2D BioPAD

Supple Graphene Bio-Platform for point-of-care early detection and monitoring of Alzheimer's Disease

2nd Project Meeting Minutes

Edifici ICN2, UAB Campus, Bellaterra - Barcelona

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Project Information

Title	Supple Graphene Bio-Platform for point-of-care early detection and monitoring of Alzheimer's Disease (GA Number 101120706)
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Duration	48 months
Website	https://2d-biopad.eu/
Coordinator	UNIVERZITA PALACKEHO V OLOMOUCI (UP-CATRIN)
Project Overview	The 2D-BioPAD project aims to introduce a fast and cost-effective, non-invasive, reliable, digitally-enabled Point-of-Care In-Vitro Diagnostic system based on graphene for supporting the early diagnosis and monitoring the progress of AD directly in primary healthcare settings.

Document Information

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1.1	25/04/2024	First draft elaborated by UP-CATRIN & Q-PLAN and shared with partners
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List of Terms and Definitions

Abbreviation	Definition
Aβ	Amyloid Beta
AD	Alzheimer's Disease
AI	Artificial Intelligence
D	Deliverable
DMP	Data Management Plan
EC	European Commission
ECR	Ethical Consideration Roadmap
EU	European Union
GDPR	General Data Protection Regulation
GFAP	Glial Fibrillary Acidic Protein
GFET	Graphene field effect transistor
GFI	Graphene Flagship Initiative
HCPs	Healthcare Professionals/Practitioners
IVD	In-Vitro Diagnostics
IVDR	In-Vitro Diagnostics Regulation
LOD	Limit of Detection
MCI	Mild Cognitive Impairment
MDR	Medical Device Regulation
MNPs	Magnetic Nanoparticles
NFC	Near-Field Communication
NFL	Neurofilament Light
PC	Project Coordinator
PoC	Point-of-Care
QA	Quality Assurance
SCI	Subjective Cognitive Impairment
SIAB	Scientific and Industrial Advisory board
tau	Tau protein
WP	Work Package

1. Introduction and scope of the document

The current document is entitled "2nd Project Meeting Minutes" and aims to provide an overview of the 2nd Project Meeting of the 2D-BioPAD project. The meeting was held on the 17th and 18th of April 2024 in Barcelona, Spain, hosted by the Fundacio Institut Catala de Nanociencia I Nanotecnologia (ICN2).

The core aims of the meeting were to:

- Present and discuss the progress made in the active tasks of the project during the first semester of the project (October 2023 – March 2024).
- Carefully plan and stimulate the work to be carried out during the second semester of the project (April – September 2024) to timely complete all the work foreseen in its framework.
- Discuss the various administrative, and financial aspects of the project.

The document at hand emphasises on the critical discussions and decisions that project partners jointly made during the following sessions:

- Project Overview
- Requirements & System Architecture (WP1)
- Biomarkers binding and quantitative analysis (WP2)
- Graphene-based platform design and implementation (WP3)
- Device Development and System Integration (WP4)
- Clinical Pilot Studies Design, Deployment, Evaluation & Validation (WP5)
- Dissemination, exploitation and communication (WP6)
- Project management and coordination (WP7)

It also presents in brief the content of the workshops and other sessions that took place during the meeting.

In addition, the "2nd Project Meeting Minutes" includes the action list, which was developed and agreed by all partners, focusing on the 2nd semester of the project, as well as the participants' list for the two days of the meeting.

Q-PLAN INTERNATIONAL (Q-PLAN), as the PMO of 2D-BioPAD, prepared the initial version of the 2nd Project Meeting Minutes and shared them with all partners of the consortium to receive their comments and feedback. The current document constitutes the final version of the 2nd Project Meeting Minutes, incorporating the comments and feedback received from the partners of the 2D-BioPAD consortium.

