EVALUATION REPORT OF THE UNIT
INT - Institut des neurosciences de la Timone

UNDER THE SUPERVISION OF THE FOLLOWING ESTABLISHMENTS AND ORGANISMS:
Aix-Marseille université - AMU,
Centre national de la recherche scientifique - CNRS

EVALUATION CAMPAIGN 2022-2023
GROUP C

Rapport publié le 17/08/2023

In the name of the expert committee[1] :

Simon Thorpe, Chairman of the committee

For the Hcéres[2] :

Thierry Coulhon, President

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.

MEMBERS OF THE EXPERT COMMITTEE

Chairperson:	Mr Simon Thorpe, Université Toulouse 3 - Paul Sabatier - UPS
Experts:	Ms Sophie Crespin, Université de Lille (PAR representative)
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	Mr Antoni Valero-Cabre, Sorbonne université, Paris (CoNRS26 representative)

HCÉRES REPRESENTATIVE

Mr Giovanni Stevanin, INSERM, Paris

CHARACTERISATION OF THE UNIT

- Name: Institut de Neurosciences de la Timone
- Acronym: INT
- Label and number: UMR 7289
- Number of teams: 13
- Composition of the executive team: Dr Guillaume MASSON

SCIENTIFIC PANELS OF THE UNIT

SVE Sciences du vivant et environnement

SVE5 Neurosciences et troubles du système nerveux

CNU69 Neurosciences

CoNRS 26 Cerveau, cognition, comportement

THEMES OF THE UNIT

The Institut de Neurosciences de la Timone is a large research centre located in the Timone hospital (Marseille). At its creation in 2012 its research focused on three main topics – motor system, sensory systems, and regulatory systems. But in recent years, this list has expanded to include additional interdisciplinary themes centred on computational neuroscience and neuroinformatics. The number of research teams has progressively increased and has now reached thirteen with an additional external team (NET) that could become a full member of the lab for the next period (2024–2028).

Globally, the thirteen different teams can be assigned to three main themes: three teams are working on the excitability of spinal networks, their intrinsic and network properties as well as non-neuronal interactions (P3M, ImaPath and SpiCCI), five teams work on the dynamics of cortical maps for decision, action and perception (ComCO, NeOpto, InVIBE, BANCO and BRAINET) and the last five teams work on Cortical and Subcortical networks for social interaction (BANCO, SONICS, SANE, BAGAMORE and CANOP).

These different functions are studied at multiple scales using a range of approaches. They include molecular, transcriptomic and genomic methods and cover the study of small networks, mesoscopic cortical maps, and macroscopic scales, with an increasing involvement of computational approaches.

The INT's strategy is also illustrated by the creation of two interdisciplinary centres in 2021 and 2022. The NeuroTechCenter (NTC) is devoted to developing advanced techniques involving Physics, Electronics and Photonics. The CoNeCT centre is developing methods in Computer Science and Applied Mathematics for Computational and Theoretical Neuroscience.

HISTORIC AND GEOGRAPHICAL LOCATION OF THE UNIT

Since its creation in 2012, the INT unit has occupied all 4,500 m2 of a pure research building located on the Timone hospital site. In 2022, the INT expanded by acquiring around 1500 m2 located in the main Medical School building ('Aile Verte' on the third floor), a few hundred metres from the original building. The new space is located in close proximity to another major neuroscience laboratory in Marseille – the Institut des Neuroscience des Systèmes, an INSERM laboratory. The Medical school building also houses the Institut de Neuropathologie (INP) and the Centre de Résonance Magnétique Biologique (CRMBM). This additional space is being using to house both the NeuroBioTools centre (incorporating a P2/P3 facility) and the NeuroTechCenter.

While not actually a part of the INT (it has the status of a support unit (Unité d'Appui à la Recherche - UAR), it is closely linked to the INT and is directed by a team leader at the INT.

RESEARCH ENVIRONMENT OF THE UNIT

The INT is a key player in several research initiatives in the Marseille area. These include NeuroMarseille, an AMU funded Federation of nine Neuroscience labs, and Marseille Imaging, which brings together 23 labs involved in biology, physics, and computer science. It is also closely involved in the EUR Neuroschool initiative funded with PIA3 funding, as well as two convergence institutes that received PIA3 funding – the 'Institute of Language, Communication and the Brain (ILCB) and the Turing Center (CENTURI).

The INT has an unusually high concentration of full-time researchers (32 CNRS and 3 INSERM) and relatively few university lecturers and professors (12 from AMU), although there are ten clinical researchers (MCU and PU-PH) with positions funded by the university.

Indeed, the INT has teams that are associated with nine clinical units at the University Hospital and has collaborations with four others. They include Psychiatry, Neurology and Rehabilitation, Ophthalmology, and Intensive Care.

UNIT WORKFORCE: in physical persons at 31/12/2021

Permanent personnel in active employment	
Professors and associate professors	12
Lecturer and associate lecturer	10
Senior scientist (Directeur de recherche, DR) and associate	10
Scientist (Chargé de recherche, CR) and associate	25
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	33
Subtotal permanent personnel in active employment	**90**
Non-permanent teacher researchers, researchers and associates	2
Non-permanent research supporting personnel (PAR)	11
Post-docs	13
PhD Students	59
Subtotal non-permanent personnel	85
Total	**175**

DISTRIBUTION OF THE UNIT'S PERMANENTS BY EMPLOYER: NON-TUTORSHIP EMPLOYERS ARE GROUPED UNDER THE HEADING 'OTHERS'.

Employer	EC	C	PAR
CNRS	0	32	18
Aix-Marseille	22	0	10
Inserm	0	3	0
CHU Marseille	0	0	3
Onéra	0	0	0
Others	0	0	2
Total	**22**	**35**	**33**

Recurrent budget excluding wage bill allocated by parent institutions (total over 6 years)	**3,137**
Own resources obtained from regional calls for projects (total over 6 years of sums obtained from AAP idex, i-site, CPER, territorial authorities, etc.)	2,015
Own resources obtained from national calls for projects (total over 6 years of sums obtained on AAP ONR, PIA, ANR, FRM, INCa, etc.)	11,887
Own resources obtained from international call for projects (total over 6 years of sums obtained)	4,871
Own resources issued from the valorisation, transfer and industrial collaboration (total over 6 years of sums obtained through contracts, patents, service activities, services, etc.).	1,665
Total in k euros	**23,575**

GLOBAL ASSESSMENT

The committee considers that the Institute des Neurosciences de la Timone is globally **an excellent laboratory**. Its **resources are clearly excellent** (90 permanent staff), with a truly **remarkable level of funding** (>23M€ over the previous contract period). Likewise, its **attractiveness is also excellent**, as demonstrated by the fact that it has recruited seven early career researchers with permanent CNRS positions in the period since 2016, in addition to one other recruited in 2015. It has also convinced another recently recruited CNRS researcher to join them for the next period, starting in 2024. The **scientific production of the laboratory is excellent or even outstanding** in many cases. It was felt that the weakest element was probably **its links with Society, although even this aspect was considered to be very good to excellent.** However, this result is hardly surprising for a laboratory whose major preoccupation is clearly fundamental scientific research.

There were some differences between the thirteen teams in terms of scientific ranking, however. Team 4 (Neopto) was considered to be globally outstanding. Four others were considered to be excellent to outstanding (teams 1, 3, 5 and 13). Five others were rated as excellent (teams 2, 6, 7, 9 and 10). Another (team 12) was considered to be very good to excellent. But even the two weakest teams (teams 8 and 11) were considered to be very good. This is, overall, a remarkable achievement. The different teams varied somewhat in the areas where they excelled, with some teams achieving outstanding ratings in specific areas.

The success of the lab is clear from the rapid increase in the number of scientists, from 110 to 175 in the period. The lab has a very well-defined strategy for developing research programs at the interface between the Behavioural Neurobiology, Brain Imaging and Neural Coding. This has involved the establishment of several research platforms. It has also involved the acquisition of around 1500 m2 of lab space.

There are few obvious weaknesses. One concern is the parity between female and male staff, particularly when considering the direction of the lab and the different teams. Given the dominance of males among the list of recently recruited researchers, this is unlikely to be fixed in the near future. However, the direction is acutely aware of the problem and trying to find ways to improve the situation.

All these developments demonstrate the remarkable vision of the lab's founding director, who has done an excellent job of putting the INT on the map and turning it into a leading research centre with a well-established international reputation.

DETAILED EVALUATION OF THE UNIT

A – CONSIDERATION OF THE RECOMMENDATIONS IN THE PREVIOUS REPORT

The previous HCERES evaluation described the INT as an 'outstanding' unit and made several suggestions at the level of the lab that have been taken into account during the contract period evaluated here. They include a recommendation to 'further promote interdisciplinary research' that has resulted in the creation of two new teams (MECA and BraiNETS) and the association of a new one, the NET team.

The recommendation to improve convergence on common themes and projects is reflected in the development of various large-scale initiatives.

The previous panel recommended that the lab increases the number of ERC proposals, and this has resulted in the submission of three consolidator and two advanced ERC proposals with at the end one successful Advanced grant.

Finally, there was a recommendation to foster interactions with clinical research, but this has not been successful, mainly because of limited support from the hospitals and the university, and also in a difficult period due to the COVID19 pandemic situation.

B – EVALUATION AREAS

EVALUATION AREA 1: PROFILE, RESOURCES AND ORGANISATION OF THE UNIT

Assessment on the unit's resources

The INT is a large research centre that has been expanding rapidly. At the end of 2021, it had 90 staff with permanent positions and a further 85 people on non-permanent positions (students, postdocs and temporary technical staff) which are **excellent human resources**. The lab has a relatively high number of full-time researchers from CNRS or INSERM (35). This is quite high compared with the number of researchers with Assistant Professor or Professor positions at the University (22). The proportion of permanent support staff to researchers is relatively low (around 0.5) as classically observed in many labs in France.

The **level of funding is particularly impressive**. Recurrent funding from the University and CNRS totalled €3,137 million. But the lab has also obtained over €20 million in external funding, mainly from national (€11,887 million) and international, mainly European, sources (4,871 M€). In addition, around 2 M€ were obtained from regional funding agencies, and a further 1,665 M€ from valorisation and industrial collaborations.

Assessment on the scientific objectives of the unit

The committee considers that the INT has been **very successful in defining a set of scientific objectives that are clear and ambitious**. Since its creation in 2012, the INT has aimed to create a truly interdisciplinary research centre in translational neuroscience using molecular, cellular, and preclinical models, and using a range of approaches from neurobiology to cognition, at scales ranging from the microscopic to macroscopic, and fostering links between fundamental research and clinical applications. The clinical research interface profits from the lab's localisation on the Timone Hospital campus and distinguishes the INT from the other main sites in Marseille. For instance, eight INT teams collaborate with nine clinical units at APHM on molecular and brain imaging in depression or neurodevelopmental and psychiatric disorders, brain imaging in stroke and trauma, rehabilitation and drug-based strategies for spasticity. These links with the clinics are still limited, however, and should be reinforced.

Assessment on the functioning of the unit

The committee was very impressed by the way the INT has been structured and run. Under the current direction, the lab has grown from seven to thirteen teams, associated with a major increase in the number of members from 110 to 175. The lab has maintained a good balance between research involving pre-clinical models, humans and pathology, but in addition, there has been a substantial boost to the number of researchers working in computational neuroscience and technology. Gender balance in team leaders still remains an issue.

1/ The unit has resources that are suited to its activity profile and research environment.

Strengths and possibilities linked to the context

The unit has 175 people among whom 90 permanent staff, with a **significant increase since 2018 (~50%)**. Two thirds of the researchers in the unit are full-time researchers (35 at the end of the last contract, with 32 CNRS and 3 INSERM) and this means that the **INT is one of the most important research centres of its kind in France**.

The unit benefits from a strong administrative team with five people dedicated to finance and administrative support. The low ratio between technical and scientific staff (0.5 when the average ratio at INSB/CNRS is 0.8) is counterbalanced by the distribution of twelve of them mainly on the platforms and equipment support.

Each year, five to six applications from early career researchers for full-time research positions are supported by the laboratory. All these applications come from international laboratories, which demonstrates the attractiveness of INT.

The average annual budget is 3.6 M€ of which nearly 90% comes from external funding including French and European source of income from service activities of the technology platforms and structural funds (FEDER/CPER, EQUIPEX+). The next technologies that will be acquired through these accredited programs will contribute to providing the Timone campus with breakthrough technologies in microscopy and further increase the attractiveness of the INT facilities.

The economic model of the laboratory is well-thought-out, and the INT management is fully aware of its positive effects as well as its limits. An interesting device has been put in place since 2018:15% of the annual budget of 800 k€ managed by the INT direction is reserved for a 'fond d'investissement' used to complete equipment or to initiate new projects with the aim of developing collaborative work between the teams of the unit.

