

HEI-Lab: Digital Human-Environment and Interactions Lab

ACTIVITY REPORT

2019 - 2020

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HEI-Lab at a glance

HEI-Lab conception is rooted on the human-context interaction paradigm that looks into human behavior and its contexts interchangeably. Our mission is to converge Psychology and Design knowledge into a transdisciplinary scientific platform aimed at studying human behavior within this interactive view. Digital technology, shaped after Psychology principals and created by Design and Engineer processes, will be the HEI-LAB signature, offering new psychological research and intervention opportunities. Such opportunities are still to exist in a consolidate fashion in the Portuguese context.

Our aim is thus to conduct research on applied Psychology and Design processes through digital systems. These systems (smart environments comprising virtual, augmented and mixed reality apps) will mimic physical and mental environments optimizing the human-context relationship and providing a deeper insight on this interrelation. Such approach will move from the classical stimulus-organism-response model, to the innovative stimulus-technology-organism-technology-response model, from which higher scientific and intervention standards can be achieved. The intersection between design, technology, and psychology will then be used to test models of human behavior (focusing on psychological processes underlying various forms of ab/normal behavior and well-being across the lifespan) and create new 3Ts (technological therapeutic/intervention tools) to be applied to the contexts of clinical/health, social/organizational, and justice/forensic psychology.

HEI-LAB will further focus on the transition between analog and digital environments in order to develop new products and services aimed at improving individuals' health and well-being. Product and services development (e.g., VR apps and AI systems for psychological intervention programs) will boost the translation of 3Ts outside academy. HEI-LAB will be also devoted to the advance of education and training of young scientists and practitioners within this digital-real world methodology, as well as to the scientific dissemination of knowledge resulting from this transdisciplinary vision. Indeed, this transdisciplinary working frame is expected to improve our scientific outputs' competitiveness and ensure efficient knowledge transfer.

HEI-LAB organizing structure comprises five levels: direction board (encompassing HEI-LAB director, strategic board, technical board, and academy liaison board), ethical board, integrate research members, collaborate research members, and external consultancy board. Our research team and direction board embrace researchers with distinct backgrounds: psychology (including clinical, cyberpsychology, forensic, organizational, or experimental psychology), designers and video-game designers, motion-capture engineers, or street intervention artists. While this medley reflects well HEI-LAB transdisciplinary view, it is worth noting that our current proposal builds on previous consolidated work. HEI-LAB integrates a core group of researchers who have worked within this frame from the last 15 years. This group has a proven track record of developing and integrating information and communication technology tools, namely virtual reality and serious games, into cognitive-behavioral therapies and programs for neuropsychological assessment and rehabilitation. These programs have been tested for efficacy and are currently being used in a set of national and international mental health institutions. Similarly, our design and video-game design researchers have developed human-centric models and solutions for both real-world and virtual settings, including solutions for education, leadership, environmental behaviors, and health interventions.

In all, HEI-LAB results from the will of setting a new agenda that will bring the cognitive-behavioural paradigm into the digital age, reaching a wider range of populations and needs, with solutions that fit today's societal challenges. We call it e-CB ([Annex VIII](#)).

HEI-Lab ruling bodies

HEI-Lab is run by four bodies: The Scientific Council (SC), the Direction (D), an Ethical Commission (EC), and an External Advisory Board (EAB). HEI-Lab is not divided into research groups. Instead, transdisciplinary work is organized into three R&D lines - in each of which any researcher can participate and is carried out in four laboratory spaces provided by ULHT: LabPsiCom, LabPsiExp, MovLab, and Delli.

The SC consists of all integrated members with a PhD, including the members of the D., and is responsible for advising the D on scientific and strategic matters, with a special focus on emerging trends and opportunities. It meets regularly four times a year.

