



WATCHING THE RISK FACTORS

WARIFA

ARTIFICIAL INTELLIGENCE AND THE PERSONALIZED
PREVENTION AND MANAGEMENT OF CHRONIC CONDITIONS



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the WARIFA newsletter!**

WARIFA PROJECT: ARTIFICIAL INTELLIGENCE AND PREVENTION OF CHRONIC CONDITIONS

WARIFA - Watching the risk factors: Artificial Intelligence (AI) and the prevention of chronic conditions – is a research project funded by EU's research and innovation programme Horizon 2020 (GA 101017385).

The WARIFA project will develop a prototype of a combined early risk assessment tool that will provide individual citizens with personalised recommendations for the management of noncommunicable diseases - such as cardiovascular diseases, cancer, chronic respiratory diseases and diabetes – which represent the leading causes of death for the citizens of the European Union. The WARIFA tool will be available to individual citizens via a user-friendly app on their smartphone.

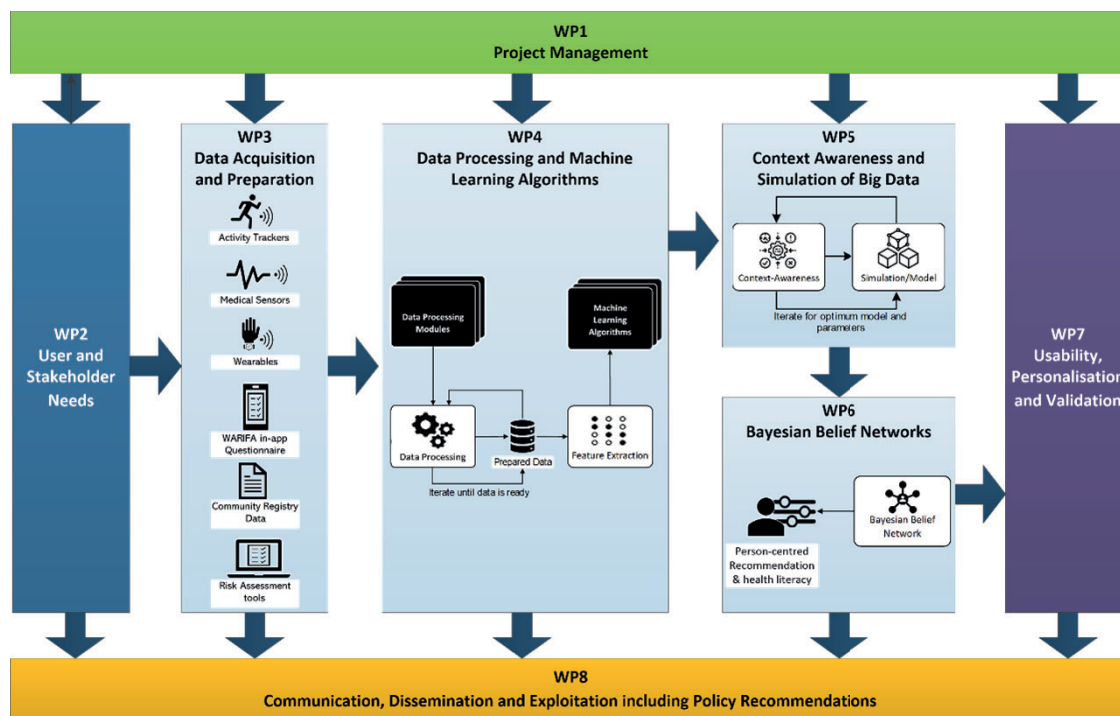
The WARIFA tool uses AI and the analysis of user-generated and big data to provide a personalized set of recommendations on lifestyle factors according to the risk score of each individual. Citizens are motivated to change unhealthy habits while supporting good lifestyle choices. WARIFA will inform citizens about the improvements on the management of a known disease while, simultaneously, raising awareness on the risk of developing another noncommunicable disease. The individuals with a high-risk score will be advised to contact the health care system.

