several performances of the play *Ánima sola (Lonely Soul)* by the Colombian author Enrique Buenaventura. This project was also supported by the Alliance Française and the CROUS de Paris. The play was also performed on 25 June 2014 and 18 October 2014 in Spanish at the ENS theatre.

#Création_FD Projekt is a writing and theatre performance project narrating Franco-German history started by students from the ENS Physics Department and ChimieParis students. Both theatre plays in the project, **La guerre ne sera pas longue - Die Gefallenen (The Fallen)**, which was performed on 9 and 11 February 2015 at the PSL campus and *Steckrübenwinter (Turnip Winter)* (written in 2015), tell the fate of several families on both sides of the Rhine caught up in the turmoil of the events of July 2014 and plunged into the tragedy of the Great War. As a show and a radio play, the audience is invited into drawing rooms between Göttingen and Paris and is led through the front lines to Russia. The project will continue in 2016 with a tour in Saarbrücken (Germany). Website : www.grandewelt.wordpress.com

Music

Sforzando, the European Chamber Music Competition for Student Amateur Musicians, whose 7th programme was held on 25 and 26 April 2014 at the Ecole des Mines de Paris and Collège des Bernardins. 10 programs of chamber music, or 32 candidates, appeared in front of more than 200 spectators. This year, the jury included among others Frédéric Lodéon (Honorary President) and Julien Caron (Director of La Chaise-Dieu Classical Music Festival, President). For the first time, a press jury was made with representatives from France Musique, La Lettre du Musicien and Classica magazines. The final on 26 April 2014 rewarded the following prize-winners: **1st Prize**: Robin Stephenson, piano; Gabriel Sulem, violin; Ariane Issartel, cello.

Publishing

Récit is an independent publishing house founded in 2014 by students at the Beaux-Arts in Paris, whose speciality is publishing artists' books.

Récit encourages discussions between art students and professional, young, or more experienced artists. The publications are subject to a call for projects in the PSL institutions in order to instigate meetings and promote young artists.

The publications are really exhibitions conceived in support of the book and designed according to a principle of commissioning.

Publications: *A Friend of a Friend*, March 2014; *Crosswords*, July 2014; *The History of Trance*, September 2014; *Boat People*, November 2014. It participated in OFF PRINT, the large independent publishing exhibition on 14 November 2014.

After the success of the workshop on the topic of **Baba Yaga**, a character from Russian tales, the LETAP organisation mainly made up of ENSAD and ENS students published a collective book on the workshop and organised an academic colloquium on the figure of Yaga and her isba (hut).

Focus 2014/2015:

- Foundation of the association publishing house: Les Editions l'Imprimante, with the goal of publishing original works, theoretical and artistic research papers by LETAP members, as well as that of PSL students selected by a call for projects.
- Publication of the collective Baba Yaga book, December 2014
- Organisation of a two-day colloquium, which will also present the work from the workshop in the form of videos, photos, and promotion of the book (January 2015).
- Launch of the project: *Wolfson, le schizo et les langues (Wolfson, The Schizophrenic and Languages)*

The magazine **regarD** brings together a range of viewpoints of the PSL institution students: texts, visual arts, short films, etc. Each one features a creation inspired by one and the same image: the cover illustration. The printed magazine is linked to a website for broadcasting short films, radio programs, playlists, and regularly posts articles online.

The first edition of the magazine was distributed in September 2015 in partner university libraries and in some bookshops. Participating PSL institutions are: CPES (PSL's multi-disciplinary Undergraduate cycle), ENS, Dauphine, Lycée Henri IV secondary school, Beaux-Arts, Conservatoire National Supérieur d'Art Dramatique, and Fémis.

Website: revueregard.fr

6- Sharing knowledge

Les Ernest comprises a series of filmed 15-minute lectures that have been uploaded. Its goal is to provide a lecture format adapted to the new media, because knowledge must be democratically shared and bridges must be built between the general public and knowledge shared, because more than ever, these new approaches, which are very often cross-disciplinary, are needed to understand the world around us, because conventional lectures are deserted as they are not compatible with internet codes. <http://www.les-ernest.fr/>

The digital magazine **Interphase** resulted from a shared desire by science and literature students in the three Ecoles in the PSL group (Ecole normale supérieure, Ecole des Mines, Ecole nationale supérieure des Arts décoratifs) to think about the sciences and their challenges together.

The two annual issues are an opportunity to combine different approaches, to question researchers in order to see and to show their applications better, the role of science in the public domain, and its relationship with other forms of thought and human, design, or pictorial activity.

This magazine provides topics for discussion which the students and researchers in various specialities will encounter. Therefore, it is not specialised and is intended for any member of the public interested by interdisciplinary issues and transfers between sciences and humanities.

Website: <http://interphase48.webnode.fr/>

The multidisciplinary magazine **Chantiers Politiques** continues to reflect on the humanities and social sciences at PSL. Based on in-depth articles, the magazine gives voice to researchers and students while being intended for the general public. Set up by ENS students in 2002, the magazine now includes students from Dauphine on its Editorial Committee and actively works with the PSL Ecoles for arts.

Publications: *Where are the maths?*, magazine No. 13, which appeared in May 2014 whose artwork was done by students at Beaux-Arts.

Edition No. 14 was devoted to *Violence* on 12 December 2014. Its launch was accompanied by a screening of Sam Peckinpah's *Ride the High Country*, followed by a discussion on the portrayal of violence in cinema between the audience, S. Denis and Emmanuelle Tissérant-Perez (EHESS).

The **Lutétium** project is a popular science channel on YouTube, which brings together pupils from ENSAD and PhD students from ESPCI in order to make professional quality videos exploring original scientific topics, in English or French, with strong artistic components.

Website: www.lutetium.paris

The online magazine, **Bulles de savoir**, supported by PSL students is dedicated to sharing knowledge. It also provides written or filmed interviews with a recognised expert. <http://bullesdesavoir.com/>

2014 figures:

58 published articles including 10 video interviews

51 contributors

3,000 different readers on average per week

2,620 fans on its Facebook page, or an increase of around 265 % over the last 6 months.

PROCYON organises annual lecture series dedicated to astrophysics and aimed at the general public. The talks are hosted in various PSL institutions such as ENSAD or the Institut Curie. They are complemented by a visit to the Observatory at the end of the series. <https://www.procyon.espci.fr/fr/>

Example of programming for 2013 and 2014:

- 16 January 2013, Jean-Marc Lévy-Leblond, "Why is it dark at night?"

- 1st April 2013, Roland Lehoucq, "Can we make astrophysics from science fiction?"

- Antoine Labeyrie, Astronomer at the Haute-Provence Observatory, Professor of Observational Astrophysics at the Collège de France, Wednesday 12 November 2014 at ESPCI,

- Thomas Widemann, Astronomer at LESIA (Laboratory of Space Studies and Instrumentation in Astrophysics), Paris-Meudon Observatory, Senior Lecturer at Versailles-Saint-Quentin University, Wednesday 10 December 2014, at ENSAD,

- Michel Mayor, Emeritus Professor at University of Geneva. He is the first person to have discovered an exoplanet. Wednesday 5 March 2014, at Institut Curie,

- Marc Ollivier, Astronomer at the Institute of Space Astrophysics at Orsay, Wednesday 2 April 2014, at ESPCI.

The association, "**Cogito Brunch**" organises brunches and open lectures for everybody at École des Mines de Paris with the aim of connecting the Paris Sciences and Literature network. Contemporary thinkers - artists, scientists, writers - are invited to discuss the major social issues. These events are extended by brunches during which the audience can debate and ask questions about the proposed topic. This makes the major cultural issues accessible to all with an introduction to this discipline often considered elitist.

<https://www.facebook.com/cogitobrunch?fref=ts>

Dauphine Discussion Débat organises debates and major interviews open to all PSL students. These events bring together up to 1,000 students and are led by the organisation members. So, the public has the opportunity to ask the guests direct questions for a dynamic and interactive discussion about subjects which closely affect current affairs. This year, there were 14 debates and "Major Interviews", including a discussion with Mme Le Gal (Advisor on Africa to M. Hollande) and a debate between M. De Rugy (EELV [Europe Ecology-The Greens] deputy) and M. Mariton (UMP [Union for a Popular Movement] deputy) on energy policy. <http://dauphinedebat.com/>

La Plume is a student newspaper which freely explores subjects, such as the economy, culture or more generally current affairs. Supported by a website, it publishes four printed issues of 32 pages during the academic year. <http://laplumedauphine.fr/>

7- Sports

In January 2014, the **PSL Voile** crew was formed from students from different PSL institutions: ENSAD, Mines and ENS. The training sessions occurred over five weekends between March and April 2014 at the Le Havre Regatta Society and enabled them to participate in the Le Havre Voiles Étudiantes regatta with a ranking of 8th out of 17.

RUGBY PSL, on 15 March 2014, the PSL student rugby players took part in organising the **Soyez Rugby** day Paris-London University Challenge, organised by the PSL sports association

Le Chapitre des Armes is a PSL student initiative aimed at practising, studying, and promoting European historical warfare techniques. Since 2013, it has been offering PSL students:

- the practice of Mediaeval and Renaissance fighting techniques by trying to reconstruct the techniques and ways of fighting as they were practised at the time. The weapons used are very varied: sword, dagger, club, spear, etc.
- the study of old books: a specific feature of the discipline in order to advance the discipline by confronting different opinions and interpretations.

The first PSL "**Head and Legs**" race took place on Sunday 24 May 2015. Open to PSL students, this 8 km course race was preceded by a general culture questionnaire whose results will count towards the final ranking, just like the physical performances. Organised by the Dauphine sports association , the race was followed by an awards reception in the main university courtyard. The Dauphine sports association is a partner of the ELA (European Leukodystrophies Association) which helps children with leukodystrophy. In addition to students raising awareness, a part of the proceeds was donated to the association.

<https://www.facebook.com/as.dauphine.paris?fref=ts>

The "**PSL Paris Fencing Tournament**", is a student and European fencing competition, which was held on 9-10 May 2015 in the heart of the Latin Quarter in the CROUS de Paris gymnasium. This first event brought together more than 60 participants from 17 different universities, including 5 foreign ones. The second event will be held in April 2016 over two days and will involve the three weapons: épée, foil, and sabre individually and as a team.

http://ece-escrime.fr/?portfolio_category=psl
<https://www.facebook.com/ECEscrimeParis>

8- Sustainable development

The **PSL environment project: waste, first step in sustainable development** has been bringing together students from the Dauphine Durable, Écosciences (Chimie ParisTech) and Écocampus (ENS) organisations since 2013, with the aim of improving waste management across Paris Sciences et Lettres.

- An enquiry into sorting in the PSL institutions via an online questionnaire circulated to all members. The results of this opinion poll with regard to ENS can be viewed on the Ecocampus website
- A series of events raising awareness of selective waste sorting and waste management on the Dauphine, Chimie ParisTech, and ENS campuses throughout the year 2013/2014: screening of the film *Wasteland* by Lucy Walker at ENS and at Paris Dauphine; event with the visual artist Zampo and "Prof Cindy Salmon", "plasticologist" interpreted by Compagnie Caribou at ENS, Dauphine, and Chimie ParisTech; screening and discussion of the film "Ready to Throw Away" by Cosima Dannoritzer on programmed obsolescence at ENS; visit to the Vert-le-Grand (91) incinerator; screening of the fictional documentary *Into Eternity* by Michael Madsen at Paris Dauphine; lecture and discussion on nuclear waste at ENS. With Bernard Laponche (nuclear physicist, Global Chance network) and Fabrice Boissier (National Agency for Radioactive Waste Management), a lecture-discussion with Delphine Lévi Alvarès (Independent Information Centre on Waste – CNIID) on waste management in France and its control at Chimie ParisTech.

The **Second Life** project enables all mobile phones, computers, printers and unused connectors to be collected on the PSL campus in order to be refurbished or dismantled ecologically. The recovered devices are then used in social or humanitarian projects. So, the collection in 2015 helped to set up a cybercafe in Togo in partnership with a local association.

The event "**Solutions for the Climate**": **Research and designs by PSL e-s students** was held at the same time as COP21 on 29 November and 2-6 December at the initiative of PSL students (ENS, ENSAD, ESPCI, Dauphine) engaged in environmental protection and who came to present their research and designs for a more sustainable world. This exhibition/performance also helped to prepare for the foundation of the PSL Sustainable **Club**: a network linking all the organisations and e-s students at PSL, rallying around environmental, ecological, climate, and sustainable development topics.

<https://www.facebook.com/psldurable/>

9- Support for young researchers

The 13th forum of cognitive sciences in the Île-de-France area, organised by the student organisation **Cognivence**, was held on 22 March 2014 with the title *Man, animal, machine, at the intersection of intelligence*. 2,000 visitors were received throughout this day to promote the cognitive sciences with the scientific community and the general public.

Focus 2013: 12th forum of cognitive sciences in Île-de-France on 30 March 2013, "When consciousness makes science"

Focus 2015: 14th forum of cognitive sciences in Île-de-France on 28 March 2015, "Humour, laughter, and irony, how does our brain work?"