The D is the strategic and executive branch of HEI-Lab. It is appointed by the administration of ULHT from among the senior researchers and follows a principle of balance between the fields of Psychology and Design. It is responsible for setting the strategic agenda of HEI-Lab and for translating it into R&D processes, products and services (PPS). D comprises three levels: Research and Development (R&D), Academic Liaison (AL) and University Extension (UE). Four researchers manage R&D: Américo Mateus and Joana Carvalho are responsible for implementing the strategic agenda; Jorge Oliveira and Filipe Luz lead the operational procedures concerning laboratory activities and digital developments. Inês Jongenelen manages AL, namely the connection with the postgrad courses. Pedro Gamito is the Director and Principal Investigator, with the responsibility for overseeing day-to-day HEI-Lab activities. Pedro is also responsible, together with Américo Mateus, for UE (interaction with HEI-Lab partners' institutions), and for translating the PPS developed and researched at HEI-Lab to the community.

An Ethical Commission (EC) consisting of one president and two researchers appointed by the SC will supervise the ethics aspects of HEI-Lab activities, including ethics of research with human participants and ethics of impacts on society and public health. It follows standard guidelines in the diverse fields in which HEI-Lab works, and will partly draw on guidelines and advice from the EAB, to establish and maintain a standard of ethical rules in research and intervention at HEI-Lab.

EAB consists of a group of high-profile international scholars. Three, Albert Rizzo, Stéphane Bouchard, and Thomas Parsons, are clinical psychologists and psychotherapists with a long career investigating and implementing digital solutions for mental health conditions. Joaquim Soares is Professor Emeritus from Mid Sweden University. His scientific tracking record reveals mastery in different methods of data collection and analysis in the fields of public health, women's health, violence towards old people, epidemiology and coronary artery disease. Soumitri Varadarajan is associate professor of Industrial Design at the School of Architecture and Design, RMIT University Melbourne. He is a leading researcher in design theory, design systems and design for health and wellbeing, and Senior lecturer (hon) of Olivia Newton-John Cancer and Wellness Centre, Austin Health. Paul Chamberlain is a senior expert reviewer and leading researcher on art and on design theory and practice focused on social care, health and wellbeing, and director of Lab4Living (Sheffield Hallam University). Telmo Baptista is the president of the European Federation of Psychologists' Association and the former president of the OPP (Portuguese Psychologists' Association).

HEI-Lab researchers

List of the Integrated Researchers of the R&D Unit who hold a PhD degree (with ORCID number)

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List of the Integrated Researchers of the R&D Unit who do not hold a PhD degree (+ORCID number)

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List of the Collaborator Researchers of the R&D Unit (+ORCID number)

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HEI-Lab 'housekeeping'

During this period, the following actions took place:

Monthly direction meetings

We held 10 Board of Directors meetings, with the following agenda:

Board Meeting #11: 10/09/2019 – 10.30h

Agenda

1. Discussion of changes to the regulation;
2. Scheduling and discussion of the general meeting of researchers;
3. Other matters

Board Meeting #12: 22/10/2019

Agenda

1. Discussion of the R&D strategy;
2. Other matters.

Board Meeting #13: 12/11/2019 – 15.30h

Agenda

1. Analysis of the indicators of the HEI-Lab researchers;
2. ILIND exploratory projects;
3. Other matters.

Board Meeting #14: 10/12/2019 – 15.30h

Agenda

1. Reformulation of HEI-Lab's R&D lines.
2. Other matters.

Board Meeting #15: 14/01/2020 – 15.30h

Agenda

1. Appreciation and discussion of the FCT Program Contract.
2. Other matters.

Board Meeting #16: 18/02/2020

Agenda

1. Budget appraisal;
2. Studies in progress;
3. Scheduling the Scientific Council;
3. Other matters.

Board Meeting #17: 24/03/2020

Agenda

1. Ongoing activities - state of play;
2. Other matters.

Board Meeting #18: 21/04/2020 – 14.00h

Agenda

1. Appraisal of the Advisory Board's evaluation reports;
2. Other matters.

Board Meeting #19: 19/05/2020 – 14.30h

Agenda

1. Preparation of the Scientific Council;
2. 2nd cycle dissertations for 2020 - 2021;
3. Other matters.

Board Meeting #20: 02/06/2020 – 14.30h

Agenda

1. 2nd cycle dissertations for 2020 - 2021;
2. Other matters.

