Semantics for the new web

Homo informaticus has already lived through a number of epochs. Spread all over the world, this human species will soon be embracing Web 3.0 that is already looming on the IT horizon. The new web promises a host of more personalized services, specifically tailored offerings for use in education and business and the merging of all media forms in the virtual world.

Web 3.0 will be composed of a semantic network, where any information expressed in human language will be “understood” or at least processed by computers.

In this way, homo informaticus’ thirst for knowledge will be quenched by a constant flow of new information sources. Travelers in the future, for example, will receive weather data, traffic news and other practical information based on their preferences and destination. Or, in science and technology, related solutions will be compared with each other in order to identify possible new approaches.

Making such digital dreams come true requires corresponding developments in hardware and software. ETH Zurich is working on a large number of research projects in IT, computer science, electrical engineering and materials science that will lead to a wide range of products and programs in the next web generation that carries – as in the past – the “ETH inside” label.

Few people know, for example, that a technology researched at ETH has long been used in every mobile phone owned by our communicative species, homo informaticus. At the end of the 1990s, a group working under Professor Qiuting Huang performed pioneering research for the digital mobile phone network. Their most significant achievement was the development of the world’s first transceiver using CMOS technology with the lowest recorded power consumption level.

Groundbreaker in mobile phone technology
Consequently, ETH is recognized as one of the forerunners in the research of integrated high-frequency switches based on complementary metal–oxide–semiconductors (CMOS). Today, CMOS technology dominates in the production of high-frequency transceivers. ETH also conducts in-depth research in other areas of wireless communication, such as cooperative mobile phone networks and energy-efficient sensors.

The future homo informaticus will not only use more and more sophisticated devices but will also wear computer systems woven into the fabric of everyday clothing. The Wearable Computing Lab at ETH is developing mini-sensors that are fixed to the body or integrated into clothing in order to perform a number of beneficial tasks.

For example, they enable precise recordings of an athlete’s body movements which can then be analyzed and optimized. Intelligent clothing can also capture health-related data, such as the

On a constant quest for information, homo informaticus also bears the “ETH inside” label.

Smartphones, tablets, apps, etc. – in the fast moving world of IT, ETH Zurich is also busily engaged in research activities and laying pivotal foundations for the digital future.

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Knowledge deficit

Concentration levels suffer when new information is taken in before old information has been processed. ETH professor Elsbeth Stern, Head of the Institute of Behavioral Sciences, evaluates the consequences of people’s daily interaction with IT.

*Ms. Stern, do computers make us dumb?* Not necessarily. People can use computers in order to enhance their mental skills and to compensate for deficits in their memory performance. The devices supplement human intelligence but don’t replace it. It is dumb to think otherwise.

*Does the use of computers and mobile phones change young people’s perceptive skills?* Constantly checking one’s iPhone and surfing the net does not leave concentration levels unaffected – and not only in the case of younger people but in adults as well. Not enough time is given to sustained periods of reflection – and to the resulting accumulation of knowledge which should be flexible enough to cope with new demands. If it is easier and quicker to obtain information from the computer rather than from your own memory, the knowledge network in your head loses strength.

What are the consequences?

Since knowledge is the key to gaining expertise and to thinking deductively, permanent use of IT devices can have a negative effect. No one wants to be operated on by a surgeon who never bothered to learn anatomy because one can always look up where the organs are online.

*What does this mean for learning?* We must carefully consider which content and competencies are important and should form an integral part of the curriculum. Teaching staff should give plenty of thought to deciding which explanations and exercises lead to sustainable and flexible knowledge. It is inappropriate to think that, in light of how quickly the world is changing, there is no longer any value in acquiring knowledge.

*Why does knowledge remain important?* Basic perceptions, insights and questions are still of relevance and must be understood in order to recognize change and innovation.