

Manifesto



Health EU

Healthy You!

This manifesto is a call to the medical and engineering research communities and industries to openly support our Health EU European initiative in personalized, preventive and participatory digital healthcare and our quest of becoming one of the next European FET Flagships or Missions by

empowering every citizen with a Human Avatar
enabling access to comprehensive personalized
healthcare, healthy lifestyle and disease prevention.

December 19th, 2018

In 2050, the EU and its forerunners will have existed for 100 years.

European health means w(h)ealth.

Our aspiration is to offer people healthcare by default, and make healthy living both enjoyable and rewarding.

Health EU can provide that foundation.

Health EU aims at providing the European citizen with a new tool, one that is totally unheard of today.

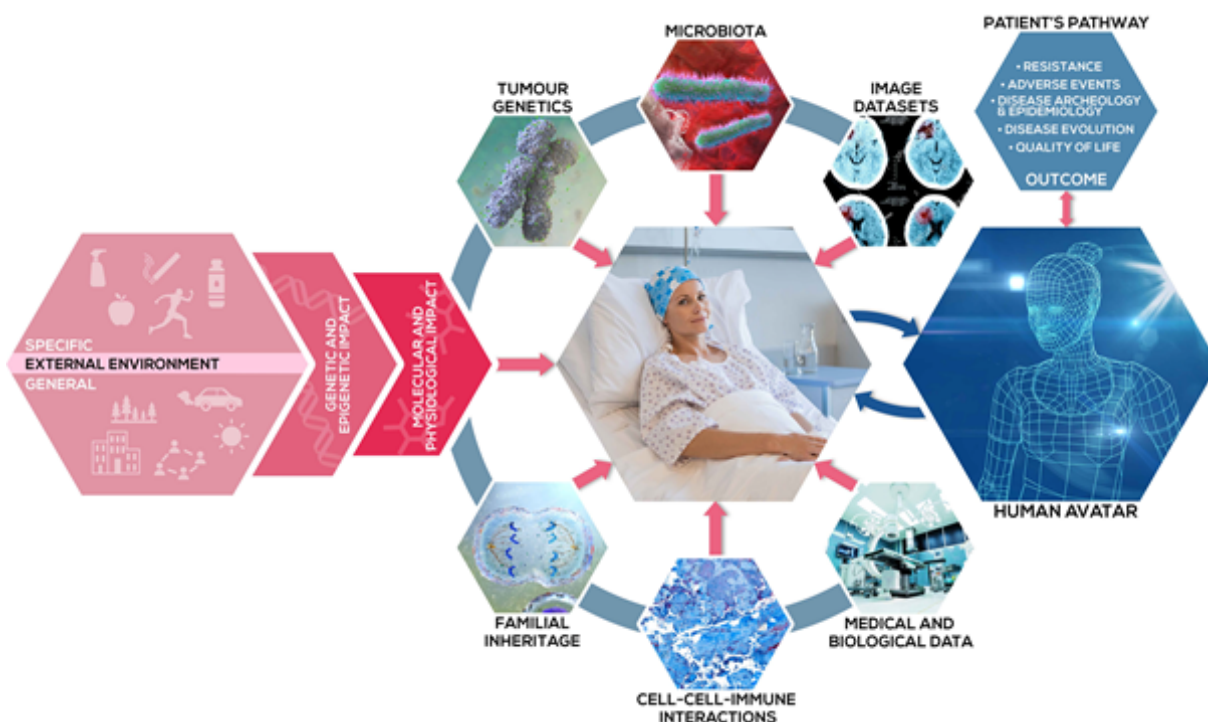
Mankind's first-generation human avatars, a combination of digital and analogue tools, fed by omics and sensor data and using most advanced Artificial Intelligence in Big Data Analytics and Internet-of-Things.

The ultimate personal assistant. Looking, hyper-personalized, after all of us.

