Research evaluation

EVALUATION REPORT OF THE FEDERATIVE STRUCTURE

IBPS - Institut de biologie Paris-Seine

UNDER THE SUPERVISION OF THE FOLLOWING ESTABLISHMENTS AND ORGANISMS:

Sorbonne U - Sorbonne Université,
CNRS - Centre national de la recherche scientifique

EVALUATION CAMPAIGN 2023-2024

GROUP D

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High Council for evaluation of research and higher education

In the name of the expert committee :

Pierre-François Lenne, Chairman of the committee

For the Hcéres :

Stéphane Le Bouler, acting president

Pursuant to articles R. 114-15 and R. 114-10 of the Research Code, the evaluation reports drawn up by the expert committees are signed by the chairmen of these committees and countersigned by the President of Hcéres.

To make the document easier to read, the names used in this report to designate functions, professions or responsibilities (expert, researcher, teacher-researcher, professor, lecturer, engineer, technician, director, doctoral student, etc.) are used in a generic sense and have a neutral value.

This report is the result of the unit's evaluation by the expert committee, the composition of which is specified below. The appreciations it contains are the expression of the independent and collegial deliberation of this committee. The numbers in this report are the certified exact data extracted from the deposited files by the supervising body on behalf of the unit.

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CHARACTERISATION OF THE FEDERATIVE STRUCTURE

- Name of the federation: Institut de Biologie Paris Seine
- Acronym of the federation: IBPS
- Label and number: FR3631
- Composition of the executive team: Director of the FR 3631: Mr. Michel Labouesse (2014 until 02/2023); Mrs. Sylvie Schneider-Maunoury (since 03/2023)

INTRODUCTION

HISTORY OF THE FEDERATIVE STRUCTURE AND GEOGRAPHICAL LOCATION OF RESEARCHERS

Founded in January 2014, the Institut de Biologie Paris-Seine (IBPS) is a research federation affiliated with Sorbonne Université (SU) and CNRS. Initially formed by five units, one, 'Evolution Paris-Seine', was discontinued in 2018. The remaining four units, Developmental Biology Laboratory (LBD), Neuroscience Paris-Seine (NPS), Biological Adaptation and Ageing (B2A) and Laboratory of Computational and Quantitative Biology (LCQB) occupy the Cassan building. The Laboratoire Jean Perrin (LJP), a biophysics unit located in a nearby building, joined in 2019. The technology department is also in the Cassan building. The scanning electron microscope is housed in a nearby building less susceptible to vibrations.

RESEARCH ENVIRONMENT AND POSITION OF THE FEDERATIVE STRUCTURE IN THE SCIENTIFIC ENVIRONMENT OF THE SUPERVISORY BODIES

Situated at the 'Pierre et Marie Curie' campus of Sorbonne Université in Paris, the IBPS benefits from a central location within an interdisciplinary university campus. With affiliations to SU, CNRS, and Inserm-labelled teams (ERL), IBPS collaborates extensively with various scientific disciplines, including physics, chemistry, and engineering. Historical solid ties with the Faculty of Medicine and growing interactions with the Faculty of Humanities contribute to its rich scientific environment. Additionally, IBPS leverages its proximity to institutions like Ecole Normale Supérieure, Institut Curie, Institut Pasteur and Collège de France for collaborative opportunities. The institute's five research units and technology department, housing six core facilities, further enhance its research capabilities and position within the broader scientific community.

HCÉRES NOMENCLATURE AND FEDERATIVE STRUCTURE THEMES

ST Science and Technology
ST3 – Earth and Universe Sciences

FEDERATIVE STRUCTURE'S OWN WORKFORCE

Catégories de personnel	Effectifs
Professeurs et assimilés	2
Maîtres de conférences et assimilés	3
Directeurs de recherche et assimilés	2
Chargés de recherche et assimilés	2
Personnels d'appui à la recherche	32
Sous-total personnels permanents en activité	**41**
Enseignants-chercheurs et chercheurs non permanents et assimilés	0
Personnels d'appui non permanents	8
Post-doctorants	0
Doctorants	0
Sous-total personnels non permanents en activité	**8**
Total personnels	**49**

GLOBAL ASSESSMENT ON THE FEDERATIVE STRUCTURE

Founded in January 2014, the Institut de Biologie Paris-Seine (IBPS) is a research federation affiliated with Sorbonne Université (SU) and CNRS. IBPS currently federates five research units, four biology-focused (Developmental Biology Laboratory (LBD), Neuroscience Paris-Seine (NPS), Biological Adaptation and Ageing (B2A), Laboratory of Computational and Quantitative Biology (LCQB)), and a biophysics unit (the Laboratoire Jean Perrin (LJP)). IBPS demonstrates a robust scientific federation fostering interdisciplinary collaboration in areas such as protein structures, developmental biology, and neuroscience. The IBPS has made commendable progress in implementing initiatives to enhance interdisciplinarity, scientific life, and outreach programs. Initiatives like the i-Bio program, seed funding, and collaborative projects showcase the IBPS's success in fostering interdisciplinary collaborations and attracting new research groups. The international PhD program offering fellowships for four annual interdisciplinary projects is a remarkable initiative. The institute has significantly improved scientific communication through various seminars and conferences and a growing adherence to FAIR principles, enhancing its scientific impact.

The institute efficiently mutualises resources, notably through interdisciplinary collaboration, teaching, training and outreach activities, and a common technological department. The technological department includes six facilities: a bioinformatics facility, Artbio, that offers unique companionship training; an imaging facility featuring advanced imaging techniques from subcellular to organismal levels; an electronic microscopy facility offering high-resolution SEM/cryo-SEM with a unique configuration in France; a protein engineering facility providing an efficient molecular interaction service; an aquatic facility with a large diversity of aquatic models and a high level of expertise; and a rodent facility (CEFI) with modern infrastructure. Collectively, this provides a strong core of state-of-the-art facilities. Ongoing efforts to centralise administrative and logistic functions aim to enhance further efficiency and streamline tasks across all units.

