



# newsletter

The Newsletter of the **P**atient **E**mpowerment through **P**redictive  
**P**ersonalised  
Decision Support (PEPPER) Project

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*[pepper.eu.com](http://pepper.eu.com)*

OXFORD  
BROOKES  
UNIVERSITY

Imperial College  
London

Universitat  
de Girona

IdIB  
Gi Institut  
d'Investigació  
Biomèdica  
de Girona  
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cellnovo

RomSoft



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## Editorial

**Dr. Clare Martin**

Project Coordinator



Welcome to the fifth issue of the PEPPER Project newsletter. We are now in the final stage of the project, which is the clinical validation of the PEPPER system. So you will find news about how the study is progressing with over 50 patients recruited between the two centres: Imperial College Healthcare NHS Trust, London, UK and Institut d'Investigació Biomèdica de Girona Dr. Josep Trueta, Spain. You can also read about how one of the participants on the study, Goretti Mallorqui, has taken part in her first ever half marathon. Goretti is using the Cellnovo pump version of the PEPPER system. Finally, please do take a look at our new video, released in December 2018, which showcases some detail about the science underpinning the project:

<https://www.tinyurl.com/pepper2018>

If you would like to offer us any feedback please contact [contact\\_pepper@googlegroups.com](mailto:contact_pepper@googlegroups.com)

# I. Venturefest

On 12 September 2018, Bedour Alshaigy and Clare Martin exhibited PEPPER at [Venturefest](#) Oxford. This is an annual event that brings together innovators, investors and entrepreneurs to make connections that lead to new investments, new businesses and new ideas in the high-tech sector.

This year, the event was hosted by Oxford Brookes University and attracted over 750 visitors. There were four themes, focusing on technology sectors in Oxford that have the transformative potential for the local, UK and world economies: autonomous vehicles, digital health, quantum computing and space.



## II. ICT2018

ICT 2018 took place in Vienna on 4-6 December 2018. This research and innovation event attracted 4800 visitors and focused on the European Union's priorities in the digital transformation of society and industry. The PEPPER project was on display as part of the ICT 2018 **Exhibition** programme, through which EU-funded research and innovation

successes are presented to the public. This gave the PEPPER team a wonderful opportunity to explain the project goals and achievements to a very varied audience. The event also gave the team a chance to meet and engage with the academic and research community, decision-makers and business representatives.



### III. Half Marathon Success

On Sunday 10 February 2019, Goretti Mallorqui, took part in her first ever half marathon. Goretti is currently using the PEPPER system with the Cellnovo pump, as a participant on the validation study. Goretti completed the Barcelona Half Marathon in an impressive 2 hours and 5 minutes.

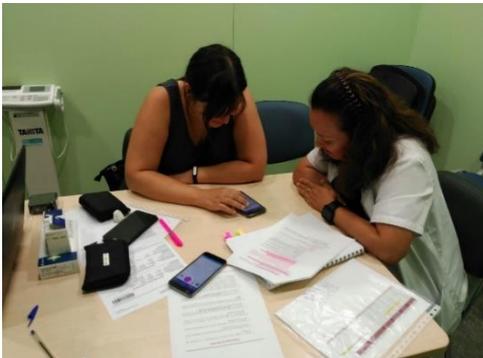
Goretti had previously only entered 10K events, but last year she started to train more seriously to achieve this ambitious goal of running 21K. By coincidence, Goretti was also using PEPPER when she ran one of her first 10K events on December 31th 2017.

She was taking part in the initial feasibility study at the time.

Goretti only took up running two years ago, at the age of 40, in order to have better control of her diabetes. In November of the same year, she was invited to join the PEPPER Innovation Advisory Board. Some months later, one of lead clinicians, Dr. Mercè Fernández told her of the possibility to potentially improve her control further by trying the PEPPER system as a study participant. Goretti said “it is very good to have access to all the tools that PEPPER offers...in general, I have to say that I'm happy running with PEPPER”.



## IV. Phase 3: Clinical Trial



A large step forward has been made in the **Patient Empowerment through Predictive PERSONALISED decision support (PEPPER)** Project.

There has been finalized 4-month feasibility study with 15 patients conducted in both centres in London (UK) and Girona (Spain). The results suggest that the PEPPER safety system is safe and feasible to use as a component of the overall system and has the potential to enable improvements in hypoglycaemia and time in range.