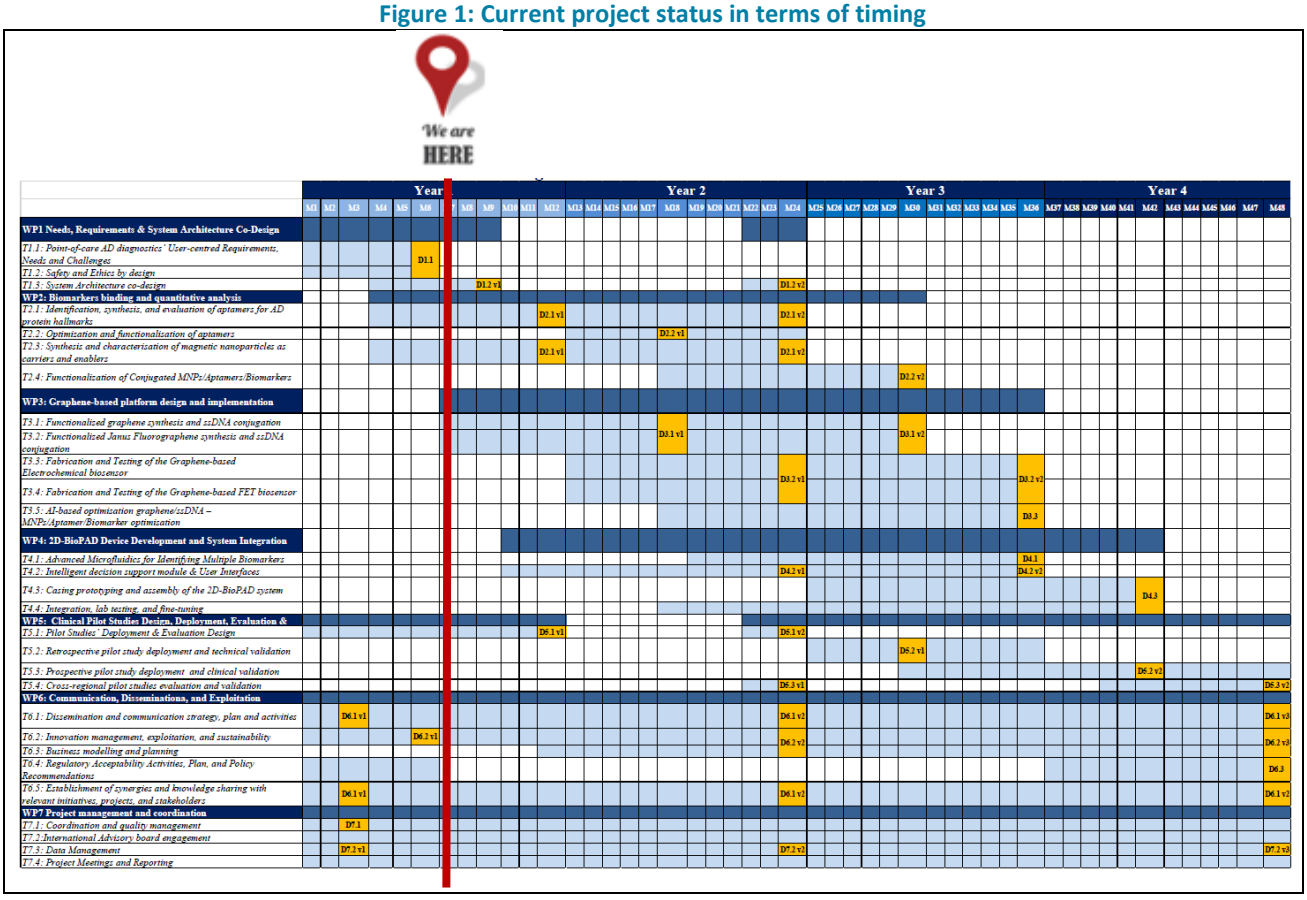
2. Project Overview

After a brief welcome from the Fundacio Institut Catala de Nanociencia I Nanotecnologia (ICN2) that hosted the meeting, the Project Coordinator (PC/UP-CATRIN) presented a quick overview of the project's current status. The PC stressed the importance of this stage of the project, during which the consortium is building a solid technical base to support the development of the PoC IVD device. In short, the overall status of the project's progress at the time of the meeting may be summarised as follows:

- ✓ **The progress of the project is in accordance with the Description of the Action**.
- ✓ **All deliverables due so far have been submitted, apart from D1.1.** This minor deviation in the delivery of "*D1.1. MCI to AD Biomarker Deep Dive Analysis for Early Diagnosis"* was decided, as the responsible partners dimmed important to extend the Online Survey deployment. The deliverable is undergoing peer review and will be submitted by M7. The PO has been informed accordingly.
- ✓ Consequently, **Milestone 1 "**Deep Dive Results, Requirements and Design Principles for 2D-BioPAD Available" (M6) **will be reached by the end of M7.**

The following figure provides an overview of where the project is currently positioned in terms of timing.

Figure 1: Current project status in terms of timing



3. Decisions taken during each session of the meeting

3.1 Requirements & System Architecture (WP1) | ICN2

This session included an overview of WP1 provided by ICN2.

3.1.1 T1.1 Main findings

Q-PLAN presented T1.1 findings, covering the results from the desk research, the semi-structured interviews and the online survey, covering main actors' needs and challenges, the current clinical practice in Finland, Germany, and Greece, the AD blood-based biomarkers, requirements for PoC IVD systems, and finally ethics and safety related to AD early diagnosis and progression monitoring.

Along these lines, the **decisions** that were made during this session may be summarised as follows:

Main decisions:

- The final set of suggested biomarkers from T1.1 is: **$A\beta_{40}$**, **$A\beta_{42}$**, **p-tau217**, **GFAP** and **NfL**. As an alternative to GFAP, **p-tau181** could also be explored.
- The biomarkers identified in T1.1 **are not necessarily the ones to be employed in the clinical pilot studies** at the end. It is crucial to ensure that the identified biomarkers can be "targeted" by aptamers and their concentration can be detected by the biosensing devices.
- All partners to **promote the online survey** (link) once more. Supplementary material can be found on SharePoint here. ZI to explore promotion via the EADC network. Clinical partners to reach out directly to memory clinics. Other partners are also requested to reach out to individual contacts. Direct contact is preferred. Focus should be given in Finland and beyond Greece.
- EVNIA together with Q-PLAN to **explore scientific publications originating from D1.1 results**. ZI will reach out to EVNIA to compare survey results with similar scientific findings from other relevant activities. Data from the Online Survey can be found on SharePoint (link) and on Zenodo (link).

Discussion on Deliverables:

D1.1 "MCI to AD Biomarker Deep Dive Analysis for Early Diagnosis" was originally to be submitted by M6. Q-PLAN and EVNIA requested an extension of one month. D1.1 was shared for quality review with the appointed reviewers and will be submitted at the end of M7.

3.1.2 T1.2 Workshop: "Ethical Consideration Roadmap – Application of Ethics in the 2D-BioPAD Project"

At the beginning of this session, the SIAB members (i.e., Charlotte Teunissen, Fabiana Arduini, Graham Armitage, and Oliver Smith) introduced themselves. Backgrounds are material science, ageing research, neurochemistry, biomarker research, biosensor development and policy and ethics. The PC introduced a summary of the 2D-BioPAD project to the SIAB members to set the scene for the following workshop.

EVNIA continued with the presentation of the Ethical Consideration Roadmap via a dedicated workshop that involved the members of the SIAB. EVNIA explained the main ethical principles that should be followed

throughout the implementation of the 2D-BioPAD activities, explaining in more detail the "self-assessment" process that needs to be completed by task leaders.