Weaknesses and risks linked to the context

Due to the limited number of technical staff (<0.5 per permanent researcher), half of the teams suffer from a deficit of technical support, partially compensated by access to local facilities, however.

In addition, INT moved to a new building ten years ago. Due to the increase in building maintenance expenses, the economic and organisational model that contributes to success in competitive calls could be jeopardised by increasingly phagocytosed financial resources for building infrastructure. The technical and logistical support needed for building operations is limited for the initial 4,000 M2 of the INT building and there have been several extensions or rehabilitation in 2016 and 2022 with others to come.

2/ The unit has set itself scientific objectives, including the forward-looking aspect of its policy.

Strengths and possibilities linked to the context

The scientific strategy and orientations appear very solid and well argued by the director and team leaders with a clear vision for how it should develop in the coming years. In addition, the team and platform leaders are strongly involved in the definition of the scientific strategy of the INT with **strong reactivity to create new teams** in the course of the contract in order to take advantage of opportunities (Teams SONIC SANE and BrainNet were created in 2021). The unit also has a clear vision of its research environment and is a force of proposals in the structuring of projects on the Timone campus i.e.: creation of an interdisciplinary centre for physics, Electronics & Photonics in 2021: NeuroTechCenter).

Weaknesses and risks linked to the context

As is often the case, with a majority of full-time researchers in the unit (35 versus 22 AMU EC), there might be a certain lack of visibility among AMU students, but most researchers are involved in teachings, at least at the master level.

Furthermore, even if the economic impact was not a priority in itself for INT, the social impact could be evaluated with respect to the translational and clinical research conducted by the fifteen permanent clinicians (MCU/PU-PH and PH) involved in the unit's research activity.

3/ The functioning of the unit complies with the regulations on human resources management, safety, the environment and the protection of scientific assets.

Strengths and possibilities linked to the context

INT's orientation is to keep the precariousness index as low as possible (around 40%), with priority given to the perpetuation of the job support of technicians and engineers (11 non-permanent CDD vs 33 permanent).
The permanent technical staff (BIATSS/ITAs) are accompanied in their career and are encouraged to submit promotion applications.
The unit has set up various committees (health and safety, biosafety) by capitalising on the expertise of the laboratory. An updated PCA is available since 2020.
The INT management is concerned with equity between staff of different bodies and working groups can be created on a specific theme (e.g. teleworking).
The INT has initiated a process to reduce CO_2 emissions and has set clear short- and medium-term objectives (e.g. limiting wastes, recycling, CO_2 quotas for travel…).

Weaknesses and risks linked to the context

Although the unit is reflecting on taking corrective measures to achieve parity (discussions ongoing at the AMU Parity committee for the next contract), this is far from being achieved among team leaders (only 2 women out of 13) and among researchers with, for the moment, 13 women and 44 men among the permanent researchers. Furthermore, the strong bias in favour of males in the recently recruited CNRS researchers will not improve the situation.

EVALUATION AREA 2: ATTRACTIVENESS

Assessment on the attractiveness of the unit

The INT's attractiveness is clearly outstanding, as demonstrated by the fact that **the lab has successfully recruited seven early career researchers to CNRS positions as well as attracting an additional twelve researchers to join the lab**. This is **a remarkable achievement**! The reason appears to lie at least in part in the lab's active strategy of selecting the best candidates and mentoring them (support committee) to help them provide a convincing proposal. The lab has also been extremely successful in its efforts to obtain funding, with a very impressive number of 200 funded projects at both the national and European levels (e.g. ERC advanced, ANR, Era-net Neuron, COEN) for a global amount of ~24M€ for the six contracts evaluated. Finally, 91 PhD students have been trained during the contract period.

1/ The unit has an attractive scientific reputation and contributes to the construction of the European research area.

Strengths and possibilities linked to the context

The INT has a scientific reputation that makes it very attractive. This is clear from the impressive amount of funding from European sources, totalling nearly 4.9 M€ over the six years. The INT has been involved in two Early Training Networks at the European level, as well as on five other international collaboration grants (ANR-NSF, 2 EraNet, 1 COEN and an ERA-Flag. One researcher has been funded by an ERC Advanced Grant.
Its international visibility is also strengthened by its policy of organising international meetings every two years, although the meeting planned for 2020 was dropped because of the pandemic. A three-day meeting in September 2022 marked the 10th anniversary of the lab. During the evaluation period, lab members have been involved in organising sixteen scientific meetings at the national or international level.
The lab also hosted visits from four international researchers from labs in the USA, Canada, the UK and Russia.
The INT also trained 91 PhD students, including five from abroad (Germany, Canada, Spain, Belgium, Morocco).
Lab members are also involved as members of the scientific boards of several scientific societies (e.g. European Academy of Sciences, IUF…).
Finally, one particularly notable example of the INT's international significance is the existence of an international laboratory (LIA Vision4action) involving members of the COMCO team and the Julich Research Centre in Germany.

Weaknesses and risks linked to the context

Given the lab's very strong financial reserves, the number of foreign visitors is somewhat disappointing, although this was certainly impacted by the Covid pandemic, and the situation should improve in the coming years. Despite repeated attempts, the lab has yet to obtain funding for ERC Starting/Consolidator grants, although three proposals reached the second round.

2/ The unit is attractive for the quality of its staff hosting policy.

Strengths and possibilities linked to the context

The committee was very impressed by the quality of the INT's staff hosting policy which has clearly been very effective. The lab has many researchers with full-time positions (35) – with the vast majority employed by the CNRS (32) although there are also three INSERM researchers. There are also a smaller number of Professors and Associate Professors (22) or Practionners (5), of whom fifteen with clinical positions at the end of the contract position. The number of researchers has increased considerably, thanks to the recruitment of seven new CNRS researchers since 2016, and the arrival of other researchers from elsewhere in France (6 from CNRS, 8 from AMU).

This very impressive success rate appears to be largely the result of a very efficient process for selecting the best candidates and helping them prepare their proposals. The lab typically supports between six and seven applications every year, and there is a real effort to maintain a balance between different types of research. The lab has an annual internal call with around 120 k€ of funding that can be used to support pilot studies and the collection of preliminary data.

Weaknesses and risks linked to the context

For largely historical reasons, the INT has not been able to recruit researchers to teaching positions with the university. Such recruitment tends to go to other sites in Marseille that have a stronger involvement in teaching, essentially the sites located in Luminy and St. Charles. In principle, the INT could have hoped that its localisation within the Timone hospital site could allow it to recruit researchers to PU-PH and MCU-PH position, however this has not been the case.

Another weakness is related to the lab's poor record in terms of parity. The proportion of women among researchers is very low (10/35 (CNRS/INSERM), 3/12 (AMU MCF/PR) and 0/10 (MCU-PU/PH), and the situation is made worse by the fact that new recruits are strongly biased in favour of males. The committee was particularly disappointed by the fact that only two of the teams have women directors. The direction of the lab is aware of the problem, but it does not seem likely that the situation could be fixed in the near future.

The situation concerning technical support staff is somewhat unsatisfactory in terms of permanent positions since the ratio of technical support staff to researchers is about 0.5. This is certainly not ideal, but in fact, it is relatively good compared to other similar labs in France and the number and quality of the local facilities at AMU and INT partially compensate for this low ratio.

3/ The unit is attractive because of the recognition gained through its success in competitive calls for projects.

Strengths and possibilities linked to the context

The committee was extremely impressed by the INTs **remarkable success rate in obtaining external funding (200 contracts)**. Since 2016, they have obtained funding from 35 ANR grants. Indeed, the overall success rate in 2021 was a remarkable 38%. A Starting ERC grant was also obtained. A further 21 grants were obtained from charitable foundations, totalling around 1.6M€. They have also been very successful in obtaining funding from various PIA (Programme d'Investissements d'Avenir) initiatives. For example, in 2020 they obtained EQUIPEX funding for a Circuit Photonics Project that will set up a state-of-the-art facility for in vivo photonic imaging in small mammals with 1.4 M€ for the INT. The INT has also benefited from several PIA-funded local schemes, including the NeuroSchool EUR and Brain and Language Convergence institute (ICLB).

Weaknesses and risks linked to the context

There are no obvious weaknesses related to the INT's ability to obtain funding. Although they could hope to have more success for ERC Starting and Consolidator grants, such funding is clearly extremely competitive.

4/ The unit is attractive for the quality of its major equipment and technological skills.

Strengths and possibilities linked to the context

The committee considers that the INT is particularly attractive because of the high quality of its research platforms. The key technologies available include the following six facilities: (1) a 3T PRISMA MRI facility that is used for functional imaging in pre-clinical models and humans, (2) a photonic imaging platform with Zeiss confocal microscopes, 1 Femtonics, 1 Karthala and 1 Bruker 2-photon microscopes, , 2 wide-field optical imaging systems and a recently purchased Mylteni light-sheet microscope, (3) a NeuroBioTools platform with four functional subunits for various cellular and molecular studies, (4) a recently created Human Investigation Platform (HIP) for promoting both basic and clinical research, (5) the S-Prime facility that includes both electronics and mechanical workshops, and (6) the Neuroinformatics and Information Technology (NIT) facility that supports both the 200+ computers on the lab's network and facilities for scientific computing and data management.
These various platforms have received very substantial amounts of external funding, including 1.4 M€ for a new MRI system in 2015, and 2 M€ for the imaging platform.

Weaknesses and risks linked to the context

Given the exceptional nature of the various platforms and technological skills available at the INT, the committee sees no real weaknesses.

EVALUATION AREA 3: SCIENTIFIC PRODUCTION

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Assessment on the scientific production of the unit

Globally, the committee considers that the **INT's scientific production is at least excellent and even outstanding**. There was some variation between the thirteen different teams, however. For five teams, production was clearly outstanding (P3M, IMAPATH, INVIBE, BANCO, mECA). For four others, the production was considered to be excellent to outstanding (COMCO, BAGAMORE, CANOPE, BRAINETS). One team was considered to have an excellent level of scientific production (SANE). The two weakest teams were considered to have scientific production that was good to very good (SONIC, SPICCI) but these teams are recent or suffered from PI loss.

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1/ The scientific production of the team meets quality criteria.

Strengths and possibilities linked to the context

The autoevaluation document notes that between 2016 and 2021, INT members published around 640 articles – with around 400 concerning basic science, 210 related to clinical research, and 35 reviews. This total corresponds closely to the number of publications that are listed using the INT as the affiliation identifier in the Scopus database (651) but is slightly lower because of the fair decision to discard clinical publications that were unrelated to the research themes of the lab. Using Scopus allows a more detailed analysis that takes into account other factors. For example, it shows that the lab's publications have been cited nearly 9,300 times, corresponding to an average of around 14.3 citations per publication. The percentages that are in the Top 1%, and Top 5% in terms of citation rate, are fairly close to what would be expected. However, by relaxing the criteria somewhat, the general impact of the lab's research is clearly above the global average, with 13.% in the top 10%, and 41.5% in the top 25%.
Overall, while performing a qualitative assessment, which is endorsed and recommended by the Hcéres, the experts noticed that the publications of the unit benefit from a visibility which stands above the average and can be qualified as excellent. A clear majority (64%) of the research articles are published in the most internationally renowned journals of their disciplines, and 42% were published in the leading specialised journals. There are even around seventeen papers that appeared in elite journals including multidisciplinary prestigious journals with large scientific readership such as Nature, Nature Human Behaviour, Nature Medicine, Nature Physics, Nature Communications, PLOS Biology, ELife, Neuron, PNAS and Cell Reports. Some of the review

papers have appeared in well-accepted supports, including Nature Reviews in Neuroscience and the Annual Review of Neuroscience.

Weaknesses and risks linked to the context

The lab has been making a real effort to institute best practices for Open Science and FAIR methodologies, including the use of the BIDS data format for MRI and electrophysiological data. However, they admit that further efforts will be needed to ensure that young researchers can master the skills needed for data analysis, and will prioritise internal training concerning scientific integrity and publication policy.
Participation of INT members on the editorial boards of journals and steering committees could also be improved since only seven participation are mentioned and limited to four INT members for speciality journals only.

2/ Scientific production is proportionate to the research potential of the unit and shared out between its personnel.

Strengths and possibilities linked to the context

As noted, the scientific output of the INT is globally excellent, and in many cases outstanding. All permanent staff participate to publications, including PhD and postdoctoral fellow. An annual ratio of **1.5 articles per person per year is reached for permanent PI**. The number of publications varies from one team to another relative to its size, number of PIs and date of creation, as expected.