WARIFA has its main focus on the prevention of melanoma skin cancer and complications of diabetes. This is achieved by providing citizens with personalized recommendations that help to improve lifestyle risk factors such as excessive sun exposure, unhealthy diet, harmful alcohol and tobacco use, and physical inactivity. In this way, WARIFA will contribute to health promotion and disease prevention actions which will help relieve the burden on health care systems and economies.

The WARIFA project started on the 1st January 2021; its first-class international consortium includes a total of 12 partners from 6 countries and represents expertise within AI technology, applied mathematics and statistics, e-health, preventive medicine, clinical medicine, epidemiology, sociology, psychology, biostatistics, communication and dissemination. The partners that will implement WARIFA in the next 4 years are: The Norwegian Centre for E-health Research (Norway) – coordinator, University of Medicine and Pharmacy "Carol Davila" Bucharest (Romania), UiT The Arctic University of Norway (Norway), University of Las Palmas de Gran Canaria (Spain), University of Oslo (Norway), Munster Technological University (Ireland), CiaoTech Srl (Italy), Netsun Software Srl (Romania), National Research Council of Italy (Italy), Rey Juan Carlos University (Spain), Sensotrend Oy (Finland), Norwegian Melanoma Association (Norway).

The WARIFA project is organised in 8 work packages (WPs) which are closely linked to each other. WP1 corresponds to Management activities. WP2 aims to map, define and collect data on user and stakeholder in order to build the blueprint for the development of the WARIFA AI tool. WP3 is focusing on data sources and data acquisition functionalities, while WP4 is in charge of defining an architecture for data processing and machine learning algorithms development. In the framework of WP5, the consortium will identify how information from WP4 can be used to describe usage patterns to extract context data. The contextualized information, based on pre-defined rules, will then be fed to the simulation algorithm to generate the optimum set of

context data for WP6, which will develop subject personalized Bayesian belief hierarchical network of factors-variables. In WP7 - Usability, personalisation and validation, the partners will ensure that the work performed within other WPs is translated to relevant, comprehensible, evidence-based recommendations and adapted to the needs and preferences of the end-users. Finally, WP8 is in charge of communication, dissemination and exploitation activities, including policy recommendations to inform the decision makers and the authorities of the policy options emerging from the project.



WHO ARE THE INVOLVED PARTNERS AND WHAT WILL THEY DO?



Norwegian Centre for
E-health Research

The Norwegian Centre for E-health Research (NSE), Project Coordinator.

The Norwegian Centre for E-health Research (NSE) is legally a part of the University Hospital of North Norway HF, and will be the responsible party for the project.

NSE is Norway's largest e-health research centre, and one of the world's largest, where many of the researchers have produced knowledge in the field for more than 25 years. The Ministry of Health and Care Services in Norway has stated that NSE should acquire and manage an overview of relevant experience and knowledge regarding e-health and m-health, and collect, produce and disseminate knowledge required by the national authorities to develop and implement a knowledge-based policy on e-health. NSE shall support the overall objectives of the national e-health strategy so that:

- Healthcare professionals should have easy and safe access to patient and user information
- Citizens should have access to simple and secure digital services
- Data shall be available for quality improvement, health monitoring, management and research

Significant research activities take place at the centre, funded through competitive funding from e.g. the Norwegian Research Council and the EU.

NSE will be responsible for the overall coordination of WARIFA. NSE is the WP leader for WP1 Project Management, and for WP5 Context Awareness, and will thorough out interdisciplinary expertise participate in all WPs, and be the task leader for task 8.4 Policy recommendations.



University of Medicine and Pharmacy "Carol Davila" Bucharest (UMFCD)

is the largest medical university in Romania. and has a wide network of university hospitals in Bucharest, covering all clinical specialities It Includes preclinical departments equipped for the various aspects of fundamental and translational research in human medicine. It collaborates for melanoma patients care with a wide network of physicians and medical centres nation-

wide, serving as national reference centre. The UMFCD Project team unites expertise in Clinical Dermatology, Public Health, Epidemiological research, Diabetes, Internal medicine, Cardiology, Biostatistics, General medicine, and has access to the relevant research infrastructure of the institution. The UMFCD Project team has meaningful scientific collaboration with stakeholders important for the success of the study in Romania - the Romanian Society of Dermatology, The Cancer Registry Vest, the Melanoma Patient organizations, the Romanian National Society of Family Medicine. UMFCD has the capacity to conduct large scale, population-representative studies on patient-related outcomes and characteristics in Romania.