The Human Avatar is the most advanced Artificial Intelligence technological tool linking Healthy Living, Prevention and Personalized Treatment of Disease.

Knowing what's good for us in a personalized fashion. And with a mandate to reward us along the way for the choices we make.

Designed and built by 100+ of Europe's leading institutes.

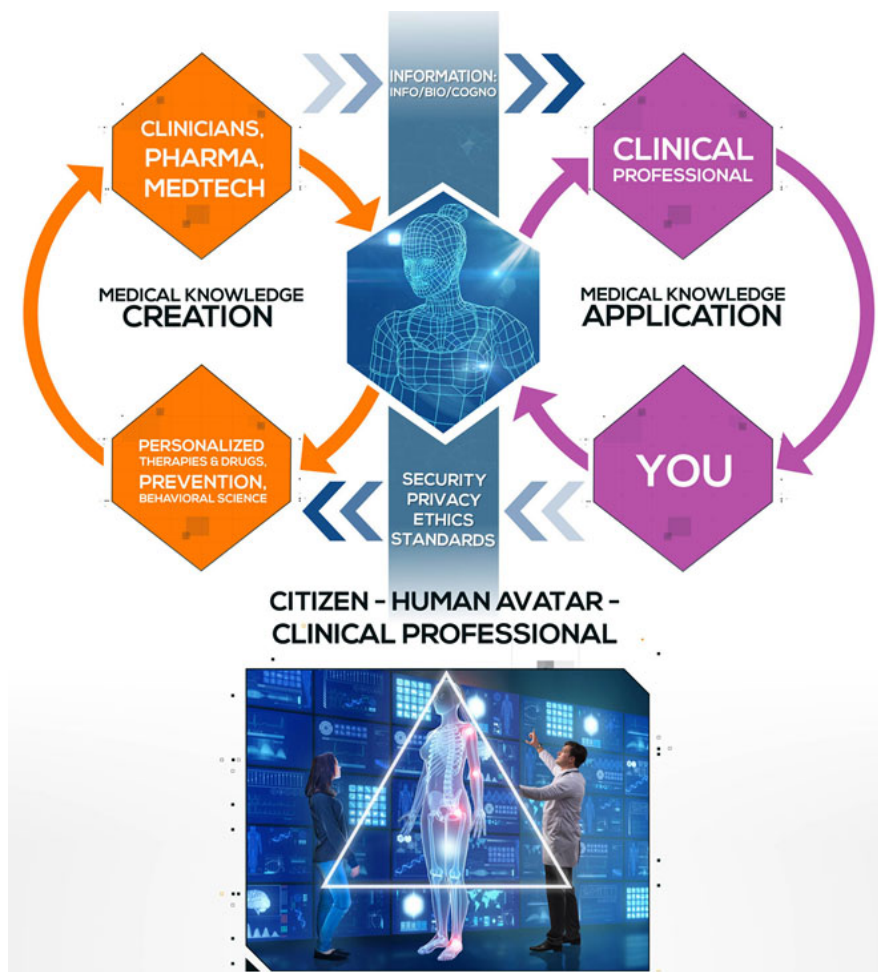


Human Avatars act as bi-directional missing links

- embodied as high-tech citizen-centric vehicles – between “Medical Knowledge Creation” and “Medical Knowledge Application”, capable of

breaking traditional barriers in information, security and ethics and revolutionizing current healthcare.

Having a Human Avatar for every citizen who chooses to use this option, which is fully controlled by these individuals, will break such traditional barriers. It will enable a universal healthcare system capable of taking into account the diversity of humans and the value of their personal data in both medical knowledge creation and application, to recommend measures for a healthy lifestyle, and to deliver the most efficient treatment.



The Human Avatar as a revolutionary bi-directional missing link in the 21st century, aiming at breaking down the information (info-bio-cogno) and security, privacy, ethics and data standards barriers between Medical Knowledge Creation and Medical Knowledge Application and at creating the Citizen – Human Avatar – Clinical Professional triangle for the personalized, preventive and participatory healthcare.