Scientific Council

During 2019 and 2020, HEI-Lab held two Scientific Councils:

15/10/2019 – 13.00h

Agenda:

1. Discussion and voting on the unit's regulations;
2. Functional organization of the unit;
3. Other matters.

26/05/2020 – 14.30h

Agenda:

1. Consideration and discussion of the Advisory Board report;
2. Researchers' Evaluation Indicators for the 2020 - 2021 cycle;
3. Overview of submitted R&D proposals and ongoing projects;
4. Other matters.

Weekly developers' meetings

Every Tuesday is held a meeting with 8 HEI-Lab developers. All ongoing projects and new proposals are discussed with the developers. Profs. Ágata Salvador, Jorge Oliveira, Micaela Fonseca and Pedro Gamito lead the sessions.

HEI-Lab redesign

In order to address FCT evaluation, the research strategy was realigned, and sent for evaluation to our Advisory Board ([Annex I](#)). Based on FCT remarks, which fell into four core clusters: Integration, Conceptual contribution, Internationalization and Full-time researchers and PhD candidates, the direction recommended a new formulation that was validated by HEI-Lab Scientific Council in 26/05/2020 ([Annex II](#)) and by the Advisory Board ([Annex I](#)).

HEI-Lab R&D activities

An extensive relation of indicators for HEI-Lab 2019-2020 + COVID-19 confinement periods can be found [here](#). Compiled data can be found in 'compiled data' sheet and raw data in 'indicators07_19-06_20-raw data' sheet.

Papers and book chapters

From a grand total of 87 publications, 52 papers were published in scientific journals, 32 of them in Q1 and Q2 outlets (a ratio of 3:1). Each researcher published an average of 2,90 papers and/or book chapter during this period (Figure 1).

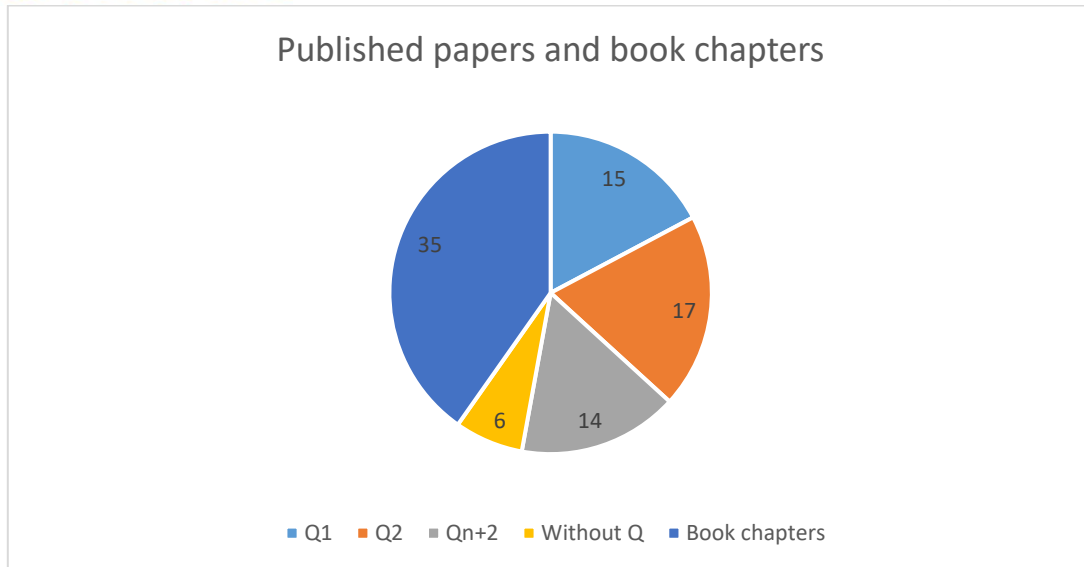


Figure 1: publishing indicators

R&D projects

HEI-Lab is enrolled in 14 funded projects, 7 FCT and 7 from other financing envelopes (Figure 2) securing > **€1.6M**.