After encouraging results of feasibility study the next step is to validate the PEPPER system in a bigger, multicentre clinical trial.

The 8-months clinical study started in November 2018 at Institut d'Investigació Biomèdica de Girona Hospital Dr. Josep Trueta and in January 2019 in Imperial College Healthcare NHS Trust, London, UK. The aim is to investigate the feasibility, efficacy and usability of PEPPER system compared to a standard bolus calculator. 55 participants have been enrolled to both of the PEPPER platforms: the smartphone platform to guide those who use multiple daily injections, and the next generation Cellnovo System, which features a Bluetooth and Android-enabled micro-pump. The system interoperates with various

peripheral devices including continuous glucose monitor system (CGM) and the physical activity monitor.

PEPPER system offers insulin dosing advice highly adaptive to the need of individuals by using an artificial intelligence technique named CBR (case-base reasoning) combined with predictive computer modelling. The system is making predictions based on real-time data in order to empower individuals to participate in the self-management of their condition.

The recommendation given to participants is based on multiple information such as: the blood glucose level, the physical activity, a presence of an illness, the stress the patient is currently undergoing, the menstrual cycle in case of women and others parameters that have potentially influence on glucose levels.

There is a strong emphasis on safety, with incorporated low and high glucose alarms, glucose predictions algorithm for hypoglycaemia, carbohydrate recommender which recommend a personalised carbohydrate snack and automatic insulin suspension in case of pump participants.

The project is also examining the extent to which human behavioural factors and usability issues have previously hindered the wider adoption of such personal guidance systems.

PEPPER is a project led by Oxford Brookes University and includes six partner institutions from three EU member states: Oxford Brookes University, Imperial College London, University de Girona, Romsoft SRL, Cellnovo Group SA, and Institut d'Investigació Biomèdica de Girona Hospital Dr. Josep Trueta, and CIBERObn Pathophysiology of Obesity and Nutrition.

## V. Meeting Girona



During the 24th and 25th of January of this year we were glad to make the Pepper project meeting, referring to the 25th to 36th months of the project, in the city of Girona. Girona is not only the headquarter of the University of Girona (UdG), where the eXiT group is placed, but also the city of the University Hospital Dr. Josep Trueta.

The meeting, which was held at the Polytechnic number IV building, enjoyed the presence of Cellnovo, Romsoft, Biomedical Research Institute of Girona (IdibGi), Imperial College of London (ICL) and Oxford Brookes (OBU) and us, the hosts.

The Cellnovo group, with Ben at the head, was reviewing the improvements that had been made to the mobile application, used by the users in order to receive the recommendations and control the whole Pepper system. The Romsoft group, through Lucian, detailed the modifications made to the Pepper website, used by the clinicians to review the cases and the system parameters, with the aim of improving the system. The clinicians of ICL and IdibGi, represented by Pari and Marzena, respectively, were explaining the details of the clinical phase 3, as well as showing the first results of recently finished phase 2. On the other hand, Pau, also from ICL, and in charge of the

safety system of Pepper, reviewed some of the details of the improvements of the system regarding the safety. From the UdG, Pablo, in charge of the dissemination package, explained some of our achievements about the project popularity, as well as shown us the video we recorded a few months ago. Regarding to the CBR, the core of the recommender system, I explained the small changes made in the CBR parameters in order to adjust it as much as possible to the clinical requirements. Clare, coordinator and member of OBU, reviewed the current state of the project and insisted on completing it in accordance with the initial specifications.

It should be said that, during the two days that the meeting lasted, not only each group shown their contributions and reviewed the status of each task, but also a Project Steering Group Meeting and an Innovation Advisory Boardmeeting were carried out.

In addition, we were able to enjoy the presence of some patients, who explained us their experience with Pepper insulin recommender. In general, the patients give a very good evaluation of the product and point out that the system helped them to increase the knowledge of their own illness.

Taking advantage of the situation, on the evening of 24th we visited Girona. A touristic guide explained to the members of the Pepper project the secrets that are hidden behind the walls of Girona and its historic quarter: Jews, 'xuixos' and flies. This city is not only interesting for its architecture, as the fans of 'Game of Thrones' know, but also for its gastronomy and history. In the night we went to dinner all together in order to co-fraternize a bit more.