Health EU's vision is to provide a citizen-centric Human Avatar system based on integrative technological and digital data approaches, combined with ethics and behavioral sciences, capable of truly delivering on the promises of personalized, preventive and participatory medicine and of achieving democratized access to universal healthcare solutions.

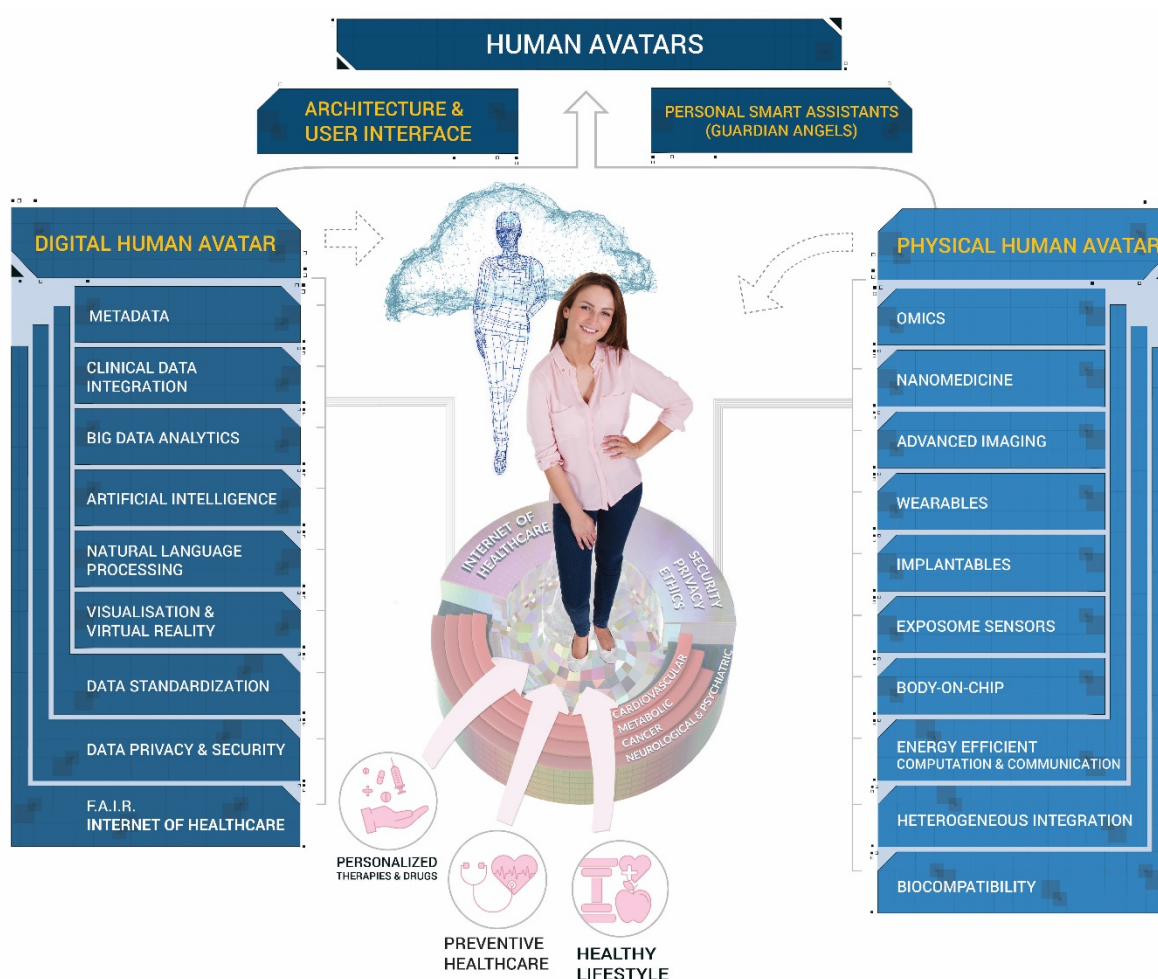
Health EU is a truly multi- and interdisciplinary FET Flagship/Mission

that creates the right balance for success between medical sciences and the most advanced Information and Communication Technologies (ICT).