Weaknesses and risks linked to the context

While the lab is clearly very productive, it has to be noted that the lab is also extremely well funded, with a remarkably high number of ANR grants (35, 6–7 ANR/year). It has also been extremely successful in recruiting new permanent researchers (7 in the contract period). It would therefore be expected that the lab should have a lot more publications in highly cited and renown journals with broad readership. In addition, there are three PI publishing 0.5 article per year or less.

3/ The scientific production of the unit complies with the principles of research integrity, ethics, and open science.

Strengths and possibilities linked to the context

The INT clearly has been making efforts to comply with the need to respect fundamental principles of research integrity, ethics, and open science. The lab has been making good progress in publishing in Open Access journals, with about 72% of the publications currently in freely downloadable format from the editors. In addition, the lab has been following the CNRS's requirement to upload versions of all the publications to the HAL server with 80% of the publications of INT freely available at HAL. The committee believes that the INT has a very good record in this respect, although the self-evaluation report did not specifically describe measures such as the use of anti-plagiarism software, it does seem to have instigated internal peer-review procedures, at least for prospective grant applications, and has devoted resources to data and source code archiving procedures. There is also no reason to believe that team members have been tempted by so-called 'predatory' conferences and journals. Instead, the lab has generally made sensible choices concerning which journals to target, and has appropriate rules for authorship, typically allowing PhD students to sign as first author at least once.

Weaknesses and risks linked to the context

The committee was not aware of any major weaknesses in the area and encourages the unit to increase the % of open access articles.

EVALUATION AREA 4: CONTRIBUTION OF RESEARCH ACTIVITIES TO SOCIETY

Assessment on the inclusion of the unit's research in society

The committee considers that, globally, the **INT's links with society are very good to excellent**. There is, however, a strong heterogeneity in team involvement. For one team, such links were considered to be outstanding (team 2 had 6 of the 9 interactions with industry or start-ups; teams 1, 5 and 7 accounted for 96% of the press releases to lay people; the six patents were submitted by 5 teams only.), and in many cases, they were very good, or excellent. However, it was clear that for a number of teams, such factors are not considered important, and it would be difficult to rate them as more than 'good' at best. This had a significant impact on the lab's overall rating.

1/ The unit stands out by the quality of its non-academic interactions.

Strengths and possibilities linked to the context

Many of the INT's teams have close links with clinical teams, and roughly 30% of the lab's scientific production is in clinical journals. As a result, the lab's work has fairly direct relevance for a wide range of clinical conditions. They include psychiatric disorders such as depression, bipolar syndromes, autism, addictions, Parkinson's disease, Multiple Sclerosis, the effects of brain lesions and stroke. Some of the work is directly relevant to the rehabilitation of spasticity, and the effects of brain lesions and stroke. Such interactions can have direct relevance for society. In addition to teaching by the AMU researcher staff, the unit is also active in events organised by the NeuroSchool (INT created the first PhD program in it).

Weaknesses and risks linked to the context

While teams with clinical links are doing research that is clearly important for society (CANOP and P3M teams for example), for some of the other teams, interactions with the non-academic community are clearly not a priority (SANE and BANCO teams for example). This may be justified for researchers motivated by pure research, but it tends to reinforce the idea that the INT is primarily concerned with fundamental research.

2/ The unit develops products for the socio-economic world.

Strengths and possibilities linked to the context

There are some examples of teams that are actively developing links with socio-economic players. The unit interacts with start-ups or industrial partners (Air Liquide, Zeiss, Fluigent, Olea Medical for example) as shown by the presence of five CIFRE funding for PhD students. In addition, six patents (1 being at the preliminary stage) have been submitted by five different INT teams (1,3, 4, 9 and 10), including a new magnetic stimulation approach, a new antispastic treatment and a method for differentiating bipolar disorder and a major depressive disorder. One of these patents is developed in collaboration with an industrial partner (Air Liquide). One encouraging sign is the decision to set up action committees aimed at going beyond individual initiatives. These include a Training Committee that aims to improve internal training and mentoring, a Valorisation Committee aimed at improving the transfer, an Ecolab Committee aimed at reducing the lab's environmental impact.

Weaknesses and risks linked to the context

Financial links to socio-economic partners are rare (9 in total for <1M€, from three teams only, teams 2, 3 and 10) with Zeiss, Eurobio, Regenlife and Air-Liquide for example, and indicate that this aspect is not currently considered to be a high priority for the unit, or at least by most of the teams.

> *3/ The unit shares its knowledge with the general public and takes part in debates in society.*

Strengths and possibilities linked to the context

Some INT members are involved in events related to scientific dissemination (31 press releases, TV or radio interviews or debates, mostly by teams 1, 5 and 7). There are also links with patient associations (e.g.: P3M particularly involved with a patient association), and these are clearly useful given the clinical relevance of quite a lot of the research done at the INT. There is also some involvement with school students (for example, the yearly summer school Motor disabilities, welcoming of students from high schools yearly, co-direction of a film with students, open days for high schools).

Weaknesses and risks linked to the context

Although the INT has some activities related to Science and Society, such activities are relatively rare and not shared by all teams at the same level. Currently, there is no action committee aimed at developing this side of the INT's activities.

C – RECOMMENDATIONS TO THE UNIT

Recommendations regarding the Evaluation Area 1: Profile, Resources and Organisation of the Unit

With significant external resources, the unit could consider hiring more engineers and technicians on short contracts in order to limit the burden of technical work on researchers, postdocs and PhD students.
Opportunities in terms of translational research with a societal contribution could arise if interactions with the AP-HM can be strengthened, in particular for the launch of new clinical studies.
In order to offer the best chances for promotion, INT is encouraged to build a strong Unit training plan (PFU). Finally, promoting team co-leadership for women may be a solution to modify the gender imbalance among team leaders.

Recommendations regarding the Evaluation Area 2: Attractiveness

The INT is clearly an extremely attractive research centre, as demonstrated by its ability to attract excellent students and postdocs who are then able to obtain full-time research positions with the CNRS (7 got a position since 2016). Part of this success appears to be related to a very effective mentoring process in which senior scientists help young researchers to optimise their research projects so that they have the best chance of success. The committee can only congratulate the lab on this achievement, and to encourage them to continue in the same way in the coming years to ensure more success in ERC grant applications in particular. Actions to recruit more PhD students from abroad must also be taken (5 of 91 according to the provided autoevaluation files).
This attractiveness is also enhanced by the lab's very active program that has been creating new research platforms and centres. This dynamic approach is clearly very successful and should be continued.

Recommendations regarding Evaluation Area 3: Scientific Production

The committee recommends that the lab should aim to have 100% of the lab's production in Open Access as soon as possible. Of course, it is now obligatory for all publications to be made available in HAL, but global accessibility is particularly favoured by publishing in Open Access journals. While there is a cost associated with the use of such journals, the INT is a particularly well-funded unit, and should make sure that publication costs are covered for all lab members.
Globally, the lab should be encouraging its members to concentrate on the quality of the research, rather than the number of publications.
It is also useful that individual researchers monitor the literature to see whether their work is being cited by creating individual Google Scholar Profiles for all lab members and verifying that information in Scopus (freely available to all people working in CNRS labs) is accurate.
When publishing particularly significant work, the lab should actively encourage the CNRS and the University to promote the research via press releases.
The committee also strongly encourages the lab to promote open science with sharing of complete data sets and methods.

Recommendations regarding Evaluation Area 4: Contribution of Research Activities to Society

The committee recommends that the INT pays more attention to links with society, in addition to the obvious relevance of clinical studies for particular patient groups.

The work of the recently established 'valorisation committee' should be strongly encouraged. This could help in the transfer of skills and promote links between the NeuroTechCentrer and other players, by taking full advantage of the AMU's environment.

The INT could also set up an additional committee to promote the diffusion of knowledge and promote other links with Science and Society.

Lab members should be actively encouraged to participate in scientific culture or dissemination events and go beyond relying on individual initiatives.

TEAM-BY-TEAM ASSESSMENT

Team 1:   Plasticity and Physio-Pathology of rhythmics Motor networks (P3M)

Name of the supervisor: Mr. Frédéric BROCARD

THEMES OF THE TEAM

The P3M team is composed of ten researchers (n=6) and professors (n=4) and three MD-PhD, helped by four technical staff of the CNRS and four students in PhD and one postdoc. The team works on neurons of the ventral horn of the spinal cord, in particular the motor neurons, and their electrophysiological properties. The bistable properties of these neurons, the chloride balance, and their respective roles in postural control, rhythmogenesis and spasticity are the main themes.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous evaluation asked the P3M team to deploy some efforts to recruit international students and postdocs, to keep and consolidate the already existing interactions between experimental and clinical researchers, to recruit junior researchers, to be provided with strong support by the unit and to continue its active involvement in training.

The committee considers that the team has taken these points into account particularly because of the continuous involvement in teachings, the promotion of a clinical trial on spasticity, the recruitment of five permanent people (2 CR and 1 DR mobility, 2 technical staff) and several PhD (including one from abroad).

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	2
Lecturer and associate lecturer	2
Senior scientist (Directeur de recherche, DR) and associate	2
Scientist (Chargé de recherche, CR) and associate	4
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	4
Subtotal permanent personnel in active employment	**14**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	0
Post-docs	1
PhD Students	4
Subtotal non-permanent personnel	5
Total	**19**

EVALUATION

Overall assessment of the team

The P3M team is a very well-structured team which carries out very high quality fundamental research. The presence of several clinicians in the group allows the development of translational aspects from fundamental discoveries, which is quite rare and very relevant. This translational aspect of the team's work is attested by a clinical trial of therapeutic repositioning in progress against spasticity.
Globally, the P3M team was rated by the panel as excellent to outstanding. In particular, the team's links with society were found to be outstanding (patents, clinical trial, creation of a scientific club). Scientific production was excellent to outstanding (47 publications), as was its use of resources and attractiveness (2 recruitment of permanent researchers by CNRS and 1 mobility, 1 PhD student from Spain).

Strengths and possibilities linked to the context

The P3M team is an experienced research team composed of full-time researchers, professors, and MD-PhDs. This allows them to develop research that links the fundamental question to more clinical applications. P3M develops three research axes with common objectives, deciphering motoneuronal properties and plasticity associated to locomotion, posture and respective alteration following spinal injury.

The team has outstanding resources, with grants from the ANR and numerous private/charitable organisations (FRM, Téléthon, IRME, AFM, ARSLA, among others), as well as from the valorisation (SATT), in collaboration with four national and international teams, totalling 2 million euros during the last contract period.

The team's attractiveness is excellent, as attested by their recruitment of PhD students and postdocs, one from Spain, as well as their multiple internal, national, and international collaborations (Canada, Spain, Netherlands...)

Research production is outstanding with 47 publications of major interest over the last five years, notably publications deciphering non-linear properties of motor neurons (Nature Communication 2022) or identifying relevant molecular targets for spinal pathology such as calpain or KCC2 enhancers (Nature Medicine, Journal of Neurotrauma, Neuroscience).

Beyond these relevant results, the P3M team makes efforts to translate their results to the clinic: three inventions (spasticity treatment, robotic orthosis and predictive biomarkers) were submitted (2 patented), and one clinical trial of repurposing molecules is ongoing.

The team has made efforts to reach out to the community and the general public by creating an association called 'spinal cord club' at Marseille and by their participation in public outreach programs (research night, brain week, press release or articles in newspapers and magazines for the 'general public').

Weaknesses and risks linked to the context

The P3M team has no weaknesses or threats to be taken into account based on the accomplished work.

RECOMMENDATIONS TO THE TEAM

The panel recommends that the members of P3M continue to maintain the excellent level of scientific activity that has characterised the team over the past five years. The possible fusion with Team 2 (IMAPATH) seems like a sensible decision that will reinforce both teams. This underlines the relevance of the team's research to clinical problems and makes good sense.

Team 2: Live imaging of cell interactions in the normal and diseased brain (ImaPath)

Name of the supervisor: Mr. Franck DEBARBIEUX

THEMES OF THE TEAM

The ImaPath team is a small team directed by a senior member of the Institut Universitaire de France (IUF) and comprising only one other permanent support staff, but it has welcomed seven postdocs and PhD students during the period of evaluation.

The team studies neuroinflammation and neurodegeneration, using several pre-clinical models of nervous system pathologies. Their methodological advances in imaging allow them to follow cellular interactions in these pathological contexts and evaluate potential therapeutic strategies.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous evaluation made a number of recommendations to the IMAPATH team summarised here in brief: it should attract good postdocs in imaging should focus more on its own research and not on technology in order to get its own grants, develop interactions with the industry and solicit the direction of INT to implement industrial start-ups in situ to elevate the lab level of technological and economical transfers, to put particular care in student supervision, to recruit another full-time researcher.