In summary, IBPS's federation synergy promotes a collaborative, interdisciplinary environment, contributing significantly to advancements in biological research. IBPS has gained national recognition, and collaborative efforts demonstrate a commitment to federation synergy. These accomplishments are significant, and the Hcéres committee congratulated both the current and former directors of IBPS and acknowledged the dedication of all individuals in the IBPS management team. The IBPS faces important coming challenges that

will require strong support from the supervising bodies. The critical need for adequate informatics support, including storage, calculations, and network resources, requires increased efforts to mitigate limitations affecting various projects. Some facilities and administration face challenges in resource sharing and staff overload, affecting their overall effectiveness. Recruiting dedicated personnel in essential areas, including IT, logistics and human resources, poses a significant challenge that needs prompt attention. Most importantly they are serious concerns regarding the infrastructure. The need for urgent renovations of the Cassan building and unresolved infrastructure issues pose risks to ongoing research activities. This issue is causing significant anxiety for all staff members.

ASSESSMENT OF THE FEDERATIVE STRUCTURE

TAKING INTO ACCOUNT THE RECOMMENDATIONS OF THE PREVIOUS EVALUATION REPORT

The IBPS has taken concrete steps to address the recommendations outlined in the previous evaluation report. The institute has implemented several initiatives to promote interdisciplinarity, including the i-Bio Initiative supported by Sorbonne University, seminars and mini-symposia, and seed funding for collaborative projects. The institute has also taken steps to improve its scientific life, including monthly institute-wide seminars, internal seminars, lay public seminars, and conferences.

The institute has implemented several outreach programs to increase public understanding of biology.

The technological department has obtained national recognition, including IBiSA labels.

The IBPS now benefits from a meeting space coupled with a common auditorium, a provision previously considered necessary by all members of the federation.

Finally, the institute has taken necessary steps towards a joint administration and has identified a new director who will pursue and extend the initial objectives.

The need for urgent renovations of the Cassan building, addressing issues with the electrical system, the internet, plumbing, air conditioning, and windows, and installing a suitable elevator for large equipment was emphasised in the previous report. Unfortunately, this matter remains unresolved. The Hcéres committee urges an increased effort from SU to address these essential infrastructure concerns.

Additionally, adequate informatics support (storage, calculations, and network) remains critical to mitigate current limitations that pose risks to various projects.

APPROPRIATION OF THE SCIENTIFIC OBJECTIVES DEFINED BY THE SUPERVISING BODIES

The IBPS has made significant and successful efforts to address the scientific objectives the supervising bodies defined. The past and current directors, Michel Labouesse and Sylvie Schneider-Maunoury, and their teams should be commended for this. These efforts include:

Strengthen collaborations and interdisciplinarity:

The IBPS introduced, in 2014, 'Incentive Actions,' a seed funding program allocating 20k€ over two years to collaborative scientific projects involving two research teams from distinct IBPS units and, if applicable, a core facility. As of 2022, the program includes teams from the Institut du Fer à Moulin (IFM). Eighteen funded incentive actions have been distributed since 2017.

The i-Bio Initiative, supported by SU idex, has funded four Ph.D. projects per year, each co-supervised by two mentors working in two disciplines.

The institute has organised i-Bio mini-symposia and a summer school on AI for biologists.

Transversal axes were collectively defined to create new synergies within IBPS and serve as bases for strategic scientific decisions.

Improve scientific communication: The institute hosts monthly institute-wide seminars, internal seminars, lay public seminars, and conferences. The institute is in the process of complying with the FAIR principles and is committed to open science.

Increase public engagement: The institute has implemented a flagship program called 'VIS ma VIE de CHERCHEUR.EUSES' (Live my researcher's life), in which high school students come to SU teaching labs to perform PCR experiments and look through microscopes to 'solve medical mystery'. The institute has also participated in the Brain Awareness Week, a training program for high-school teachers entitled 'Profs-en-Fac,' and dialogues with high-school students via the Declics-Cercle FSER program.

Increase attractiveness: The interdisciplinary environment, coupled with i-Bio funding initiatives, has played a pivotal role in attracting and fostering the emergence of new research groups within the IBPS.

The committee applauds the initiative, offering fellowships for four annual PhD projects, each co-supervised by mentors from different disciplines, one being an IBPS or IFM (Institut du Fer à Moulin) member. In 2022, the i-Bio project expanded to include a pre-doctoral training program for international students, fostering collaboration among IBPS and IFM units through three rotation internships during the first year. This not only provides valuable skills but also allows informed choices for subsequent PhD theses. Though this initiative is only two years old, the committee acknowledges its effectiveness and the early success it has shown in attracting students at the international level.

The growth of IBPS relies on its capacity to draw in new research groups nationally and internationally. Although the institute has successfully attracted and fostered the emergence of new groups, enhancing visibility is crucial for attracting researchers, especially at the international level. To achieve this, calls at the IBPS level, as proposed by Martin Giurfa (future director), will be crucial, necessitating the potential for space allocation decisions to be made at the IBPS level.

ASSESSMENT OF SCIENTIFIC ACTIVITY RESULTING FROM FEDERATIONAL SYNERGY

The Institute exhibits a robust scientific federation, combining diverse research units with a collective focus on biology. The institute fosters interdisciplinary collaborations between experimental biologists, computational biologists, and physicists. The collaborative research spans protein structures, chromosome dynamics, developmental biology, neuroscience, and aging. The federation supports an approach to understanding biological processes across multiple scales, incorporating modelling and quantitative approaches.

Initiatives like the i-Bio program highlight the institute's commitment to federative collaboration and promoting interdisciplinary research through funding, grants, and hiring support. Integrating research, teaching, and training within the federation underscores the institute's dedication to knowledge dissemination and the next generation of researchers.

As detailed in a following section, the technological department is committed to providing state-of-the-art technologies to the scientific community, attentive to the needs and training scientists (e.g. the companionship initiative of the Artbio platform).

The IBPS federation is making strides toward a unified administration. Three staff members, led by a General Secretary, manage financial affairs and core facilities. Efforts are underway to centralise administrative functions across all units, with consensus from directors and staff. A designated 450 m2 space on Building B's third floor is

being refurbished to house the consolidated administrative unit. This initiative aims to enhance efficiency through standardised procedures and streamlined tasks.

In summary, the IBPS's scientific activity resulting from federation synergy is characterised by a collaborative, interdisciplinary approach, fostering a favourable environment that enhances the institute's scientific impact and contributes to advancements in biological research.