UMFCD will lead the activities performed in the framework of WP2, and will participate in the implementation of WP 1, 5, 6, 7, 8.



UiT The Arctic
University of Norway

The Arctic University of Norway (UiT) is the third largest in Norway and the northernmost university of the world.

The Health informatics and -technology (HIT) group (former: Medical Informatics & Telemedicine (MI&T) group) was established 1994-95. From the beginning, the group has been responsible for teaching Medical Informatics / Health Informatics courses at the **Department of Computer Science**. Our

research approach is experimental with a focus on health technology (artefacts). The group has a long tradition working with clinicians at the University Hospital of North Norway (UNN), as well as various research groups in Europe and USA.

The Department of Community Medicine, Faculty of Health Sciences: The Department's network includes researchers with a range of health professional backgrounds and related specialty fields (medicine, statistics, molecular genetics, health economy, psychology, environmental medicine, sociology, philosophy). Their research activity is based on large population studies, biobanks and randomized controlled trials. The Department employs a total of 200 staff, of whom 160 are academic staff, responsible for close to 100 ongoing externally funded projects.

In WARIFA, UiT, Department of Computer Science will lead WP3 Data acquisition and preparation, participate in the data collection, the formulation of recommendations for disease prevention and the dissemination of the results in WP1, WP2, WP3, WP7 and WP8. UiT will participate in researching how information and communication technology (ICT) best can be used to promote health, using theories of health behaviours for effective tailoring of self-management interventions in WP2 and WP7.



University of Las Palmas de Gran Canaria (ULPGC) is a modern institution with a long academic record of accomplishment located in Gran Canaria, Canary Islands. In this project, two research institutes are involved: the **Research Institute for Applied Microelectronics (IUMA)** and the **Research Institute for Biomedical and Health Sciences (iUIBS)**.

IUMA is composed by more than 40 doctors and more than 55 researchers with strong presence in diverse initiatives. **IUMA** has been working in data processing since 1995, having relevant contributions to this field. **IUMA** has extensive experience in participation in different European projects and industrial partners. The most recent research project has been the HELICoiD European project, where **IUMA** was the coordinator and a very active research partner in data processing using artificial intelligence. These and other projects have led to the acquisition of state-of-the-art equipment that is employed in the development of new technology products for industries located in USA, Europe and Australia.

iUIBS was founded in 2014 and comprises more than 100 researchers from different backgrounds and disciplines, engaged in both clinical and experimental research, the former in close collaboration with the University Hospitals in Gran Canaria. **iUIBS** is one of the youngest and currently the most prolific of ULPGC's research institutes. Diabetes, Metabolism and Lifestyle are core branches of knowledge in **iUIBS**.

ULPGC will provide the WARIFA project with knowledge about imaging and signal processing techniques based on machine/deep learning approaches. **ULPGC** has experience in the development of processing algorithms for hyperspectral imaging classification in different types of cancer, including skin cancer. In consequence, **ULPGC** will contribute to several technical WPs, providing its knowledge in the algorithm development for artificial intelligence solutions to processes that collected data in WARIFA. ULPGC will also provide a more clinical perspective, from both health care professionals and patients. ULPGC will lead WP7 "Usability, personalisation and validation", and participates in WP1, WP2, WP3, WP4, WP6 and WP8.



UiO : University of Oslo

University of Oslo (UiO). Oslo Centre for Biostatistics and Epidemiology (OCBE) is a joint centre integrating the activities of the Department of Biostatistics, UiO, and the Section of Biostatistics, Epidemiology and Health Economics, Oslo University Hospital. OCBE develops statistical methods and their

application to the design, analysis and interpretation of biomedical, clinical and epidemiological studies and data. Research at OCBE covers most of biostatistics, with main research activities in longitudinal and time to event data, measurement uncertainty, evidence synthesis, causal inference, clinical trials, observational studies, statistical genomics and big data.