The committee considers that the team had indeed taken these points into account, with four postdocs fellows during the period, even though it was not possible to recruit another full-time researcher. The possible fusion the P3M team for the next contract will answer almost all other recommendations.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	1
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	0
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	1
Subtotal permanent personnel in active employment	**2**
Non-permanent teacher researchers, researchers and associates	1
Non-permanent research supporting personnel (PAR)	0
Post-docs	1
PhD Students	2
Subtotal non-permanent personnel	4
Total	**6**

EVALUATION

Overall assessment of the team

The panel considers that, globally, the IMAPATH team is excellent. The level of scientific production is outstanding, given the small size of the team. The team's resources were found to be very good to excellent, as are the team's links with society. The attractiveness of the team was considered to be very good considering the recruitment of four postdocs and the training of three PhD students (including 2 CIFRE).

Strengths and possibilities linked to the context

The team has published 21 original articles in the past five years, so that its production can be considered outstanding given its small size, with only two permanent staff (one of whom is emeritus), and the fact that the team leader is a university lecturer. Main achievement identified the monocytes derived dendritic cells are key actors and targets in the deleterious/beneficial balance of neuroinflammation in tumours and multiple sclerosis (Souberan J. Neuroinflammation 2019, Caravagna et al. Scie Rep 2018, ElWaly et al. Cells 2021) They include eighteen original well-cited scientific publications in journals such as Scientific Reports and Journal of Neuroinflammation.

The team's research themes involve a large amount of technological development, which has resulted in excellent industry links (Eurobio, Panaxium, etc). These include two CIFRE funded in collaborations with industry (Zeiss and REGEnLIFE).

The team has very good attractiveness, as indicated by the number of post-docs (4) and thesis students (3) during the past five years and has had support from the ANR and the ERC, among others. The team leader is involved in undergraduate and master's education that maintains contact with students to attract M2 or future PhD students.

Weaknesses and risks linked to the context

The team leader's teaching responsibilities reduce the time available to run the team.
Grant resources have been very good, but much of this funding is ending or has ended.
Links to society and collaborations are very good but will be important to maintain for the long term.
Another weakness could be that the studies tend to be descriptive, and this may be reflected in the lack of publications in the top-ranking journals.

RECOMMENDATIONS TO THE TEAM

Interactions and collaborations with other INT teams would reinforce the stability of the ImaPath team's research project. A strategy of recruitment, either university faculty or CNRS/INSERM researchers, should be put in place. The possible fusion with the P3M team will respond to these needs.

Team 3: Cognitive Motor Control (CoMCO)

Name of the supervisor: Mr. Thomas BROCHIER

THEMES OF THE TEAM

The main objective of the COMCO team is to develop complementary projects to address the brain mechanisms and neuronal processes that translate internal goals, predictions, and contextual constraints into motor plans for the actual execution of directly observable body movements. To address these topics, the team runs experiments in various models to probe neuronal activity at different spatial and temporal scales. Their activities tackle three main complementary questions: the role of beta oscillations in movement anticipation/preparation and sensorimotor adaptation; the principles of movement coordination between effectors; and the signature of sensorimotor network dynamics at the neuronal level. Importantly, the team's scientific focus has gradually shifted towards more cognitive aspects of motor control.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous evaluation made no specific recommendations but suggested that the team continue obtaining grants to improve the amount of technical help, to interact with clinicians, to optimise human capital more than acquiring new competences and suggested that science and not experimental models should drive research integrating different approaches.

The committee considers that the team has taken these points into account. Even if no clinicians are present in the team, this had no impact on translational research and a clinical trial is ongoing with a compound acting on neuroprotection.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	1
Senior scientist (Directeur de recherche, DR) and associate	1
Scientist (Chargé de recherche, CR) and associate	3
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	0
Subtotal permanent personnel in active employment	**5**
Non-permanent teacher researchers, researchers and associates	1
Non-permanent research supporting personnel (PAR)	0
Post-docs	3
PhD Students	6
Subtotal non-permanent personnel	10
Total	**15**

EVALUATION

Overall assessment of the team

The panel considers that, globally, the COMCO team is excellent to outstanding. This very positive evaluation applies to the team's resources (5 permanent researchers, ANR and Marie-Curie funding), its attractiveness (12 PhD during the analysed period), and its scientific production (>1.2 publications/year/PI). Links with society are also excellent (in particular a patent on neuroprotection with Air Liquide).

Strengths and possibilities linked to the context

The team develops research in pre-clinical models, healthy humans and patient models on the topic of cognitive control. During the last five-year period, it has published work in the three axes of its research program. The team strength lies in the high complementarity between human and pre-clinical models approaches for functional explorations at different temporal and spatial scales. In particular, the team deciphered the role of beta-oscillations in movement preparation and sensorimotor adaptation and identified signatures of sensorimotor network dynamics in pathological circumstances (Brochier et al, Scie Rep 2018 ; Jahani et al., J. Neuroscie 2020; Schmidt et al., J. Neuroscie 2019; Mathew et al., Scie Rep 2020). The research project developed by COMCO has been well funded through national (ANR) and also European grants (ITN In2PB & FLAG-ERA PrimCorNet). The team has developed a rich network of international relationships (via the coordination of MCS-IT networks) and applied clinical research projects in the field of neuroprotection and intracranial recordings in patients with Parkinson's disease (with the Equipex+ HIPE by AMU). International visibility is evident through its network of international collaborators and the coordination of an international laboratory (LIA Vision4Action) between CNRS and Juelich Research Centre International Research Project (CNRS IRP) with the Institute of Neuroscience and Medicine (INM6) of the Forshungszentrum Julich. Importantly, there is an important level of collaboration and cross-signed articles and joint grant applications between PIs of the COMCO team. Importantly, the COMCO team has supervised five PhD thesis who authored publications (7 other PhDs are currently ongoing), which show their ability to attract students and PhD fellowship funding. The team is involved in technical and industrial development activities via a partnership with Air Liquide santé to develop and test neuroprotective drugs in clinical patented projects.

Overall, this is an impressive team directed by a team leader involved in major management responsibilities. The team's scientific focus has been gradually shifted towards more cognitive aspect of motor control. Nonetheless, the team had to face the departure of two permanent researchers involved in key aspects of its research program. All team members showed a sustained publication record with a total of 39 articles in recognised journals for the field (J Neuroscience, Neuroimage, eNeuro, Scientific Reports, eNeuro…) with a mean of 1.25 publications per year and per PI.

Weaknesses and risks linked to the context

A contingency plan (for example a co-coordinator) might be needed to ensure the coordination of the team scientific activities, given the time-consuming responsibilities of the current team leader. The publication record of the team is not always totally coherent with the planned and central axes of research set as part of the team program and could be improved in quality. Balance needs to be preserved between the free intellectual progression of individual PIs and the strengthening of the main research challenges set up by the team in its common program. The departure of two researchers could be a risk for the research axis to which they contributed to. The clinical projects of the team in implanted Parkinson's disease patients in collaboration with the Neurology department seem still at fragile states and need to be supported and reinforced. For example, three PU-PH originally listed in the organigram have left the team in 2017, and the main current collaborators of clinical projects are not among the list of permanent members of COMCO.

RECOMMENDATIONS TO THE TEAM

It is important to establish a contingency plan to ensure a coherent team direction in spite of the time consuming and challenging research missions the team leader is developing. The collaborations with clinical services and access to patients and recordings at AMU and AM-HP need to be strengthened and diversified via the integration of relevant PH and PU-PH to the organigram of the team. Team's production, from experimental papers to I+D and potential clinical application need to be kept coherent and be dictated by the main axes of the research plan.

Team 4: dynamic NEuronal OPerations in visual TOpographic maps (NeopTo)

Name of the supervisor: Mr. Frédéric CHAVANE

THEMES OF THE TEAM

The NeopTo team's project is to understand how the visual system processes and computes motion trajectories in topographic maps generated by naturalistic visual or prosthetic inputs. Research activities are organized in three main axes, experimental, technological, and computational, under the coordination of three leading PIs and aim to understand: how cortical interactions at multiple spatiotemporal scales shape the processing and representation of visual stimuli within cortical maps; how to improve prosthetic vision using retinal stimulation and cortical imaging approaches; finally, how to develop methods for multi-scale and multi-model imaging. The team uses recordings at microscopic and mesoscopic scales with 2-photon calcium microscopy and wide-field voltage-sensitive dye imaging. All activities converge to an overarching goal, understanding the functional advantage of dynamic operations in topographic maps for processing and representing sensory information.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

For the previous evaluation, there was one specific recommendation for the NEOPTO team: 'formulating more explicit hypotheses to be tested experimentally… would provide a long-term common goal to integrate the various research projects carried out.' Other recommendations to the INVIBE and NEOPTO teams together were to identify a small number of common scientific priorities, developing more stringent a priori hypotheses to be tested experimentally, recruit a Marie-Curie postdoctoral fellow to reinforce team activities, apply more to EU grants, pay attention to a better gender balance when recruiting new group members, update the website and teach at the master level.

The team has worked in the right direction to address these concerns (increased teaching involvement, seven postdocs recruited, better scientific vision), nonetheless, some level of risks still remain for the upcoming period ahead because of the extreme specialisation of each PI. Gender bias is still present.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	1
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	2
Scientist (Chargé de recherche, CR) and associate	1
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	1
Subtotal permanent personnel in active employment	**5**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	1
Post-docs	1
PhD Students	5
Subtotal non-permanent personnel	7
Total	**12**

EVALUATION

Overall assessment of the team

The panel considers that the NEOPTO team is globally outstanding with a rare expertise in mesoscopic imaging at the international level. This qualification applies equally to the team's resources (4 PI, 1 clinician, and multiple funding), its attractiveness (7 PhD trained) and the quality of the scientific production (26 articles with international collaborations in Nat Rev Neurosci, J. Neurosci, PNAS, J NeuroPhysiol, Plos Comp Biol, etc.). The team's links with society were considered to be excellent to outstanding with, in particular, the collaboration with an artist who is one innovative aspect of the team that ensure important visibility by the lay public. It is particularly striking that the team has obtained no less than seven ANR, with an average of around 250 k€ per year and published 26 articles (1.7 article/PI/year).

Strengths and possibilities linked to the context

The NEO-OPTO team is a thematically coherent and an excellently organized team with a clear research program that addresses fundamental and clinically applied questions while developing and testing innovative technologies in the field of microscopy, neurophysiology, and visual prosthetics. The team has developed a research program integrating experimental, computational, technological, and clinical approaches to an overarching goal, which is to characterise the organisation and dynamic properties of topographic maps processing and representing visual information.

The team has an excellent track record, well balanced across PI and co-authoring students, combining high-ranking generalist journals and specialised outlets in neuroscience, computational neuroscience and ophthalmology. Specifically, they have a total of 26 publications for the evaluated period, some of which are in particularly high visibility journals such as PNAS, PLoS Computational Biology, eLife and Scientific Reports. All permanent PIs of the team contribute to a coherent body of publications, combining general and specialised outlets and encompassing a diversity of models and combining sophisticated, sometimes quite unique, approaches (voltage-sensitive dyes imaging – VSDI, advances 2-photon microscopy and computational models). Importantly, close interactions with ophthalmology have led to original projects (dynamic representation of visual information in cortical maps by neurocomputational approach and multiscale dynamic measures, works on amblyopia…) and technological contributions on low-level vision and retinal prosthesis. All permanent members are involved in institutional collective duties at the INT. In particular, the three main PIs are involved in time-consuming collective responsibilities (adjunct unit director, photonics technical platform director, and members of CoNRS section 51).

The team also maintains rich collaboration with multiple non-academic partners (Vect-Horus, Monticelli Clinic, ONERA, and the start-up CurveOn CNRS-LAM) with a diversity settings and agreements (technical and methodological support, equipment testing, and technological product innovation), has filed a retinal prosthetic patent and develops software to assist ophthalmologists. The team has been able to attract or participate in National (7 ANRs), European (ATTRACT-EU and MCS-ITN network) and regional/local (Equipex) funding. The team is also active in the training of PhD students (2 completed and 5 ongoing) and participates in teaching (CogMaster, ENS). It is also involved in knowledge dissemination activities with lay publics, education of elementary and high school students, and in public debates and social outreach.

Weaknesses and risks linked to the context

The number and time-consuming nature of the collective institutional activities of some permanent members generously contribute to might end up taking a toll in their ability to sustain the breadth, high level and diversity of fronts they have been able to cover, or their integration and coherence. The clinically and technologically applied program relies on a single ophthalmologist working for a private clinical centre with no statutory academic relation with AMU or the AP-HM, and this project seems institutionally fragile and should be either diversified, multiplied or strengthened. Although it is claimed that theory, experiments, and sophisticated technology lay at the heart of any research project of NEO-OPTO, there is a risk of excessive specialisation of some of the senior researchers into either technological, computational, or even clinical research activities (particularly if developed part-time), that might affect integration. The lack of motivated students to take on highly complex neuroimaging experimental and clinical projects, leading to few and not always high-level publications compared to those involving computational or theoretical approaches, might threaten the attractiveness of experimental work.