REALITY AND QUALITY OF SCIENTIFIC ACTIVITY

IBPS conducts its scientific endeavours through interdisciplinarity and collaboration, notably driven by the i-Bio Initiative funded by idex SUPER with a budget of 3.2 million euros (plus 0.4 million euros from the SFRI) over the past four years. This initiative supports various activities, including four annual PhD projects, research grants, providing starting packages for new team leaders, and organising events such as mini-symposia and summer schools. With a modest annual budget of 319,000 euros, IBPS independently conducts seminars, conferences, and summer schools and provides seed funding for collaborative projects.

The impactful outcomes of IBPS scientific initiatives are evident in projects initially supported by seed funding, progressing to the i-Bio initiative, securing national funding like ANR grants, and establishing research trajectories. In addition to financial support, IBPS facilitates technology transfer and engages in public outreach. The institute manages state-of-the-art platforms, contributing significantly to publications, patents, equipment acquisition, and skilled personnel recruitment. Strengths include a new director with a clear vision, structural reinforcement, and initiatives promoting interdisciplinarity.

The Hcéres committee commended the IBPS-Doc-Postdoc-Association (IDPA), a highly active association for graduate students and postdoctoral students, partially funded by the institute. IDPA organises numerous inclusive events, including weekly breakfasts, monthly beer hours, professional meet-ups, defense rehearsals, and retreats, contributing significantly to institute cohesion.

Regular committee direction (COD) meetings are vital in fostering cohesion among the research units, facilitating effective communication, and enabling prompt and responsive decision-making.

PERTINENCE AND QUALITY OF COMMON TECHNICAL SERVICES

IBPS operates six common technical facilities, including two imaging facilities (Photonic Imaging and Electron Microscopy), a Protein Engineering facility, a Bioinformatics facility (ArtBio), and two animal care facilities for rodents and aquatic animals. These facilities play dual roles in service provision and technological research, evidenced by publications and patents. They provide services, assist users, offer training sessions, and contribute to educational efforts. These facilities maintain overall beneficiary budgets, enabling some investments. Collaborative ties with LJP and LCQB underscore their crucial role in promoting scientific advancements.

The Hcéres committee highlights the need for a global steering committee with a scientific head to enhance coordination. Mutualisation for data science needs is recommended for improved synergy and efficiency. Addressing understaffing issues requires a coordinated recruitment strategy among facilities to ensure adequate support and optimal functioning.

We provide below an assessment of and recommendation for each facility.

BIOINFORMATICS FACILITY

The bioinformatics facility, Artbio, is led by a DR CNRS (C. Antoniewski) and currently includes four engineers (3 permanent staff and 1 CDD). 50% of the facility activity provides support and training on bioinformatics and data analysis. In particular, one third of this is devoted to standard bioinformatic services by directly analysing users' data. The remaining two-thirds lie in an innovative training format called companionship, where personalised trainings are offered to biologists to teach them how to analyse their own data. Many web services (e.g. Galaxy server, cloud storage) provided by Artbio also allow IBPS biologists to analyse and store their datasets autonomously. The other 50% of facility activity is dedicated to developing new computational methods or pipelines related to specific research projects in collaboration. Many grants (INCA, ANR, etc.) fund this activity. It led to the publications of fifteen papers (4 as first/last (co)authors) and the development of more than 50 open-access scripts, tools, and programs during the evaluation period.

In addition to the existing high-quality service and support offered by Artbio, the facility aims to provide new services related to single-cell analysis and AI/modelling that will require extra staff and dedicated equipment (GPUs for computing). To reduce the waiting list for successful companionship, Artbio aims to develop an interactive online version that may allow them to accompany more biologists on their project. Reinforcing the training on FAIR principles is also a priority.

These excellent perspectives are, however, jeopardised by the imminent departure of the scientific officer of the platform who was the driving force behind Artbio, and it is, therefore, urgent to recruit at least a new SO whom an operative manager may help.

Consideration of previous recommendations

- '*Animating the community of bioinformaticians present within the different IBPS units*'. No concrete actions have been finalised towards this aim.
- 'Transversal actions to promote bioinformatics within IBPS.' The development of the companionship is a success and has motivated many biologists to consider bioinformatics.
- '*Funding stability for a long-term strategy*'. The service incomes of the facility are stable, and research incomes are very good. This has allowed the facility to invest in new equipment (e.g. a Psilo storage server). The facility is labelled by IBiSA, IFB and France Génomique.
- 'Needs of strong informatics infrastructures: communication with SU IT is still very poor regarding informatics-related issues (computing and storage servers) that are essential for an efficient bioinformatics facility.

Quality and effectiveness of the scientific animation policy

The facility is involved in several teaching activities at the local (e.g. Master 2 at SU), national (e.g. training on FAIR data), and international (e.g. training on Galaxy tools) levels. Artbio Members attended over 10 conferences and are active in several scientific networks (e.g. Galaxy project, SU omics). It advises other facilities (e.g. imaging and electron microscopy platforms) on data analysis. However, no concrete actions were taken to federate the community of IBPS bioinformaticians scattered across IBPS units and teams.

Adequateness and quality of dispensed common services

The services provided by Artbio in data analysis are diverse and adapted to the IBPS needs. Users express high satisfaction with the quality of analyses conducted and commend the investment and strength of proposals put forth by facility members. Several web services provided by Artbio for bioinformatic analyses (Galaxy, R & Jupyter servers) and data storage (cloud) and training (online tutorials) are available to all IBPS members.

Artbio is involved in promoting FAIR and open science principles in biology and provides advice to IBPS members.

The committee commends Artbio for initiating the companionship training initiative. This initiative is clearly a success as it allows users to become autonomous in 'routine' data analysis and, thus, investigate their data from different perspectives.

Degree of resources sharing among constituent units

The facility is used by IBPS teams (36%) and other researchers at SU (13%) and in the Paris area (50%), illustrating the success of the facility.

All the members of Artbio are fully dedicated to the facility. Extra staff is needed to expand the facility's expertise (e.g. modelling/AI) and allow more companionships. IBPS constituent units currently do not contribute to the facility in terms of manpower.