In WARIFA, UiO will participate in WP1, WP2, WP3, WP7 and WP8, providing extensive expertise on the risk factors of skin cancer and other chronic diseases in the data collection and monitoring, the risk prediction and the formulation of recommendations for disease prevention. It will also contribute in the evaluation of the potential sources of bias, the evaluation of existing risk prediction models and the validations.



Munster Technological University (MTU) - former known as the Cork Institute of Technology (CIT) - is a leading third level educational institute in Ireland with over 17,000 students across the Faculties of Science & Engineering and Business & Humanities. The ADAPT Centre for Digital Content Technology (Grant 13/RC/2106) which function within the MTU is funded under the Science Foundation Ireland Research Centres

programme and combines the worldclass expertise of researchers at five universities (Trinity College Dublin, Dublin City University, University College Dublin, Dublin Institute of Technology, Munster Technological University) with that of its industry partners to produce ground-breaking digital content innovations. ADAPT's vision of the future envisages a revolution in the way people can seamlessly interact with digital content, systems and each other; enabling users to achieve unprecedented levels of access and efficiency. ADAPT sees global digital content as 'live content', where content technologies are enabled with embedded intelligence to deeply analyse, translate, adapt and multimodal deliver content to users appropriate for their needs, preferences, and use. Providing Personalized Digital Content will be the key enabler for users to globally engage without being overwhelmed. ADAPT research is spearheading the development of next-generation digital technologies that enable seamless tech-mediated interaction and communication. The breadth of ADAPT's research expertise is unique globally and the Centre's structure supports collaborative innovation with industry to unlock the potential of digital content.

The ADAPT team at MTU will bring to WARIDA its extensive experience in designing, developing, and implementing technologies and applications based on natural language processing and machine learning for medical documents or patient narratives in the project. ADAPT Centre will provide personalized context aware recommendations and data analytics algorithms with an aim to better management and prevention of chronic diseases, which will integrate ubiquitous data from the user's environment with user-generated data. MTU will participate in WP1, WP5/4, WP6, WP7 and WP8.



CiaoTech Srl, (CIAOTECH) the Italian branch of PNO Group, represents Europe's largest independent public funding and innovation consultancy with 30 years of hands-on expertise with more than 500 funding programmes in most EU countries, annually raising approximately 1 Billion Euro for its clients. PNO's "Innovation Management" services deliver high quality support to

large sized companies, SMEs, Universities, Research Institutes, Associations and clusters in the full cycle of the innovation process including analysis, definition and innovation processes planning building innovation networks, partnerships and projects and managing projects and driving innovation. PNO has a unique positioning in defining and managing innovation ecosystems, while providing scouting, intelligence and business acceleration services, taking particular care of exploitation and IPR aspects.

In WARIFA, CIAOTECH will be the leader of WP8 Communication, Dissemination and exploitation including the policy recommendations and will be involved in the following activities:

- Stakeholders analysis
- Dissemination strategy (incl. logo, project identity, dissemination material)
- Dissemination/Communication, including organisation of projects event (scientific and industrial),

- participation in international conferences/fairs, publications on high-level journals, website, etc.
- Exploitation plan (incl. support to exploitation management and workshops)
- Business Plan, incl. market analysis survey (with industries end user), preliminary business model and financial forecasts.



NetSun Software (NETSUN) is a software company that provide Web, Mobile and Reporting development services for Large enterprises since 2002. Some of our customers are: Deutsche Telekom (Romania and Slovakia), Mars Inc. (global), Provident (Romania), Otto group (Romania), Danone (Romania), Orkla Foods (Romania) and other companies

NetSun team will contribute to WARIFA project with competences on:

- Data processing and feature extraction
- Context awareness and simulation of big data
- Usability, personalization and validation of UI
- System Testing on various aspect from User Interface to Data simulations
- Software development

Netsun will participate in WP1, WP3, WP4, WP7 and WP8.



