FET Consultation - template FET Flagships

Proposal ACE: ACcessible Europe

About you

- What is your background? Are you submitting this proposal as an individual, or do you represent a community or institution?

I am a senior researcher at a public research institute and my background is bioengineering having worked for many years at the borderline between robotics and neuroscience with the dual goal of advancing knowledge of ourselves and developing technological solutions for the weak components of our society. During my career I have seen how important it is to establish a causal link between science, technology and society. Societal benefits deriving from new technologies must be based on excellent science particularly when improving the quality of life of human population is the ultimate goal. With respect to the current proposal of launching a flagship called "Accessible Europe" I am presenting this as an individual but, as described below, in order to achieve the key point of ACE, i.e. to make Europe a better place to be for all European citizens, it is necessary to consolidate a scientifically interdisciplinary community and an heterogeneous and transnational network of users and key societal players of the European Union.

What is the challenge and the vision?

- What is the grand S&T challenge and its underlying vision and what are the main objectives your initiative would address? Why is this a grand S&T challenge and what makes it a "game-changer"?

The main S&T challenge of the flagship "*ACcessible Europe*" (ACE) is to develop the scientific knowledge and the related technologies to make Europe the best and most accessible region in the world. The word "Accessible" here has to be seen in a very ample meaning. Accessible in the social sense means to attract people to Europe by developing new technologies supported by policies and educational programs to remove barriers to social inclusion and to improve the quality of life of all citizens in Europe. *Accessible Europe* must be addressed to the fragile part of our society such as persons with disabilities and elderly. There are so many unique things to see and visit in Europe that are precluded to this increasingly numerous population sector (worldwide). Thanks to advances in knowledge about humans and to new technology, Europe could be more accessible, better understood and enjoyed. Accessible Europe could also address some of the critical issues created by the refugee crisis and the migratory pressure from countries with critical political and economic situations. In particular the use of new technologies for the training of persons with different cultural background and level of schooling for a sustainable integration in Europe could help address a political issue which will remain with Europe for some years to come.

For the fragile as well as refugee citizens new educational tools and technologies can be developed based on our increasing knowledge of human sensory, motor and cognitive disabilities as well as of cultural differences and societal barriers. A particular challenge is posed by the need to develop educational techniques adapted to the wide range of ages and educational levels typical of migrant population and to the "language barrier" which very often still represents an insurmountable obstacle.

The goal is to create an information technology framework to support the European ideal of "unity in diversity". However, access to information alone is insufficient for this to be successful. True inclusivity focussing on individual and social well-being is equally dependent on a sense of belonging and shared values. A central element of ACE is to provide people with meaningful access to our diverse socio-cultural values, allowing people to embrace what it means to be European. For this to work, "access" necessarily becomes a participatory process involving psychologically meaningful bi-directional interaction and social exploration that leverages an individual's natural curiosity. Inclusive well-being is developed, not taught.

The main challenge for Europe and the need for a political intervention establishing an ad-hoc *European Flagship*, is the holistic dimension of ACE which makes the whole rather than the individual contributors the hardest part to achieve. Helping a fragile (or disenfranchised) person become happier depends on knowledge of her/his physical, psychological, social and cultural situation. All factors affecting how to enter in contact with her/him must be addressed. Technologies not explicitly taking these individual aspects into consideration are bound to become useless (and a waste of money). On the other side "miracle" solutions based on immature knowledge not transferable to current technologies are bound to create illusory expectations and frustrations (and a waste of money).

Improving the accessibility of Europe on the basis of a fair, democratic growth is where European citizens expect Europe to make a difference.

- What are the main technologies, including digital technologies[1], which your initiative will advance?

Technologies contributing to ACE are related, in a broad sense, to communication technologies and more specifically to human-machine interaction and communication. The main challenge for ACE is how to improve the mutual exchange of information between humans of all ages, culture and abilities and between humans and the environment. This requires technologies for the exchange of information with citizens with sensory, motor and cognitive disabilities as well as with children and adults with different languages and cultural background. As a few example: technologies for sensory substitution and virtual reality, Brain machine interface, human-robot interaction, self-localization and guides for indoor and outdoor autonomous navigation, digital guides for different levels of education based on virtual reality, automatic speech recognition and instant translation, architectural design and engineering for accessibility etc.. Furthermore a strong effort is needed for the definition and establishment of Europe-wide standards for the exchange, in digital format and in real time, of a wide variety of information including 3D and 4D information in real, virtual and mixed reality scenarios.