The facility is financially self-autonomous. This allows them to invest in informatics infrastructure (servers) that IBPS members can use. However, there does not seem to exist coordination at the IBPS level (nor at SU) to share (bio) informatics resources (computing & storage).

Adequateness and complementarity of scientific strategy within the framework of other local federative structures

While the standard bioinformatic service offered by Artbio can be found in other local platforms (e.g. CINBIOS), the companionship training makes Artbio a unique facility in the local area.

Strengths

- High-quality bioinformatic services are provided to users.
- Web tools available to IBPS members for data analysis and storage.
- Companionship training.
- Promotion of FAIR principles and open science.
- High-quality research.

Weaknesses

- Lack of implication in the scientific animation of the community of IBPS bioinformaticians.
- Lack of communication with SU IT services to share informatics resources.
- Departure of the Scientific Officer.

Recommendations

The committee recommends to:

- identify a successor very rapidly and design a new organigram of responsibilities among Artbio members. If the facility is overloaded, a steering committee (made up of IBPS researchers) may help Artbio make scientific strategic decisions and make project/companionship selections.
- build on the success of companionship to extend the offer (e.g. online version, more staff involved). Mutualisation of human resources with IBPS units (bioinformaticians present in the IBPS teams) and other SU bioinformatic facilities can be a solution to allow more companionship and reduce the waiting list.
- animate the IBPS community of bioinformaticians. The organisation of methodological seminars and the participation of non-Artbio bioinformaticians in Artbio training may be a first step.
- continue to promote FAIR principles within IBPS.
- improve communication with other SU informatics facilities and SU UMS Sacado.
- reinforce the link with the imaging and EM facilities regarding their needs in image data analyses.

IMAGING FACILITY

The imaging facility demonstrates a very good scientific quality, offering advanced imaging techniques from subcellular to organismal levels. Its expert staff, comprising four dedicated engineers and one engineer expert in instrumentation at LJP and the facility, manages the platform efficiently and offers valuable guidance and training to users. The fruitful collaboration with the LJP significantly contributes to the facility's development and the implementation of innovative approaches.

The imaging facility has contributed to several publications. Notable contributions include the development of the DiAna tool and collaborative research on Thiomargarita.

The CNRS Cristal medal awarded to one of its engineers attests the facility's impactful contributions to scientific knowledge and innovation in imaging.

Following the death of the imaging facility manager in May 2023, the engineers are overloaded with work and there is an urgent need to recruit an engineer.

Quality and effectiveness of the scientific animation policy

The imaging facility's scientific animation policy is very good. Notable activities include organising specialised courses and active participation in international events. Being part of networks like GDR Imabio and rt-mfm demonstrates its commitment to collaboration and advancing microscopy techniques.

Adequateness and quality of dispensed common services

The imaging facility offers high-quality imaging services covering subcellular to organismal levels. Its expertise includes wide field, confocal, biphoton, macroscopic, light sheet, super-resolution imaging, and techniques like photomanipulation, fluorescence lifetime measurements, and spectral analysis. Additionally, they specialise in developing and adapting clarification protocols for various biological entities. Services extend to image treatment and analysis involving deconvolution, segmentation, 3D-spatial analysis, colocalisation, proximity, surface overlap, 3D reconstruction, and artificial intelligence. The addition of Zeiss 980 FAST-Airyscan II confocal microscopes enhances its capabilities.

Acknowledging the rising need for image analysis and data management, efforts are underway to establish a dedicated data analysis group, fostering potential collaborations within the technological department's facilities.

Degree of resources sharing among constituent units

User fees sustain the facility financially and contribute to acquiring new equipment, with major purchases reliant on equipment grants. Enhanced involvement from IBPS unit research teams is recommended to expedite the procurement of some new equipment.

Strengths

The imaging facility at IBPS plays a vital role in supporting a diverse user community and promoting collaborations among research teams. Effective communication between management, especially the technical head, and users is critical in identifying necessary equipment acquisitions. Ongoing methodological developments cover various areas, such as creating low-toxic clearing protocols and implementing confocal super-resolution techniques. The facility's ability to innovate with dedicated approaches in partnership with LJP is a strength.

Weaknesses

No significant weaknesses to be highlighted. Fundraising challenges and managing aging equipment are typical aspects of any imaging facility's operations.

Recommendations

The committee recommends creating a working group on image analysis which could be expanded to address broader needs in data science. The Artbio companionship model can serve as an excellent example to guide the training of users towards greater autonomy in image data analysis.

ELECTRONIC MICROSCOPY FACILITY

The electron microscopy facility platform is directed by a CNRS engineer, assisted by two additional engineers (a fourth one retired in 2018). The platform has expertise in conventional sample preparation and observation in TEM and STEM-in-SEM, cryo methods for sample preparation in TEM and cryo-SEM, array tomography, and correlative light electron microscopy (CLEM). The specificity of the platform is the high-resolution SEM/cryo-SEM with a unique configuration in France, which provides a combination of resolution and devices for cryo. Another specificity is offering various tools and protocols to study specific biological samples. The platform contributes to new developments for optimising sample preparation for users, allowing, for example, the automated observation in array tomography (AT). Through specific projects, the platform contributed to 45 publications; among them, 16 were co-authored by the platform engineers. Some of these publications are in generalist journals (PNAS, Nat. Commun., J. Colloid and Interface Sci.) and a few in technical journals (JOVE, J. microscopy) where the platform engineers publish their technical developments and optimised protocols.

In the following period, the platform will develop skills in 3D modelling & analysis to better analyse the EM images. New equipment will be acquired in the short term to improve sample preparation and upgrade the SEM. In the mid-term, the replacement of the TEM, which is about twenty years old, must be prepared. Some discussions have been initiated with chemistry and physics institutes about buying shared tools; a financial plan has to be implemented. Recruiting a fourth engineer in 2024 will allow the platform to develop new offers and welcome more users.

Consideration of previous recommendations

- *'The platform should enhance the promotion of its expertise and explore utilisation opportunities within the IBPS community'*. Further improvements are necessary in this regard.
- *'To define their specificities in comparison with other platforms of the Paris area.'* The specificity of the platform is to offer various tools and protocols to study specifically biological samples. They also provide unique developments and tools related to cryo techniques.