After the success of its first programme (on 31 May 2013), the second **Multidisciplinary Paris Sciences et Lettres Day** was organised on 24 May 2014 at the initiative of PSL PhD students in the PSL lecture hall. These two days allowed 24 PSL PhD students to present their ongoing research studies before the general public. Videos of their presentations are available on the PSL website:

http://www.univ-psl.fr/default/EN/all/education_fr/journee_pluridisciplinaire_des.htm

The 2nd programme of **Meet the Young Physicists** on 6 November 2014 brought together the community of young physics researchers in a colloquium organised by and for young researchers.

Estimated summary for the 2014 programme:

- 200 registered
- 140 participants
- 41 abstracts submitted
- 16 verbal presentations
- 45 posters
- 10 organisers
- 14 PhD students represented (109, 127, 162, 287, 288, 391, 397, 447, 474, 511, 517, 534, 560, 564)

APPENDIX VIII - Note on the organization of reflection, teaching and academic innovation in research universities

This note addresses the proposal in V3 of Chapter 2 of the Idex Rapport to create a university within PSL, which would be responsible for training PSL managers on how to “re-think the university of tomorrow”. It would thus become a major driver in the PSL learning organization by both stimulating organizational innovation and promoting visibility of PSL as an entity. Three specific tasks are at play in this process: forward-looking thinking about the university’s organization; training of personnel in order to enhance “academic management”; and support for academic units in their innovation and transformation process. We will provide a brief overview of the bodies that are responsible for these tasks in international research universities today.

Three models can be distinguished:

- A Committee-Based Model.
- An Institutional Research Model where the university’s central organization is responsible for the collection and analysis of data, and its transformation into effective policy.
- The Innovation Lab Model where a specific organization is set up with its own team to provide support to academic units. It is generally focused on questions of educational innovation (Education Lab), and we will consider only those Labs that provide academic units will support for their educational innovation.

For each of these models, we will set out the task or tasks for which they are responsible: forward-looking thinking, training of personnel, or support for innovation.

1- The Committees Model: MIT/NYU/JHU

An essential element in the governance of Anglo-American research universities, the Committees are working groups that bring together members of various academic units within the university, generally led by an administrative representative (Vice-Provost, Deputy Vice-Provost or Chancellor, etc.), under the authority of the relevant Vice-Provost (academic affairs, personnel, international relations, etc.). They can be permanent (standing committees) or non-permanent for topical subjects (ad hoc committees).

These working groups are generally responsible for making recommendations to the university’s decision-making bodies. They can write formal reports but are not involved in the training of staff, or in providing support or implementing programs that result from their recommendations. Generally speaking their role is primarily one of forward-looking thinking. The issues they deal with can include:

- The functioning of the university (the strategic 10-year plan, the financing model, the use of digital technologies, etc.)
- Transversal academic questions (the future of education, the future of PhDs, etc.)
- Assessing the value of major thematic programs (Should an environment program be set up? Should a School of Education be set up?).

The role of the administration vis-à-vis these working groups is primarily to steer the reflection of academic members (logistical organization + coordination for the production of deliverables; they may also liaise with external experts on specific subjects).

MIT is one of the universities that gives its Committees the most important role to play in forward-looking thinking: on extremely varied subjects (Future of MIT Education, Graduate Education and MITx, MIT School of Education?, MIT Energy Initiative, etc.), and relative to various hierarchical levels (Congregation, President, Provost, Graduate School). At NYU and Johns Hopkins, the work of the Committees is facilitated by a sufficiently strong administration (extended Provost's team with approximately 15 Vice-Provosts in each case), which ensures the production of reports and the implementation of recommendations.

Principal task performed: forward-looking thinking.

2- The Institutional Research Model: Harvard

Some universities have nevertheless decided to institutionalize their strategic thinking, conferring responsibility for this task on a specific individual. Harvard has thus set up an Office of Institutional Research, composed of a dedicated staff of 9 people under the leadership of a Vice-Provost for Institutional Research.

The mission of the Office: to collect and analyze institutional data from the perspective of higher education and its developments, thereby supporting decision-making in the university's various governing bodies (President, Provost, Governing Boards, Deans of Schools). It thus serves as a body for data analysis, strategic reflection, and advice for the different academic units. One of its principal missions is to provide useful information (internal data and insights on the functioning of higher education) in order to facilitate decision-making.

The Office is also responsible for relations with external accreditation bodies. Focused on organizational reflection and innovation, the Office has a number of counterparts in educational innovation. These include various research and experimentation centers (the 2 principal ones being the Bok Center and the Christensen Center), which test new educational practices and train academic staff in educational innovation. This exemplifies the separation proposed in Chapter 2 between the Internal University and the Teaching Center.

Principal task performed: forward-looking thinking + data analysis.

3- The Innovation Lab Model: HLUSt/Maastricht University

Some universities have sought to institutionalize academic innovation (to be distinguished from educational training for teachers, which is generally administered by Learning and Teaching Centers). They have thus set up Labs that provide support to academic units (schools, departments or professors) in the implementation of new teaching or academic practices.

In 2014, Maastricht University set up an EdLab that is focused on educational innovation and which also has a research and experimentation function. With a dedicated staff (8 persons), the EdLab is available for all teachers who want to develop their teaching practices. It also serves to analyze the functioning and success of innovative programs launched by Maastricht University. Two aspects are of particular interest: educational research and the concrete support given to academic units for the implementation of projects.

For its part, HKUST set up an Interdisciplinary Programs Office in 2008 that provides support for the creation of new research and training programs. It provides support to academic units that plan to launch interdisciplinary projects and also acts as an internal consulting body. Programs or projects can

then be carried out within the IPO (two majors – Environment and Bioengineering – in addition to an interdisciplinary Masters degree on risk management).

Principal task performed: support for program development.

4- Summary

Two messages emerge from this overview:

- The three tasks listed initially (forward-looking thinking, staff training, and support for academic innovation) are quite related, calling on skills and fields of expertise that are highly correlated. All three are essential to re-thinking and implementing the university of tomorrow. They all help facilitate changes and evolutions in the academic context. They all require strategic knowledge of the higher education environment. They all represent a valuable resource in the transformation of academic units, ensuring that the academics themselves also subscribe to the changes.
- These tasks are not centralized in a single structure; if PSL was to do that, it would represent a major organizational innovation for the institution. Such a structure, which would require the participation and acquiescence of member institutions, does not appear to be compatible with PSL's organizational model.

These two comments lead to one question: what will be the scope of the internal PSL university proposed in Chapter 2? Will it be limited to the training of a generation of PSL Managers? Or will it have within its scope of action the steering of inter-institution working groups (as per – and relative to the same subjects – as the Anglo-American Committees)? Is there any value in making it be a body that provides support for change, and thereby helps the institutions create new innovative programs?

APPENDIX IX - The P X L programme: People Excellence Leadership

Building the Excellence of Tomorrow

This note aims to make proposals to contribute to the reflection on the "PSL target university". The general idea is to strengthen the management of support teams for the development of the PSL Research University.

1- Plan

- Introduction: for innovative and efficient support services
- 6 findings and points of attention regarding the administrative organisation of PSL
- Potential target objectives for the "support & staff" services
- 2 complementary schemes:
 - o Progressive "à la carte" implementation of 7 cross-cutting projects
 - o Capitalise on the pre-existing skills of certain institutions

2- Introduction: for innovative and efficient support services

Toward a new management function: economic, light and inventive

PSL must create a new administrative superstructure that is light, economical and efficient: the objective is to facilitate the implementation of scientific and academic projects and to provide support and assistance for this strong ambition.

In this respect, limiting the numbers of PSL administrative staff is a major objective. It is important to show that the funding granted by our financers is indeed primarily devoted to its ambitious policy of research and training.

PSL must aim to be particularly virtuous in its organisation. It must even establish an original, ambitious and innovative goal for its administration and develop new standards of efficiency, innovation and economy in terms of the administrative management of its projects. It would thus act as a laboratory which would also allow its members to benefit from the feedback on experience.

Of course, this approach aims at an optimisation of the use of public funds and of the funds allocated by our financers. It may also offer its member institutions, at a time when the optimisation of budgets is a key issue, paths toward the simplification of their administrations in order to effectively focus their resources primarily on projects of research and academic recognition.

For a fluid and simple dialogue of management and coordination

The coordination of efforts and the operation in a network mode will ensure the integration, association, implication and mobilisation of the stakeholders around the ambitious and shared objectives of the site.

If the structure of PSL must ensure the quality of the reports with respect to its financiers and controllers, as well as equip the Steering Committee with the proper management tools, PSL Research University proposes to develop simple and innovative systems of feedback with the member institutions aimed at the empowerment and mobilisation of the recipients of funds, based on a dialogue of management and a well-planned timetable.

The mission of monitoring management is under the supervision of the Director General in charge of finance.

This dialogue could take place during a bimonthly conference with the general management of PSL, the directors general of the services of the institutions, their assistant directors general and their financial directors. This conference would aim to ensure the coordination of the reports, as well as the preparation of administrative decisions for the Steering Committee.

General coordination promoting the sharing of experience and the search for mutualisation

Beyond the quality and simplicity of the Idex/LabEx reports, the PSL general management team, with the COO and the SG of the member institutions, will promote the search for synergy between the institutions, the sharing of best practices and the search for economy.

It will achieve this:

- by building on common resources to advance common projects
- by promoting actions that will enable member institutions to benefit from:
 - the effects of scale (e.g. grouped orders and the promotion of a purchasing strategy),
 - the pooling of resources (premises, staff, equipment),
 - specific expertise (international, knowledge transfer, etc.).

General coordination encouraging innovation and agility

It will focus on launching original and innovative projects to complete, control and monitor a programme of transformation, or even ambitious multi-dimensional integration.

It will support the organisation in its pursuit of development by contributing to new sources of funding.

Finally, it will provide governance tools and innovative methods to promote flexible and efficient management, in particular with the support of well-designed IT systems which are deployed and shared or connected with the PSL institutions.

3- 6 Findings and points of attention

- Management of the ambition of PSL: to become one of the Top 20 Universities of Excellence
- Management of development in a complex environment: fast and sure, international, multi-site
- Management of the diversity of PSL institutions: professions, missions, visions, cultures
- Management of identities: varied, based on different trajectories and histories
- Management of strong personalities: ambition, pride, skills, excellence

- Management of the lack of resources and means within the institutions in terms of quality and number, and the intensification of auditing and reporting procedures

Findings and points of attention regarding the administrative organisation of the entire PSL

- It is essential to increase the transparency of decisions, information and project management to generate confidence
- The administration, or rather the Staff & Support services, has a dual mission:
 - o Secure the administrative and financial framework for the operation of PSL
 - o Provide perspective, global vision, methods, added value, ideas, resources, "smart simplicity" and real substance!
- Everyone, at all levels, must benefit from the dynamics of PSL and contribute to it.

Target objectives

- Propose scenarios for the development of organisation that
 - o Innovate, imagine, create value
 - o Reinforce, complement, fill gaps or weaknesses
 - o Generate cooperation, sharing and commitment... which should be the PSL spirit
 - o Secure and strengthen the development of PSL in its fundamental missions
- Devote the means (and find them) in order to promote initiatives for the cross-fertilisation of management
- Provide a budgetary framework and calendar for this initiative

In short, demonstrate that PSL "empowers" each of its members.

4- 2 complementary schemes which could unite and support development

- Implement 7 levers and cross-cutting projects in order to progressively disseminate a managerial culture and the tools for innovative and efficient management
- Identify and build on skills developed by the PSL institutions to capitalise on the know-how and save time

Here is a proposal of 7 levers and cross-cutting projects to federate the energies

1. **Create a managerial culture of excellence** by launching programs in the areas of quality development, project management, leadership, mutualisation, sharing experience and good practices
2. **Prepare, train and develop the managers of tomorrow with the creation of a Training Centre**
3. **Support the development of simple and effective Digital Solutions**
4. Propose to the teams of lecturers & researchers from very different backgrounds and disciplines a place for reinforcement, resourcing, exchange, meetings, discussion and re-creation: **the Centre of Teaching & Research Excellence**
5. **Develop international presence built on real logistics bases** to accelerate the Recognition of PSL
6. **Support the search for public and private resources:** marketing and commercialisation for new financial resources

7. Build new spaces for work and academic life

How the cross-cutting projects could irrigate and transform...