During the workshop, Mr Smith from the SIAB raised 2 points:

- There can be **ethical issues in the societal aspect**. For example, clinicians may get '**false positives**', which may create anxiety to the patients. The reply from EVNIA was that it is too early to give a specific answer at this stage of the project, but such identifications (like false positives) are part of the project activities. Also, EVNIA pointed out that project results should be presented in an objective and clear manner independently of what the results show. Moreover, overall considerations should be made on disseminating the validity of the 2D-BioPAD system, based on the project results.
- Regarding the use of Artificial Intelligence (AI), **how the partners expect to avoid biases and if there is some specific approach to tackle them**. Mr Smith noted that it is important to refer to specific methodologies for AI. EVNIA replied that it is up to the specific task leaders of AI-based tasks to decide and elaborate on the ethical considerations. Q-PLAN also explained that the consortium is aware of methodologies for assessing trustworthiness and ethics in AI applications, with the partner responsible for the implementation of the AI solutions, being experienced in handling similar data, so ethical considerations will be addressed.

The **decisions** which emerged through the course of this session are:

Main decisions:

- Task leaders need to **complete the ethical self-assessments** presented in the context of the ECR. The timeline for the ethical self-assessments has been presented by EVNIA and is inside the 2D-BioPAD SharePoint.

  Special focus should be given to the **clinical pilot studies' protocol**, which is due (1st version) on M12.

Discussion on Deliverables:

The ECR has been incorporated into D1.1, whereas a standalone version is also available through the project's website (link). The results of the self-assessments will feed T6.4 activities and high level results will be documented in the respective deliverable (D6.5).

3.1.3 T1.3 Co-creative exercise: "Toward next generation lateral flow assays: Background and recent advances."

Finally, ICN2 carried out the workshop "Toward next generation lateral flow assays: Background and recent advances". Current set-ups and examples of LFIAs were presented. Near-Field Communication (NFC) for lateral flow with rGO electrodes and aspects of antenna design were presented. There exist websites to develop a similar app to the project target. A prototype mobile app to receive and visualize the results of the biosensing readings was also presented.

GRAPHEAL also presented the way of operation of GRAPHEAL sensors and the integration to the printed electronics, similar to credit cards. The system of encryption and data protection will be based on the bank system of data protection (credit cards), ensuring compliance to GDPR. A prototype mobile app to receive and visualize the results of the biosensing readings was also presented. GRAPHEAL also presented mockups for the potential version of the final mobile app, based on the existing app for the COVID-19 product.

The **decisions** which emerged through the course of this session are:

Main decisions:

- The development of the devices should focus **first and foremost on performance and reliability**. This might require a higher initial cost, e.g., higher cost on electronics, towards achieving better performance in detecting more than one biomarker at the same time. Overall cost and user-friendliness are also important but should follow after reliable results have been achieved.
- **Biomarkers are to be targeted in plasma**. Thus, an extra preparatory step should be included in the process ideally directly on the device (i.e., using microfluidics). As a first step, it was agreed to use an external preparatory step, using a tube with a pre-existing buffer, before providing the fluid on the device. In any case, complicated processes (i.e., centrifugation) must be avoided. Attention should be given to (i) not dilute the fluid too much (or too little) as it might affect the effectiveness of the aptamers binding to the target analytes; (ii) the conditions (i.e., salinity and pH) of the fluid provided to the device. The **affinity between the probe and target is quite important and must be addressed early on** under WP2 activities.
- Information on **both biosensing technologies should be included in D1.2**, including preliminary mobile apps, microfluidics, and other relevant information to the design of the 2D-BioPAD system. The deliverable should also aim to address the requirements identified in D1.1.

Discussion on Deliverables:

The WP1 deliverable expected in the second semester is D1.2 System Architecture, Version 1 (M9, R, PU, ICN2). The deliverable is expected earlier than the end of the task.

A detailed list of actions was prepared for WP1 and is included in the Action List of the project (see Section 5 of the current document). The WP1 PowerPoint presentation is included in the dedicated project's cloud storage (i.e., Microsoft Teams).

3.2 Biomarkers binding and quantitative analysis (WP2) | AUTH

The discussion during this session revolved around aptamer identification / selection for targeting AD biomarkers. Three aptamers (RNV95, T-SO508, Aβ7-92-1H1 (Aβ-Apt)) from literature were tested for affinity with Aβ biomarkers ($A\beta_{40}$ and $A\beta_{42}$). Preliminary results were not successful or not aligned with the literature, leading NOVA to initiate the selection process for new aptamers for Aβ biomarkers.

An extended discussion focused on the challenges related (i) with the aggregation of Aβ monomers into oligomers and polymers, which make it difficult for the aptamers to bind to the targeted analytes, and (ii) the procurement of the analytes (being Aβ or tau biomarkers) for experimentation.

AUTH also presented the preliminary results related to the synthesis of variations of magnetic nanoparticles with gold.

Along these lines, the **decisions** that stemmed from this session of the meeting can be summarised as follows:

Main decisions:

- The important biomarkers to target, confirmed once more from the clinical partners, are: **$A\beta_{40}$**, **$A\beta_{42}$**, **p-tau217**, **GFAP** (or **p-tau181**), and **NfL**. Hence, aptamers identified or selected must target these biomarkers
- **NOVA has started the selection process for new aptamer(s) for $A\beta_{40}$ and $A\beta_{42}$,** since literature-based aptamers were not successful.
- **Next target will be the GFAP**, starting with literature-based aptamers before proceeding to selection.
- AUTH and NOVA to **seek advice from the SIAB** (i.e., Charlotte Teunissen) for biomarker procurement and affinity challenges.
- AUTH will test **all three MNP configurations demonstrated during the meeting in terms of conjugation** with aptamers (focusing on Thrombin). Preliminary results are expected by M12 and will be included in the respective report (D2.1).