Quality and effectiveness of the scientific animation policy

The platform is involved in teaching activities. It delivers Master 1 & 2 courses at Sorbonne University and Paris Cité University, respectively, for a total of six days/year. Starting in 2024, it will also give through CNRS Formation Entreprise training on SEM in Biology.

The platform members also contributed/attended seven conferences and are active members of fournetworks (RIME, Sfmu, GN-MEBA, LUMIC).

Adequateness and quality of dispensed common services

The platform offers a great variety of electron microscopy approaches that could, in principle, serve many biological questions and preparations. Their expertise ranges from sample preparation (TEM, cryo) to image analysis (3D EM).

The platform mainly functions in a fully assisted mode, in which platform engineers perform sample preparations and measurements. A small portion of the users are trained to work autonomously. Such functioning of the electron microscopy platform, which is common in biology labs, requires a high timeshare of the engineers per user. As such, with three engineers, the platform has been understaffed over the evaluation period. The situation will improve with the upcoming recruitment of a new engineer.

Degree of resources sharing among constituent units

The IBPS users represent only a minority of the platform users. Thus, the degree of resources sharing among the constituent IBPS units appears limited. Some efforts shall be made to further advertise the platform's offers and possibilities to the IBPS community.

The revenues generated by the platform balance the expenses. However, part of the equipment is rather old (freeze-substitution apparatus (AFS, Leica, 2000), plunge-freezing apparatus (CPC, Leica 2000), TEM (2100HC, JEOL, 2006) and would require significant investment to be refreshed or renewed. Strategic choices will have to be made to select the equipment to be renewed and a financial plan needs to be prepared.

Adequateness and complementarity of scientific strategy within the framework of other local federative structures

The IBPS platform differs from other electron microscopy platforms in surrounding laboratories by its willingness to develop tools and protocols for biological samples. An example is the high-resolution SEM/cryo-SEM with a unique configuration in France, which provides a combination of resolution and devices for cryo. Another example is the optimisation of sample preparation for users, allowing the automated observation in array tomography (AT).

Strengths

- The platform has long-standing expertise in electron microscopy, specifically for scanning EM, freeze fracturing and Cryo-SEM, and has implemented up-to-date imaging approaches over the years. It provides a unique offer and expertise to study biological samples.
- The platform has the know-how to train and offer satisfactory services to the users.
- The platform budget has been balanced thanks to strategic technical offers.

Weaknesses

In practice, the platform engineers consistently offer users comprehensive 'assisted' support, fostering a collaborative environment. While the co-authorship of publications with engineers remains relatively low, there is ample room for future growth and increased collaboration, highlighting the potential for even more impactful outcomes.

- The facility is used by a small minority of the IBPS members; better advertising among the IBPS community on their expertise and developing possibilities is recommended.
- Part of the equipment is rather old and would require significant investment to be refreshed. Strategic choices must be made to select the equipment to be renewed. The strategy to raise substantial funds for future cutting-edge material has yet to be developed.

Recommendations

The committee recommends:

- that the platform should better advertise their expertise and develop possibilities within the IBPS community.
- that, given the limited platform's resources, strategic choices should be made with old material that may or may not be replaced. A strategy to raise significant funds for future cutting-edge material should be implemented. These strategic choices should constitute a good time for mid- and long-term perspectives.

PROTEIN ENGINEERING FACILITY

The facility is composed of two engineers from Sorbonne University. One PU acts as a scientific manager. The facility provides two services: peptide synthesis performed by one engineer and analysis of molecular interactions performed by the other engineer. Close collaboration with users drives project development and methodological advancements, resulting in significant contributions to publications, with sixteen co-authored articles since 2017, including publications in generalist journals like Sci. Adv. and PNAS, alongside one patent. During the last period, 70 peptides were synthesised, and twelve projects per year were performed without information on the number of IBPS teams and the total number of teams using the platform.

Some old pieces of equipment will be replaced. The budget is already secured for the molecular interaction part of the platform for a more sensitive SPR system and a new technology combining microscale thermophoresis and spectral shift. Funding has to be finalised for a new preparative HPLC. These new pieces of equipment should make the platform more efficient and solve, at least partly, the overwhelming activity.

The platform will propose a new service for an *in-silico* structure-based approach for the design of binding partners. This expertise will be provided by a CR CNRS, who will train interested users.

Consideration of previous recommendations

- *'The facility should communicate on their expertise.'* Appropriate actions were taken, such as participation in workshops and networks.
- *'The peptide synthesis and protein interaction facility' and the 'MS facility in proteomics' should fuse to create a proteomic facility. This new association could also allow Paris Sorbonne University to create a larger proteomic facility on the UPMC site.'* The MS facility has left the IBPS, and these facilities have not been fused.

Quality and effectiveness of the scientific animation policy

The facility is involved in Master 2 and Licence courses at Sorbonne University during workshops (3 workshops per year). The platform also contributes to Lifelong learning with Sanofi (3 workshops). They also communicate locally on the platform day of the IBPS, during technical seminars, or in the IBPS seminars. They also participate in one international conference at the Pasteur Institute.

Adequateness and quality of dispensed common services

The platform offers two services: peptide synthesis and molecular interactions. The users are satisfied with the quality of the provided services. Platform members either perform experiments for peptide synthesis or work in a hybrid mode of performing or training users for the molecular interaction part of the platform. Still, the services

proposed are quite limited, and staff, at least for the molecular interaction part, is overwhelmed. New planned equipment should increase the efficacy of the platform and partly solve this difficulty.

Degree of resources sharing among constituent units
The user distribution for peptide synthesis (68% INPS-SU, 18% academic, and 14% private) and molecular interactions (48% INPS-SU, 30% academic, and 22% private) was provided without specific information about IBPS-only usage.

Adequateness and complementarity of scientific strategy within the framework of other local federative structures
The service proposed does not seem to be provided by other local federative structures. Several IBPS-SU teams use the platform.

Strengths
- The facility's highly competent staff provides a strong expertise that has led to many publications.
- The platform is involved in teaching and communicating with the local community. The platform receives benefits every year, showing that it is viable in the context of IBPS.