Empowered by PSL
RESEARCH UNIVERSITY PARIS

DAUPHINE
UNIVERSITÉ PARIS



l'Observatoire
de Paris

L'ÉCOLE
DES HAUTES
ÉTUDES
DES SCIENCES
SOCIALES

MINES
ParisTech

Chimie Paris
ParisTech

And the other
institutions

1-Programmes & Methods for the Management of excellence

2-PSL Manager Training Centre

3-Develop digital solutions

4-Develop a centre of pedagogical excellence and innovation for research

5-Prepare and support our international presence

6-Develop and support the search for funding and resources

7-Imagine new spaces for academic and university life

How the cross-cutting projects would be managed

Empowered by PSL
RESEARCH UNIVERSITY PARIS

DAUPHINE
UNIVERSITÉ PARIS



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de Paris

L'ÉCOLE
DES HAUTES
ÉTUDES
DES SCIENCES
SOCIALES

MINES
ParisTech

Chimie Paris
ParisTech

And the other
institutions

Project management:

Co-coordinators PSL / COO "commissioned" institution

Selected projects: each institution remains free to engage in a specific project and to determine when to get involved

Resources

- Budget allocation by PSL
- team (if applicable): PSL, external resources and availability
- power of negotiation (grouped purchases) and economies of scale

Governance

- PSL president's report (budget / lead time / quality / performance) e.g. Task force
- committee of members or Steering Committee

1-Programs & Methods of the Management of excellence

- ✓ It is the fruit of the current work of the group of COOs
 - Identification of avenues for progress
 - Launching inter-establishment projects
 - Sharing experience, documents and good practices
- ✓ To define:
 - the articulation of the group of COOs with the IS, Comm and HR groups, etc.
 - Reporting to the Steering Committee

2-Creation of a Manager Training Centre

- ✓ Objectives
 - Develop a common managerial culture of excellence
 - Boost the leadership skills of managers
 - Strengthen the skills and expertise of the collaborators
 - Identify and Master the key skills (e.g. Leadership, Project Management, Quality, Language skills, etc.)
- ✓ Means and possible operator: House of Public Affairs and DEP of Dauphine-PSL

NB1: We already have programs open to managers of PSL

- Executive Master in Public Management
- Executive Master in Research Management
- Executive Master in the management of change in public organisations
- Executive Doctorate in Public Affairs

We are in the process of developing a programme for the management of projects and quality (2 levels: the basics over 2 days, certification over 5/6 days)

We can develop cycles of conferences with managerial themes, but also on all the subjects of interest to PSL

3- Develop digital solutions that are innovative and which create value

- ✓ Services to students (and to lecturer/researchers)
 - MOOCS, SPOCS
 - ENT

- Multi Service Card
- Knowledge portal
- ✓ The dematerialisation of administrative operations
- ✓ "A la carte" pooling of the deployment of new IT systems
 - Human resources information systems (HRIS)
 - Finance IS
 - Academic IS
 - Research IS
 - Websites, etc...

4- To develop a centre of pedagogical excellence and innovation for research

- ✓ Create a "Faculty Club" or a faculty network: both physical and digital
- ✓ Develop resources to develop the pedagogical skills of lecturers/researchers
 - Teacher training with the best foreign institutions and universities
 - Theatre workshops
 - New technologies...
- ✓ Provide lecturer/researchers with premises and cutting-edge tools to support their research
 - FabLabs
 - Video walls
 - Etc.

5-Prepare and support our international presence

- ✓ Identify and build on the "international" contacts of PSL members:
 - CNRS network,
 - EFEO,
 - Dauphine,
 - etc.
- ✓ Gradually create legal structures to assure the development of the activities of PSL abroad

6- Develop the search for financial resources

- ✓ Secure sustainable public resources for the institutions (e.g.: the risk of budget cuts)
- ✓ Optimise the search for funding in a coordinated manner

- CPER (national-regional contracts)
- Financing by local communities
- European funding
- ✓ Develop a strategy for the search for own resources
 - Tuition fees
 - Businesses
 - Continuous training
 - Sponsorship and donations

7-Imagine new spaces for academic and university life

- ✓ Student housing: promote the idea of "Houses"
- ✓ Host Incubators
- ✓ Develop Learning & Research Centres
- ✓ Digitize the campuses
 - Deployment of fibre broadband
 - Wi-Fi everywhere
 - Harmonise equipment for simple connection throughout PSL

2-Identify and build on the skills developed by the institutions

Empowered by PSL RESEARCH UNIVERSITY PARIS

	DAUPHINE UNIVERSITÉ PARIS	ECOLE NORMALE SUPÉRIEURE	EPCI ParisTech	L'ÉCOLE DES HAUTES ÉTUDES SCIENTES SOCIALES	MINES ParisTech	l'Observatoire de Paris	And the other institutions
ENT, CMS...	X						
Continuous Training	X						
New spaces for <u>academic</u> and university life		X					
Student housing		X					
Innovation and incubator	X		X		X		

How know-how develops and is shared...

Empowered by **PSL** 
RESEARCH UNIVERSITY PARIS

DAUPHINE
UNIVERSITÉ PARIS



l'Observatoire
de Paris

L'ÉCOLE
DES HAUTES
ÉTUDES
SCIENTES
SOCIALES

MINES
ParisTech

Chimie Paris
ParisTech

And the other
institutions

Project management:

COO or the "resource" teams of the institutions "identified" by their skills

Selected projects: each institution remains free to engage in a specific project and to determine when to get involved

Resources

- Budget allocation by PSL: funding for the "base" and human resources (e.g. worker with PSL contract "placed" with the IT services of Dauphine)
- Funding of "variations" per institution
- team (if applicable): PSL, external resources and those ideally available within the institutions (the challenge of maintaining the level of skills within the institutions)

Governance

- PSL president's report (budget / lead time / quality / performance) e.g. Task force
- committee of members or Steering Committee

APPENDIX X - The Digital Development Plan (DDP)

1- Achievements

With the implementation of the DDP in 2014 and 2015, PSL has conceived, developed, deployed and put into production the following information systems, which will be operational from 31/12/2015:

- The X-Net portal offering services to different communities within PSL (teachers, researchers, students, etc.) and the general public;
- The knowledge portal, helping teachers, researchers and students to navigate the resources of PSL's institutions;
- The digitalisation of the historical resources that constitute PSL's cultural heritage, available through the knowledge portal (PSL Explore) to the general public who, for example, will be able to discover a virtual copy of an original work;
- A system for advertising and managing calls for proposals, making this complicated process more straightforward for researchers, lecturers and students;
- The *Partage* messaging service for internal use by those working for PSL services;
- The collaborative student portal, centralising resources for PSL students, based on the software developed by Paris-Dauphine University and since adapted and deployed for the whole of PSL;
- The staff portal, allowing for the exchange of documents about projects between PSL services staff and improved coordination of the administrative staff of the different institutions.
- Three fixed studios and two mobile studios, all fully equipped, as well two newly recruited digital media producers, for the production of MOOCs to be shared between institutions;
- The PSL Alumni website;
- The 'Repex' collaborative portal for the collection and computation of performance indicators and statements of expenditure, to be used by the general directors of services and the finance directors of the institutions in order to make this key reporting process more coordinated and more reliable.

2- To be deployed between 2016 and 2018:

- A repository of structures and people, as well as a directory and federated identity, which represent an indispensable foundation for the many systems mentioned above and will be finalised in September 2016;
- A single PSL Wi-Fi network available across all institutions, currently in development and operational from summer 2016;

- Management systems for the administration of student services and PSL doctoral students, to be launched before summer 2016;
- The electronic document and records management system, to be operational before the end of 2016;
- A single PSL card, harmonising the 14,000 existing student cards spread across the different institutions and offering a range of services (secure access to certain rooms, access to the canteen, library access, discounts on books etc.), to be finalised by the end of 2016;
- A document and records management system for resources belonging to the different institutions and shared for use across PSL and a management system for centralising and disseminating research documents, to be launched in 2016;
- A management system for transfer to industry actions, providing services for registering patents and providing support to start-ups, available from 2017;
- A decision support system to replace Repex, designed to automatically manage the data from management and performance indicators by connecting directly to the institutions' information systems, to be operational from 2017;
- The optimisation of the infrastructure of the inter-institutional network, to be brought up to the Ministry's security standards in 2017; A management system for running and disseminating the bibliometric database, planned for 2018;
- Centralised management of libraries, a network as wide as it is complex, to be developed during 2018.
- Finally the shared system for computing big data, through the creation of a cluster, planned for 2018

APPENDIX XI - Paris Sciences et Lettres' real estate and urbanisation master plan

Priorities

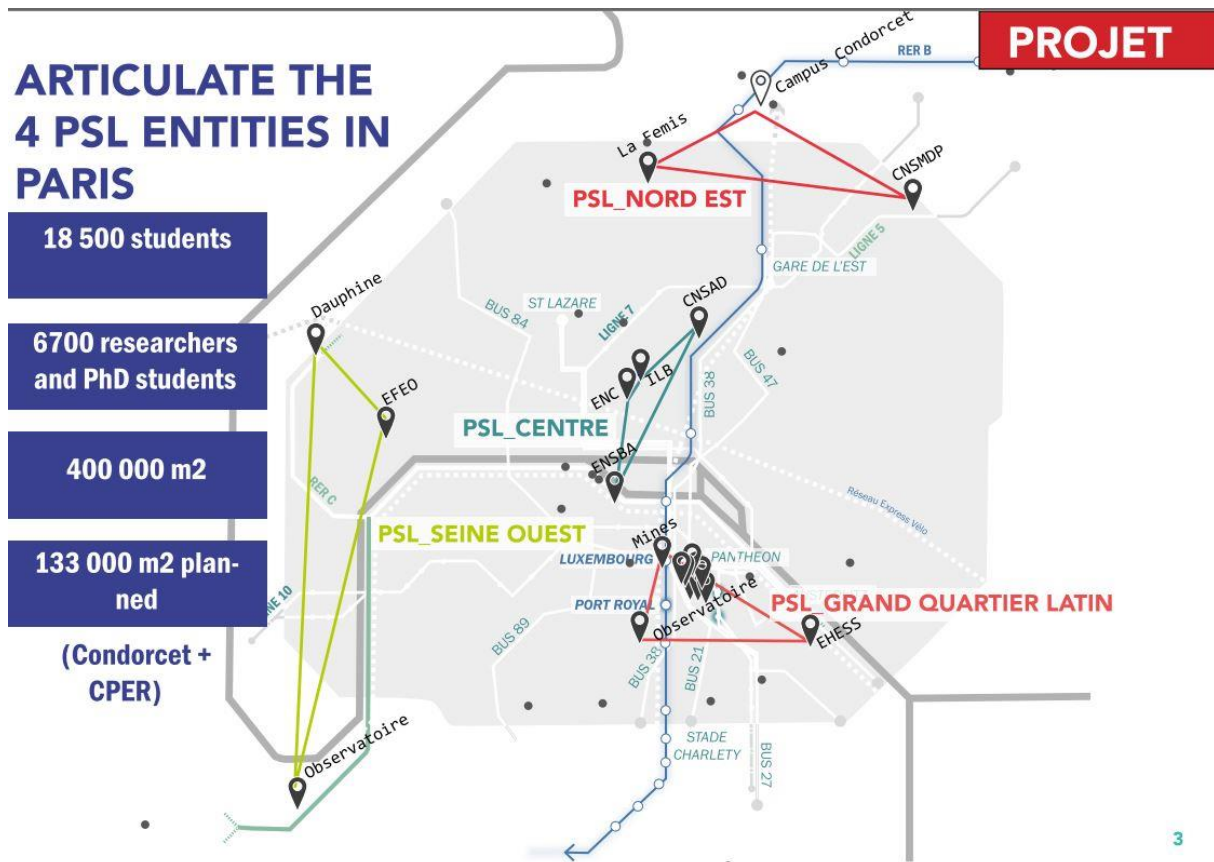
- 1) Improve students and researchers living and working conditions
- 2) Make PSL's Urban Campus more visible and comprehensible
- 3) Take advantage of real estate opportunities with the support of the Paris city council.