The **National Research Council of Italy (CNR)** is the largest public research institution in Italy, the only one under the Research Ministry performing multidisciplinary activities. Founded as legal person on 18 November 1923, CNR'S mission is to perform research in its own Institutes, to promote innovation and competitiveness of the national industrial system, to promote the

internationalization of the national research system, to provide technologies and solutions to emerging public and private needs, to advice Government and other public bodies, and to contribute to the qualification of human resources. In the CNR's research world, the main resource is the available knowledge which means people, with their skills, commitment and ideas. This human capital comprises more than 8.000 employees, of whom more than half are researchers and technologists. Some 4.000 young researchers are engaged in postgraduate studies and research training at CNR within the organization's top-priority areas of interest. A significant contribution also comes from research associates: researchers, from Universities or private firms, who take part in CNR's research activities.

In the framework of WARIFA project, CNR will lead WP6 Bayesian Belief Network, and participate in WP1, WP3, WP4, WP6, WP7 and WP8.



The **Rey Juan Carlos University (URJC)** was founded in 1996 with the objective of offering high quality education and academic and scientific excellence. It is the youngest public university in Madrid, and currently more than 46.000 students are enrolled on its undergraduate and graduate programs and more than 1500

lectures. The university is distributed over its five campuses in Alcorcón, Aranjuez, Fuenlabrada, Madrid and Móstoles. URJC has 5 University Hospitals where Biomedical Engineering and

Medicine students carry out internships. It also contributes to integrate multidisciplinary research teams of clinicians and engineering to exploit synergies of combined advance machine learning with personalized medicines. In URJC, the group involved in the project belongs to Signal Theory and Communications Department. It has strong expertise in creating, developing and raising Machine Learning and Big Data Analytics for a wide variety of applications in the health domain. It collaborates and coordinates research and applications on machine learning models with several projects involving Hospital Universitario de Fuenlabrada, Hospital de Móstoles, Hospital del Sureste and Hospital Universitario Fundación de Alcorcón, in Madrid, Spain.

In WARIFA; URJC will be responsible for developing novel methodology for early detection of behavioral patterns and risk factors. Cutting-edge advance machine learning algorithms for risk analysis will be also provided. URJC will lead WP 4, and participate in WP WP1, WP3, WP6, WP6 and WP8.



Sensotrend (Sensotrend) is a SME company focused on making life with type 1 diabetes easier through innovative apps.

Sensotrend's key expertise for the WARIFA project is in making data available, both from medical devices like glucometers, continuous glucose monitors, insulin pumps, and injection pens

with a memory function, and from wellness apps like nutrition diaries, exercise trackers, and sleep monitors. Sensotrend will participate in WP1, WP3, WP4, WP7 and WP8.



Melanomforeningen

The **Norwegian Melanoma Association (Melanoma Assoc.)** is an association for people who have or who has had melanoma/skin cancer, their dependents and others related to this situation. Its primarily aims to support the patient and their close ones through information, guidance and exchange of experience with others in the same situation. It also prioritizes work on preventive

measures through sun-related campaigns and dissemination of knowledge. Its aim is to spread knowledge about melanoma / skin cancer, and how this cancer can be prevented. The association prioritizes prevention, treatment and research, as well as aims to contribute to each patients feeling of safety during the course of treatment. It has contact with, and exchanges experiences with, other equivalent international organizations. The Norwegian Melanoma aims to be a political driving force that advocate the needs of people with melanoma.

In WARIFA, the Norwegian Melanoma Association will play the role of user representative that will provide valuable contributions from the user perspective in the development of the WARIFA tool

PARTNERS



Norwegian Centre for
E-health Research



UiT The Arctic
University of Norway



ULPGC
Universidad de
Las Palmas de
Gran Canaria



UiO : University of Oslo



MTU

Ollscoil Teicneolaíochta na Mumhan
Munster Technological University



Italian National
Research Council



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