RECOMMENDATIONS TO THE TEAM

NEO-OPTO should come up with a contingency plan to make sure public and institutional commitments of its permanent members does not impact the good and coherent work, organisation and productivity of the team. Methodological specialisation across permanent members is a valuable asset, but given their multiple responsibilities, this could potentially affect integrative approaches and integrative thinking. Hence, it is paramount that main individual projects proposed to PhD students and postdocs leverage experimental, computational, and technological aspects. The clinical project of NEO-OPTO needs to be strengthened by associating in addition to the current valuable clinical collaborator to other academically consolidated PIs, PU-PH and PH, if possible associated to AMU and AP-HM and/or diversifying locations. There is a male gender bias in the composition of the NEO-OPTO team (20% are female), also identified across team leaders at the level of the INT, that might require thought and action.

Team 5:   Inference in Visual Behaviours (InVibe)

Name of the supervisor: Mr. Guillaume MASSON

THEMES OF THE TEAM

The INVIBE team's project is oriented towards the integration of visual perceptual mechanisms and cognitive mechanisms (decision-making, attention) in a behavioural context, essentially visuo-oculomotor actions. The main questions concern the dynamics of Bayesian inference in perception and visuomotor transformations and the neurophysiological substrates of eye movements. The unifying theoretical framework for INVIBE researchers is the study of how neural circuits represent these different levels of acquired and learned information in a probabilistic and dynamic manner, dubbed 'Dynamic inference'. INVIBE has a strong expertise in visual perception and oculomotor control, combining psychophysical, behavioural and neurophysiological methods in both humans and monkeys, with an emphasis on subcortical and cerebellar structures. Nonetheless, the arrival of three researchers has allowed the team to address these questions at cortical level, by studying the population coding (underlying decision-making, attentional selection and spatial remapping) in cortical retinotopic networks using electrophysiology in monkeys and MRI imaging in humans. Future plans involve strengthening modelling work (neural coding and Bayesian decision) but also innovating experimental approaches (multi-unit and multi-area electrophysiology) and extending experimental models to pre-clinical models.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

For the previous evaluation, a single specific recommendation for the INVIBE team was that 'considering envisioned project on awake monkey neurophysiology will need significant personnel resources'.
In addition, the INVIBE and NEOPTO teams were considered together, and several recommendations were made: identify a small number of common scientific priorities, develop more stringent a priori hypotheses to be tested experimentally, recruit a Marie-Curie postdoctoral fellow to reinforce team activities, apply more to EU grants, pay attention to a better gender balance when recruiting new group members, update the website and teach at the master level.
Given full-time reintegration of Guillaume Masson, director of the INT for one decade, as team leader, the recruitment of newly arrived permanent researchers to the INVIBE staff, the involvement in multiple funding applications (2 ANR, FRM, Simon foundation) and the hiring of five postdocs, we consider that most recommendations have been addressed.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	1
Scientist (Chargé de recherche, CR) and associate	5
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	0
Subtotal permanent personnel in active employment	**6**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	1
Post-docs	1
PhD Students	8
Subtotal non-permanent personnel	10
Total	**16**

EVALUATION

Overall assessment of the team

The panel considered that, globally, the INVIBE team is excellent to outstanding. Resources (6 PI, ANR and FRM funding), attractiveness (9 PhD) and scientific production (44 articles) were all found to be outstanding. The team's links with society was the only area where the team scored slightly less well (not enough collaboration with companies in particular) but was nevertheless considered to be very good. The team is particularly impressive in having recruited no less than four researchers with permanent positions during the period.

Strengths and possibilities linked to the context

This is a thematically coherent team with a clear research program on fundamental questions in the field of dynamic inference in human and pre-clinical models. Originally anchored in the study of cortical representations and mechanisms of visual perception and eye movements, a solid and successful strategy integrating new permanent researchers has allowed INVIBE to expand its experimental models and open their field of view to the study of visuo-spatial cognition to address links between selective attention and decision-making, spatial constancy and even metacognition. Likewise, new blood has allowed the team to update and expand their methodological expertise in neuroimaging and neurophysiology. The team has been successfully attracting national funding for projects encompassing the activities of several of their members and holds a very good publication track record, quite well balanced across PIs combining high impact and specialised journals and with PhDs and postdocs co-authoring about 20% of published papers.

Specifically, the team has published 44 papers during the period, with several in recognised journals including Neuron, PNAS, Science Reports, Current Biology but also numerous papers in more speciality journals such as the Journal of Neurophysiology.

The INVIBE team has developed well-coherent expertise on the domain of dynamic inference for years anchored in the fields of visual perception and eye movements such as in the neural map and circuit description (Goffart et al., J. Neurophysiol 2018) and visiomotor integration (Madathati et al., Scientific Rep 2017, Szinthe et al., Scientific Rep 2020; Wu et al., J. Neurophysiol 2021). Thanks to a well-established and newly arrived researcher, INVIBE members now have the possibility to expand into new and more creative horizons. The team has produced work in pre-clinical and human experimental models and is actively engaged in the development of technological applications using virtual reality. The team has also been very successful in attracting national grants (6 ANR and FRM Predict Eye) to fund collaborative work between some of its own members and also lead international European training grants (ITN MSCA Pace). Interestingly, a smart and fruitful recruitment strategy is in place for new young permanent members. New members have rapidly integrated and expanded the traditional topics of the team and preserving a core interest in dynamic inference, embracing more cognitive approaches such as elective attention and decision-making. They have also been key to renew and update methodological expertise on neuroimaging and neurophysiology. Importantly, the stated general 'philosophy' that new permanent researchers that must propose a fit between their own research project and the team's collective research strategy is also a strength that can ensure innovation without excessive dispersion. The team has been also very active training PhD students (8 ongoing and 4 completed) and five postdocs, all of them have presented their work in international conferences and all but one, have authored or co-authored publications of the team. Finally, INVIBE members contribute to a rich network of prestigious collaborators (ENS Paris, Institut de la vision Paris, UBC Vancouver…) that participate in <50% of the team's publications.

Weaknesses and risks linked to the context

There have been some shy attempts led by one permanent member of the team to develop studies in human patient populations to better understand how developmental (autism) or neurodegenerative conditions (Parkinson) may affect dynamic inference (prediction). Nonetheless, the lack of clinically inspired (patients as a model) or applied (diagnostic/therapeutic) clinical projects does not seem a priority. Furthermore, INVIVE has lost in 2018 all collaborating PU-PH or PH, and the lack of clinical AMU faculty or CHU personnel among its ranks might hinder these initiatives. A single permanent member of the team is very actively involved in the development of technology for human and pre-clinical model. Although several PhDs are co-supervised with an INVIBE PI, it is unclear if the collaboration with ONERA in human factors is nourished by topics driven by INVIBE members or led and inspired by the former with INVIBE sharing expertise and allowing the use of their lab spaces and equipment. The team is overall productive, but volume and quality could be improved and more particularly the ratio of papers produced hence signed or co-signed with PhD students is overall rather low (12/44) given the high number of doctoral students in training or trained since 2018. INVIBE members are missing computational neuroscience and modelling expertise. Finally, given the experience and expertise of some of

the more 'junior' permanent members of INVIBE, some should be invited to take leadership responsibilities at the team (collegial direction of the team) or at the Institute level. Despite the isolated efforts of a single researcher, there is not a collective strategy to contribute to scientific communication and dissemination of their activities and findings.

RECOMMENDATIONS TO THE TEAM

If as part of its scientific strategy INVIBE decides to rely on human pathological models to better address some of its fundamental questions on dynamic inference and/or contribute to diagnostic and therapeutic applications, a serious attempt needs to be made to establish solid relations with some AMU and CHU clinical services and to integrate clinical collaborators. The collaboration with ONERA either in experimental (Human factor research) or technological (use of virtual reality) grounds needs to be clarified and better integrated in the scientific strategy of the INVIBE team. The team is overall productive in terms of publication, but an effort should be made so that in spite of the technical and experimental complexity of some projects, PhD students and postdocs account for a larger portion of authored and co-authored publications. Finally, without threatening collective spirit and effort, a mentoring strategy should be set up to make sure highly experienced permanent members are invited to take responsibilities at the team and institute level and setting the basis for promotion. Finally, some collective efforts should be invested to participate on a regular basis into societal outreach activities and debates. There is a male gender bias in the composition of the INVIBE team (1/3 are female), also identified across team leaders at the level of the INT that might require thought and action.

Team 6:   Neural basis of communication (BaNCo)

Name of the supervisor: Mr. Pascal BELIN

THEMES OF THE TEAM

The auto evaluation document contained remarkably little information concerning the BANCO team's research themes, beyond stating that they concern the neural basis of communication. However, the previous evaluation panel noted that the team had proposed four projects for the period 2016–2021: comparative studies of cerebral voice processing in pre-clinical models; emotion and communication; natural human verbal communication; and spatiotemporal model of natural-sound representation in the brain.

Judging from the presentation by the team leader during the on-site visit, and the team's publications, it seems clear that most of these topics have indeed been studied during the evaluation period. In particular, the COVOPRIM ERC project, which started in 2020, has allowed the team to develop a comparative approach to voice processing. This has involved the development of automated behavioural testing methods, fMRI and fMRI-guided electrophysiology. The team has also developed a corpus of natural conversations, coupled with recordings of fMRI, eye tracking and physiological measures such as heart rate and breathing. The overall objective appears to be the development of a multi-factorial, design-free and data-driven approach that analyses sound at multiple levels, from low-level acoustic properties to categorical decisions (e.g. voice vs non-voice, actions and material properties). There are also attempts to link the results to representations found in deep-learning trained AI networks. Other work has looked at brain activity during human-robot and human-human dyadic social interactions.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous evaluation committee made the following comments, after noting that no real weaknesses emerged: increase the number of PhDs and Postdocs, increase the number of personnel, and increase collaborations with other INT teams to avoid scientific isolation.

Thanks to ERC Advanced funding, the team has indeed been able to recruit more PhDs and Postdocs. On the other hand, the committee found that the risk of progressive isolation of the BANCO team within the INT has not been eliminated, and currently the team only interacts with a few other teams, specifically COMCO, BAGAMORE and MECA. Its size is also still unsolved due to a recruited scientist that rapidly left.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	1
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	2
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	0
Subtotal permanent personnel in active employment	**3**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	1
Post-docs	2
PhD Students	9
Subtotal non-permanent personnel	12
Total	**15**

EVALUATION

Overall assessment of the team

The committee considers that the BANCO is globally excellent. The scientific production of the team is quite outstanding, especially given the small size of the team (3 permanent personnel). It has obtained very impressive resources, in particular, thanks to the team leader's ERC Advanced Grant that deserves to be rated excellent to outstanding. On the other hand, the attractiveness was only rated as very good (no more PI in spite of the recruitment of 8 PhDs and 7 postdocs), and the team's modest links with society were rated as good in particular because of the insufficient links with industry.

Strengths and possibilities linked to the context

The BANCO team has been very well resourced, as illustrated by the COVOPRIM Advanced ERC grant obtained in 2019, but also two other ANR grants with researchers in Toulouse and Lyon.

Its scientific production was quite outstanding despite the small size of the team (3 permanent researchers), with a total of 48 articles which is more than two articles per year per researcher. It is particularly notable that the quality of the journals is very high in terms of large visibility and coverage, with papers in Current Biology, PNAS, Nature, Human Behaviour, Neuron and eLife. Of note 42% and 13% of the publications have PhDs or postdocs among authors, respectively. The team reported the functional characterisation of a large corpus of vocalisations (Current Biology 2021) and brain responses during human-human and human-robot interactions (Scientific reports 2022).

While the BANCO team only has relatively limited collaborations with other teams in the INT, it does have active collaborations with other labs in the region. These include the Laboratoire Parole & Langage-LPL in Aix, the Laboratoire d'Informatique des Systèmes-LIS and the Institut des Neurosciences des Systèmes-INS. It also has active collaborations with several other leading labs outside of France, including the Pompeu Fabra University in Barcelona (Spain), McGill's university (Montreal, Canada) and the universities in Glasgow (UK), Maastricht (NL), Zurich and Geneva (CH). Such collaborations illustrate the international visibility of the team, and in particular, the team's leader. In addition, the team was attractive with eight PhD students and seven postdocs but no novel PI. Dissemination was limited to few events (interview at TV, seminars in schools) while the topic is of general interest for the lay people.

Weaknesses and risks linked to the context

The team currently only has three permanent researchers. One CNRS researcher quit the team in 2018, and one additional CNRS researcher who was recruited in 2017 left the team in 2022. This is one reason why the committee only considered the attractiveness of the team as 'very good'.