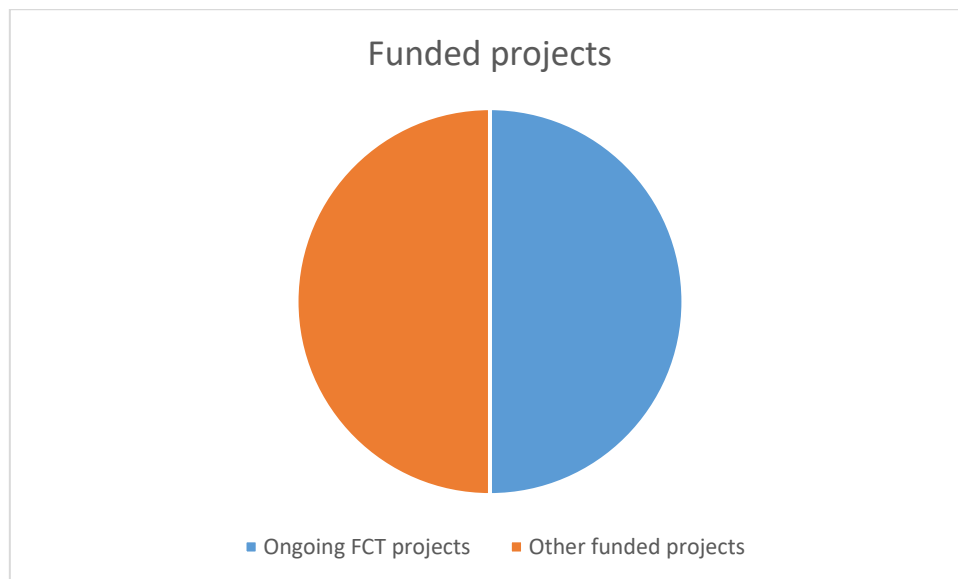


Figure 2. Ongoing funded projects.

Ongoing funded FCT projects

Under several FCT research exercises, the following HEI-Lab researchers' projects were funded:

“FEMOFFENCE - The myth of innocence: A mixed methods approach toward the understanding of female sexual offending behavior was funded by the Portuguese Science Foundation with € **127.993,70€**. PI: Joana Carvalho.

“AUTOMOTIVE: AUTOMATIC multiMODal drowsiness detection for smart VEHICLES” was funded by the Portuguese Science Foundation. The consortium is led by INESC TEC, with the participation of HEI-Lab, ISEL and CARDIOID, having been funded with **238.786,63€**.

Researcher: Pedro Gamito

MarES - Alterações nos usos e valores dos serviços de ecossistemas marinhos na região do Ártico Norueguês, financiado pela FCT, Ref: MarNoruega/0002/2016. **150.000€**. Researchers: Pedro Gamito and Jorge Oliveira.

FCT -Do you recognise me? The impact of chronotype and time-of-day on face recognition(Ref: 31082, 2018). **224.571.07€**. Researcher: Pedro Joel Rosa.

R&D project "GBL4deaf: Videojogos Educativos Acessíveis a Surdos" - FCT 2017 para Projetos de SR&TD, com a referência: LISBOA-01-0145-FEDER-032022. **234.992,35€**. Researcher: Filipe Luz

The myth of innocence: A mixed methods approach toward the understanding of female sexual offending behaviour. **127.993,70€**. Researcher: Nélio Brazão.

DYSheart - Emotion (dys)regulation in adolescence: Heart rate variability as a psychophysiological marker of emotion regulation patterns in normative, internalizing, and externalizing youth samples. **244.477,16€**. Researcher: Nélio Brazão.

Other funded projects

P2020 - POISE: Santa Casa da Misericórdia de Santarém e ULHT - D'AR-TE: prevenção de situações de (re)incidência da agressão em jovens. **30.000€**. PI Jorge Oliveira.

CODI (Comité para el Desarrollo de la Investigación, Colombia) - Respuesta Pupilar Como Marcador Psicofisiológico Asociado Al Sistema. **30.000€** PI Pedro Joel Rosa.

Id Games- Co-Create Assistive Games For People With Intellectual Disability To Enhance Their Inclusion (2019-1-EL01-KA204-062517, Erasmus+) - Supported with **226.000€**. Researcher: Filipe Luz.

Fundação Calouste Gulbenkian: Promoção de competências digitais em jovens a cumprir medidas tutelares educativas de internamento. **66.106€** Researcher: Nélio Brazão.

EPIS: Gestão do comportamento agressivo em escolas: Efeitos diferenciais da intervenção com alunos e com professores. **60.006€**. Researcher: Nélio Brazão.