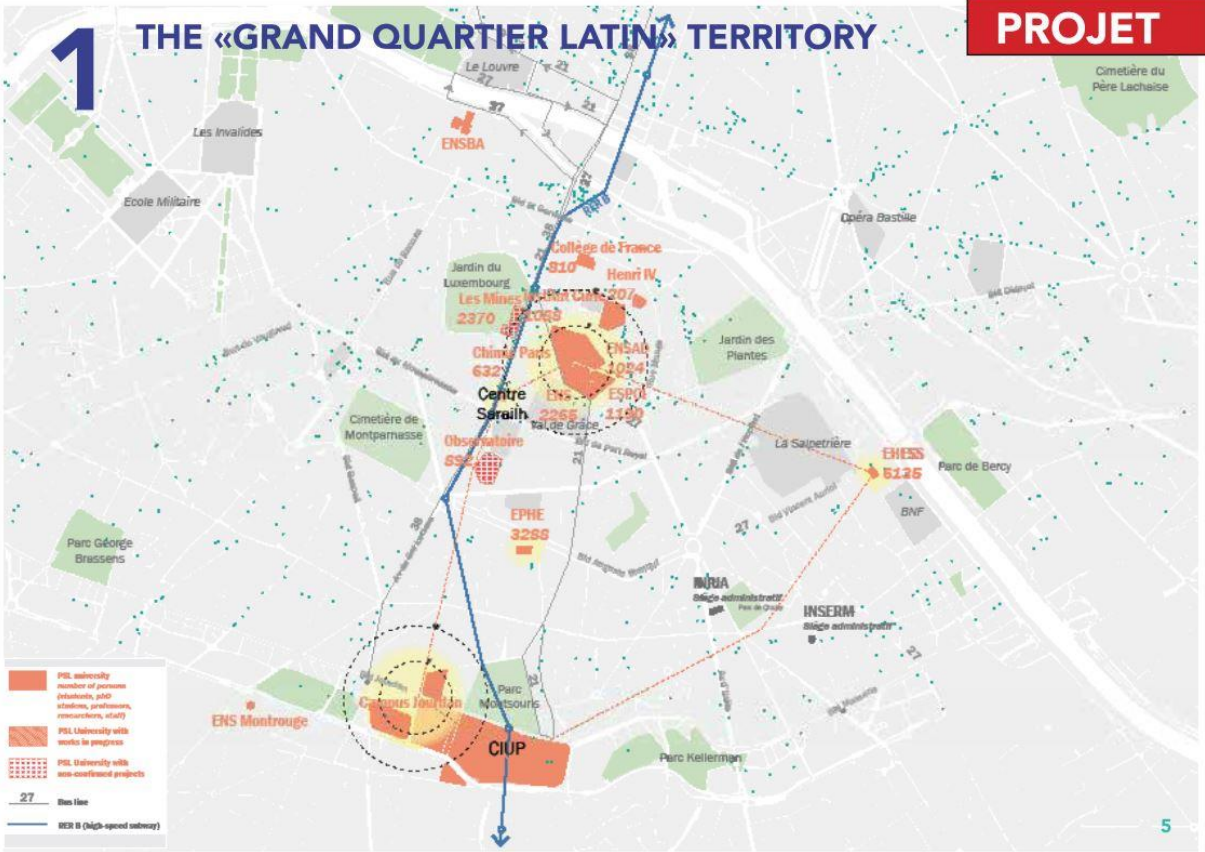
OFFER THE SPATIAL CONDITIONS FOR PSL'S DEVELOPMENT

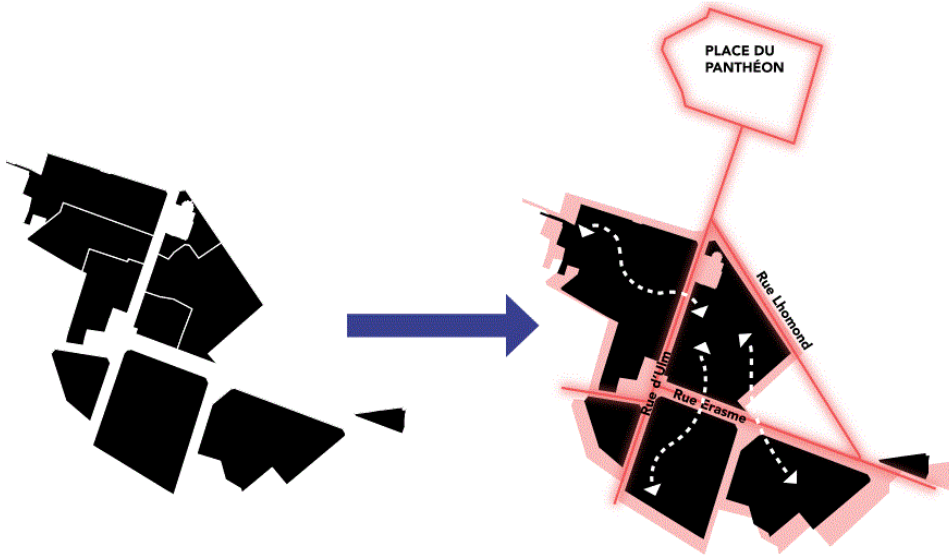
- > One priority: student and researcher housing
- > Identify mid and long term real estate opportunities

ESTABLISH PSL CAMPUS

- > Recognize PSL establishments in the city
- > Open the establishments to different types of groups
- > Make possible study and research in a legible urban campus

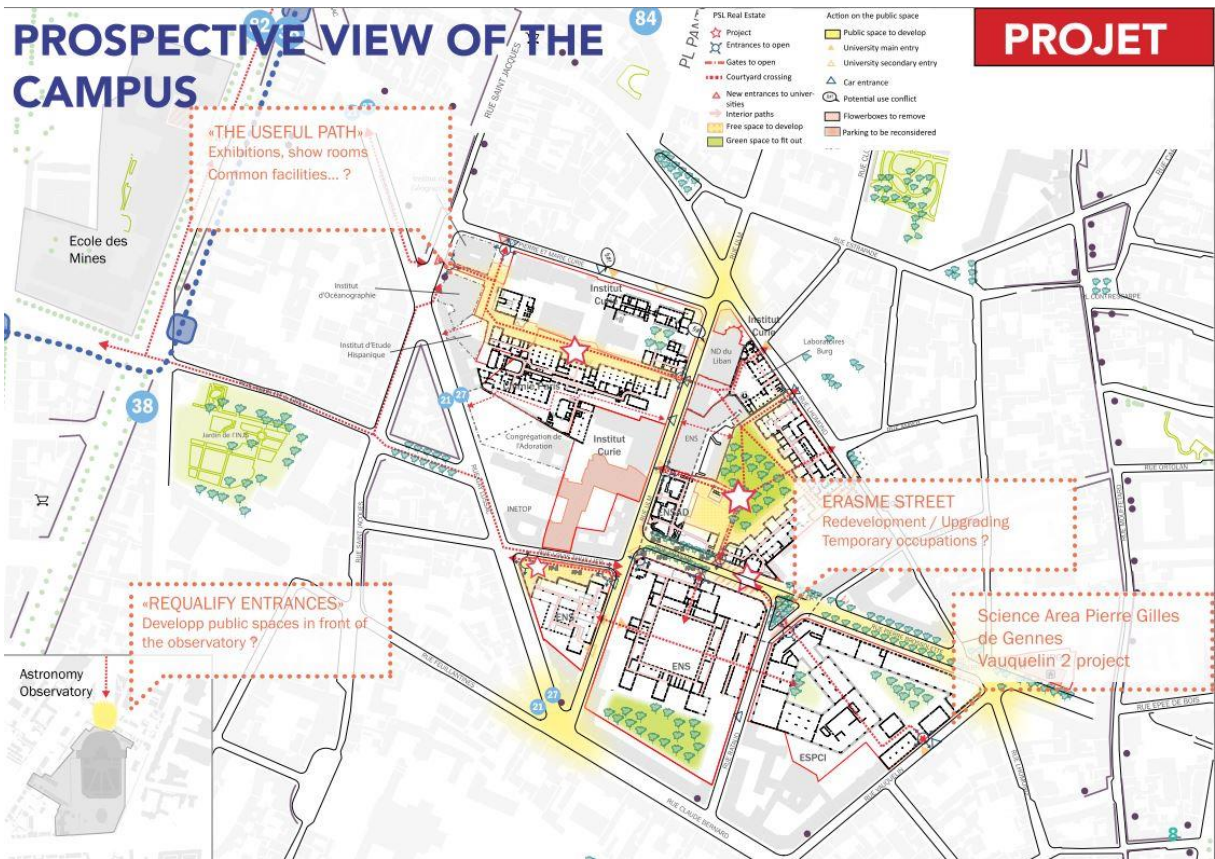






FROM A NEIGHBOURHOOD...

... TO A CAMPUS



PROJET



COURTYARDS
INSIDE THE PSL
UNIVERSITIES

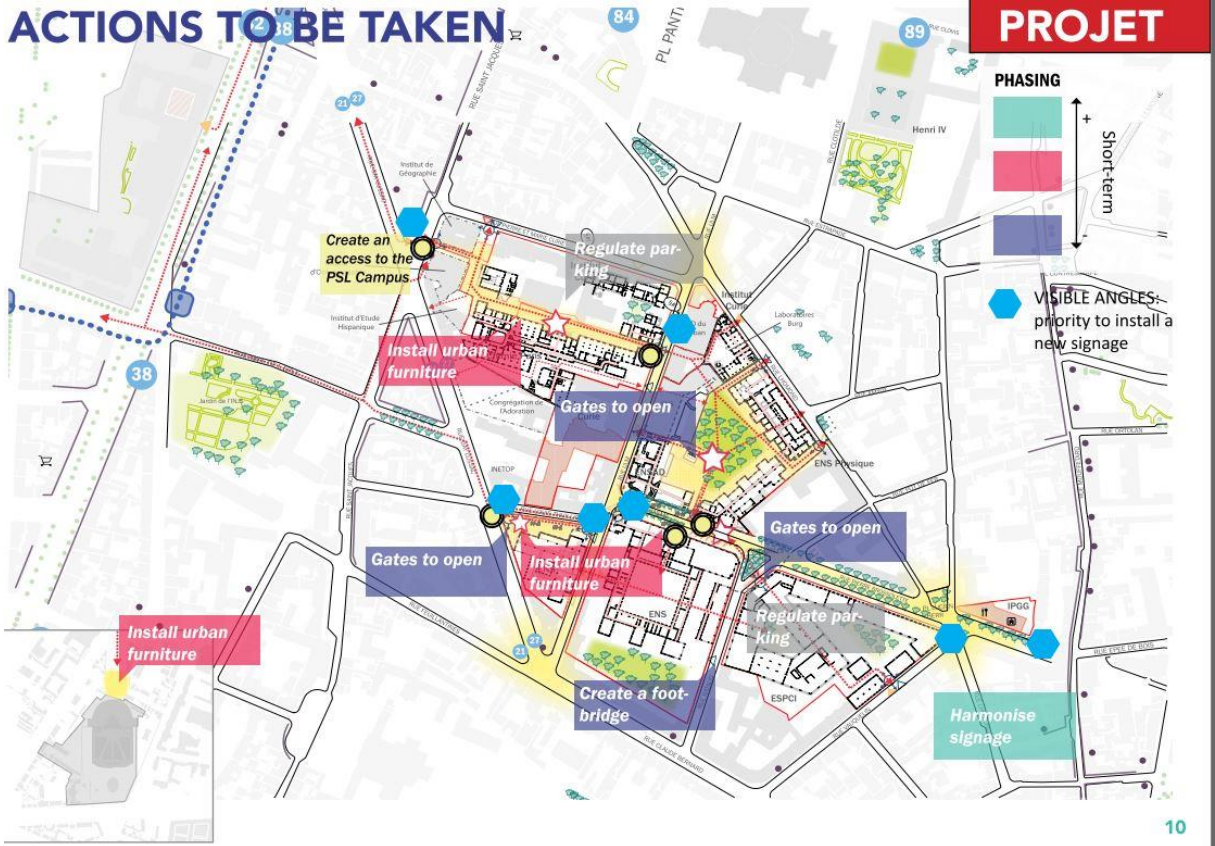


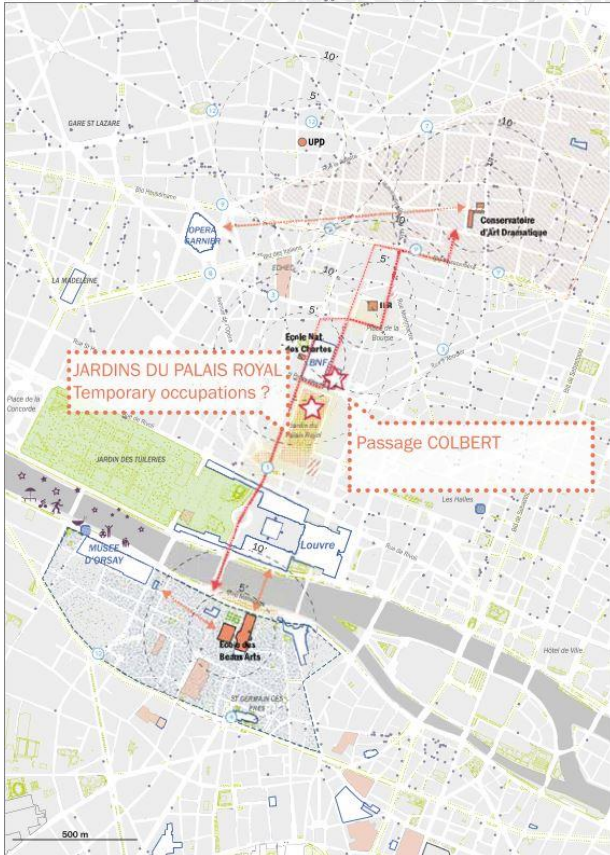
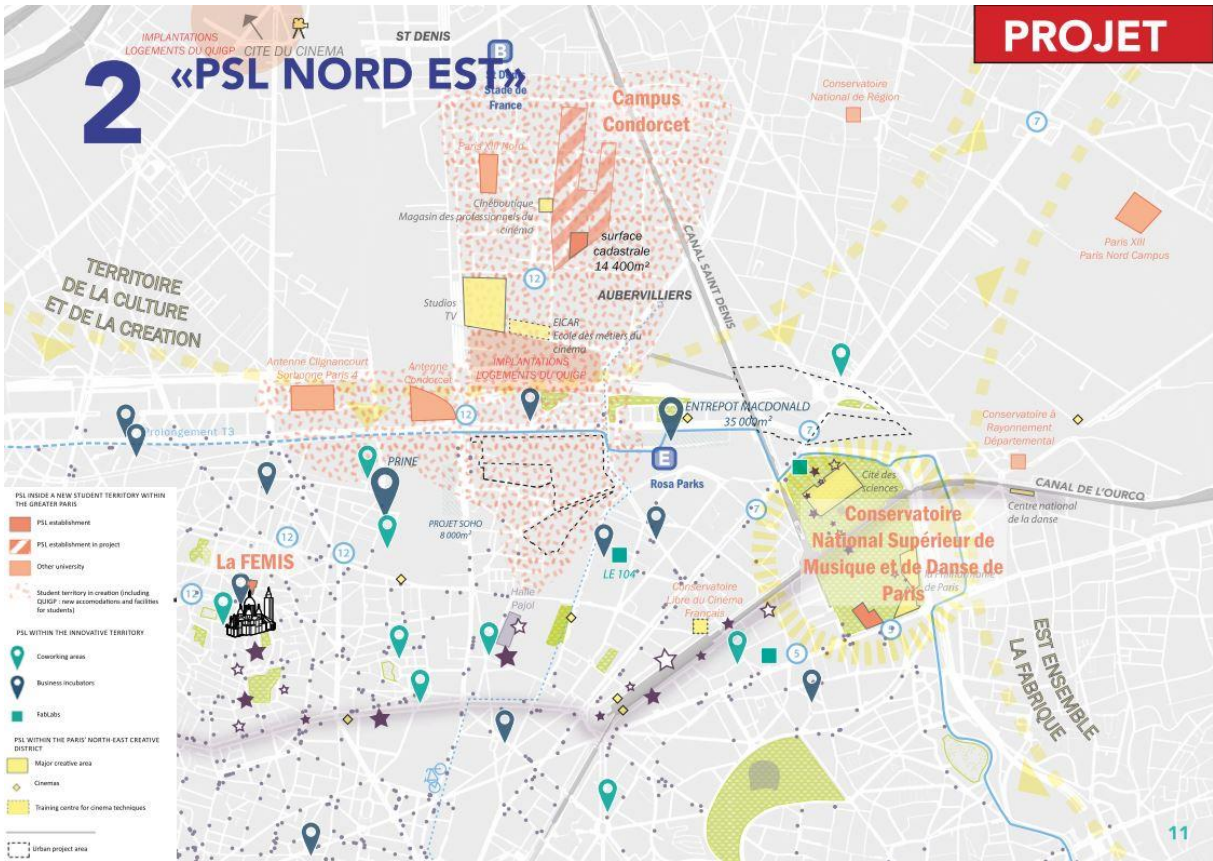
RUE ERASME AND PLACE KASTLER :
UPGRADE THE PUBLIC SPACE