Health EU's Human Avatars form the backbone of a first

European Integrative Human Avatar Platform

for disruptive innovations in digital healthcare.



The European Integrative Human Avatar Platform combining Digital and Physical technologies, as proposed by Health EU to revolutionize personalized, preventive and participatory healthcare.

The game-changer solution: Health EU's Human Avatars for personalized and preventive healthcare

The Health EU mission is to become the game-changing research programme that will lead to better and more sustainable health and wealth ("whealth") for the European population.

Personalized medicine

Personalized medicine targets the use in medical practice of the right drug, for the right patient, at the right dose at the right time. The significance of the qualifier "personalized" is derived from, and built on, the notion that treatment of an individual patient can be dynamically adjusted to his/her personal (epi)genomic and immunological data, as well as the omic profile and immunoprofile of the disease and host. Genomic data can often be used to predict one's predisposition to react more or less favourably to prescription drugs, thus assisting the clinician in choosing a more effective patient-specific treatment strategy. The first benefits of personalized treatment are already evident in haematology and oncology, accounting for 38% of its conclusive use in medical practice, and a growing proportion in psychiatry (17%), cardiology (7%) and neurology (6%). The second wave of applications in personalized medicine will come from further characterisation of tissue/system dysfunction at a greater granular level through the interpretation of omics data (e.g. transcriptomics, proteomics, metabolomics, immunomics and microbiomics). The birth of personalized medicine is the product of engineering and computer sciences meeting life sciences.

Revolutionary solutions for P6 medicine

Health EU's FET Flagship revolutionary solutions will be provided by the development of personalized medicine that is coming out of the integrative convergence of significant developments in systems biology, the Internet of Things and Artificial Intelligence. These sciences are poised to transform healthcare systems radically as they migrate away from mass-market-driven medicine into a market-of-one to provide the right treatment to the right patient at the right time. We are now entering the era of so-called P6 (Predictive, Preventive, Personalized, Participatory, Psyo-social, Public) medicine that seeks to promote healthier living in a proactive manner, with every citizen's well-being benefiting directly in physical, mental and economic terms. P6 medicine will actually impact the health status of society as a whole. A major differentiator of Health EU as a game-changer approach is that it exploits **the intrinsic value, from both scientific and economic perspectives, of the biological and medical data of every citizen, under the highest standards of ethics and security, to support a Human Avatar based vision offering access to affordable universal healthcare.**

Citizen-centric Human Avatar

This major paradigm shift into unscaled and personal services, however, cannot happen without the development of new health data management systems to plumb and understand in greater depth each individual's body. Only a citizen-centric Human Avatar of the type proposed by Health EU can deliver on the promises of P6 medicine. With healthcare systems and populations empowered to focus more on health as opposed to only treating disease, and as a result of the shift from an illness-centred approach to greater public health practices, Health EU's Human Avatars will promote healthier living in a proactive manner. Personalized medicine, by means of greater predictive and preventive measures, and **the active and voluntary participation of individuals**, will impact the health status of society as a whole, and that should lead to better management of its costs, hence the qualifier "Public" in P6.

Unique features of Health EU

- Delivering on the promises of personalized and preventive medicine in **advancing towards affordable universal healthcare solutions**;
- Taking medical sciences and practice to the next level by building on scientific and technological developments so as **to promote well-being and improve life expectancy in good health**;
- Providing future tools and infrastructure **to accelerate the generation of new data that can further enhance our knowledge** of the means to support prevention and personalized treatment of diseases;
- Inducing a clear **shift towards personalized and effective use of means and techniques**, with maximum efficiency treatments, at the right time to the right patient;
- Creating **new business models, financing frameworks and incentive schemes** to enable the development, adoption and diffusion of Human Avatars and associated solutions;
- Developing **comprehensively designed educational platforms/training for next generation supra-disciplinary scientists** serving the future emerging requirements of the flagships/mission;
- Forming **a mission-like mechanism** of applications and deployment with high economic and societal impact.