  By M25, the project should have an operating prototype, for the retrospective study. Hence, conjugated MNPs/aptamers must be available earlier (e.g., M18) so that they can be incorporated into the biosensing devices.
- Parameters such as the temperature of the samples (since some of them at the beginning shall be frozen) should be defined also for the retrospective study.
- AUTH will organise **dedicated WP2 meetings with NOVA and CeADAR** to address the identified challenges.

Discussion on Deliverables:

The WP2 deliverable expected in the second semester is D2.1 – Conjugated MNPs/Aptamers Design, Synthesis, and Selection, Version 1 (OTHER, SEN, M12, AUTH)

A detailed list of actions was prepared for WP2 and is included in the Action List of the project (see Section 5 of the current document). The WP2 PowerPoint presentation is included in the dedicated project's cloud storage (i.e., Microsoft Teams).

3.3 Graphene-based platform design and implementation (WP3) | UP-CATRIN

UP-CATRIN, as the leader of WP3, presented the overview of WP3 (which has just started on M7 with T3.1 and T3.2), with ICN2 following on the current status of the electrochemical biosensor (T3.3). In particular, UP-CATRIN introduced the current status on the graphene derivatives that have already been discussed and exchanged with ICN2, which are based on Thiol, and the need for delivering dual functionalization to improve performance.

ICN2 presented preliminary results, showcasing the biomarker concentration using antibodies, which can reach up to 10fM. The next steps included the use of aptamers instead of antibodies and the decrease of the concentration detection range on average (currently in 100-500nM – to reach 10nM).

Finally, CeADAR presented briefly the approach to be followed later in the project (M18) regarding the use of AI under T3.5.

The feedback during the discussion that followed includes below points:

Main decisions:

- UP-CATRIN to **develop dual functionalized derivatives** and share them with ICN2 to evaluate the performance.
- UP-CATRIN to discuss with GRAPHEAL the **use of derivatives on the GFETs**.
- INC2 to **replace antibodies with aptamers and focus on the LOD of Thrombin**. In the case of Thrombin, the target is expected to increase the current, whereas the use of aptamers is expected to reduce the LOD.

Discussion on Deliverables:
Not applicable as the first deliverable of WP3 is expected by M18.

A detailed list of actions was prepared for WP3 and is included in the Action List of the project (see Section 5 of the current document). The WP3 PowerPoint presentation is included in the dedicated project's cloud storage (i.e., Microsoft Teams).

3.4 Device Development and System Integration (WP4) | GRAPHEAL

This session included an overview of WP4 provided by GRAPHEAL. WP4 is expected to start on M10 with T4.2. GRAPHEAL gave an overview of the WP and the steps to be followed for the integration of the system to be deployed for the clinical pilot studies. Following, GRAPHEAL presented more information about the microfluidics and the chip on the device (T4.1), the mobile app and the firmware implementation (T4.2), including several mock-ups, and the potential casing of the final device (T4.3).

A discussion followed regarding the separation of blood samples directly on the device to target directly biomarkers in plasma. GRAPHEAL replied that the separation e.g. of the red cells could be possible to happen on the device, which will be investigated. Possibly some chemical preparation would be needed in terms of pH, but blood is easier to tackle compared to e.g. saliva or sweat.

Along these lines, the **decisions** that were made during this session may be summarised as follows:

Main decisions:

- GRAPHEAL to **examine the process for on-device blood separation** and elaborate a bit more on the next project meeting.
- **The mobile app of the device can be used for educational purposes** as well, for training HCPs. Additional features may be required, and will be discussed after a first version is available.
- GRAPHEAL will organise a **workshop with the HCPs that will use the device** in the clinical pilot studies (UEF, GAADRD, ZI) and other interested partners **early in 2025** to collect feedback on the device and the mobile app.

Discussion on Deliverables:
Not applicable as the first deliverable of WP4 is expected by M24.

A detailed list of actions was prepared for WP4 and is included in the Action List of the project (see Section 5 of the current document). The WP4 PowerPoint presentation is included in the dedicated project's cloud storage (i.e., Microsoft Teams).

3.5 Clinical Pilot Studies Design, Deployment, Evaluation & Validation (WP5) | UEF

UEF presented an overview of WP5, focusing on questions and issues that need to be addressed for drafting the clinical protocol for the retrospective and prospective clinical pilot studies.

Along these lines, the **decisions** that were made during this session may be summarised as follows:

Main decisions:

- Biomarkers to be targeted where confirmed once more: **Aβ40**, **Aβ42**, **p-tau217**, **GFAP** (or **p-tau181**), and **NfL**.
- A **uniform Clinical Protocol** for both the retrospective and prospective studies will be created. There will be separate **Manuals of Operations**, including guidelines to be followed across all three clinical centres. The Clinical Protocol should be "flexible" and mainly the Manuals of Operations should include specific details, to make it easier to amend (the Manuals only) if needed.
- A first draft of the Clinical Protocol should be available **by the end of May** to have sufficient time to review and submit to the ethical committees in the three clinical centres **before the summer break**. The target is to **submit to ethical committees in early July** and get **committees' approval by the end of July** so that it can be included in D5.1.
- UEF to arrange **meetings with the Clinical partners (EVNIA should also be included) in April and May** to discuss the details of the Clinical Protocol. Important aspects (e.g., do we need to block the patients in between iterations only for 2D-BioPAD) should be clarified and documented.
- D5.1 should include **a clear and specific timeline (deployment plan) for all clinical pilot studies' activities**. This information can be omitted from the Clinical Protocol but should be included in D5.1 to guide other project activities (e.g., availability of devices, consumables, transportation of samples, etc.).
- The 2D-BioPAD system/device **cannot interfere with the current routine clinical processes**. The test would be performed **after the diagnostics process** by the same HCP. For some cases, and mainly during the Feasibility stage, two HCPs may be employed to do some independent evaluation of the use of the system.
- Results from the test **will not be disclosed to patients and/or their caregivers**. They will be used only for research.
- The focus of the evaluation is the **2D-BioPAD system, which is the combination of the device and the mobile app** (as the latter is needed for getting the results from the former).