ACTIONS TO BE TAKEN

PROJET

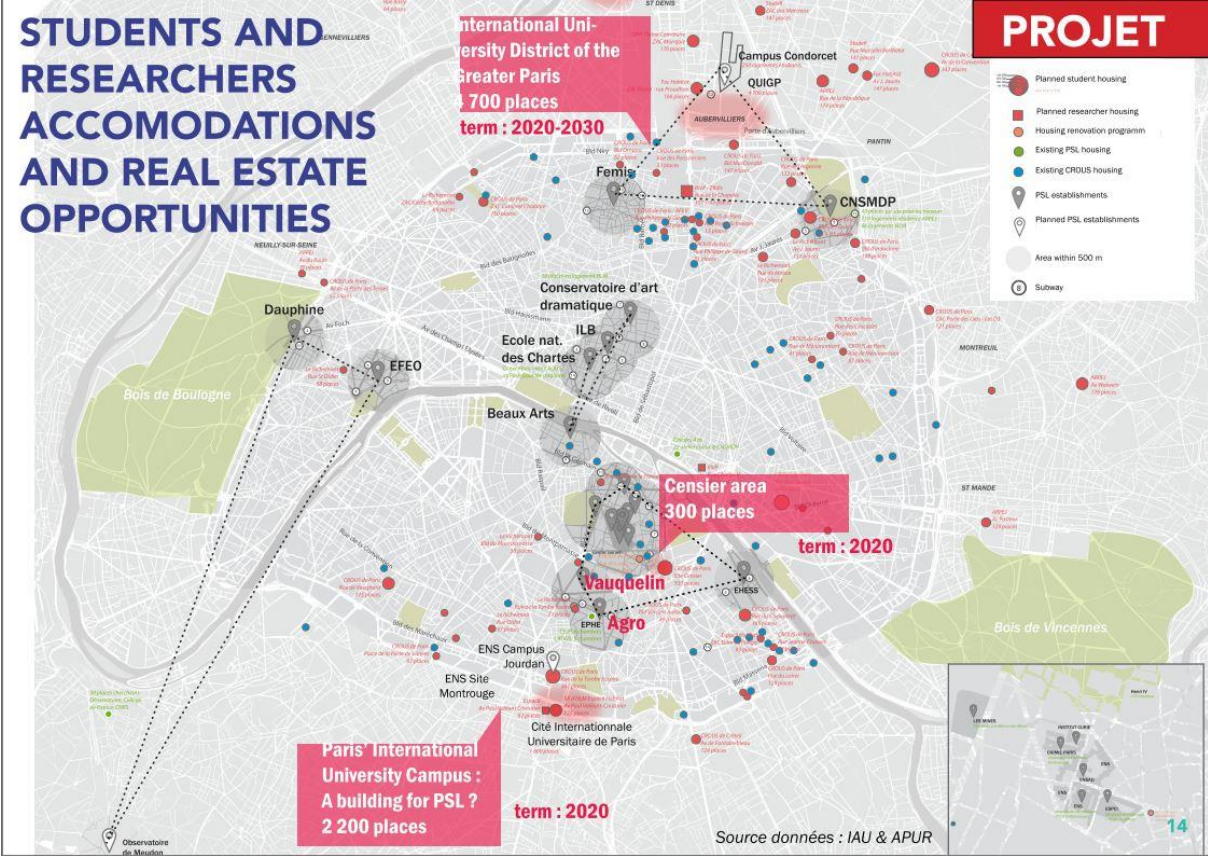




STUDENTS AND RESEARCHERS ACCOMODATIONS AND REAL ESTATE OPPORTUNITIES

PROJET

- Planned student housing
- Planned researcher housing
- Housing renovation program
- Existing PSL housing
- Existing CROUS housing
- PSL establishments
- Planned PSL establishments
- Area within 500 m
- Subway



Source données : IAU & APUR

APPENDIX XII - First Report of the PSL Strategic Directions Committee

(in French, the committee is known as the Comité d'Orientation Stratégique (COS))

January 2014

Background: PSL Strategic Directions Committee (SDC)

1. The SDC was set up by the PSL Directorate to offer commentary, insights and guidance on PSL's vision and goals and to offer recommendations for the short, medium and long term. The members* of the SDC were invited to Paris on 8-9 December 2013. In advance of the meeting, the PSL Directorate circulated to members of the SDC a series of presentations about PSL, including some describing individual initiatives. These documents proved an excellent foundation for the Committee's deliberations and discussions with colleagues from the PSL Foundation and from member institutions of PSL. The SDC members are grateful to all PSL colleagues who gave of their time and engaged very openly and creatively with us.

2. This report is based on our reading of all the documentation provided, on background research carried out by members of the SDC, and on our discussions and deliberations in Paris.

Introduction

3. The committee members were unanimous in applauding the vision and the ambition of PSL, which aims to become a truly world-class research university, one that is recognised as amongst the leading universities in the world. PSL is already more than simply a grouping of prestigious institutions: unusually but excitingly, it seeks to become a full academic entity operating as a federation with a central directorate and all of the characteristics of a research university**, offering the full (L-M-D) range of educational provision as well as undertaking research. The ambition is shared by all of the member institutions of PSL, which are themselves committed to excellence and of the highest quality in research and education. There is also a shared commitment to developing ever-more innovative and interdisciplinary synergies in research.

4. PSL thus has enormous academic assets and has the potential to be a genuinely paradigm-changing university in Europe (and, indeed, globally). However, the diversity of its federation also raises questions and challenges, since each member institution has its own history, deep-rooted culture, specific ways of functioning and, indeed, national (and to differing extents, international) brand and profile. Furthermore, the member institutions maintain their autonomy. In other words, PSL is neither a tactical grouping nor a traditional merger but is, rather, a unique integrative federation, based on the convergence of research and educational initiatives. A significant indication of the PSL vision is that it aims to be a research university with a common signature and a common degree.

* See Appendix 1 for membership of the Strategic Directions Committee.

** For a recent definition of what makes a research university, see the Press Release on the Hefei Statement on the Ten Characteristics of Contemporary Research Universities announced by AAU, LERU, GO8 AND C9 and the Statement itself (attached in Appendix 2)

5. It was made clear in many of our discussions that, while there was considerable enthusiasm for the concept of PSL, its origins were rooted for some in anxiety about their own institutions' ability to develop and flourish alone in an increasingly complex higher education landscape in France and in the highly competitive globalised landscape of higher education research and education.

6. The main issue is therefore one of integration and collaboration, rather than one simply of excellence, since that has already been achieved – although it needs to be fostered, furthered, deepened and broadened as PSL develops a culture of and commitment to innovation.

7. PSL must therefore aim not only to be a world-class university, but also to establish a deep sense of collective vision and to become and operate as 'a harmonious congregation'. Furthermore, it must also hold fast to its vision of making innovation and interdisciplinarity key defining characteristics. Additionality through growth and federation is not enough; it is vital that new synergies be identified, nurtured and promoted across all of PSL's academic, administrative and corporate processes and not simply in research.

PSL as an institution

8. Developing a federal entity is the most challenging and the most interesting problem faced by PSL. It might initially seem to be just an organisation problem of building a workable federation. However, it is not just a problem of structure and organisation but a linked problem of strategy, structure, culture and identity, people and leadership. Ultimately it is a problem of delivering outcomes in the short, medium and long term; consequently, the setting of deliverable targets across different timescales becomes a crucial political problem.

9. PSL seems to have made great progress in a relatively short time. This is laudable, but also potentially dangerous. Sometimes those who move first and fastest can be those who fall first into the pitfalls and fail. Somehow PSL has to manage the temporal problem of achieving purpose and momentum in the short term whilst also providing the seeds of sustainable development in the medium and long term. This is one of many dualities that PSL faces as an institution and it will be helpful if the PSL board explicitly recognised these dualities and worked on them as an ongoing agenda.

10. The central duality is how to build a credible and progressive institution whilst also nurturing and sustaining relationships with its constituent parts. The complexities of engaging with these dualities over time will require an explicit 'learning-by-doing' process. PSL must capture what it learns and respond to any mistakes of judgment or direction in a judicious manner.

11. The creation of a common degree (e.g. the undergraduate programme) is a notable step forward. It is just as vital that all staff commit personally to the desired common signature in publications, public lectures and conferences, consultancy work, etc. It is thus important to make the member institutions and their staff members understand that the common signature does more than confer heightened institutional value: it will ensure that PSL performs much better in the international ranking tables than any of the individual institutions could do alone.

12. PSL has already embarked on institution-building initiatives. SDC commends the three types of research funding instruments that have been implemented for the years 2012 and 2013: pilot, exploratory projects (PEPS); inter-institutional structuring projects; and PSL Chairs of Excellence. SDC also commends the fact that, while each of these funding initiatives has its own purpose, they share the overall objectives of increasing interactions between PSL research teams and promoting a structuring momentum and the fact that the criteria for selecting projects were scientific excellence, their potential impact for research at PSL, and how they would help in the organisation and development of research.

13. SDC considers it paramount that further instruments (with a greater funding pot made available) be put in place to leverage the exceptional quality of the science represented in PSL institutions and encourage cross-institutional collaborations, which both provide an impetus for structural development of PSL and foster the sense of belonging to a single over-arching institution.

14. However, the criteria for evaluation of the projects could be better spelled out. In addition to the excellence of science, the potential for the emergence of a common PSL culture and for the promotion of the values of PSL seem to be important. Also, all projects, including those involving the humanities and arts, should be evaluated externally.

Recommendation 1: The PSL Board should explicitly consider on an on-going basis the dualities of achieving purpose and momentum in the short term and providing the seeds of sustainable development in the medium and long term.

Recommendation 2: PSL should adopt an explicit ‘learning-by-doing’ process as part of its strategic thinking and management processes.

Recommendation 3: The PSL Directorate should find ways of persuading all staff of the urgency and importance of using a PSL signature in all public engagements (publications, public lectures, conferences, consultancy work, etc).

Recommendation 4: Further research funding instruments (with a greater funding pot made available) should be put in place in order to continue the leveraging of the exceptional quality of the science represented in PSL institutions in order to encourage cross-institutional collaborations and consequent institution building.

Recommendation 5: All projects, including those involving the humanities and arts, should be evaluated externally.

Innovation and interdisciplinarity

15. The PSL commitment to both innovation and interdisciplinarity was applauded by all members of the SDC, who equally welcomed PSL’s determination to work creatively and effectively with business.

16. It was noted that traditionally the training received by French engineers made them into good ‘administrative engineers’, trained not so much to conduct research as to become the top managers of French multinational companies. The SDC noted also from the experience of a member who has been working with ESPCI for several years that there is considerable difficulty in persuading French researchers and French companies to speak to one another and that this is a long-term problem. In

this respect, ESPCI has been a leader in building relationships with industrial R and D (Research and Development) and in setting up joint laboratories.

17. ESPCI has been unique among the Schools in having a strongly research-based curriculum, and has introduced research-based projects running over several terms into the training of all students. This has been enthusiastically embraced by the students.

Indeed, when the International Scientific Committee of ESPCI met the graduates from 2009, these alumni highlighted their multidisciplinary expertise and the high value of their research training, stressing that this type of education was unique to ESPCI and should be perceived as one of the main strengths of the School.

18. A flagship PSL project is the creation of an Institute of Technology and Innovation (ITI), which brings together the strengths of 3 engineering Schools (ESPCI ParisTech, Chime ParisTech and MINES ParisTech) and ENS with several other PSL member institutions (Université Paris-Dauphine, Institut Marie Curie, Observatoire de Paris, Collège de France and École nationale supérieure des Arts Décoratifs); the École nationale des Ponts et Chaussées is also a partner. This is a highly ambitious project of integration in itself, as it seeks to harmonize the syllabi of the core engineering Schools with the further aim of promoting interdisciplinarity. In what will be a unique engineering programme in France, students will also follow classes in innovation and entrepreneurship and each student will have two tutors, one from business/industry and the other from the world of academic research; furthermore, students will be expected to work on a start-up project based on a business plan and aiming to develop a patent.