Likewise, the rating for links to society was rated as 'good', which is relatively generous given that the auto evaluation document provides little evidence for activities in this area, particularly nothing with industry. The exception is the fact that team members have regularly participated in events aimed at the public, including few interviews in the press, radio and television to promote their work.

RECOMMENDATIONS TO THE TEAM

The committee has the following recommendations for the BANCO team. We agree with the previous evaluation's opinion that there was a risk of the team becoming isolated within the INT. The remaining team members should increase their efforts to develop collaborations with colleagues, and not rely so much on external collaborations. In particular, since the team is increasingly interested in computational modelling, and comparing brain activation patterns with representations in deep-learning trained AI systems, it would be beneficial to interact more with other researchers involved in computational modelling inside INT. The team could also work to increase links to researchers in the close INS lab, particularly those involved in the analysis of auditory processing.

The team could also play an even more active role in the Brain and Language Convergence Institute, where they could play an even more prominent role in promoting Marseille as a world-leading centre for research in their area of interest.

Team 7:   Basal Ganglia, Motivation and Reward (BaGaMoRe)

Name of the supervisor: Mrs. Christelle BAUNEZ

THEMES OF THE TEAM

The BAGAMORE team uses a translational approach, from pre-clinical models to patients with Parkinson's disease or addictions, to better understand the role of the basal ganglia (GB) in motivation and reward-related processes, normal behaviours or pathological states, such as addiction or impulsive disorders. In pre-clinical models, work focuses on the role of cholinergic interneurons in the striatum and their interactions with the dopaminergic system with approaches combining optogenetics, electrophysiology and behaviour. The BAGAMORE team studies the role of the subthalamic nucleus (NST) and its cerebral network (cortico-STN) by deep cerebral stimulation, optogenetic manipulation, electrophysiological recordings, or fibre photometrics in cocaine or alcohol addiction in the isolated individual alone or in the presence of a congener. The clinical human research combines behavioural and electrophysiological studies and makes recordings of neuronal activity and fMRI in parkinsonian patients or substance users (psychostimulants or alcohol) to explore the clinical effects of the high-frequency stimulation of the NST on the motivational state of parkinsonian patients presenting or not an impulsive disorder. The team has a solid technical expertise in sophisticated behavioural tests, electrophysiology and deep brain stimulation and a long history which ensures the reliability of results and work based on a solid foundation for working hypotheses.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous evaluation recommended aiming for higher-impact publications, to increase funding (including ERC), to increase the participation to international meetings of all the members of the team, to increase the task force on addiction also in pre-clinical models, to reduce the responsibilities of the team leader, to increase the size of the team because of the multi-modal and diverse approaches (recruit researchers working on pre-clinical models and clinicians, technicians). The expert committee also recommended keeping the direction and to have as many as possible international graduate and postdocs fellows, to increase connections within INT to compare the physiology of the basal ganglia with that of the cortex in addiction, to increase the collaboration between two pre-clinical models and to recruit a young researcher, possibly with external funding.

The team has addressed some of these concerns and implemented adequate actions except for public venues and integration of multiple models.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	1
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	1
Scientist (Chargé de recherche, CR) and associate	4
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	1
Subtotal permanent personnel in active employment	**7**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	0
Post-docs	2
PhD Students	5
Subtotal non-permanent personnel	7
Total	**14**

EVALUATION

Overall assessment of the team

The panel considers that the BAGAMORE team is globally excellent. The level of production is excellent at the level of this large team (7 PI), although considered good to excellent at the level of each PI with one research article and one clinical article per PI per year. It has very good to excellent resources and links with society. Attractiveness was excellent, despite several changes to the list of personnel during the evaluation period.

Strengths and possibilities linked to the context

This is a long trajectory team exploring across species the role of the basal ganglia in motivation and reward-related processes, normal behaviours or pathological states, such as addiction or impulsive disorders. State of the art sophisticated behavioural tests, electrophysiological recordings, and interventional approaches (optogenetics in pre-clinical models and deep brain stimulation-DBS in human PD patients) are used to such endeavours. A long thematic history ensures the quality and reliability of work based on solid working hypotheses.

Team members show strong scientific production (47 scientific papers + 58 clinical ones) in good to excellent quality journals (Mol Psy, PNAS, etc.) regarding the study of deep brain stimulation of the subthalamic nucleus as a potential treatment for addiction in pre-clinical models. Additionally, publications involving the study of the influence of social context on drug use is particularly original and have also appeared in good, specialised journals (Psychopharmacology, Proc Biol Sci, Addic Biol). More recently, translational study involving neurobiological work in pre-clinical models and socio-epidemiology questionnaires in human substance users has been harder to publish in high impact journals. Importantly, all permanent researchers have published articles over the reference period (around 1 article/PI/year when considering the 47 scientific papers only) and all PhD and postdoctoral researchers have contributed to the scientific production of the team.

The team has experienced important changes on its membership since 2018. Three senior PIs left the team between 2018 and 2021 (retirement and internal mobility). But it has been also able to integrate a new researcher to study the cellular mechanisms of deep brain stimulation of the subthalamic nucleus (STN) in the various models of addiction, and also welcomed two researchers from IBDM in Marseille in 2021, with expertise in patch clamp on anesthetized pre-clinical model, to develop parallel rodent experiments of current endeavours on the role of cholinergic interneurons of the striatum, explored in pre-clinical models. Attractiveness was also evidenced by the eight postdocs hired, mainly at the national level, however.

Nearly all team PIs are funded by national or regional funding schemes (5 ANRs, 1 INCA, NRJ, France Parkinson). Three PIs of the BAGAMORE team (the team leader, a PU-PH and a PH) are actively involved in decision-making instances in national or local patient associations such as France Parkinson and the Parkinson Sud-Est network. Additionally, the team leader contributes to the national and international visibility of the team thanks to multiple invited talks, whereas a network of international collaborators (La Jolla, Vancouver, Oxford) is attested by joint publications. Finally, team PIs participate yearly in scientific dissemination sessions among lay audiences (Fête de la science, Brain Week, World Parkinson's Day) and outreach activities (Declics, Apprentis Chercheurs, MAAD programs supported by INSERM).

Weaknesses and risks linked to the context

The team has experienced the departure of three key researchers since 2018 and has been obliged to focus on the scope of their research domains present in the prior plan such as posture in Parkinson's disease, the study of substance abuse (cocaine or alcohol) on the vulnerability to PTSD or computational network tools and applications. Nonetheless, this could also be taken as an opportunity to tighten up the central topics of the team and open room for permanent junior researchers to take responsibilities and flourish. Unless this information has been omitted, the team participates poorly in large-scale clinical trials or to develop diagnostic and therapeutic applications that could benefit patients impacted by addictions, in addition to study them as models of disease.

RECOMMENDATIONS TO THE TEAM

Further levels of internal integration and collective multilevel project should be promoted. Given the relevance of the topics at hand for health and society, more efforts could be done so that basic science drives specific clinical diagnostic and therapeutical applications to benefit patients, rather than using patients to better understand physiology. Without being an absolute must, the team could do more to cooperate with private companies, engage in technological innovation, secure more funding and involve more forces in dissemination to the lay people or at least with a better distribution of efforts across permanent members.

Team 8:   Social Cognition and Connectomics (SONIC)

Name of the supervisor: Mr. Eduardo GASCON GONZALO

THEMES OF THE TEAM

The SONIC team is composed of two permanent researchers that focus on pre-clinical models to clarify the molecular basis of social behaviour as well as the changes caused by pathologies. Team members use and develop innovative methods to correlate behavioural and molecular changes such as a method of genome editing for microRNAs in vivo. This aims to allow them to go beyond observations/correlations and determine the role of certain molecular circuits for social functions.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

At the time of the previous evaluation, the team was called microRNAs and Social Cognition (mirCOS). The following recommendations and comments were made: the expert committee recommends publishing more, to integrate scientific networks and promote international visibility of the team by oral presentations, limit the dispersion with the integration of new scientists and keep focus by rational allocation of efforts and resources, look for support from other INT teams on physiological and behavioural approaches, consider alternative approaches in case of technical difficulties in its molecular genetics approaches, and apply for an ERC grant.

While the team has clearly been trying to deal with these points, there are several that remain still relevant. In particular the need to publish more is still an issue as <1 paper per PI/year remains low.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	0
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	2
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	3
Subtotal permanent personnel in active employment	**5**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	1
Post-docs	1
PhD Students	2
Subtotal non-permanent personnel	4
Total	**9**

EVALUATION

Overall assessment of the team

Globally, the panel considers that the SONIC team is very good. Its strongest point is its links to society that were found to be excellent (1 Cifre funding, 1 tool developed for follow-up of behaviour, dissemination to the public). Resources are very good to excellent with three ANR-funded projects with international partners. The team's attractiveness is also very good. Currently, the level of production is relatively modest (4 papers, 1 patent) and was considered to be good to very good.

Strengths and possibilities linked to the context

The Sonic team was created in 2016 with the goal of better understanding the molecular basis of complex social behaviours. Initially, the team focused on the study of microRNAs in physiological and pathological models, with the goal of eventually moving on to the study of pre-clinical models. Over the years, the team has worked to attract researchers and consolidate a tight and dynamic research team. However, despite these efforts, the team faced difficulties in the beginning, with a lack of researchers and staff to supervise and guide them. Thanks to a great effort to make the team more visible at the local and international level, the team has been able to reverse this situation in the past two years. Three papers are currently being finalised, collaborations have progressed well, and a European network is being formed. The incorporation of new researchers and students has given a definitive momentum that will hopefully allow the team to consolidate its good dynamics. There are now five permanent people in the team (2CR, 3 AI) with one postdoc and two PhDs (one CIFRE funding).

The team's scientific production has a focus on using the latest technologies and developing new procedures and tools (microRNA editing in vivo, brain-on-chip devices and opto-electrical technology for neural activity recording) to answer scientific questions around the molecular and neural bases of social behaviour. The team members analyse their data in a rigorous way and use statistical tools best suited to the data. The team's research is original, and trying to clarify the molecular basis of social behaviours as well as the changes caused by pathologies. The team plans to extend its research to establish causal links between behaviour and molecular changes and extend its experimental models to pre-clinical models with a richer social repertoire. Expansion towards more socially relevant models is a plus that will allow more directed links between molecular mechanisms and behaviour.

The team published a total of four papers in the period under evaluation but there are two other papers published in 2022. The journals include Nature Communications and iScience, two well-accepted journals with a large audience and visibility. They are also active in dissemination to the public through scholar welcoming and regular participation to brain awareness days.

Weaknesses and risks linked to the context

The team has undergone a number of personnel changes during the period with three departures in 2020 only partly compensated by the arrival of a full-time INSERM researcher. This level of uncertainty has made it difficult to have a clearly defined research strategy. In addition, the team is involved in two local facilities that may be time-consuming.

RECOMMENDATIONS TO THE TEAM

PI should also increase their funding sources, particularly at the international level and maybe focus more on science than on technological developments with facilities.

Team 9: CANOP

Name of the supervisor: Mrs Christine DERUELLE & R. BELZEAUX

THEMES OF THE TEAM

The CANOP team was created recently (2018) from a lab linked to a psychiatry unit. Then two subgroups joined the team in 2020 and 2021 making the largest team in psychiatry in Marseille. This team studies normal and pathological development of social/affective function, using cognitive, imaging, and molecular techniques.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

At the time of the previous evaluation, the team was called SCaLP (Social Cognition across Lifespan and Pathologies). The committee made several recommendations and comments: the team needs to publish in more generalist journals, recruit more international students or postdocs who can possibly join CNRS or Inserm with permanent positions, increase the collaboration with international autism and fMRI centres and obtain more international grants, strengthen the link with clinicians and participate in national networks federating research on autism and other psychiatric disorders.

Globally, the panel felt that the team has made a good attempt to address the points raised but see recommendations for further improvement.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	3
Lecturer and associate lecturer	2
Senior scientist (Directeur de recherche, DR) and associate	1
Scientist (Chargé de recherche, CR) and associate	2
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	5
Subtotal permanent personnel in active employment	**13**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	0
Post-docs	0
PhD Students	6
Subtotal non-permanent personnel	6
Total	**19**

EVALUATION

Overall assessment of the team

The panel considers that, globally, CANOP is an excellent team. The participation of fundamental scientists and psychiatrists predicts the success of an excellent multidisciplinary research project. The team's scientific production was rated at excellent to outstanding with around three papers/PI per year. Its resources and attractiveness were both found to be excellent given the multiple ANR and Eranet funding. Links with society were found to be very good to excellent.

Strengths and possibilities linked to the context

The team members bring a broad range of scientific approaches and skills to the common research project. The team works on the mechanisms underlying neurodevelopmental disorders, using molecular, behavioural, and imaging tools.