- As per the GA, **UEF will handle the benchmarking** (focusing mainly on blood samples) **with lab equipment for samples from all three clinical centres**. Hence, GAADRD and ZI are expected to ship their samples to UEF. GAADRD and ZI can also test the samples, but this is considered added value.
- The prospective pilot study will cover **4 groups of subjects, Healthy, SCI, MCI, and AD**.
- The MDR/IVDR requirements should be taken into consideration for the Clinical Protocol. We **do not aim** for regulatory approval during the project.
- **A dedicated clinical data software should be employed for storing the data from the clinical pilot studies** and producing the eCRFs. UEF with ZI will examine the use of REDcap, whereas UEF will discuss with EVNIA to use their (EVNIA's) software if possible. This must be included in D5.1 (and in the revision of the DMP as well).

Discussion on Deliverables:

The WP5 deliverable expected in the second semester is D5.1 – Clinical Pilot Studies Initiation Package and Ethics check (R, PU, M12, UEF). The draft of the protocol needs to be ready by the end of May 2024. It is suggested to have the first version of D5.1 by the end of July 2024.

A detailed list of actions was prepared for WP5 and is included in the Action List of the project (see Section 5 of the current document). The WP5 PowerPoint presentation is included in the dedicated project's cloud storage (i.e., Microsoft Teams).

3.6 Dissemination, exploitation and communication (WP6) | Q-PLAN

This session revolved around the dissemination and communication activities of the project, including the synergies with other projects and initiatives, such as the GFI.

Q-PLAN informed about available promotional material and activities. A project presentation is available on MS Teams **here** and partners are welcome to use it to exhibit the overview of the project in other activities. A leaflet, poster, and banner about 2D-BioPAD are also available through the project's website (**here**).

EVNIA also provided a quick update on T6.4. The regulatory affairs plan outline is available here. The document's content will continue to be enriched during the implementation of the project and will be finalized by the end of the project.

Along these lines, the **decisions** that were made during this session may be summarised as follows:

Main decisions:

- All partners are expected to **report their Dissemination and Communication activities**, in the dedicated spreadsheet available **here**. Any outreach events or actions can be included in the file. It is recommended to collect evidence related to 2D-BioPAD for these activities (photos, agendas, etc.).
- Clinical partners will support the **translation of the 2D-BioPAD animated video's subtitles in Finnish, German, and Greek** to allow HCPs, patients and caregivers to be better informed. Other partners are also welcome to contribute if needed.

- All partners (and their teams) should subscribe to the project's newsletter on the project's website, as well as to the project's social media (LinkedIn, Facebook, Twitter, and YouTube channel here).
- The consortium will include some additional time during its digital monthly meetings to discuss the interaction with GFI and our contribution to their monthly meetings and working groups.
- Synergies will be established with GRAPHERGIA and COMFORTage, whereas a presentation to the EADC by ZI will be arranged in the following months. More suggestions on synergies (other ongoing projects, e.g., WW-Fingers) are more than welcome here.

Discussion on Deliverables:

D6.1 – Dissemination and Communication Plan and Activities, Version 1 was submitted on M3 and the D6.4 -– Exploitation and Sustainability Plan, Version 1 was submitted on M6. There are no other deliverables expected for the next semester.

3.6.1 Guest presentation: MUNASET

Our guest Felix Hempel, Alexey Tarasov and Chandan Singh provided an overview of the MUNASET project. MUNASET's main goal is to use biomarkers (including blood biomarkers) to track therapy response against depression. So, the target is to assess the response to treatment of depression (for example with drugs), by examining the levels of biomarkers. The goal is not so much the diagnosis of depression.

The **discussion** that followed included the following decisions.

Main decisions:

- MUNASET and 2D-BioPAD will **organize a technical workshop in June** (about 2 hours).
- The two projects will co-organise **the Biomedical Parallel session during the Graphene Week** (the cost of 5000 € will be covered by 2D-BioPAD/UP-CATRIN this time and MUNASET will covered the next Graphene Week). **UP-CATRIN to make the application to the GF**.
- Aim to work on joint publications. ICN2 expressed interest towards that.
- Explore the possibility for the two projects to collaborate on the technical matters (such as graphene) and its applications. Also, in terms of exchanging research students.
- Finally, the MUNASET partners will share with the 2D-BioPAD partners some interesting publications on depression biomarkers for drug efficacy and how their metrics change during the therapeutic procedure.

A detailed list of actions was prepared for WP6 and is included in the Action List of the project (see Section 5 of the current document). The WP6 PowerPoint presentation is included in the dedicated project's cloud storage (i.e., Microsoft Teams).

3.7 Project management and coordination (WP7) | UP-CATRIN

This session of the meeting was focused on discussing the management and coordination aspects of the project and was guided by the respective presentation given by UP-CATRIN.