It is important to stress, moreover, that the development of new technologies in the above mentioned areas must rely on a deep knowledge about human sensorimotor and cognitive abilities at the population level and at the personal level. As a consequence, studies of these human abilities from the Neuroscience, Social Sciences and Humanities perspective is of paramount importance. It would be a mistake to think that ACE can be driven by technology. ACE must be driven by society which is its ultimate recipient.

Why is it good for Europe?

- Is your initiative relevant for the European industry and what is its innovation potential that would benefit Europe's economy and/or society?

Making Europe more accessible will have important direct and indirect impact on European Industries. ACE will have an important impact on the communication industries at the level of the first and last link in the communication channels namely how to acquire the information from humans and how to deliver the information to humans. In a society where real and virtual realities are becoming indistinguishable and topics like "Internet of Things", Robotics, Ambient Intelligence, and augmented reality, personalized exploitation of information is becoming of paramount importance. This has an impact at the level of designing and manufacturing new electronic and mechanical devices and systems, software development for personalized APPs (including various aspects of learning).

A second area of importance is related to the development of industries and services supporting Europe's cultural heritage and tourism. Europe is an enormous and unique base of touristic sites and a great majority are either very difficult or not accessible at all. Visiting a historic European City for the fragile population can

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[1] See in particular the EU's Digital Single Market Strategy (http://ec.europa.eu/atwork/pdf/cwp_2016_en.pdf)?

be very hard if not impossible. It is worth stressing that we are not only referring to the so-called architectural barriers preventing people to reach specific places (even if this is a major issue) but to the holistic experience of visiting a site with its sounds, smell, breeze, the sensation of touching a marble column and feeling a bas-relief. Worldwide there are big investments in virtual realities and I think we must invest a comparative amount of money in "augmented reality" to stress the uniqueness of a *real visit* vs. a virtual reconstruction (the danger, otherwise, is that Europe will be virtually visited elsewhere with a catastrophic repercussion for tourism industries). We need to convince our citizen and the tourists worldwide that coming to Europe is a plus.

Last but not least, improving the accessibility and integration of new citizens by developing ad-hoc educational methodologies for persons of different age, sensorimotor abilities, and/or culture will allow Europe to exploit the full potentials of its citizens and to create a fairer and better place to live.

- Are there existing international research initiatives linked to this proposal? How would this initiative position Europe with respect to other regions in the world?

As far as I know there is no such holistic initiative in spite of the fact that different communities exist that are contributing separately to the topics of ACE. Even in Europe such communities exist and would benefit from a wider view offered by a flagship project. Some of the past and present FET proactive initiatives could contribute as, for example, the community of the Human Brain Project (HBP) flagship developing an ICT infrastructure addressing relevant aspect of human brain modelling which could be a knowledge base for ACE.

What would it take to do it?

- What is the scale of the effort required to reach the objectives and how long will it take to do so?

To be effective Accessible Europe must be fostered at the European Scale (at least). It has to necessarily blend the contribution of scientists, technologists, users and, at the end of the chain, providers of the technologies and services allowing a more Accessible Europe. Scientists and Technologists to discover what is possible, users to dictate what is needed and providers to deliver it.

As to "how long it will take" I think it is better to see ACE as a European long term, never ending, policy which, however, can start delivering advantages for Europe within a decade and can be working full-force in a couple of decades.

- Why is Europe well positioned in terms of skills/expertise and capabilities, including industrial capabilities, to address the challenge and exploit the results? Which are the research communities to be involved?

Europe is the region of the world with the highest concentration of cultural artefacts and longer cultural history. Europe is also a crossroads and destination of migration flows. ACE may transform both these facts into opportunities by transforming Europe in a more enjoyable place to visit and a better place to live. This is achieved by adapting our countries to fragile citizen and visitors and by forming citizens entering Europe with non-homogenous educational level and ages.

- Are there existing national or European research initiatives linked to this proposal? What is the added value for such an effort at the European level?

Every country in Europe invests considerably in improving and facilitating the access to tourists and, to a lesser extent, for the integration in the society of the newly arrived immigrants. In both cases the sharing of a Europe-wide objective and the coordination of efforts at the European level are certainly beneficial and could result in better results with a more effective used of money.

https://ec.europa.eu/futurium/en/content/fet-flagships

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