Digital Health is on the top-priority list of all nations.

The proposal Health-EU - Human Avatar is a comprehensive and ambitious proposal in the Health-ICT domain. It spans from Healthy-Living promoting systems to Prevention - Early Diagnostics - Early Therapeutics - Increased Cure Rates - Personalized Care, and represents the digital model system to advance our health care systems, their sustainability and in the end will result in healthier European citizens.

We want to grant to our children a sustainable healthcare system.

The shared enthusiasm between top European academic, industrial and other stakeholders created a network with a potential impact second to none.

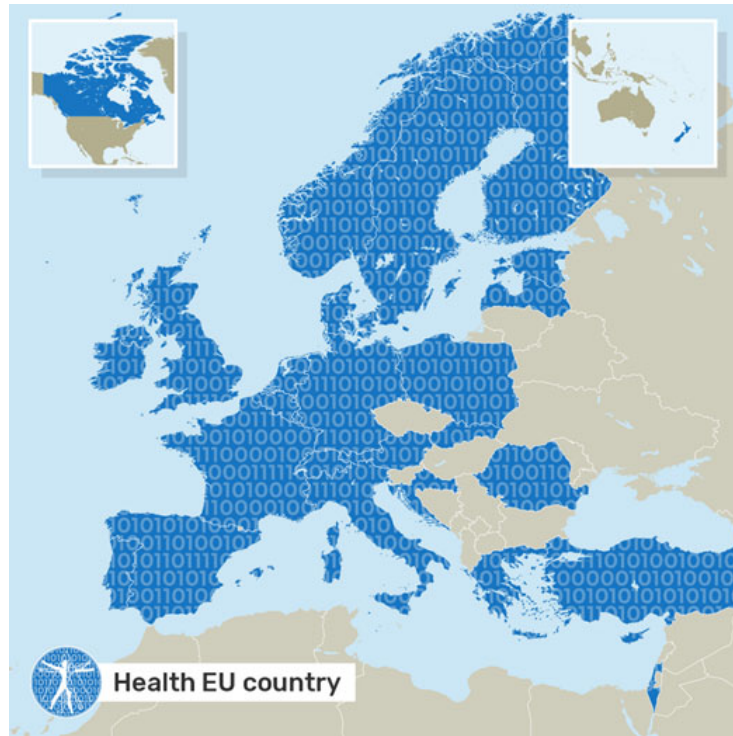
Europe cannot afford to forfeit this strategic initiative which brings together key players from academia, industry and societal stakeholders in Europe.

Today, Health EU is directly endorsed by 110 full partners, more than 90 industry stakeholders and more than 100 groups world-wide.

It is now time to ACT to unify the future of digital healthcare in Europe!

We invite the European Commission and the Member States to take all necessary actions to support the Health EU initiative for a future Flagship/Mission project.

We invite all our supporters to sign on-line (<https://www.health-eu.eu/support>) the Health Manifesto as an expression of their full support.



Health EU partnership in 2018.



Health EU stakeholders in 2018.