The **decisions** which emerged through the course of this session are:

Main decisions:

- Q-PLAN reminded partners that they need to provide their input for the 1st Semester Internal Report **by Friday 26/4/2024** to Q-PLAN and UP-CATRIN following the instructions provided by e-mail.
- Communication with SIAB will be done through GAADRD (as the T7.2 leader), while Q-PLAN and UP-CATRING should be informed. It is important not to overburden them with emails from different partners. **All emails targeting SIAB should first be sent to GAADRD. It is important to engage them in selective and meaningful activities, to avoid burdening them with many emails and keep communication efficient, as the SIAB members are participating pro bono.**
- SIAB members will not attend physically consortium meetings, unless there are special circumstances**. In major events (e.g., GFW or Final conference), they can be invited to join in person.** The rest can be virtual attendance (for example in some sections of the project meetings).
- GAADRD will invite **George Theodoridis** and **either Roche or Fujirebio to join the SIAB**. The target is to onboard them by the end of May.
- The main platform to use as an open repository for datasets and publications (also EC approved) is Zenodo. However, partners are also free to upload their data on other platforms as well, as long as they are OpenAIRE. Q-PLAN has created a **2D-BioPAD Zenodo Community.**
- Regarding publications to journals, it is important to **check beforehand, what kind of versions are (not) allowed to be accessible in other online depositories. Not all journals allow for pre-finalised versions to be available in other repositories.**
- Partners discussed the possibility that the next project meeting (in October 2024) could happed in parallel with Graphene Week. The timing is tight so we could only discuss WP1 and WP5 during Wednesday morning and Friday afternoon and have a separate online meeting for other project activities. ICN2 also proposed to have the next project meeting in Tirana, under a global conference organized from the 28th of October to the 1st of November 2024. UP-CATRIN with Q-PLAN will send additional information in the following weeks.

Discussion on Deliverables:

D7.1 - Management and Quality Plan was submitted on M3 and D7.2 - Data Management Plan, Version 1 was submitted on M4.

A detailed list of actions was prepared for WP7 and is included in the Action List of the project (see Section 5 of the current document). The WP7 PowerPoint presentation is included in the dedicated project's cloud storage (i.e., Microsoft Teams).

4. Action List

WP.Task. #	Action point	Partner	Deadline	Comments
1.1.1	Collect additional responses in the online survey (Exploit networks like EADC or WW-FINGERS – Need to collect answers from Finland)	All partners	30/4/2024	-
1.1.2	Promo articles	Q-PLAN	30/6/2024	Related to T7.1
1.1.3	Link requirements of D1.1 to technical activities	All partners	30/6/2024	Should be included in D1.2
1.1.4	Publish D1.1 results	EVNIA/Q-PLAN	15/05/2024	Other venues / deadline may be explored as well.
1.1.5	D1.1 Corrections after review	Q-PLAN	30/4/2024	-
1.1.6	D1.1 submission	Q-PLAN	30/4/2024	-
1.3.1	Prepare first draft of D1.2	ICN2	31/5/2024	-
1.3.2	Complete the initial ethical self-assessment	ICN2	27/6/2024	-
1.3.3	Final version of D1.2 available for submission	ICN2	27/6/2024	-
2.1.1	Complete the initial ethical self-assessment	NOVA	27/6/2024	-
2.1.2	Contact SIAB to get insight on the procurement form of biomarkers	NOVA / AUTH	30/4/2024	Reach out to Charlotte Teunissen through GAADRD
2.1.3	Set up dedicated monthly meetings for WP2 after the general project meetings	NOVA / AUTH	30/4/2024	-
2.1.4	Evaluate new aptamers for $A\beta_{40}$ and $A\beta_{42}$	NOVA	ongoing	-
2.1.5	Investigate aptamers for GFAP biomarker evaluation	NOVA	30/9/2024	-
2.1.6	First draft version of D2.1	AUTH	tbd	-
2.1.7	Final version of D2.1 for submission	AUTH	30/09/2024	-
2.3.1	Complete the initial ethical self-assessment	AUTH	27/6/2024	-

WP.Task. #	Action point	Partner	Deadline	Comments
2.3.2	Test the three MNP configurations in terms of conjugation with aptamers (focusing on Thrombin)	AUTH	30/9/2024	-
3.1.1	Complete the initial ethical self-assessment	UP-CATRIN	27/6/2024	-
3.2.1	Complete the initial ethical self-assessment	UP-CATRIN	27/6/2024	-
3.3.1	Replace antibodies with aptamers and focus on the LOD of Thrombin	ICN2	30/9/2024	-
4.2.1	Firmware initial development for the 2D-BioPAD system	GRAPHEAL	30/9/2024	-
5.1.1	Complete the initial ethical self-assessment	UEF	27/6/2024	-
5.1.2	First Draft of protocols for the clinical studies	UEF / GAADRD / ZI	31/5/2024	-
5.1.3	Clinical studies to be submitted to ethical committees for approval in the three clinical centers	UEF / GAADRD / ZI	1/7/2024	-
5.1.4	Approvals from ethical committes collected	UEF / GAADRD / ZI	31/08/2024	-
5.1.5	First version of D5.1 (including detailed pilot study timeline)	UEF	31/08/2024	-
5.1.6	Final Version of D5.1 available for submission	UEF	30/09/2024	-
6.1.1	Complete the initial ethical self-assessment	Q-PLAN	27/6/2024	-
6.1.2	Press Release about the 2nd consortium meeting	Q-PLAN	22/4/2024	-
6.1.3	2nd Newsletter	Q-PLAN	30/9/2024	-
6.1.4	Social media campaigns	Q-PLAN /Support by all	ongoing	-
6.1.5	Website content update with educational material	Q-PLAN / Support by all	ongoing	-
6.2.1	Complete the initial ethical self-assessment	Q-PLAN	27/6/2024	-
6.2.2	T6.2 workshop	Q-PLAN/ ALL	30/09/2024	-