Weaknesses
As indicated in the previous report, the services offered are still limited.
The staff is overwhelmed, partly because of the use of old materials.

Recommendations
-The platform should improve communications with the whole IBPS community to involve more IBPS teams in developing services and using the facility.
-The platform should (i) finalise the replacement of the old equipment and (ii) develop a new offer upon the arrival of the new CR.

RODENT FACILITY

The Center of Functional Exploration (CEFI) opened in 2020; it is a state-of-the-art animal facility (mice and rats) located in a brand-new building. The platform is co-led by an IE (experimental zone) and an AI (breeding and housing) and supervised by a DR. Seven zootechnicians (including 5 CDD SU) work on the platform. The platform is divided between an EOPS area and an experimental zone (for surgery, gene transfer and behavioural phenotyping).

The CEFI has a housing capacity of 3800 cages for breeding, with an additional 1300 cages in the experimental units. While the breeding and housing part of the CEFI opened in 2020, the experimental zone in the new building will open in 2024. The facility is used by many teams at the IBPS (23 teams).

Consideration of Previous Recommendations
'It is unclear what actions are being taken in anticipation of transferring the 200 mouse lines to a new EOPS facility. The estimated cost is about 2.5 k€/mouse line.' The IBPS and the units have both partly paid the cost of transferring mouse lines.

Quality and effectiveness of the scientific animation policy
There were no indications of scientific animation, but the platform provides training for users (both initial training for animal experimentation as well as lifelong training).

Adequateness and quality of dispensed common services
The CEFI is a state-of-the-art facility providing animals for many teams at the IBPS. Due to the transfer of mouse lines to the new facility, there has been a slowing down of activity during the period, which has not entirely

recovered. Also, there has been a high personnel turnover in recent years, leading to a staff shortage. At some point, team members had to help manage mouse lines, which was suboptimal. The current situation seems to be better with new recent hires.

Degree of resources sharing among constituent units

The facility's budget is around 250 k€, the cost for users has increased since the move to the new building. The budget is balanced. However, the facility is only at 1/3 capacity, which is not sustainable as it barely ensures sufficient income to cover expenditures. With the arrival of the IFM teams, the number of cages will go up, and zootechnicians from IFM will join the platform, which is a positive prospect. Even though the cost has gone up, the price for IBPS/SU teams is still below the average of animal facilities in France as it does not include the cost of CDDs.

Adequateness and complementarity of scientific strategy within the framework of other local federative structures

The facility will have to accommodate the future mouse lines from the IFM. With the arrival of new personnel (6 staff), it is expected that the activities of zootechnicians will be diversified to include manipulations (injections, genotyping), which may help to boost the interest of zootechnicians and limit turnover. The experimental rooms will be open to users in 2024. One future project is to increase the space dedicated to the phenotyping platform and close the access of this area to users in order to i) allow more teams (including the IFM teams) performing a wide variety of behavioral tests, and ii) ensure the same controlled health status in the experimental platforms.

Strengths

The CEFI is a state-of-the-art facility with excellent working conditions and dedicated personnel.

Weaknesses

The facility has a high turnover of non-permanent staff and difficulty recruiting even for open positions. The high turnover is not specific to the IBPS, but the difficulty of recruiting even for open positions is due to unacceptable low wages in the Paris area.

Recommendations

Care should be taken to ensure the facility is used at capacity and generates enough income to cover expenses. The housing of mice from non-IBPS/SU academic teams or the private sector should be strongly considered.

AQUATIC FACILITY

Built in 2015 and extended in 2021, the aquatic facility brings together an attractive variety of models, including Zebrafish, Danionella, Killifish, and Xenopus laevis and tropicalis. An expert engineer (IR) manages the platform with the support of three permanent technicians and one non-permanent staff. The platform offers high-quality services in animal husbandry and key expertise in cryopreservation, embryo bleaching, and genetic engineering (transgenesis, CRIPR/Cas9) in collaboration with user teams. The staff are also strongly involved in training scientists. Users are 11 IBPS teams, three from other research laboratories (SU) and one non-academic. A highlight over the period is the development of a very useful semi-automatic food dispenser performed in collaboration with physicists of the LJP (patent registered in France and extended to Europe and the US; publication in Zebrafish, 2019; presentation at national AFSTAL and international FELASA conferences). The facility plans to offer transgenesis and CRISPR/Cas9 techniques performed in collaboration with user teams as a service.

Consideration of previous recommendations

'It may be hazardous to propose a technological development around gene editing unless new personnel are specifically recruited to develop that aspect. Otherwise, gene editing and genotyping should be left to the

research teams'. Gene editing is performed in collaboration today and should soon be a service, with genotyping being left to research teams.

Quality and effectiveness of the scientific animation policy

The platform's staff are deeply involved in training scientists to comply with the law for using animals in research; they also teach and train on CRISPR-Cas9 genome editing in aquatic models for students, researchers, engineers, and technicians from public and private laboratories. This high level of expertise is well recognised, and they were recently authorised to organise training courses for scientists responsible for designing or conducting experiments on aquatic animals.

Adequateness and quality of dispensed common services

The platform offers very high-quality services. For example, improving Killifish husbandry led to collaborations with Institut Pasteur and the Centre de Recherche des Cordeliers (Methods Cell Biol, 2020; Curr Biol, 2021, co-signed by the platform staff); the development of a Xenopus model to screen drugs for remyelination led to two publications with the head of the facility as first author (Methods Mol Biol 2019; Mult Scler 2018; coll. ICM).

The facility is well equipped, and over the period, they have continued to improve it (investment in housing 690k€; new equipment 177k€).

Users were highly positive regarding the quality of the service but were concerned that an expert on Xenope would be retiring.

Adaquateness and complementarity of scientific strategy within the framework of other local federative structures

The facility integrates well into the local SU animal facilities network (RPPA) and closely interacts with national networks (Celphedia, EFOR, Resama, and ComAqua). It benefits from the National label GIS-IBISA.

Strengths

- Diversity of aquatic models and the high level of expertise of the staff.
- The facility offers very high-quality services that make it attractive and very useful for the scientific community.
- The facility benefits from high visibility at the local and national levels.

Weaknesses

- Expanding the genome editing service without improving the level of staff support may still be a risk.
- Due to a lack of staff, they have stopped the cryopreservation of zebrafish, which can soon be a problem considering the number of transgenic lines they keep (333).