Health EU Coordination:

Coordinator and spokesperson: **Alexander M.M. Eggermont**

Directeur Général Gustave Roussy, Professeur Oncologie, Université Paris-Sud, France

Co-coordinator: **Adrian M. Ionescu**

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Co-coordinator: **Albert Van den Berg**

Professor of Miniaturized Systems for (Bio)Chemical Analysis, University of Twente,
The Netherlands

Health EU Strategic Board:

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Prof. Mikael Östling, Kungliga Tekniska Högskolan, Stockholm, Sweden

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Prof. Chris Van Hoof, Imec-vzw, Belgium

Prof. Cisca Wijmenga, University Medical Center Groningen, The Netherlands

List of Health EU Consortium Partners

N.	Proposer name	Country
1	INSTITUT GUSTAVE ROUSSY	FR
2	ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE	CH
3	UNIVERSITEIT TWENTE	NL
4	ACADEMISCH ZIEKENHUIS GRONINGEN	NL
5	ACADEMISCH ZIEKENHUIS LEIDEN	NL
6	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE	IT
7	ALLEANZA CONTRO IL CANCRO	IT
8	Ares Trading SA	CH
9	BAR ILAN UNIVERSITY	IL
10	BAYER AKTIENGESELLSCHAFT	DE
11	BLUENOVE	FR
12	CENTRE HOSPITALIER UNIVERSITAIRE DE GRENOBLE	FR
13	CENTRE HOSPITALIER UNIVERSITAIRE VAUDOIS	CH
14	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	FR
15	CENTRO DE NEUROCIENCIAS E BIOLOGIACELULAR ASSOCIACAO	PT
16	CHARITE - UNIVERSITAETSMEDIZIN BERLIN	DE
17	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES	FR
18	CONSIGLIO NAZIONALE DELLE RICERCHE	IT
19	CONSORZIO NAZIONALE INTERUNIVERSITARIO PER LA NANOELETTRONICA	IT
20	CSEM CENTRE SUISSE D'ELECTRONIQUE ET DE MICROTECHNIQUE SA - RECHERCHE ET DEVELOPPEMENT	CH
21	DANMARKS TEKNISKE UNIVERSITET	DK
22	E.P.O.S. IASIS RESEARCH AND DEVELOPMENT LTD	CY
23	EBERHARD KARLS UNIVERSITAET TUEBINGEN	DE
24	EDINETHICS LIMITED	UK
25	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZUERICH	CH
26	EIDGENOSSISCHE MATERIALPRUFUNGS- UND FORSCHUNGSANSTALT	CH
27	ELEKTRONIKAS UN DATORZINATNU INSTITUTS	LV
28	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.	DE
29	FUNDACIO INSTITUT CATALA DE NANOCIENCIA I NANOTECNOLOGIA	ES
30	FUNDACION CIDETEC	ES
31	Genopole	FR
32	GOETEBORGS UNIVERSITET	SE
33	HELLENIC PASTEUR INSTITUTE	EL
34	HITS GGMBH	DE
35	HRVATSKO KATOLICKO SVEUCILISTE	HR
36	IBM RESEARCH GMBH	CH
37	IIGM FOUNDATION	IT
38	IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE	UK
39	INFINEON TECHNOLOGIES AG	DE
40	INSTITUT MINES-TELECOM	FR
41	INSTITUT NATIONAL DES SCIENCES APPLIQUEES DE LYON	FR
42	INSTITUT POLYTECHNIQUE DE GRENOBLE	FR
43	INSTITUTO DE SALUD CARLOS III	ES
44	INSTITUTUL NATIONAL DE CERCETAREDEZVOLTARE PENTRU MICROTEHNOLOGIE	RO