WP.Task. #	Action point	Partner	Deadline	Comments
6.3.1	Initiate market analysis in the context to T6.3	Q-PLAN	October 2024	-
6.5.1	Complete the initial ethical self-assessment	Q-PLAN	27/6/2024	-
6.5.2	Engaging with key projects and initiatives through social media	Q-PLAN	ongoing	-
6.5.3	Establish synergies with GRAPHERGIA COMFORTage	Q-PLAN	30/06/2024	-
6.5.4	Present project to EADC meeting	ZI	tba	-
6.5.5	Organise technical joined workshop with MUNASET	Q-PLAN	30/06/2024	-
6.5.6	Organise the Biomed parallel session during GW24	UP-CATRIN/Q-PLAN	30/6/2024	-
7.1.1	Partners update KPIs list	All	26/4/2024	-
7.1.2	NDA with GrapheneCSA / SC Decision	ALL	30/4/2024	-
7.2.1	Reach out, enrich the board and finalise SIAB (4 additional members)	GAADRD	31/5/2024	-
7.2.2	Ad-hoc engagement based on project needs (e.g., Graphene Week)	GAADRD	Summer 2024	-
7.3.3	Align with the Clinical Pilot Study Protocol	Q-PLAN / UEF	July 2024	-
7.4.1	Partners provide input on 1st Semester internal progress report	ALL	26/4/2024	-
7.4.2	Q-PLAN shares the 2nd project meeting minutes with partners	UP-CATRIN / Q-PLAN	25/4/2024	-
7.4.3	Partners provide feedback to the meeting minutes	ALL	30/4/2024	-
7.4.4	Final Project Meeting minutes shared with partners	UP-CATRIN / Q-PLAN	2/5/2024	-
7.4.5	Elaboration of the "1st Semester Internal report"	UP-CATRIN, Q-PLAN	10/5/2024	-
7.4.8	Hold digital monthly meetings (agenda, moderation, minutes, etc.)	UP & Q-PLAN/ ALL	1/6/2024	-
7.4.9	Planning for 3rd Semester meeting in Prague in October 2024	UP-CATRIN / Q-PLAN	Sep 2024	-

5. Annexes

5.1 Annex I – List of Participants

List of Participants – DAY 1 (17/04/2024)

No	Organisation	Country	Participant	Attendance (Signature)
1	UNIVERZITA PALACKEHO V OLOMOUCI (UP)	Czechia	Aristeidis Bakandritsos	
			Michal Otyepka	
			Lucie Hrabalikova	
			Jana Marková	
			Petr Jakubec	
			David Panáček	
			Ivan Dědek	
			Martin-Alex Nalepa	
2	Q-PLAN INTERNATIONAL ADVISORS PC (Q-PLAN)	Greece	Alexandra Gkouma	
			Aristotelis Folas	
			Elli Roma-Athanasiadou	
			Apostolos Tsolakis	
3	FUNDACIO INSTITUT CATALA DE NANOCIENCIA I NANOTECNOLOGIA (ICN2)	Spain	Arben Merkoçi	
			Ruslan Alvarez	
			Marianna Rossetti	
			Gabriel Maroli	
			Andy Bruno	
			Daniel Quesada	
4	GRAPHEAL	France	Vincent Bouchiat	
5	ARISTOTELIO PANEPISTIMIO THESSALONIKIS (AUTH)	Greece	Makis Angelakeris	
6	NOVAPTECH (NOVA)	France	Jean-Jacques Toulmé	
			Sandeep Kumar	

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No	Organisation	Country	Participant	Attendance (Signature)
7	ITA-SUOMEN YLIOPISTO (UEF)	Finland	Alina Solomon	
			Mervi Issakainen	
			Anna Mäki-Petäjä-Leinonen	
8	ELLINIKI ETAIRIA NOSOY ALZHEIMER KAI SYGGENON DIATARACHON SOMATEIO (GAADRD)	Greece	Magda Tsolaki	
			Foteini Pikouli	
9	EVNIA APS (EVNIA)	Denmark	Gitte Holst	
			Angeliki Koukoura	
			Kyriaki Antonopoulou	
			Eirini Papadaki	
10	ZENTRALINSTITUT FUER SEELISCHE GESUNDHEIT (ZI)	Germany	Lutz Froelich	
			Lucrezia Hausner	
11	UNIVERSITY COLLEGE DUBLIN, NATIONAL UNIVERSITY OF IRELAND, DUBLIN (CeADAR)	Ireland	Polat Goktas	

The following participants joined the meeting **online** on **Day 1**:

- Aristeidis Bakandritsos (UP-CATRIN)
- Aristotelis Folas (Q-PLAN)
- Elli Roma-Athanasiadou (Q-PLAN)
- Anastasia Pantazaki (AUTH)
- Sophia Lavrentiadou (AUTH)
- George Litsardakis (AUTH)
- Jean-Jacques Toulmé (NOVA)

List of Participants – DAY 2 (18/04/2024)

No	Organisation	Country	Participant	Attendance (Signature)
1	UNIVERZITA PALACKEHO V OLOMOUCI (UP)	Czechia	Aristeidis Bakandritsos	Remote
			Michal Otyepka	
			Lucie Hrabalikova	
			Jana Marková	
			Petr Jakubec	
			David Panáček	
			Ivan Dědek	
			Martin-Alex Nalepa	
2	Q-PLAN INTERNATIONAL ADVISORS PC (Q-PLAN)	Greece	Alexandra Gkouma	
			Aristotelis Folas	
			Elli Roma-Athanasiadou	
			Apostolos Tsolakis	
3	FUNDACIO INSTITUT CATALA DE NANOCIENCIA I NANOTECNOLOGIA (ICN2)	Spain	Arben Merkoçi	
			Ruslan Alvarez	
			Marianna Rossetti	
			Gabriel Maroli	
			Andy Bruno	
			Daniel Quesada	
4	GRAPHEAL	France	Vincent Bouchiat	
5	ARISTOTELIO PANEPISTIMIO THESSALONIKIS (AUTH)	Greece	Makis Angelakeris	
6	NOVAPTECH (NOVA)	France	Jean-Jacques Toulmé	
			Sandeep Kumar	