Recommendations

Care will need to be taken to maintain, at least, the level of staff support; they should reconsider performing cryopreservation of zebrafish to reduce the number of live animals, limit costs and improve space.

DEGREE OF MUTUALISATION OF UNIT RESOURCES

The IBPS demonstrates a notable degree of mutualisation of resources through its common technological department, interdisciplinary collaboration, shared interests, and collaborative initiatives. The emphasis on teaching, training, and outreach further contributes to the mutualisation efforts. A common administration is also instrumental in the efforts. Below we highlight the main area of mutualisation.

- IBPS has a common technological department that supports the institute's research activities. This department addresses a wide range of needs in biosciences and offers services in the core areas of imaging, bioinformatics, proteomics, and animal housing. The technological department collaborates with the Laboratory Jean Perrin (LJP) to develop instrumentation for live imaging and aquatic facilities.

- The IBPS fosters interdisciplinary research and collaboration, bringing together theorists, experimentalists, computational biologists and physicists. The i-Bio Initiative, launched in 2020, is a significant effort to promote

interdisciplinary research in biology. This initiative, as well as IBPS seed funding, involves collaboration between IBPS and the Institut du Fer à Moulin (IFM). Organisation of seminars, mini-symposia, and assistance to teams for funding applications and technology transfer participate extensively to promote synergies.

- While the institute's research interests are diverse, its collective expertise positions it well to embrace recent trends in biological research, including modelling and quantitative approaches.

- Approximately 60% of the research staff in the units have teaching positions at SU. There is a promotion of teaching partnerships between teachers-researchers and CNRS/Inserm researchers to balance teaching loads. The IBPS technological department significantly contributes to teaching and training through practical courses.

- The IBPS has a communication strategy, including an internal newsletter, website, and participation in public outreach activities. The institute engages in outreach programs for high school students and participates in events addressing general societal interests.

- The IBPS is working to streamline administrative tasks and create a common administrative unit. The IBPS budget is funded independently by CNRS and SU, with additional contributions from each unit. Human resources management involves ranking at both the institute and unit levels.

- The IBPS supports internal ecological and sociological initiatives with a green committee proposing actions to reduce the ecological impact of research performed at IBPS and a listening cell to help solve human relations issues.

PERTINENCE OF THE SCIENTIFIC STRATEGY, COMPLEMENTARITY/INSERTION IN RELATION TO THE OTHER FEDERATIVE STRUCTURES PRESENT ON THIS SITE

The committee commends the IBPS for having attracted a future director with a clear vision for the future of IBPS.

The future director's vision is well-thought-out, emphasising proactive governance and management strategies to enhance IBPS's effectiveness. The focus on funding foresight, technical staff development, coaching for 'Concours,' optimisation of research cores, and implementing a mentoring program demonstrates a comprehensive approach to address various aspects crucial for the institute's success.

The creation of a Scientific Council, inclusive of COD members, elected representatives of the transversal axes, and core facility leaders, is a commendable step toward shaping the scientific direction of the IBPS. This initiative reflects a commitment to inclusivity and shared decision-making. The proposed structures demonstrate a transparent and participatory approach. Extending the scientific policy beyond individual units by integrating transversal axes aligns with the institute's overarching scientific goals. This initiative is likely to enhance coordination, promote a unified vision, and contribute to the success of the IBPS as a leading institution in life sciences research.

A critical challenge for the IBPS is the recruitment of dedicated personnel in essential areas such as IT, logistics, communication, human resources, and grant applications. This is vital for ensuring the smooth and efficient functioning of the institute.

Given the intricate organisational structure of the institute, the IBPS members and the future director recognise the need for common and shared rules among its units. The director plans to adopt a Code of Internal Rules for the IBPS to address this. Achieving consistency in budget management, staff allocation, and team hiring across the institute is imperative for cohesive operations.

Accommodating IFM teams at IBPS presents an early challenge, necessitating clearing space occupied by a startup, and renovation. An unclear plan poses risks such as discontent among researchers and the potential departure of individuals seeking alternative solutions. To mitigate this, developing a clear plan and a contingency strategy is crucial. Transparent communication between supervising bodies and the Institute head is essential to formulate and disseminate information effectively within IBPS, ensuring a smooth transition and addressing concerns proactively.

The committee acknowledges Sorbonne University for politically endorsing support for the entire building renovation. However, the committee emphasises the importance of SU providing a clear calendar to the IBPS regarding this renovation. It issues a cautionary note, indicating a potential crisis and significant challenges, particularly the inability to recruit personnel if a clear plan is not established.

RECOMMENDATIONS TO THE FEDERATIVE STRUCTURE

Recommendations specific to the technology department and its facilities were formulated in the respective sections. Below we formulate more general recommendations aiming to foster collaboration, streamline operations, and solidify IBPS's position as a leading institution in life sciences research in Paris, France, and beyond.

Address infrastructure issues. The issue of the renovation of the Cassan building is most urgent to overcome project limitations. Transparent communication regarding future reorganisation and renovation plans requires attention.

Sustain funding and interdisciplinary initiatives. Continuous funding for the i-Bio program to foster interdisciplinarity is vital. Additionally, expanding the successful international PhD grants program through i-Bio and integrating it with other PhD grants will enhance visibility and attract top talent to contribute to IBPS's research objectives.

Strengthen international visibility. Implementing calls at the IBPS level will be pivotal in attracting researchers internationally and recruiting new groups through appealing start-up packages (space, Tech support and funding). This will necessitate space allocation and decisions at the IBPS level. The importance of European and international funding, particularly from sources like ERC or HFSP, should be highlighted in IBPS's strategic planning. Increased international visibility will also result from enhanced international collaborations. The IBPS should seek partnerships, plan exchange programs, and promote joint research projects.

Fostering a sense of belonging is crucial for the institute. All personnel, including students, postdoctoral students, scientific, technological, and administrative staff, are encouraged to engage in collective activities and utilize shared spaces for regular interaction.

Optimize logistics and mutualisation efforts by sustaining ongoing efforts in mutualisation. A dedicated service, with personnel handling parcels and overseeing general logistics within the IBPS, is recommended to optimize logistical operations. IT support should be reinforced in collaboration with SU IT.

