

Predicting the fate of the Earth

What consequences will climate change have on society and business? What will the future of the world be like? These are topics addressed by computer industry executive Bob Bishop. His International Centre for Earth Simulation (ICES) aims to pool the specialist knowledge of researchers and scientists around the world and make it publicly accessible.

There are scores of well-developed climate centres and hundreds of climate researchers all over the world. Why do we need another new institution like ICES?

Because climate research can only contribute part of the solution. Climate change and its full consequences are so complex that the knowledge from many other disciplines needs to be taken into account – from natural sciences to social and economic sciences. The fate of the Earth cannot be understood without integrating this knowledge. Existing climate research centres examine only part of the problem; they lack a view of the overall picture. On the other hand, we are finally arriving at a position to pool all of this specialist knowledge.

Doesn't the Intergovernmental Panel on Climate Change (IPCC) do precisely that in its reports? It also has chapters on the consequences of climate change for business and society.

What researchers are missing is the computer platform – hardware and software – to integrate all of this knowledge. They do not have continuous access to the world's leading-edge systems.

So you want to merge existing knowledge about climate change using the best computers?

Yes, using advanced modelling, simulation and visualisation tools – because nobody else does. No single country in the world sees it as its task to integrate all of this knowledge across the world, and make it publicly accessible. Nobody feels responsible for the big picture – most countries spend funds only on their own national priorities. The time has now come for a project like ICES. It is only in the last few years that computers, along with



the Internet and other modern instruments, have reached the performance level necessary to even contemplate this task.

How much do machines like that cost?

The purchase price for one of the top ten computers in the world is some USD 300 million, but they are normally leased. Incidentally, the fastest of these machines is currently in Japan. In the last ranking six months ago, however, a Chinese computer led the way.

What are these computers used for?

I assume that the focus is on military and defence use, and related sciences, which in my opinion is a major cause for concern. The overall fate of our planet should be much more important than the development and testing of new weapons. Predicting the future of the planet is a complex problem, but up to now we have not tackled it with our best equipment. So let us use the best systems and people to solve the most urgent problem!

You had a successful career in the computer industry. How did you come to launch an organisation like ICES?

I spent more than 40 years developing and managing companies that focused on the scientific use of computers. In the process, I worked with scientists from a whole variety of disciplines – physicists, chemists, geologists, mathematicians, engineers and medicos. All of them highly specialised. I understand this specialisation and respect it, but Mother Nature doesn't work in that way alone. It is integrated horizontally as well. Although we are dependent on people who have an in-depth knowledge of their work, overspecialisation is a problem today. Researchers do not talk enough with one another beyond the boundaries of their specialist field. In nature, however, everything is linked to everything. We are missing this approach in science. We have to learn to integrate our knowledge!

What role do you have in all this?

When I retired five years ago from my day job, I decided to devote myself to this task – which has become a passion. I believe that you have to be “retired” to do something like this – it is simply not possible during your professional career. Whether it's in business or in science, those who want to progress up the career ladder have to focus entirely on

their specialist field. Now, having left this career behind, I try to use my experience to bring the right people together and to create an integrated, holistic picture of the Earth, for the public good.

That sounds very ambitious...

... and it is!

Do you believe in a formula for the world that explains everything and can be used to calculate everything if sufficient computer capacity were available?

Not at all. But I do think many of the complexities of nature can be unravelled. Complex system theory incorporates a host of very difficult-to-solve problems. Disasters, chaos and discontinuity phenomena are all difficult to manage with computers. But it should be remembered that computers today are 1,000 times faster than they were ten years ago. And in ten years' time, they will be 1,000 times faster again. Provided that we can also develop the necessary software to link the various knowledge areas, we will generate new knowledge and insight with this integration and levelling-up of machine performance. New, hitherto non-existent forecast models and algorithms will be developed and, with the help of these models, we can ask: What if? And simulate different approaches to solving big problems, such as how we can reduce emissions most efficiently, or respond to sea level rise, or best handle resource depletion of the Earth.