45	INSTYTUT BIOCYBERNETYKI I INZYNIERII BIOMEDYCZNEJ PAN	PL
46	INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM	BE
47	ISTITUTO SUPERIORE MARIO BOELLA SULLE TECNOLOGIE DELL'INFORMAZIONE E DELLE TELECOMUNICAZIONI ASSOCIAZIONE	IT
48	KAROLINSKA INSTITUTET	SE
49	KATHOLIEKE UNIVERSITEIT LEUVEN	BE
50	KUNGLIGA TEKNISKA HOEGSKOLAN	SE
51	MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV	DE
52	NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS"	EL
53	NATIONAL TECHNICAL UNIVERSITY OF ATHENS - NTUA	EL
54	NATURWISSENSCHAFTLICHES UND MEDIZINISCHES INSTITUT AN DER UNIVERSITAET TUEBINGEN	DE
55	NIPED Research Foundation	NL
56	NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU	NO
57	OTTO-VON-GUERICKE-UNIVERSITAET MAGDEBURG	DE
58	PHILIPS ELECTRONICS NEDERLAND B.V.	NL
59	QUEEN MARY UNIVERSITY OF LONDON	UK
60	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN	DE
61	RIJKSUNIVERSITEIT GRONINGEN	NL
62	ROBERT BOSCH GMBH	DE
63	ROLAND BERGER GMBH	DE
64	SABANCI UNIVERSITESI	TR
65	SCIPROM SARL	CH
66	SIB INSTITUT SUISSE DE BIOINFORMATIQUE	CH
67	SINTEF AS	NO
68	SLOVENSKA TECHNICKA UNIVERZITA V BRATISLAVE	SK
69	SORBONNE UNIVERSITE	FR
70	STICHTING IMEC NEDERLAND	NL
71	STICHTING INSTITUTE FOR HUMAN ORGAN AND DISEASE MODEL TECHNOLOGIES	NL
72	STICHTING KATHOLIEKE UNIVERSITEIT	NL
73	STMICROELECTRONICS SRL	IT
74	TALLINNA TEHNIKAULIKOOL	EE
75	TECHNISCHE UNIVERSITAET GRAZ	AT
76	TECHNISCHE UNIVERSITAET MUENCHEN	DE
77	TECHNISCHE UNIVERSITAET WIEN	AT
78	TECHNISCHE UNIVERSITAT BERLIN	DE
79	TECHNISCHE UNIVERSITEIT DELFT	NL
80	TECHNISCHE UNIVERSITEIT EINDHOVEN	NL
81	Teknologian tutkimuskeskus VTT Oy	FI
82	TEL AVIV UNIVERSITY	IL
83	THE CHANCELLOR MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE	UK
84	THE UNIVERSITY OF AUCKLAND	NZ
85	TTY-SATIO	FI
86	UNIVERSIDAD DE ZARAGOZA	ES
87	UNIVERSITA CAMPUS BIO MEDICO DI ROMA	IT
88	UNIVERSITA DEGLI STUDI DI CAGLIARI	IT
89	UNIVERSITA DEGLI STUDI DI ROMA TORVERGATA	IT
90	UNIVERSITA' DEGLI STUDI DI MILANO-BICOCCA	IT
91	UNIVERSITAET BERN	CH
92	UNIVERSITAET LEIPZIG	DE
93	UNIVERSITAETSKLINIKUM AACHEN	DE
94	UNIVERSITAT DES SAARLANDES	DE
95	UNIVERSITAT ZURICH	CH
96	UNIVERSITATEA POLITEHNICA DIN BUCURESTI	RO
97	Universitätsklinikum Jena	DE
98	UNIVERSITE CATHOLIQUE DE LOUVAIN	BE
99	UNIVERSITE DE LAUSANNE	CH
100	UNIVERSITE DU LUXEMBOURG	LU

101	UNIVERSITE LYON 1 CLAUDE BERNARD	FR
102	UNIVERSITE PARIS-SUD	FR
103	UNIVERSITEIT MAASTRICHT	NL
104	UNIVERSITETET I OSLO	NO
105	UNIVERSITY COLLEGE CORK - NATIONAL UNIVERSITY OF IRELAND, CORK	IE
106	UNIVERSITY OF BRIGHTON	UK
107	UNIVERSITY OF SURREY	UK
108	UPPSALA UNIVERSITET	SE
109	VRVIS ZENTRUM FUR VIRTUAL REALITY UND VISUALISIERUNG FORSCHUNGS-GMBH	AT
110	WEIZMANN INSTITUTE OF SCIENCE	IL



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