Establish comprehensive informatics support. This will boost efficiency and collaboration. The IBPS should establish comprehensive informatics support, encompassing storage, calculations, and network, with backing from the supervising bodies by improving communication with SU UMS Sacado. This centralized system will streamline data sharing, enhance resource accessibility, and promote collaboration among all units within the federation. Additionally, the institute should offer clear guidelines for data sharing, storage, and management across all units, ensuring transparency and adherence to FAIR principles.

Coordinate the initiatives of the technological department. The committee recommends appointing a scientific head and establishing a steering committee for the core facilities. This steering committee should prioritize actions, coordinate efforts, and find solutions, particularly focusing on shared endeavours such as data analysis. The appointment of a new scientific officer for Artbio is necessary.

Execute strategic scientific strategy and personnel recruitment. The regular meetings of the COD (Committee of Direction) are recommended to play a pivotal role in defining common objectives, with the flexibility to maintain distinct organisational modes when necessary. The recruitment of essential personnel is required for smooth institute functioning.

Establish clear guidelines and foster a unified organisational culture. It is crucial to develop an internal regulations document (Règlement intérieur). This document should outline specific rules and shared practices, define roles and responsibilities, and standardize decision-making processes across the IBPS. The future director is on the verge of proposing such a document to address organisational complexities, consistency in budget management, staff allocation, and team hiring. This is essential to maintain cohesive operations.

Enhance administrative efficiency and communication. This implies strengthening administrative efficiency and coordination across the institute, continue improving internal communication mechanisms, particularly regarding reorganisation and renovation plans, and developing internal regulations to foster a unified organisational culture. The committee also encofurages the IBPS to continue its efforts to improve the internal communication towards ITA and IBPS teams regarding the administration's future reorganisation and renovation of the building.

CONDUCT OF THE INTERVIEWS

Date

Start: 18 Janvier 2024 à 8 h

End: 18 Janvier 2024 à 18 h 30

Interview conducted: on-site

INTERVIEW SCHEDULE

Location: on site visit (IBPS Conference room (C404))

8:30 a.m. - 8:35 a.m. Presentation of Hcéres evaluation by the Scientific Officer, Yacine Graba (Délégué Hcéres)
Attending:
- *IBPS Steering Committee (Conseil de direction de l'IBPS)*
- *Institute Council (Conseil d'Institut)*
- *Members of the Federation*
- *Team, project and platform leaders (present and future)*

8:35 a.m. - 9:25 a.m. Presentation of the IBPS by the current and next director: Sylvie Schneider-Maunoury & Martin Giurfa
Attending:
- *IBPS Steering Committee (Conseil de direction de l'IBPS)*
- *Institute Council (Conseil d'Institut)*
- *Members of the Federation*
- *Team, project and platform leaders (present and future)*

9:25 -10:30 Presentation of some IBPS actions:
- Incentive Actions
  - Marie Breau & Lea-Laetitia Pontani
  - Damien Brégeon & Clément Carré
- *I-Bio* Pre-Doc + PhD Program
  - Roberto Netti
  - Brenda Nieto Rivera
  - Tulio Almeida
  - Olga Vasiljević
- IBPS Doc & Postdoc Association (IDPA)
- Vis Ma Vie De Chercheur-euses (VMVDC) - Caroline Dubacq & Lou Lambert

Attending:
- *IBPS Steering Committee (Conseil de direction de l'IBPS)*
- *Institute Council (Conseil d'Institut)*
- *Members of the Federation*
- *Team, project and platform leaders (present and future)*

10:30:10:45 Break C405 (Hcéres SO and committee, closed doors)

10:45 -12:15 Platform visits and user's committee discussion (two sub-committees)
- Visit & Presentation of platforms
- Meeting with user's committees

12:15 - 12:45 Meeting with the members of the Federation
Attending:
- *Members of the Federation*

12:45-2 p.m. Lunch C405 (Hcéres SO and committee, closed doors)

2 p.m.-2:30 p.m. Meeting with the IBPS Steering Committee (Conseil de direction de l'IBPS)

Attending:

- *IBPS Steering Committee (Conseil de direction de l'IBPS)*

2:30 p.m. -3 p.m. Meeting with the representative of institutions

Attending:

- *CNRS : Mr Bernard Poulain*
- *SU: Mr Philippe Agard*
- *SU:* Ms Elizabeth Nagel-Perez
- *Inserm : Mr Thierry Galli*

15 h – 15 h 30 Meeting with the Institute Council (Conseil d'Institut)

Attending:

- *Institute Council (Conseil d'Institut)*

3:30 p.m. - 4 p.m. Meeting with IBPS direction team (present and future)

Attending:

- *Sylvie-Schneider-Maunoury*
- *Amal Mossab*
- *Valérie Goguel*
- *Martin Giurfa*
- *Michel Labouesse*

4 p.m.-4:15 p.m. Break C405 (Hcéres SO and committee, closed doors)

4:15 p.m. – 6:30 p.m. Deliberation of the Committee (closed hearing)

PARTICULAR POINT TO BE MENTIONED

None

GENERAL OBSERVATIONS OF THE SUPERVISING BODIES

Marie-Aude Vitrani
Vice-Présidente Vie institutionnelle et démarche participative
Sorbonne Université

à

Monsieur Eric Saint-Aman
Directeur du Département d'évaluation de la recherche
HCERES – Haut conseil de l'évaluation de la recherche et de l'enseignement supérieur
2 rue Albert Einstein
75013 Paris

Paris, le 3 mai 2024

Objet : Rapport d'évaluation DER-PUR250024396 - IBPS - Institut de biologie Paris-Seine

Cher Collègue,

Sorbonne Université vous remercie ainsi que tous les membres du comité HCERES pour le travail d'expertise réalisé sur l'unité de recherche « IBPS ».

Sorbonne Université n'a aucune observation de portée générale à formuler sur le rapport d'évaluation transmis.

Je vous prie d'agréer, Cher Collègue, l'expression de mes cordiales salutations.

Marie-Aude Vitrani
Vice-Présidente Vie institutionnelle
et démarche participative

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www.hceres.fr

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