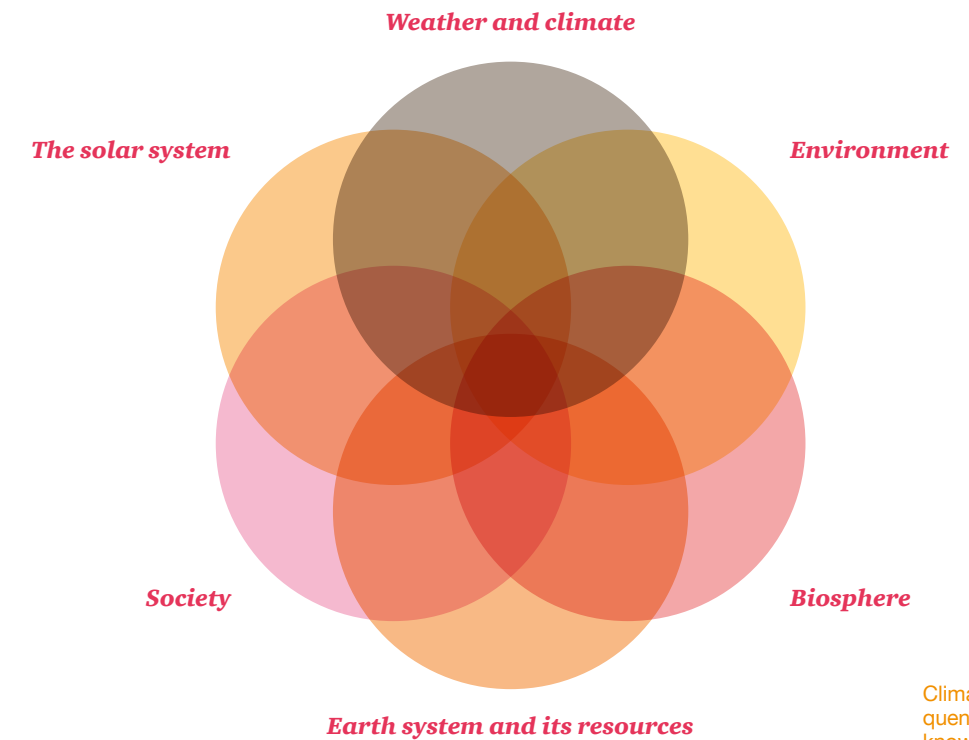
So that is your vision for ICES. What have you already achieved?

I have set up a foundation in Switzerland and appointed an advisory committee with five outstanding scientists. However, the last 18 months have primarily been spent explaining our project at 30 different conferences and institutions around the world. We do not want to set up new methods for collecting data in order to operate our models; instead, we want to work with existing data that is already being collected by various institutions. That means we are dependent on partnerships – and on many of their good ideas as well!

You need approximately USD 300 million for a supercomputer and mention ongoing costs of USD 50 million a year.

How far have you got in procuring funds? I do not ask governments for money; they have enough worries with their own budgets. The money has to come instead from private,

ICES: View of the overall picture



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philanthropic organisations, which is why I talk to foundations that pursue compatible goals to the ICES Foundation. Our long-term financing is not yet in place, but I am conducting very intensive discussions at this time.

Have you received any specific promises?

Unfortunately, no. On the other hand, the project is so ambitious that I am surprised by the very positive reactions alone. People say to me: Yes, that makes sense. But is the project also feasible? Can this type of forecast be realised with modelling and simulation using advanced computer technology? Is it really possible to see the planet's future?

And how does science see it?

At least half the scientists say that something like that cannot be realised – and I respect their opinion. Indeed, if they thought it was simple, they would have tackled a project like this long ago.

How high do you rate the chances of your model for the world actually working by the end of this decade?

100 per cent! The question is only which philanthropic organisation will contribute

to laying the foundations of the project. That is what I am discussing at the moment. Although many people I talk to do not know about the specifics of science, they are familiar with the problem of overspecialisation. And they, too, have an intuitive feeling that nature is a holistic matter. They wonder whether there are holistic answers for the future of our planet. I would say there are. For the first time, we can provide such answers with the help of new systems and sensor technology. It may take a bit more time, but we have to start today.

Who specifically do you now hope will provide financial support?

In the USA alone, 35 billionaires have undertaken to donate half of their assets for the common good before they die. If 500 million dollars were to be invested in many small projects, this would require a huge management effort. Our project, however, is different – it is big, expensive and very ambitious. But its time has come. What's more, it is not about making a profit; the results will be available to everyone. —