The team's attractiveness is excellent, as they were able to attract eight PhD students. Their resources were also excellent, coming from both the ANR (4 grants), Europe (Eranet) and Foundation (FRM) sources.

Visibility is excellent as one of the team's members obtained the Prix Marcel Dassault in 2022.

The total number of publications for the period was particularly impressive, with no less than 143 articles, many of which concerned clinical work. However, the team's fundamental research production is excellent, with seventeen papers in highly cited journals. They include Nature Medicine, JAMA Psychiatry, Nature Communication and Molecular Psychiatry. They identified an epigenetic signal associated antidepressant treatment response in mood disorders (Belzeaux et al, Nature comm 2020), and a brain morphological signature of autism (Brun et al., Biol Psych 2016). They submitted two patents on bipolar disorder diagnosis and developed one software for surface analysis and modelling.

Weaknesses and risks linked to the context

The team's links with society are very good but insufficient given the nature of their work, particularly regarding the dissemination with the public. Collaborations within the unit were also insufficient.

RECOMMENDATIONS TO THE TEAM

Finding a balance between the clinical projects and the fundamental research will continue to be a challenge, especially since it appears difficult to recruit appropriate candidates to a permanent position at the CNRS. The team should try to obtain a hospital-university staff.

Team 10: Methods and Computational Anatomy (MeCA)

Name of the supervisor: Mr. Olivier COULON

THEMES OF THE TEAM

The MeCA team conducts research at the frontier of neuroimaging and modelling. They rely on strong theoretical and methodological foundations for their work, developing most of the methods they use themselves, which are based on theoretical mathematical foundations. Their approach is open science, ensuring reproducibility of their results. MeCA is a strongly interdisciplinary team with an individual approach to the analysis of neuroimaging data. The central topic of their research is cortical folding, and they focus on objects such as cortical sulci or subparts of these sulci, which is original as only few teams work explicitly on these topics. Methodologically, they have an original mathematical approach to folding analysis, based on spatial frequency analysis of surfaces.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous evaluation noted a potential risk of becoming a technological facility, and suggested keeping the priority on scientific interests, apply for high-quality grants to increase the number of people in the team and to not disperse in too many projects.

The panel considers that the team took these recommendations into account.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	1
Lecturer and associate lecturer	1
Senior scientist (Directeur de recherche, DR) and associate	1
Scientist (Chargé de recherche, CR) and associate	1
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	0
Subtotal permanent personnel in active employment	**4**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	0
Post-docs	0
PhD Students	5
Subtotal non-permanent personnel	5
Total	**9**

EVALUATION

Overall assessment of the team

The panel considers that, globally, the MECA team is an excellent and dynamic research group. Its scientific production was found to be outstanding (2.5 publications/year/PI), and its links with society are excellent, particularly with the start-up and through the development of tools for MRI imaging analysis, particularly using machine learning models. The team's resources and attractiveness were both found to be very good to excellent given the recruitment of a researcher, adequate funding by ANR and FRM, and training of ten PhDs and postdocs.

Strengths and possibilities linked to the context

The MeCA team (4 permanent researchers in December 2021) conducts research at the frontier of neuroimaging and modelling, with a focus on cortical folding. They have an original and individual approach to the analysis of neuroimaging data, which sets them apart from the majority of the community. Effectively, they mostly use machine learning approaches to automatise morphometric studies. They have a strong theoretical and methodological foundation for their work, developing most of the methods they use themselves and using an open science framework to ensure reproducibility. Their research has made significant contributions to the field (modelling of the prenatal gyrification in Wang et al., Scientific reports 2021, the first morphological characterisation of the Pli de passage in Bodin et al., Neuroimage 2021, identification of white matter properties as a prognostic tool in accidental pathologies in Velly et al. Lancet Neurol 2018), and their publications are in high-quality and recognised journals. They published 53 journal articles (2.5 publications/year/PI) and fifteen conference proceedings during the evaluation period, including several in high-ranking journals that include Lancet Neurology, Nature Physics and eLife. Regarding interactions with society, they have produced three software toolboxes for MRI analysis, one PI was the founder of a start-up, and they interact with other start-ups. In addition, the team has obtained numerous grants, including ANR and FRM grants.

They also have strong collaborations with international partners through consortia such as ENIGMA and Prime-Net, including with McGill, UCLA, the University of Texas, and labs in Barcelona, Lausanne and Oxford, then ensuring strong visibility. One researcher was recruited at the interface between CANOPE and MECA in 2017 and they trained eight PhDs and four postdocs.

The strengths of the MeCA team include their solid theoretical and methodological foundations for their research, their unique and original approach to the analysis of neuroimaging data, their significant contributions to the field of cortical folding and the quality of their publications. For all these reasons, the scientific approach of this team can be rated excellent.

Weaknesses and risks linked to the context

The panel identified no obvious weaknesses.

RECOMMENDATIONS TO THE TEAM

The MECA team's expertise in the study of cortical anatomy could be particularly useful in the context of initiatives such as the Digital Brain. It is recommended that the team increases the amount of collaboration with teams working on the modelling of brain activity (for example, at the INS, Marseille).

Team 11:   Spinal Cord – CSF Interface (SpiCCI)

Name of the supervisor: Mr. Nicolas WANAVERBECQ

THEMES OF THE TEAM

The SpiCCI team was created in 2018 and studies the roles of neurons in contact with the cerebrospinal fluid (CSF) in the spinal cord. The morphology, channel-expression phenotype, and sensory functions have been characterised by the team during the past evaluation period. The team has been able to demonstrate a role for these neurons in motor control.

The team, mainly composed of the teaching faculty (4 permanent researchers and one engineer), has recently received funds sufficient to ensure their research project in the next years.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

The previous evaluation of the ancient form of this team resulted in the following comments and recommendations: publish with higher impact factor, involve further staff members at national and international levels to increase visibility, participate in international grants calls, interact with the clinic (CSF biobanking has been proposed in the project during the visit), recruit a postdoc since all permanent staff members have heavy teaching duties, increase the number of PhD/Postdocs.

The panel considers that many of these recommendations are still pertinent. In particular, the need to increase the number and quality of publications is still an issue.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	2
Lecturer and associate lecturer	2
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	0
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	1
Subtotal permanent personnel in active employment	**5**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	0
Post-docs	0
PhD Students	3
Subtotal non-permanent personnel	3
Total	**8**

EVALUATION

Overall assessment of the team

The panel considers that the SPiCCI team is globally a very good research group working on a rare niche in France and Europe. It has excellent resources with three different ANR funded projects. Attractiveness and links with society are both very good to excellent (involvement in teachings, links with patients, involvement in a club and social events, recent recruitment of a postdoc from abroad). The weakest point is the level of production, which was ranked between good and very good (3 publications which is less than the number of permanent people in the team) but should hopefully improve in the near future.

Strengths and possibilities linked to the context

The team is composed of four experienced university researchers, one engineer, three PhD students and one postdoc.

The team has excellent financial resources, with sufficient current ANR support (n=3) to continue the project.

The research subject is original and fundamental and takes advantage of the different skills within the team. The team members' university contacts should continue to allow good recruitment of undergraduate interns and PhD students, maintaining the team with very good attractiveness. They have attracted four PhD and two postdocs during the contract period, all authors of the team's publications.

The team has excellent links with society, not only through the university, but also through technology transfer (patch-clamp training), a CSHL summer school organisation, and contact with the public (hosting high school students, participating in Brain Awareness week, etc.). The team also interacts with other groups in Europe (Germany, UK, Paris) or in the US (Austin, Cold Spring Harbor…).

Weaknesses and risks linked to the context

The team lacks full-time CNRS/INSERM researchers, which necessarily slows its production that remains good nonetheless (3 publications in Eur J of Neuroscie, Mol Neurobiol, J. Physiol, with only two as team leader, but associating PhD students and postdocs). The low publication rate should increase in the next few years (3 papers under submission), with the increased funding and capacity to recruit PhD students and/or post-docs into the project.

RECOMMENDATIONS TO THE TEAM

The cited difficulties in recruitment of full-time researchers are important to solve. Recruitment of either full-time researchers or at least technical staff would be helpful in reinforcing the team. If it is possible to increase collaborative efforts with other INT teams, this could compensate to some extent and should in turn increase possibilities for publishing more and better.

Team 12: SANE

Name of the supervisor: JM Goaillard

THEMES OF THE TEAM

The research work of SANE is interested in the roles of intrinsic properties of neurons and their consequences on the spontaneous activity of these neurons. The team focuses on dopamine neurons of the midbrain which present a molecular (dopamine) and functional homogeneity (tonic activity, long duration action potential…). The team was able to show that dopamine neurons co-express populations of ion channels that are necessary for the expression of their electrophysiological properties. This co-expression of groups of channels allows the homogeneity of electrophysiological activity while allowing a morpho-phenotypic heterogeneity.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Since the team was only created recently, there was no available previous evaluation.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	1
Lecturer and associate lecturer	1
Senior scientist (Directeur de recherche, DR) and associate	0
Scientist (Chargé de recherche, CR) and associate	1
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	1
Subtotal permanent personnel in active employment	**4**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	0
Post-docs	0
PhD Students	0
Subtotal non-permanent personnel	0
Total	**4**

EVALUATION

Overall assessment of the team

Globally, the panel considered that the scientific approach of the SANE team is very good to excellent. It has had excellent resources, largely thanks to an ERC grant that finished in 2019 and a smaller grant from Fondation de France. However, since the team arrived recently at the INT, it needs to obtain new funding to continue (previous FF and ERC funding ended and they now rely on an INT grant support mainly). Despite low funding, scientific production has been very good with eleven articles in well-recognised journals (Scientific reports, J Neuroscience among others). Attractiveness was considered to be very good with two PhDs and two postdocs and unfortunately the lack of PI. The weakest aspect was probably the team's links with society that were only rated fair to good with only one event with the public and few teachings.

Strengths and possibilities linked to the context

The SANE team is a small team that newly joined the INT in 2021. It is composed of one researcher and one teacher researcher and one technical support. This small research team was previously in the UNIS laboratory (Inserm UMR 1072) since 2006. The level of funding was high with the obtention of an ERC grant the past ten years. The research theme is original, and the development of innovative tools will surely help publish original articles of interest during the next contract.

In addition, the SANE team has been able to develop innovative and state-of-the-art tools for modelling (software), electrophysiological recordings and transcriptomics (single cell patch-seq.).

The SANE team has published eleven original or review articles over the last five years (7 of which only with the team members) representing a 1.3 publication/year/PI. The publication list includes a high-profile review in the Annual Review of Neuroscience, as well as other publications in the Journal of Neuroscience and Scientific Reports, for example. Eighty percent of the publications included as co-authors of the two PhDs or two postdocs trained.

Weaknesses and risks linked to the context

The SANE team is a small group with two permanent staff with only two PhDs and two Postdocs trained. Human resources will be a challenge in the coming years. Beyond the ERC grant, the level of self-funding is also low, and the SANE team will need to secure funding to recruit new PhD, postdocs. The low level of publication is a weakness for the last contract and will be a threat in the coming year. SANE team has no involvement in outreach projects or events. Although the equipment is now part of a platform of the institute, only a few recent collaborations with other INT teams (P3M, BAGAMORE and SPICCI) have been evoked.

RECOMMENDATIONS TO THE TEAM

The viability of the SANE team will depend a lot on whether it can obtain significant funding in the near future. The team needs to put every effort into obtaining the necessary funding to increase the team size.

The team has a very original research theme, and the panel hopes that it will be possible to continue with this work.

If the funding does not materialise, there is no doubt that other teams at the INT could provide fallback options. We would also encourage the team to think more about ways to enhance links with society.

THEMES OF THE TEAM

The BraiNETS team conducts research in computational neuroscience at the interface between system/cognitive neuroscience and artificial intelligence. To study how brain interactions support neural computations underlying cognitive functions, BraiNETS bases its research on theoretical approaches and computational tools from artificial intelligence and statistics. The team's research focuses on four axes: (1) neurocomputational bases of goal-directed learning, (2) analysis and modelling of brain interactions, (3) models of active sampling in the brain, and (4) alterations in brain connectivity after a stroke.

CONSIDERATION OF THE RECOMMENDATIONS OF THE PREVIOUS REPORT

Considering the creation of the team in 2020, there was no previous report and recommendation.