19. The SDC was very impressed by this determination to produce a different type of PhD focused not only on research but also on its translation to application. Furthermore, it applauds the decision to create from Autumn 2014 a doctoral programme including a preparatory 'D-zéro' year which will lead to a PSL pre-doctoral certificate, and then to a PSL doctorate, and SDC urges PSL to develop this example and create a PSL-wide doctoral programme on this innovative model, which will undoubtedly attract many excellent students from France and the international community. Such an increase in the number of doctoral students is essential if it is to be internationally competitive.

20. It will be crucial that this doctoral programme secures strong on-going financial and political support from both Government and industry, both for the obvious reason of sustainability of the programme and also (and even more importantly) in order to establish the national and international credibility of the programme.

21. SACRe, a programme for creating and performing arts students, is an equally innovative doctoral programme. Now in its second year, it is offered across the five PSL creative and performing arts Schools and ENS, and one of the originalities of the programme is that there is a mix of students from the six different schools. The students follow specific classes and a core programme of courses, the idea being that they should form a multi-disciplinary cohort of artists within a single doctoral programme. The aim is to train students at the interface between theory and practice, with the selection of students being based on their creative/artistic skills rather than on their theoretical or academic results. This is a bold and much-needed initiative, and SACRe has the potential to change the world of the arts as well as the academic world.

22. The importance and value of practice-based research in the arts is not yet fully recognised in France or, indeed, in many other countries. However, as countries increasingly see their futures in terms of the knowledge economy, it is imperative also to understand and exploit the benefits brought on both the individual and the national levels by the cultural sector, by what is now called the 'creative economy'. PSL's SACRe programme will give it a leadership position in France, but it might usefully engage with foreign research agencies which have developed both clear policies for practice-based research and funding opportunities for practice-based PhDs and collaborations between university academics and practitioners, e.g. the UK Arts and Humanities Research Council (AHRC) or the PEEK programme of the Austrian Science Fund (FWF).

23. CPES, the new undergraduate programme now in its second year, is another imaginative educational initiative, offering a creative alternative to the traditional preparatory class while maintaining a multidisciplinary core curriculum. SDC was impressed by the partnership approach to curriculum adopted, with the students starting their first year at Lycée Henri-IV and then, depending on their broad disciplinary interests, moving in the second and third year to the Grandes Écoles or Dauphine or split their time between Lycée Henri-IV and Lycée Louis-le-Grand. SDC applauds the fact that, thanks to a partnership with the British Council, all students will gain proficiency in English and enthusiastically welcomes the fact that students are exposed to research in two ways: through contact with doctoral students from the ENS from the first year of the cycle and through doctoral students from the ENS from the first year of the cycle research internships.

24. It is encouraging that all PSL students are able to obtain the PSL undergraduate diploma, and the SDC hopes that PSL will in time (and ideally as soon as possible) be able to issue a PSL Licence. This is essential if PSL is to be recognised internationally as a university as is normally understood. In this context, it is encouraging that the École de Chimie, for instance, has agreed that their students could be registered as PSL students with no extra enrolment fee and would be able to obtain the PSL diploma with the grade of a Licence. However, it must be a priority for PSL that it persuades the relevant ministerial authorities and other stake-holders of the need for PSL to award its own Licence and other degrees.

25. As noted above, PSL has already achieved much that is innovative and genuinely ground-breaking in its development of new approaches to research and research-led education.

Recommendation 6: SDC urges PSL to create a PSL-wide doctoral programme on the ITI model, i.e. with a pre-doctoral year and with each student having two tutors, one from PSL and the other from an appropriate company, government department, NGO, arts organisation, etc.

Recommendation 7: PSL should work to ensure that the doctoral programme secures strong on-going financial and political support from both Government and industry both for the obvious reason of sustainability of the programme and in order to establish the national and international credibility of the programme.

Recommendation 8: In order to strengthen and develop the SACRe doctoral programme, PSL colleagues should consider engaging with foreign practice-based research funding agencies which have developed expertise in the defining and funding of practice-based research in the creative and performing arts.

Recommendation 9: PSL should as soon as possible be made eligible to issue a PSL Licence and other degrees and should work with the relevant ministerial authorities to secure this outcome which is

important not only for PSL but more broadly for France's international position in the global higher education landscape (and world rankings).

Strategic development

26. The ambition to innovate is both laudable and necessary. However, since virtually everything in PSL is new (apart from its various member institutions), PSL will be challenged by the transaction costs and political liabilities of innovation. The PSL Board could therefore usefully think in terms of 'a mixed economy of development', i.e. refraining from being committed to any single formula or recipe of innovation. Thus some research or teaching innovations could be cross-federation innovations, while others could be initiated within a particular part of the federation - as long as they are represented as PSL innovations. Some innovations could be nationally directed, while others could be more international in terms of beneficiaries. Yet other innovations could be directed to internal stakeholders in PSL institutions, others to both internal and external stakeholders. PSL has started well, finding some good niche areas that are not fully occupied by the component parts of PSL and creating exciting new initiatives and processes. This 'acclimatisation without threat' approach is a good way of securing buy-in from members of PSL and is an important element in the vital work of institution building.

27. SDC thus recommends that, as it takes forward its institution-building work, PSL should explicitly adopt the principle of flexibility of response, in order to avoid becoming locked into routines which may appear in the short term to be beneficial, but which may in the medium term create problematic unintended consequences.

28. An important feature of this mixed economy of response will be to create innovative structures, processes and initiatives which meet several purposes and not just one. All innovations have high transaction costs, so it is important to seek to defray some of those costs by requiring all innovations to satisfy multiple purposes. In other words, innovations should not only meet instrumental goals but also meet the cultural purpose of signalling and establishing the values and identity of the new PSL. While this is clearly happening with the creation of such innovations as the engineering doctoral school, programme, the SACRe programme or the undergraduate cycle, our discussions with some academic members of PSL revealed that they were seeing innovations mainly in instrumental terms and not in terms of institutional culture or identity-building.

29. While major structural changes in research and education can take time to take forward, much can be achieved through smaller 'quick wins' initiatives which build community as well as potentially resulting in new and interesting synergies. Examples could include research 'speed-dating'/'get to know you' events where faculty can meet and discuss their current and future research plans, 'town meetings' to which all PSL staff are invited on significant individual topics, be these regarding research areas, educational priorities, governance or whatever, etc.

30. A key issue for the short, medium and long term is how to maintain the commitment to shift the paradigm of what a university, and especially a research university, can be in France. SDC welcomes and applauds the confidence shown by the PSL leadership in envisaging and implementing high-risk, high-impact projects in research and education; it considers also that in order to maintain this momentum, equal imagination and boldness should be shown with regard to the estate.

31. The core engineering institutions in ITI already form something like a campus, and it should be possible to link the engineers through buildings and walkways as building plans are taken forward. It would be useful to go even further and promote the ‘physical emergence’ of a PSL campus through astute urban development interventions in the main geographical area where the PSL institutions are located. These possibly relatively simple interventions could include, for example, a clear and highly visible unifying sign-posting of buildings and areas and wifi available for students and faculty on the ‘campus’, and even the establishment of a pedestrian zone among the main buildings. While this latter idea would entail considerable time spent in discussion with the planning authorities of the Ville de Paris and other external stake-holders as well as internal consultation, there is evidence from around the world that such strategic pedestrianisation can bring massive social and economic benefits not only to the institutions involved but also to the city.

32. A world-class student experience is vital if PSL is to become and be recognised as a world-leading university. The innovative degree programs and the engagement of all students with research from the first year of the undergraduate cycle are clearly the foundation and the vital dimension of their experience. Now that these are largely in place, PSL should consider offering all its students a holistic student experience which is on a par with the world’s leading universities and in which they gain a broad portfolio of transferable, ‘life’ skills as well as learning, research and entrepreneurship skills. This would, for example, entail encouraging doctoral students as well as faculty to take part in public engagement activities, incorporating experiential learning in all degree programs, supporting students to participate in community service through volunteering programs , and enabling undergraduate students from all disciplines to take laboratory and experiment classes.

33. An important dimension of PSL’s strategic development will be its international positioning. Teaching in English will be vital – as long as the classes are genuinely interactive in English both the faculty and the students reflect on what they learn from working in English and translating mentally from French into English. However, the use of French will be essential in some areas of the humanities; furthermore, teachers and examiners will need to develop policies about and communicate to students explicit statements on how the quality of English is to be assessed.

34. All of the member institutions of PSL have significant, if differing, international profiles. In order to position itself as a new and internationalised ‘federal’ research university, PSL should consider targeting a few strategic and long-term international partnerships rather than a multiplicity of opportunistic short-term contract-based partnerships – and these partnerships should be with other world-leading universities who share the values as well as the research excellence of PSL. One way of simultaneously achieving a strategic operating international presence and furthering its vital institution-building is for PSL to envisage identifying several PSL research Grand Challenges that would involve colleagues and research groups from across the PSL institutions in working together and with international partners to address global problems.

Recommendation 10: As PSL develops and innovates as an institution, it should explicitly adopt the principle of flexibility of response, in order to avoid becoming locked into routines which may appear in the short term to be beneficial, but which may in the medium term create problematic unintended consequences.

Recommendation 11: A programme of ‘quick wins’ events could be put in place to complement the major cross-PSL initiatives in order to involve as many individual faculty as possible in thinking in new, collaborative interdisciplinary ways.

Recommendation 12: Active consideration should be given to urban development interventions and how these can benefit the growth of PSL as a ‘campus’ university and as a complex but also highly and innovatively efficient university. This will involve both much consultation with the PSL community and considerable discussion with the Ville de Paris planning authorities and other external stake-holders, but the rewards would be significant and on multiple levels, both to PSL and to the city of Paris.

Recommendation 13: In order to compete for the world’s best students, PSL will need to offer a world-class, holistic student experience in which they can gain transferable ‘life’ skills as well as academic skills.

Recommendation 14: While the use of English in teaching and learning will be a key element in establishing PSL as an international university, PSL should ensure that all teaching and learning is truly interactive and that students know exactly how their use of English is evaluated and assessed.

Recommendation 15: In positioning itself internationally, PSL should target a few key strategic and long-term international partnerships with other world-leading universities who share the values as well as the research excellence of PSL. It should also envisage identifying several PSL Grand Challenges that would involve colleagues and research groups from across the PSL institutions in working together and with international partners to address global problems.

Identity and image

35. A core issue in our discussions in Paris was how PSL can build a distinctive and additive purpose and identity whilst at the same time building and sustaining effective relationships with all the members of the PSL federation.

36. A further challenge is that of constructing and communicating a narrative. The historical, political and aspirational aspects of that narrative are already being powerfully articulated by the Director and senior figures in PSL. Fundamental to the development of the narrative will be the choice of language and the values implicit in the chosen language. Obvious key words are Paris, Sciences, Lettres, University and Research, which are emblematic of PSL’s physical and symbolic presence, direction, identity and merit, but further words and images will be needed as PSL grows and develops. Here again it will be useful to think in terms of a ‘mixed economy’ – in this case of words and ideas which are culturally potent and which will underpin PSL’s on-going narrative of identity, ambition and direction.

37. It will be for the PSL leadership to choose these new words and the lexicon from which to draw them. Possibilities will be the language of engagement, of impact, of synergistic thinking and working, of crossing intellectual boundaries and international borders, of the nature and challenges of innovation, etc. As they develop the next stage of PSL’s vision and its representation in language, the PSL leadership should choose words and a discourse which speak to different audiences in different ways.

38. In our encounters with people from the various PSL institutions, we became aware that the sense of belonging to this federal, meta-level body needs to grow and that shared, ‘corporate’ values need to spread horizontally and vertically through the university. Internal communication is an essential first step, led by the heads of the various institutions, with overall direction given by the Director of PSL. Leadership on brand/identity/vision must come from the top, but it is vital also that active buy-in is

secured from across all of the PSL institutions and that all colleagues feel that they can contribute in a 'bottom-up way.

39. It will be important to maintain the identity of the various institutions in PSL, whilst also building a clear and strong identity for PSL itself – which must not be seen as stifling what the Schools are doing, but, rather, strengthening and developing existing work and bringing more of it clearly under the PSL banner, as with, for example, the PSL Chair in Computer Science (based at ENS) or the Civilisations Institute in the Collège de France, where membership of PSL undoubtedly was key to it being awarded funding for its major renovation project.

40. Evidence from other large and complex research universities (e.g. Imperial College and UCL in the UK and/or the emerging Hamad bin Khalifa University in Qatar) shows that it is eminently possible to maintain the historic identities of constituent Schools who have chosen to join, whilst simultaneously developing and celebrating the identity of the host university. PSL is, of course, different in that its member institutions retain their autonomy, but the lessons are nonetheless valid regarding how to help past and new identities to live and work together, mutually supporting and reinforcing each other.

41. SDC was unanimous in considering that it is vital that all students exit from PSL with some form of PSL certification. We recognise that there are significant hurdles to be overcome with regard to PSL awarding degrees at all levels of the L-M-D cycle, but wherever this is not (yet) possible, some form of PSL certificate or recognition of PSL's role on transcripts should be provided.