In summary: two beautiful days of work and pleasure in Girona.

## VI. Other related news

People with type 1 diabetes 'missing out on life-changing glucose monitors'

<https://www.bbc.com/news/health-46125978>



Type 1 diabetes study shows dietary protein is linked with additional insulin need

<https://www.diabetes.co.uk/news/2019/jan/type-1-diabetes-study-shows-dietary-protein-is-linked-with-additional-insulin-need-94221545.html>



Comparative Efficacy of Insulin Pumps vs Multiple Daily Injections for Pregnant Patients with Type 1 Diabetes

<http://www.diabetesincontrol.com/comparative-efficacy-of-insulin-pumps-vs-multiple-daily-injections-for-pregnant-patients-with-type-1-diabetes/>



Type 1 diabetes trends investigated across Europe in new 25-year study

<https://www.diabetes.co.uk/news/2018/nov/type-1-diabetes-trends-investigated-across-europe-in-new-25-year-study-98965474.html>



AI is transforming the lives of people living with diabetes

<https://techerati.com/features-hub/interviews/ai-healthcare-diabetes-big-data/>



## VII. Profile – Lucian Nita



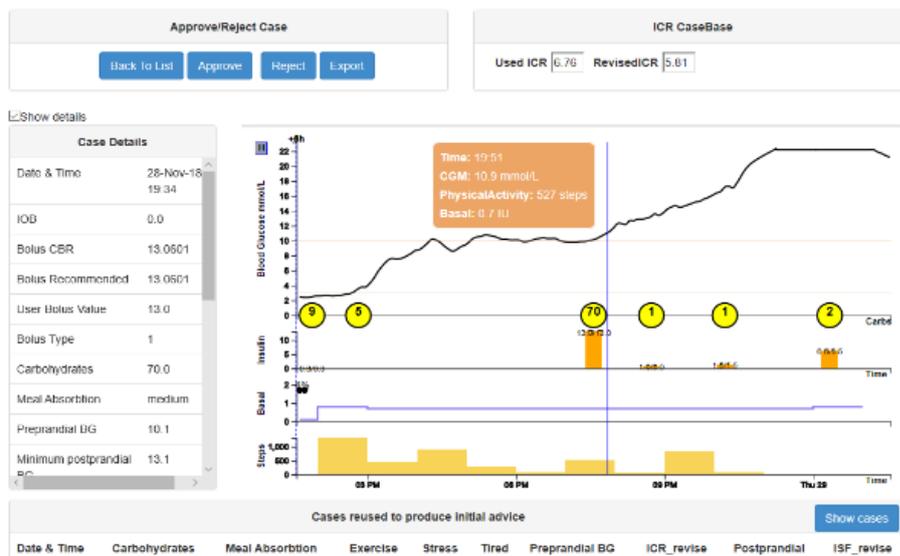
Lucian Nita is Project Manager at RomSoft company and the head of the Research department. He graduated in Computer Science Faculty from Technical University of Iasi (Romania) in 1989 and then received the Ph.D. degree on Metrology from the same University.

He has a large experience in the implementation and development of

software applications: database administrator, Oracle developer (forms & reports), data acquisition systems, windows driver model, assembler, LabVIEW, Matlab, microcontrollers, C++, C#, ASP, JavaScript.

This experience has been achieved by working on various commercial projects (design, build, test and implement software applications, building customer specific software services, outsourcing) and also on national or European research projects.

The main tasks within these projects are the development of software tools required by any research activity: acquisition and processing of primary data, forecasting tools and artificial intelligence, integration of various software components made by partners for the realization of a functional product. In the Pepper project, he is responsible for creating the web application through which clinicians analyse and validate system functionalities.



## VIII. Future events

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We are pleased to announce our public event (AI: The Future of Diabetes Self-Management?) on Tuesday, 12 March 2019 in London. Join us this evening in a live discussion where we introduce the PEPPER system from both the patient and clinical perspective, as well as a short demo of the PEPPER app. Food and drink will be provided. Tickets are free of charge, but must be booked on Eventbrite using the following link (<https://tinyurl.com/y2nnqzjz>)

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