WORKFORCE OF THE TEAM

Permanent personnel in active employment	
Professors and associate professors	0
Lecturer and associate lecturer	1
Senior scientist (Directeur de recherche, DR) and associate	1
Scientist (Chargé de recherche, CR) and associate	0
Other scientists (Chercheurs des EPIC et autres organismes, fondations ou entreprises privées)	0
Research supporting personnel (PAR)	0
Subtotal permanent personnel in active employment	**2**
Non-permanent teacher researchers, researchers and associates	0
Non-permanent research supporting personnel (PAR)	0
Post-docs	1
PhD Students	3
Subtotal non-permanent personnel	4
Total	**6**

EVALUATION

Overall assessment of the team

The committee considers that, globally, the BrainNETS team is excellent to outstanding in terms of scientific approach. Its resources (ANR, Chair…), attractiveness (6 PhD and 4 postdocs during the contract period) and scientific production (13 articles since 2020 and 5 softwares) were all found to be equally excellent to outstanding. Links with society were somewhat less impressive and were considered to be very good to excellent. But this should not overshadow the general impression, which was very positive for this new team on computational neuroscience.

Strengths and possibilities linked to the context

The team created in 2020 is growing rapidly with the recent hiring of a tenure track. The team appears particularly attractive with six PhD students trained (3 still currently in the team) and four postdocs hired (1 at present). Since the creation of the team in 2020, it has produced a total of thirteen publications. These include seven journal articles (with one in Nature Communications, one in Neuroimage, and two in PLoS Computational biology), three peer-reviewed conference proceedings, a review paper and a book chapter in the sixth edition of the classic text 'The Cognitive Neurosciences'. This is an excellent production in quantity and quality in a very short period.

They have also produced five different software packages for analysis of electrophysiological data that include 'FRITES' (FRamwork for Information Theoretical analysis of Electrophysiological data and Statistics), a system that is available for download and is related to the European EBRAINS initiative.

Funding has been very good, with two sets of funding related to the European Human Brain Project, two other relative to European Innovation Training Networks (ITNs), and another from the ANR. A particular interesting development has been the decision by the AMU to fund a junior professorship position that should allow the recruitment of a very promising young candidate.

The team, although currently small with just two full-time staff, has a very rich network of collaborations. Within the INT, there are collaborations with six other teams. It also has collaborations with three other labs in Marseille, in particular with researchers at the INS, several teams elsewhere in France (Paris, Lyon, Grenoble and Strasbourg), as well as abroad (German, Italy, Spain, the Netherlands and the USA). It will also be a major player in the newly formed CoNeCT centre.

PI are involved in a few teachings at AMU and Ecole Centrale Méditerranée and in a summer school.

Weaknesses and risks linked to the context

Since the creation of the team in 2020, the seven scientific articles have been published within the team and only with external collaborations suggesting that, at least for the time being, there are only relatively weak interactions with the other INT's teams. For the moment, very few interactions with society were evidenced except teachings and software production.

RECOMMENDATIONS TO THE TEAM

If the local IHU project based on the Digital Brain is selected, the BraiNETS team should play a key role for its future development.

In the next contract, inter-INT teams projects should be encouraged. In particular, it will be important to develop links with the teams involved in Computational Neuroscience, particularly given the arrival of new permanent staff members. More interactions with the MECA team could be highly beneficial.

Given that the team is actively developing software tools that can be of use for the general community, it might be worth looking at the possibility of involving an industrial partner to help with distribution.

CONDUCT OF THE INTERVIEWS

Date(s)

Start: 07 décembre 2022 à 11 h

End :   08 décembre 2022 à 17 h 30

Interview conducted: on-site or online

INTERVIEW SCHEDULE

Research Lab Visit program
Institut des neurosciences de la Timone (INT)
Date of the visit: 7–8 of December 2022 (on site)
Present Lab director: Guillaume Masson

HCERES Scientific advisor: Mr. Giovanni Stevanin
Research committee:
Mr. Simon Thorpe (**President**), Expert panel HCERES
Ms Sophie Crespin, PAR representative
Mr. Bogdan Draganski, Expert panel HCERES
Mr. Pascal Fossat, Expert HCERES
Mr. Denis Jabaudon, Expert panel HCERES
Ms Ann Lohof, CNU representative
Mr. Antoni Valero-Cabre, CoNRS26 representative

<u>Observers:</u>
Bernard Poulain (CNRS/ITMO)
Jean-Louis Vercher (CNRS/ITMO)
Emmanuel Bourinet (CoNRS25)
Zoom link:
https://univ-amu-fr.zoom.us/j/86561080297?pwd=bUF1QmN2Q2Yyb1VyYktUNHNhN1lNdz09

December 6th
Arrival at Marseille
8 p.m.   Evening dinner (only committee members and HCERES Scientific advisor)
                         Dîner : Maison Montgrand, 35 Rue Montgrand — 13006 Marseille
                         Hotel: Adagio Timone Marseille, 21 chemin de l'armée d'Afrique, Marseille

December 7th
9:00-9:30   Welcome coffee (closed-door): Visiting committee with the HCERES advisor
                         (SALLE VINAY, 1st floor INT building)

9:30-9:45   Presentation of the evaluation process to the unit by the HCERES advisor
9:45-10:30   Presentation of the unit scientific outputs and strategy by the lab director
                         (20′ presentation + 20'discussion)

10:30-11:00   Coffee break room R+4

11:00-12:30   Presentation of the scientific programs and research results by group leaders
                         (14′ presentation + 14'discussion) Amphithéâtre d'odontologie

Physiological and physiopathological mechanisms of the spinal cord
P3M: Plasticity and Physiopathology of Rhythmic Motor Networks_F Brocard (DR2 CNRS)
SPICCI: Spinal cord – CSF interfaces_N Wanaverbecq (MCF AMU)
IMAPATH: Live imaging of cell interactions in the normal and disease brain_F Debarbieux (MCF AMU)

12:30-2 p.m.   Lunch (closed-door with the committee and HCERES advisor)
                         (SALLE VINAY, 1st floor INT building)
2 p.m.-3:30 p.m. Presentation of the scientific programs and research results by group leaders
                         (14′ presentation + 14'discussion) Amphithéâtre d'odontologie

Cortical and subcortical networks: system and molecular approaches
BAGAMORE: Basal ganglia, motivation and reward_C Baunez (DR1 CNRS)
SONIC: Social cognition and connectomics_E Gascon (CRCN CNRS)
SANE: System approaches of neuronal excitability_JM Goaillard (CRCN INSERM)

3:30 p.m.-4 p.m.   Coffee break room R+4

4 p.m.-5:30 p.m.   Presentation of the scientific programs and research results by group leaders
                             (14′ presentation + 14'discussion)

Cortical networks, neuroimaging, normal and pathological social cognition
BANCO: Neural basis of communication_P Belin (PR1 AMU)
CANOP_C Deruelle (DR1 CNRS) & R Belzeaux (PH AP-HM)
MECA: Methods and computational anatomy_O Coulon (DR2 CNRS)

5:30 p.m.-6:30 p.m.   Visit of INT facilities (Photonic platform and IRM platform)
                             (only committee members and HCERES Scientific advisor with Unit director)

7 p.m.   Evening dinner (only committee members and HCERES Scientific advisor)
                             Diner: Maison Montgrand, 35 Rue Montgrand — 13006 Marseille

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December 8th
8:30-9:00   Welcome coffee (closed-door): Visiting committee with the HCERES advisor
                             (SALLE GASTAUT, entrance of the INT building)

9:00-12:30   Presentation of the scientific programs and research results by group leaders
                             (14′ presentation + 14'discussion)

Cognition and cortical networks: vision, action
COMCO: Cognitive motor control_T Brochier (DR2 CNRS)
NEOPTO: Neuronal operations in visual topographic maps_F Chavane (DR1 CNRS)

10:00-10:30   Coffee break room R+4

INVIBE: Inference in visual behaviors_G Masson (DR1 CNRS)
BRAINETS: Brain networks and learning_A Brovelli (CRCN CNRS)

12:30-1:30 p.m.   Lunch (closed-door with the committee and HCERES advisor)
                             (SALLE VINAY, 1st floor INT building)

From 1:30 p.m.   **Meetings with the various categories of personal**
                             (SALLE GASTAUT, entrance of the INT building)
1:30 p.m.-2 p.m.   Discussion with scientists (without team leaders)
2 p.m.-2:30 p.m.   Discussion with PhD students and postdocs
2:30 p.m.-3 p.m.   Discussion with engineers, technicians and administrative personnel (in French)
3 p.m.-3:30 p.m.   Discussion with the representative of the managing bodies (closed-door)
                             & local representatives

– Aix-Marseille Université
VP Recherche : Pr Philippe Delaporte
VP Thématique pour le secteur médecine/santé : Pr Nicolas André
Faculty of Medicine, President of the scientific council: Pr Jean-Louis Mege
—CNRS/INSB
DSA Neurosciences: Pr Bernard Poulain
Déléguée Régionale : Mme Aurélie Philippe

15:30-16 : 00   Discussion with the team leaders (closed-door)
4 p.m.-4:30 p.m.   Discussion with the director (closed-door)

4:30 p.m.-5 p.m.   Private meeting of the visiting committee (closed-door)
                             (SALLE VINAY, 1st floor INT building)

5 p.m.   End of the visit and Departure from Marseille

PARTICULAR POINT TO BE MENTIONNED

Due to a strike affecting trains, two members of the panel were connected instead of being present in Marseille but the discussions and presentations were fluid and this had no influence on the planning of these two days interview.

Interview of the supervising bodies (AMU and CNRS) highlighted the high visibility of the INT institute at the national level, reinforced by the gathering of most neurosciences forces in the Neuro Campus La Timone these recent years. Funding and attractiveness of the institute are excellent and the INT is very dynamic and flexible by the integration of teams during the contract period. Both AMU and CNRS strongly support INT in these dynamics.

GENERAL OBSERVATIONS OF THE SUPERVISORS

Le Président de l'université

au

Département d'Évaluation de la recherche - Hcéres

Objet : Observations de l'unité relatives au rapport d'évaluation des experts Hcéres

N/Réf. : VPR/LS/AMS/CM – 23-07

Dossier suivi par : Cécile Merle
Tél :   04 13 94 95 90
cecile.merle@univ-amu.fr

Vos réf :
DER-PUR230023175 - INT - Institut des neurosciences de la Timone

Marseille, le jeudi 15 juin 2023

Madame, Monsieur,

Je fais suite au mail que vous nous avez adressé le 23/05/2023 dans lequel vous me communiquiez le rapport d'évaluation Hcéres de l'Unité INT - Institut des neurosciences de la Timone.

Comme demandé dans ledit mail, je vous fais part des observations de portée générale en reportant les commentaires de la direction de l'unité que nous partageons:

First, we would like to thank the HCERES Committee for its in-depth review of our Self-Evaluation Document and the quality of the interviews during the INT visit. We appreciate the constructive comments and recommendations of both the Unit and the Teams and acknowledge the very positive appreciation of the work done by the INT personnel over the 6-years contract. The recommendations made will be carefully considered by the INT current and future Directorship as well as by the Team leaders and personnel in order to take them into account for the incoming 5-years period.

We would like to make only one general comment:

General comments: One main remark/critics of our activities concerns the Societal Impact of our activities. We acknowledge that we need to work hard to improve this aspect in the future. As mentioned in the Evaluation Report, there are several opportunities: the link with clinical research, the new NeuroTechCenter…. It must also be indicated that readiness level is an important factor: several research projects conducted at INT over the last years are now becoming mature enough to envision translational approaches (i.e. clinical trials in spasticity or stroke, marmoset model for biomedical research) or technological transfer (e.g. brain-on-a-chip, curved sensors for imaging…). In the future, we will insist on (i) developing a strong culture, in particular among researchers, for transfer and valorization, (ii) better structure, after identifying a motivated leader, our internal Valorization Board that could help in setting and conducting a pluriannual strategy that better integrates the opportunities on the Aix-Marseille sites (e.g. CISAM+, CARNOT…) with the expertise and innovation R&D at INT, (iii) develop a strong internal support regarding transfer and valorization at both legal and administrative/financial aspects, that our team can rely on to develop and mature their technological projects. One good example is the attempt to structure CLINT, an INT-based initiative to support clinical research in both healthy volunteers and patients. The success of CLINT implies that our Institutions (AMU, CNRS, with AMIDEX) support it with personnel staff (e.g. Clinical Research Assistant, Clinical Data Manager) that is able to structure partnerships with the clinical institutions (AP-HM, CNRS/INSB) regarding ethics, protocols and data management. Valorization and

transfer activities of the NeuroTechCenter and biomedical research with the marmoset models at MPRC/INT are two other examples. Institutions such as CNRS and AMU have strengthened their administrative support at global level. Still, we need to build a local, disciplinary-based know-how and competence pool, closer from the scientific teams. Such activities can be shared by (open to) several other neurosciences lab, although this would need to be encouraged and supported by both CNRS and AMU. INT is willing to play this structuring role with the neuroscience community at Timone and/or AMU level.

Vous souhaitant bonne réception des présentes,

Je vous prie de croire, Madame, Monsieur, l'expression de mes respectueuses salutations.

Eric BERTON

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