CIMLT - Design For Education Innovation. **125.000€** PI: Américo Mateus

ALGALVE - Criatividade - Problems Solvers (6 Municipios - 15 escolas). **30.000€**. PI: Américo Mateus

ILIND funded projects

Under two ILIND funded projects, we have developed and/or adapted 12 apps since January 2020. Trials are expected to start in September/October 2020. See [Annex III](#) for ongoing ILIND funded projects.

Proposals submission

44 proposals were submitted to different funding schemes. All these submissions took place under COVID-19 confinement period (Figure 3).

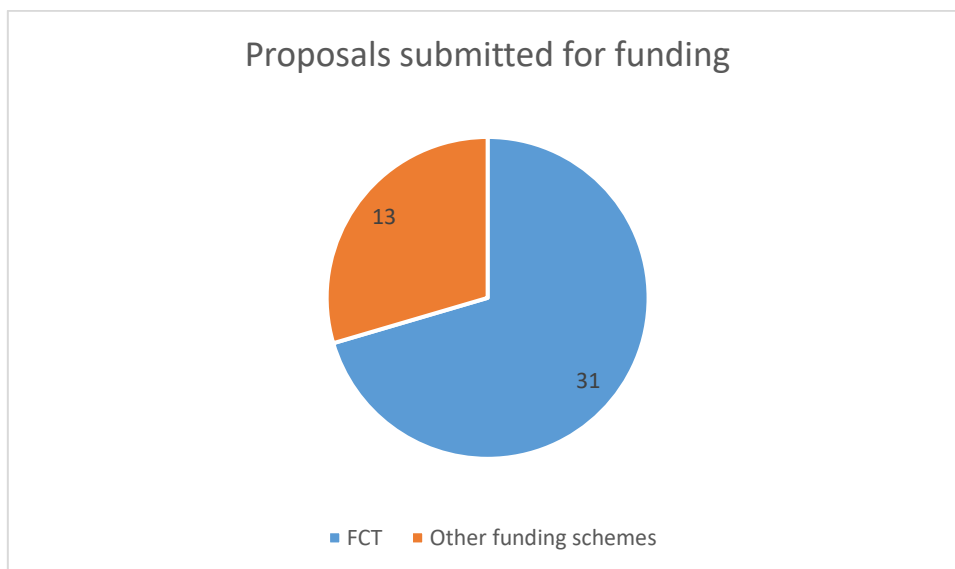


Figure 3. Proposals submission.

- FCT

We have submitted 31 proposals to FCT through several calls (including COVID-19's calls). See [Annex IV](#) with a short list (or check it [here](#) for full list).

- Other funding exercises

We have submitted 12 proposals to other funding schemes. See [Annex V](#) with the full list (or click [here](#)).

Other indicators

Invitation for communications, seminars, classes, in European and international context

HEI-lab researchers were invited to serve as speakers in several international fora (check it [here](#)).

Participation in panels and European and international councils (eg, panels of scientific and professional societies, individual project and R&D panels, editorial boards, etc.)

We serve as editors (associated and gest editors) in 15 journals (check it [here](#)).

International and national conferences organization, PC membership, etc.

HEI-Lab was enrolled in the organization of 4 conferences, with the role of Chair in one of them (<http://icdvrat2020.ulusofona.pt/>) (check it [here](#)).

Activity under COVID-19 confinement

During confinement, HEI-Lab was engaged in the following activities, that can be further inspected [here](#) ('indicators07_19-06_20-raw data', columns in blue). Some of them overlap with the ones listed above.