42. The website is a valuable tool for both communication and community building, and as such needs to be more than just 'instrumentally' bilingual in French and English. Given PSL's decision to use English language as the main medium of teaching, it is important the English language web presence is strengthened and conceptualized in terms of English-speaking audiences, as this will help to attract more excellent foreign student and encourage overseas researchers to become engaged.

43. It would be helpful if greater co-ordination could be managed between individual School websites and the PSL website, when there is important news, e.g. winning of Nobel Prizes or Fields Medals, significant research break-throughs, new degree programs, winning of major research funding, etc.

44. Another initiative to promote the image of PSL would be to organize four to five highly visible public lectures per year: the "PSL Lectures", given by leading academics, which will ideally be live-streamed as well as archived on the PSL website.

Recommendation 16: As the PSL vision is taken forward, its representation in language ('the PSL narrative') will need to be modified; this will be the responsibility of the PSL leadership with input from across the university. Care should be taken to choose words and a discourse which speak to different audiences in different ways about PSL's core values and key ambitions.

Recommendation 17: Lessons about how to manage the co-existence of the established identities of the PSL member Schools and the identity of the new research university that is PSL could be drawn from the experience of foreign universities, e.g. Imperial College and UCL in the UK and/or the emerging Hamad bin Khalifa University in Qatar.

Recommendation 18: SDC was unanimous in considering that it is vital that all students exit from PSL with some form of PSL certification.

Recommendation 19: The English language web presence should be strengthened and conceptualized in terms of English-speaking audiences, in order to attract more excellent foreign students and encourage overseas researchers to become engaged.

Recommendation 20: Greater co-ordination between the Schools' websites and the PSL website to achieve great impact both internally and externally.

Recommendation 21: As part of its profile-raising and community-building activities, PSL could organize four to five highly visible public lectures per year: the "PSL Lectures", given by leading academics and both live-streamed and archived on the PSL website.

Attracting and retaining talent

45. Through the Idex, Labex, Équipex and associated initiatives, the French Government has invested significantly in Higher Education, with a special focus on centres of excellence. It has also granted greater autonomy to higher education institutions and is encouraging greater high-level collaboration in research and education.

46. Despite these much more propitious circumstances, universities in France still face the challenge of attracting and retaining significant numbers of top faculty and top students from across the world. Given PSL's ambitions, it is vital that it succeeds in attracting the best, and therefore it will need to develop strategies to achieve this on an on-going basis.

47. Its own academic excellence will be the main magnet for attracting faculty and students, but in the highly competitive world of international higher education, it needs to be vigorously and creatively pro-active in its recruitment activities.

48. SDC did not have time to discuss the challenges in depth with PSL colleagues at its meeting in Paris, but it suggests that in order to formulate a robust recruitment strategy, PSL should undertake a 'force field analysis' of the issue.

49. Questions to address would include, for instance: what are the driving forces at the moment encouraging top students and faculty to come to PSL? what are the equivalent restraining forces inhibiting such talent from joining PSL? how big a role do salaries play in the decision-making of potential faculty? what extra-academic positive 'draw' factors can determine a decision to choose PSL over another world-class university? how important a positive driver or a negative restrainer is the decision to use the English language? How powerful will the PSL Excellence Chairs be as an instrument to attract top researchers? PSL will know which other questions need to form part of this analysis.

50. One of the most important lessons taken from industrial uses of such force field analysis is that the key to the successful management of problems and challenges lies not only in building up the number of positive drivers, but in reducing the potency of the restrainers.

51. An excellent example is that of INSEAD, which has been very astute in managing this particular variant of the ‘talent wars’. First of all, it saw this as a long-term problem, one which needed a repertoire (a mixed economy) of responses. It knows the market well and responds to it, indeed even perhaps keeping ahead of it. It offers salaries comparable to those of the top US Business Schools. Notably, for a long period, it has been building and nurturing relationships with top US-based scholars, inviting them over on short-term visits and then persuading them to encourage their top PhD students to come to INSEAD. PhD students at INSEAD are also offered visits to top US Schools during their training and a virtuous cycle of building of intellectual and social capital occurs. The INSEAD story is one not only of playing the market in economic terms, but one of long-term relationship-building founded on reciprocal benefits. PSL will not want to imitate INSEAD exactly, but it can undoubtedly learn useful lessons from INSEAD’s experience. And PSL must remember that it has the incomparable asset of the cultural, intellectual and diplomatic riches of Paris.

52. Students will be attracted by the academic excellence of PSL and its focus on interdisciplinary thinking and working and its increasing engagement with business and industry. Attention will need to be paid to student funding issues, especially at the doctoral level, where ‘allocations doctorales’ are essential if PSL research groups are to build world-leading teams – and even higher doctoral student funding packets will be needed enough as competition grows globally for the best students.

Recommendation 22: PSL could usefully conduct a ‘force field analysis’ of the issue of attracting the best faculty and students.

Recommendation 23: With regard to the ‘talent wars’ for the world’s top researchers, useful lessons could be learned from the experience of INSEAD.

Recommendation 24: As part of the recruitment strategy for students, attention will need to be paid to student funding issues in the context of global competition for the best students as all levels.

Conclusion

53. SDC was enormously impressed by all that PSL has already achieved and by all its plans and the scale of its ambition. There is, of course, much to be done, but we were very encouraged by the enthusiasm of the PSL colleagues whom we met and by their determination to realise PSL’s ambitions.

54. By Spring 2015 when we meet again, SDC expects PSL and all of its member institutions and its staff and students to have a deeper and fuller sense of shared identity. We also expect it to have established a reputation both in France and internationally for being committed to excellence, interdisciplinarity and innovation in research and education and for engaging pro-actively and creatively with government, business and industry.

55. PSL has set itself an ambitious programme of work and faces many challenges in the months ahead. We trust that this report will help in this work, although we are aware that our recommendations entail adding to the programme of work!

56. We look forward to following closely its progress and to continuing to offer what guidance we can.

Appendix

Membership of the PSL Strategic Directions Committee

(Those marked with an asterisk were unable to attend the meetings in Paris on 8-9 December 2013)

*Professor Sir Tony Atkinson, Research Professor of Economics, University of Oxford

Professor Dame Jocelyn Bell Burnell, Astrophysicist, Fellow of the Royal Society

Professor Gérard Ben Arous, Mathematician, Director of the Courant Institute, New York University

Professor Dame Julia Higgins, Chemical Engineer, Faculty of Engineering, Imperial College London

Professor Pierre Magistretti, Professor of Neuroscience, Director of the Brain Mind Institute, École Polytechnique Fédérale de Lausanne

*Neil McGregor, Art Historian, Director, British Museum

Professor Andrew Pettigrew, Professor of Strategy and Organisation, Saïd Business School, University of Oxford

Professor Michael Worton, Emeritus Professor of Arts and formerly Vice-Provost, University College London (UCL)

APPENDIX XIII - 2nd Report of the PSL Strategic Directions Committee November 2015

Background: Strategic Directions Committee (SDC)

1. The SDC was set up by the PSL Directorate to offer commentary, insights and guidance on PSL's vision and goals and to offer recommendations for the short, medium and long term. This is its second report, the first being delivered in January 2014. During the past year, one member, Mr Neil McGregor, formerly Director of the British Museum, resigned from the SDC due to the level of his other commitments. Three new members were appointed to SDC this year.⁴
2. The members of the SDC were invited to Paris on 25-27 October 2015. In advance of the meeting, the PSL Directorate circulated to us a series of presentations about PSL, including some describing individual initiatives. These documents proved a very helpful foundation for the Committee's deliberations and discussions in Paris with colleagues from the PSL Directorate and from member institutions of PSL. The SDC members are very grateful to all PSL colleagues who gave of their time and engaged very openly and creatively with us.
3. This report is based on our reading of all the documentation provided, on background research carried out by members of the SDC, on our discussions and deliberations in Paris, and on follow-up documents and information provided after our interview visit by colleagues in various PSL institutions.

Context

4. Higher education is evolving and changing rapidly across the world in order to meet the new demands and expectations of national and regional governments, employers and students. As a result, traditional models of what a university is are being questioned, challenged and modified, and new models are being tested in different parts of the world. Yet so far, no single model seems fully fit for purpose in our increasingly complex, globalized world.
5. It is widely recognised that partnership-working must be at the heart of the 21st-century university, but it is also recognised that strategic and long-term partnership-working is very difficult to achieve, especially when striving to do this on the multiple levels of research, education and training, enterprise, knowledge exchange, and public engagement.
6. The PSL initiative is of great importance to France and the future of its higher education ecology. Its success is also very important to the wider world of higher education, which needs proven new models of what a comprehensive research university can be and do.
7. While PSL's creation was motivated in part by a desire for institutional self-preservation in a potentially threatening national as well as global higher education landscape, it emerged equally from a shared desire on the part of the member institutions to do something different

⁴ See Appendix 1 for current membership of the Strategic Directions Committee.

within a close, 'federal' structure which enables innovative and interdisciplinary collaborations.

8. The PSL vision continues to impress and excite the SDC. However, as the PSL Leadership recognises, there still remains work to be done on both the strategic and organisational levels. The recommendations in this report seek to help with this crucial work.

Developments over the last two years

9. PSL has developed considerably over the past two years, growing to include 24 member institutions; notably, between December 2014 and January 2015, four world-leading institutions in the humanities and the social sciences joined PSL. This has created an admirable balance between the sciences and the arts, humanities and social sciences and offers the prospect of many new and exciting interdisciplinary collaborations across PSL. It also means that, in terms of coverage, PSL now compares well with the best of the world's top universities.
10. A new President, M. Thierry Coulhon, has been appointed to succeed Mme. Monique Canto-Sperber. The President is now President of both the PSL Foundation and the PSL ComUE. A new team has been set up: while the Dean for Education and the Dean for Enterprise and Industrial Partnerships joined the new presidential team, a new Vice-President, a new Dean for Research and a Vice-President for Digitalization were recently appointed.
11. In parallel with the development and refinement of organisational structures, policies and procedures, many research and educational initiatives have been established or are at the discussion or planning stages.
12. Of particular importance is the fact that the accreditation of doctorates has now been transferred to PSL and is now the exclusive prerogative of PSL. The fact that all doctoral students will graduate with a PSL doctoral certification, featuring both the PSL logo and the logo of the relevant institution, is a significant step forward in PSL identity formation and shared institutional pride.

Feedback from PSL to the first SDC Report

13. SDC noted with appreciation the very full response to its January 2014 Report and was pleased to note the depth of the engagement by PSL colleagues with the Report. Significant progress has been made and account has been taken of almost all of our recommendations, though there are a couple of areas where we would recommend that PSL consider again our suggestions.
14. One area is that of the nature of the student experience. In Recommendation 13, we suggested that, in order to compete for the world's best students, 'PSL will need to offer a world-class, holistic student experience in which they can gain transferable "life" skills as well as academic skills'. Considerable thought and investment have been given to expanding the students' experience of campus life ('PSL Happy Hours'; 'PSL Day; the PSL Symphony Orchestra and Choir; PSL Sports, etc). We applaud this, and we encourage PSL to continue expanding the number and range of extra-curricular activities available to students.

15. Nonetheless, we would urge PSL again to enhance further the students' learning and personal development experience and to consider how they could offer students development opportunities in transferable and 'life' skills, such as global citizenship, leadership, team-working, enterprise, communication, etc. A useful example is to be found, for example, in the ITI doctoral programme, but a university-wide programme, with some development opportunities embedded within courses and others offered discretely, would be of enormous benefit to students on all courses and at all levels.
16. On research, we suggested that PSL 'should [...] envisage identifying several PSL Grand Challenges that would involve colleagues and research groups from across the PSL institutions in working together and with international partners to address global problems' (Recommendation 14). As the PSL Research Strategy takes shape in the context of the expanded PSL, such an approach, allied to a public engagement strategy, would greatly strengthen PSL's global standing. In this context, we are delighted to note PSL's recent decisions on research planning and funding (see paragraphs 27 and 28 below).

Recommendation 1: The student experience and the long-term employment prospects of PSL students would be greatly enhanced by a PSL-wide programme of development opportunities in life and transferable skills.

Governance

17. Issues of governance continue, understandably, to pre-occupy PSL and its member institutions. Underlying all the discussions and debates, there is a clear sense of the vital importance of the autonomy of member institutions, allied to a shared commitment to working under principles of federalism and subsidiarity in order to achieve innovative collaborative initiatives in research and education.
18. The principle of unanimity was described to us as a 'life or death' principle for the institutions. Here, while understanding the contextual reasons for this, we consider that such a principle is not sustainable for a global university, could create perceptions of institutional frailty, and could have negative unforeseen consequences as PSL develops. It seems to us important that the conditions for the necessity of a unanimous vote be made abundantly clear. We believe also that PSL should over time define itself and its workings as driven by consensus and transparency, reserving the absolute of unanimity for truly mission-critical issues.
19. Throughout the documents that we were sent, embedded in the additional documents that were presented to us in October and recurring in many of our interviews in October was a commitment to the all-importance of 'bottom-up' approaches and activities in all spheres. While the recognition of the academic and institutional creativity role of scientists and scholars is admirable, 'top-down' approaches and interventions are also necessary in order to shape the institution's direction and identity.
20. There is much vital yet inevitably time-consuming work of persuasion and consensus-building still to be done as PSL develops its new university model. At the same time, PSL and its President must be able also to give leadership, shaping PSL as a new exemplar of an integrated university, rather than simply providing a funding function and a convening function. In this

way, PSL will become a powerful catalyst, an agent for change in the world of higher education in France and beyond.