No	Organisation	Country	Participant	Attendance (Signature)
7	ITA-SUOMEN YLIOPISTO (UEF)	Finland	Alina Solomon	
			Mervi Issakainen	
			Anna Mäki-Petäjä-Leinonen	
8	ELLINIKI ETAIRIA NOSOY ALZHEIMER KAI SYGGENON DIATARACHON SOMATEIO (GAADRD)	Greece	Magda Tsolaki	
			Foteini Pikouli	
9	EVNIA APS (EVNIA)	Denmark	Gitte Holst	
			Angeliki Koukoura	
			Kyriaki Antonopoulou	
			Eirini Papadaki	
10	ZENTRALINSTITUT FUER SEELISCHE GESUNDHEIT (ZI)	Germany	Lutz Froelich	
			Lucrezia Hausner	
11	UNIVERSITY COLLEGE DUBLIN, NATIONAL UNIVERSITY OF IRELAND, DUBLIN (CeADAR)	Ireland	Polat Goktas	

The following participants joined the meeting **online** on **Day 2**:

- Aristeidis Bakandritsos (UP-CATRIN)
- Aristotelis Folas (Q-PLAN)
- Elli Roma-Athanasiadou (Q-PLAN)
- Anastasia Pantazaki (AUTH)

5.2 Annex II – Agenda of the meeting

Day 1 –Wednesday 17th of April 2024

Time	Topic	Responsible Partner(s)
09:30 – 09:50	**Welcome and Project Overview**	**ICN2 /UP**
09:50 – 10:30	**WP1 - Requirements & System Architecture** *(overview of WP1 activities & outcomes and planning of next actions)* ➲ Insights derived from desk research and interviews ➲ Initial outcomes of the survey ➲ Action plan for the 2nd semester (activities, important deadlines, responsible partners, etc.)	**ICN2** (Q-PLAN, EVNIA)
10: 30 – 10:45	**Introduction of the SIAB members**	**SIAB members**
10:45 – 11:45	**T1.2 Workshop: *"Ethical Consideration Roadmap – Application of Ethics in the 2D-BioPAD Project"* + SIAB members** *(Presentation of Ethical Consideration Roadmap, Discussion on application of ethics and responsibilities)*	**EVNIA**
11:45 – 12:00	*Short coffee break*	
12:00 – 13:00	**T1.3 Co-creative exercise: *"Toward next generation lateral flow assays: Background and recent advances."* + SIAB members**	**ICN2**
13:00 – 14:00	*Light lunch and Coffee*	
14:00 –15:00	**WP2 - Biomarkers binding and quantitative analysis** *(update on WP2 approach, discussion and planning of next actions)* ➲ Initial results of aptamer identification and synthesis of magnetic nanoparticles ➲ Action plan for the 2nd semester (activities, important deadlines, responsible partners, etc.)	**AUTH** (NOVA)
15:00 – 15:45	**WP3 - Graphene-based platform design and implementation** *(update on WP3 approach, discussion and planning of next actions)* ➲ Preparatory actions during the 2nd semester	**UP** (ICN2, GRAPHEAL, CeADAR)
15:45 – 16:30	**WP4 - Device Development and System Integration** *(update on WP4 approach, discussion and planning of next actions)* ➲ Preparatory actions during the 2nd semester	GRAPHEAL (Q-PLAN, WR)
16:30 – 17:00	**Wrap up and conclusions of the 1st day**	
17:00 – 17:15	**Consortium meeting photo**	
17:15	**End of Day 1**	

20:00	**Consortium Dinner at El Nou Ramonet, Carrer Carbonell 5, Barcelona**

Day 2 – Thursday 18th of April 2024

Time	Topic	Responsible Partner(s)
09:15 – 10:00	**Welcome and short visit to ICN2 facilities and labs**	**ICN2**
10:00 – 11:15	**WP5 - Clinical Pilot Studies Design, Deployment, Evaluation & Validation** *(update on WP5 approach, discussion and planning of next actions)* ➲ Initial insights derived from the design on the pilot studies ➲ Action plan for the 2nd semester (activities, important deadlines, responsible partners, etc.)	**UEF** (GAADRD, ZI)
11:15 – 11:30	*Short coffee break*	
11: 30 – 12:15	**WP6 - Dissemination, exploitation and communication** *(update on WP6 activities, discussion and planning of next actions)* ➲ **Workshop on exploitation and round discussion (30min)** ➲ Updates on Dissemination and communication activities; Business modelling and planning; Regulatory Acceptability Activities, Plan, and Policy Recommendations; Networking & joint activities with relevant initiatives ➲ Action plan for the 2nd semester (activities, important deadlines, responsible partners, etc.)	**Q-PLAN** (EVNIA)
12:15 – 12:40	**Guest presentation: MUNASET**	
12:40 – 13:40	*Light lunch and Coffee*	
13: 40 – 14:15	**WP7 - Project management and coordination** *(update on WP7 approach, discussion and planning of next actions)* ➲ Project overview ➲ Management and Quality Plan ➲ Advisory Board ➲ Data Management Plan ➲ Internal semester reporting ➲ Overview of action plan for the next 6 months (M7 – M12) ➲ Planning for the next project meeting	**UP** (Q-PLAN, GAADRD)
14:15 – 14:30	**Wrap up and end of the 2nd project meeting**	**ALL**
14:30	**End of Day 2**	

2D BioPAD

Supple Graphene Bio-Platform for point-of-care early detection and monitoring of Alzheimer's Disease

GA 101120706

Partners

CATRIN Czech Advanced Technology and Research Institute

Q-PLAN INTERNATIONAL

ICN2 Institut Català de Nanociència i Nanotecnologia

Grapheal

NOVAPTECH Think Aptamer

UNIVERSITY OF EASTERN FINLAND

Alzheimer Hellas

Evnia To Strive • To Seek • To Find

Zentralinstitut für Seelische Gesundheit

CeADAR Ireland's Centre for Applied AI

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