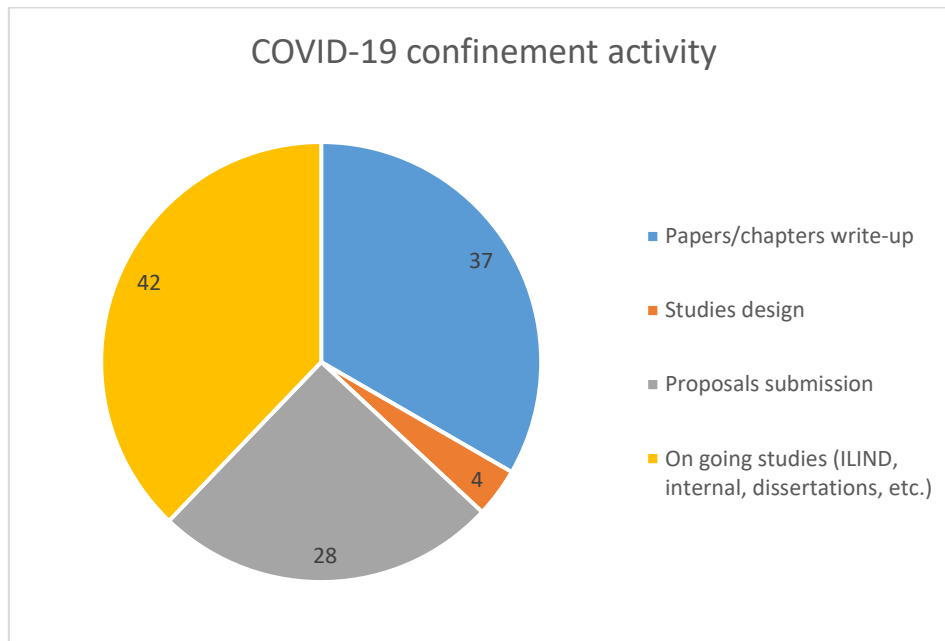


Figure 4. COVID-19 confinement activity

Papers/chapters write-up

37 papers and book chapters are being prepared for publication.

Studies design

4 R&D projects were initiated

Proposal submission

We have submitted 28 proposals, some of them to COVID-19 calls.

Ongoing studies (ILIND, internal, dissertations, etc.)

We have started and continued 42 studies

HEI-Lab academic activities

- Integration of academic activities

Enduring with the strategy initiated in 2018-2019 that adopted a cross-disciplinary pedagogical approach, in 2019-2020, students from Psychology, Design and Videogame degrees had common practical work assignments on the following courses: SPA - Sensation, Perception & Attention, Cyberpsychology (Psychology), Design Management 3^oyear (Design) and Entertainment Systems (Videogame).

HEI-Lab extension

During this period the following projects with our partners' institutions have continued:

- Santa Casa da Misericórdia da Amadora. RCT with Alzheimer's samples for cognitive stimulation
- Polícia de Segurança Pública. Stress Inoculation study with VR anxiogenic cues.
- Casa do Telhal. Controlled study of cognitive stimulation on Opioid Use Abusers.
- Centro Hospital Psiquiátrico de Lisboa. Exposure therapy to anxiety disorder patients with the use of VR cues.
- Centro Hospital Psiquiátrico de Lisboa. Cognitive Stimulation of Bipolar Disorder patients
- Steelcase Education
- Promothean Education
- Impersol
- Agrupamento escolas de: Alcanena, Aveiro, Montijo e Alvalade

HEI-Lab 'pet-projects'

In 2020, HEI-Lab started several projects that have other aim than research. They include apps to train junior psychologists (OPP), recreation of iconic psychology experiments (HEI-Lab studio), and the development of a new inventory to evaluate the impact of technology on the way people behave, think and get emotional (eCB).

OPP: Portuguese Psychological Association

We are developing for OPP an application to train ethical skills through an avatar, that will be available to teach junior psychologists in Portugal through OPP's web site. ([Annex VI](#)).

HEI-Lab studio

Hei-Lab Studio is a transdisciplinary platform that provides multiple digital content (e.g., tasks, games), combining the input of Psychology, Design, and Videogames. Hei-Lab Studio was created to offer reliable and innovative resources for research purposes, but also for anyone who wants to learn more about psychology, design, or videogames-related topics ([Annex VII](#))

eCB

This project aims to examine the influence of digital context (i.e., Internet, social networks, video games, mobile applications, etc.) on individuals' cognitive, behavioral, and affective functioning. Specifically, this project's central goal is to develop and test a new scale to promote new research paths and the advance of the current knowledge on this specific field ([Annex VIII](#)).

HEI-Lab Youtube channel

HEI-Lab is now on YouTube! All our demos can be checked here: <http://bit.ly/heilabchannel>

HEI-Lab analytics center

Up to now we have spent 1932,87€ ([Annex IX](#)).