Recommendation 2: While PSL is committed to ‘bottom-up’ approaches, ‘top-down’ approaches and interventions are also needed to provide leadership and direction as the university seeks to become a new model of integrated research university.

Community-building

21. PSL is rightly proud of the wide range of disciplines and prestigious institutions that make it up. In many ways, the main engine of the PSL academic enterprise is the complementarity of the member institution – which enables them to achieve things in research and in education and training that would be impossible to realise alone.
22. Nonetheless, PSL as a federal university is still in ‘start up’ phase, and the institutions and, especially, the colleagues cannot yet know each other fully in all of their specificities and differences. The new PSL website and the PSL Explore website will make a significant contribution here, but are only part of the solution. A variety of approaches to building collective knowledge of the ‘big picture’ and shared pride in PSL as well as in their individual home institutions could be deployed to help to build a deeper sense of the PSL community.
23. Effective internal communication will be imperative, through websites and newsletters, etc. Real-time events also have an institution-building role to play. For instance, receptions hosted in different member institutions could be held to bring together people from across PSL to celebrate institutional or individual successes (the winning of major research funding or of academic honours, etc), networking opportunities could be offered after university-wide consultation meetings, and so on. These social gatherings will complement the academic meetings and help to build the sense of belonging to PSL as well as to a member institution.
24. Common graduation ceremonies would be another way of strengthening the human dimension of the university as a community. Also, the creation of honorary fellowships of PSL would offer an annual opportunity for colleagues to participate in nominating candidates and to attend the conferment ceremonies and receptions – as well as increasing PSL’s visibility nationally and internationally.
25. Internally, PSL has recovered very well from the turbulence caused by the leadership ‘crisis’, and confidence has been rebuilt in the project - and in the new leadership. This process has undoubtedly been strengthened by the enthusiasm for the PSL project of the recently-joined members. It is now, in our opinion, urgent to formulate a persuasive ‘directional narrative’ for PSL. This narrative would respond to the fundamental questions of ‘Who? What? Why? When?’, setting out PSL’s great vision, a short history of its major achievements so far, and, crucially, laying out a road-map with clear milestones for the next few years.
26. While this directional narrative will have significant impact internally, it is vital for the wider world, to whom PSL’s vision and purpose remain somewhat invisible. The formulation of such a narrative seems to us one of the top priorities for PSL if it is to achieve global recognition as a paradigm-shifting integrated research university.

Recommendation 3: Online internal communications have a vital role to play in building a sense of community, though they would benefit from the complementarity of frequent institutional events of a celebratory nature which bring colleagues across PSL together in different PSL venues.

Recommendation 4: A directional narrative setting out PSL's vision, major achievements and a road-map for the next few years should be formulated as a matter of urgency. This will have considerable value both for the internal PSL community and also for the wider world.

Research

27. The framework for facilitating world-class research is currently being defined. SDC recognises the importance of defining a governance structure for research with clear instruments. However, we had some concerns during our interviews in Paris in October that there was yet no research strategy beyond a commitment to a 'bottom-up' approach. We realise that many national research strategies, including that of France, necessarily take a 'top-down' approach and that many scholars and scientists can have resistance to such an approach. However, we felt that, in its capacity as a highly interdisciplinary, federal university, PSL should capitalise on its potential to do more than simply facilitate research and that it could and should create a purposeful framework within the research takes place.

28. We felt that its research strategy should set out a conceptual framework for the creation and support of research programs. We are therefore delighted (and impressed) that since our visit, PSL has crystallised its strategic thinking on research and has decided to invest the majority of its available research funds in a series of PSL 'Grand Programs', all of which will be resolutely inter-institutional in nature and will address issues of national and global significance.

Recommendation 5: We commend PSL on its conceptualisation of its research responsibilities in today's complex global world and on its creation of PSL Grand Programs in research, which will mobilise PSL's incomparable strengths in research in an outward-facing and strategic way.

Public engagement

29. Now that it is well established, PSL should think strategically about how it wants to relate to society at large. Does it, for instance, want to contribute to solving global problems or national or local problems? Or to solving problems at all of these levels? In other words, how will it engage with the world?

30. PSL remains very inwardly focused. This is perhaps inevitable, given the need to build a sustainable and integrated research university. Now, however, it needs to engage much more with the external world and it has to work hard at improving brand recognition.

31. Many of the former students of the PSL institutions are now active at the highest levels in government, public administration, business and industry. They often have great loyalty to the institutions where they studied and, of course, know them well. However, they may not all be

aware of, or fully up to date with, PSL as a federal research university of 24 institutions. Many of these alumni already give great service to their 'home' institutions through existing institutional alumni organisations. However, they also have enormous potential as persuasive ambassadors for the research university that is PSL. Consideration should now be given as to how best to mobilize them in a coherent and structured way, possibly through the umbrella PSL University Alumni Association.

32. While many of the member institutions have vibrant relationships with the business and industrial communities, active knowledge exchange with industry is less well established at the shared ComUE level than is desirable for a research university.
33. SDC applauds the pre-doctoral programme in the Institute of Technology and Innovation (ITI) for students from engineering schools, ENS or science masters programs, where students choose courses in 3 out of 10 disciplines, attend courses on how to create a start-up company, and undertake internships or are placed in laboratories, concluding with a 1-month team exercise to develop a start-up concept that they then pitch to actual investors. We would urge PSL to consider including internships in more postgraduate programs. This would be of enormous benefit to the students and also bring considerable benefit to the university, in terms both of profile-raising and of offering possibilities of long-term strategic partnerships with business and industry.
34. Around the world, there is a growing expectation that universities will engage more fully with the general public – who are, after all, funding them to a great extent through their taxes. Public engagement goes much further than dissemination of research or even knowledge and involves researchers in listening to, developing their understanding of, and interacting with, non-specialists and ultimately, wherever possible, involving members of the public in the formulation of research questions before planned research begins.
35. Many PSL member institutions are experienced in research dissemination, most notably the Collège de France, which has nearly 5 centuries of experience of giving lectures to the general public, many of which are now streamed online. The challenge now lies in moving from a transmission mode to a pro-actively dialogic engagement mode.
36. With the outstanding intellectual and scientific forces that it musters across its member institutions, allied to a strategic commitment to public engagement, PSL could gain a national leadership role in France as a pioneer of participatory research.
37. Much of the fundamental research in PSL has considerable public policy implications and several institutions already have considerable experience of advising law-makers, decision-makers and opinion-shapers. We therefore suggest that PSL develop a public policy strategy, which will establish it as the 'go to' university in France for Government, local and regional authorities and other decision-making agencies seeking evidence-based advice.

Recommendation 6: As part of its outreach and profile-raising work, PSL should seek to involve the alumni of its member institutions as ambassadors for PSL as well as for the member institutions. Consideration should be given as to how best to engage them in a coherent and structured way, possibly through the umbrella PSL University Alumni Association.

Recommendation 7: Public engagement should become an integral part of PSL research and its dissemination – and a defining characteristic of PSL.

Recommendation 8: Building on its leadership position academically in France, PSL should work to become a national pioneer of participatory research.

Recommendation 9: We also recommend that PSL develop a public policy strategy that will enable it to become France’s pre-eminent ‘go to’ university for evidence-based advice.

Education and Training

38. SDC is very impressed by the undergraduate CPES programme, which exemplifies the PSL commitment both to interdisciplinary and to the intrinsic link between research and teaching. We hope that the programme will, as planned, grow and will diversify further its disciplinary and interdisciplinary offerings.
39. SDC met informally with some CPES students and were extremely impressed by them, by their reasons for choosing the CPES ahead of the ‘*classes préparatoires*’ route, by their enthusiasm for their courses and by their mature modes of thinking. It is very encouraging that students go on to study at postgraduate level at a diverse range of institutions, including prestigious overseas universities as well as in PSL itself.
40. There are many areas in which PSL could create interdisciplinary undergraduate programs beyond the CPES. Our discussions revealed that there is a need for the biologists of the future to be identified earlier in their academic careers, and one example could be that of biology and physics, where cross-working between biology and physics in a PSL programme across Institut Curie, ENS and ESPCI could deliver an innovative degree programme.
41. In this context, it was very encouraging to hear research scientists in Labexes state how eager they would be to undertake some teaching at the Masters and even the undergraduate level, even though this is not part of their contracts. It was gratifying also to learn that Collège de France colleagues would be willing to undertake teaching on PSL programs.
42. It is disappointing that progress on the shift of Masters degrees to PSL has been delayed. However, we understand the intra-institutional dynamics behind the delay and we urge the Task Force to think strategically both about the nature of PSL-stamped masters programs and about what their place should be within PSL’s B-M-D offer. We also support the creation of one masters degree per discipline within PSL by 2018.
43. Furthermore, we urge the Task Force to undertake work to map out the educational terrain, identify the gaps that exist in learning today and evaluate the employment and societal needs of France and globally. It will then be possible to formulate an Education and Training Strategy to fill those gaps, to create and implement new teaching models, and thereby to meet those needs.
44. In order both to enhance the course choices of existing students and also to accelerate the creation of new interdisciplinary programs, it will be essential to have a common course calendar among the institutions. We regard this as of the highest priority and urge PSL to meet its target of September 2016 for achieving this.

Recommendation 10: We recommend that PSL, building on the success of its flagship CPES degree, should develop more interdisciplinary undergraduate degrees. We offer one suggestion that arose out of our discussions in Paris, but there will be many other possibilities.

Recommendation 11: We urge the Task Force to think strategically about the nature of PSL-stamped masters programs and what their place should be within PSL's B-M-D offer. Also, we support the creation of one masters degree per discipline within PSL by 2018.

Recommendation 12: We urge the Task Force to formulate an Education and Training Strategy that will set the context and lay out the milestones for the development of new degree programs.

Recommendation 13: We give our full support to the introduction of a common course calendar among the institutions by September 2016.

Identity and image

45. The major questions asked by those outside PSL are (a) what differentiates PSL? and (b) what is it that is more than the sum of its parts? At present, answers to these questions are somewhat long and complex, and work on internal and external communications should seek to distil those answers into a series of 'key messages' that are accessible to all and will be used by all colleagues when speaking publicly.

46. It is good to see that progress is being made in the use of a common signature in publications and in public engagements, with movement from 5% of papers being thus signed at the end of 2014 to 15% in March 2015 and 23% in September 2015, with a projected 30% by the end of December. We urge PSL to do all it can to maintain this momentum and to persuade the Collège de France, who is a member only of the PSL Foundation, to use the signature also.

47. It is encouraging that all ComUE member institutions now include the PSL logo on their websites, and we would urge all PSL colleagues to include the PSL logo on their business cards.

Recommendation 14: We recommend the distillation of 'key messages' from PSL's vision and mission statements and strategic documents, which all colleagues should be encouraged to use in all public engagements.

Recommendation 15: PSL is making steady progress in encouraging colleagues to use the PSL common signature in all publications; PSL should do all it can to persuade all colleagues, including those in the Collège de France to adopt this signature.

Recommendation 16: We urge all PSL colleagues to include the PSL logo on their business cards.

Conclusion

48. SDC was very impressed by all the progress made by PSL since our last report and by the way in which the President and his team have gained the confidence of the community.
49. Our discussions with those whom we interviewed in October and our various independent conversations and other communications with members of the PSL community have confirmed that they have a growing sense of pride in and commitment to PSL as well as their respective home institutions. We found the same pride in the students with whom we talked.
50. We see as key priorities for the next months the following:
 - further action on integration and transparent consensual decision-making
 - the development of 'content-rich' strategies which will set the course for PSL's development over the next few years
 - further action on building institutional cohesion, identity and sense of belonging
 - greater engagement with the wider world beyond PSL.
51. We hope that our Report will be of help to PSL, both in the long term and in its final preparations of its submission to the international jury.
52. Finally, we would like to express our admiration for PSL and for its leadership and colleagues and students.

29 November 2015

Appendix

SL Strategic Directions Committee (SDC)

(Those marked with one asterisk were unable to attend the meetings in Paris on 25-27 October 2015 but have seen and approved the Report; those marked with two asterisks are new members of SDC)

**Professor Dudley Andrew, R. Selden Rose Professor of Film and Comparative Literature, Yale University

Professor Sir Tony Atkinson, Fellow of Nuffield College, University of Oxford

**Dr Jo Beall, Director of Education and Society and Member, Executive Board of the British Council

Professor Gérard Ben Arous, Director of the Courant Institute, New York University

*Professor Dame Jocelyn Bell Burnell, Astrophysicist, Fellow of the Royal Society

**Professor Hubert Girault, Professor of Analytical and Physical Electrochemistry, École Polytechnique Fédérale de Lausanne

Professor Dame Julia Higgins, Physicist, Professor at Imperial College London, and Fellow of the Royal Society

*Professor Pierre Magistretti, Professor of Neuroscience, Director of the Brain Mind Institute, École Polytechnique Fédérale de Lausanne

Professor Andrew Pettigrew, OBE, Professor of Strategy and Organisation, Saïd Business School, University of Oxford

Professor Michael Worton, CBE, Emeritus Professor of Arts and formerly Vice-Provost, University College London (Chair)