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## How are humans going to become extinct?

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**By Sean Coughlan**

BBC News education correspondent

### **What are the greatest global threats to humanity? Are we on the verge of our own unexpected extinction?**

An international team of scientists, mathematicians and philosophers at Oxford University's Future of Humanity Institute is investigating the biggest dangers.

And they argue in a research paper, *Existential Risk as a Global Priority*, that international policymakers must pay serious attention to the reality of species-obliterating risks.

Last year there were more academic papers published on snowboarding than human extinction.

The Swedish-born director of the institute, Nick Bostrom, says the stakes couldn't be higher. If we get it wrong, this could be humanity's final century.

### **Been there, survived it**

So what are the greatest dangers?

First the good news. Pandemics and natural disasters might cause colossal and catastrophic loss of life, but Dr Bostrom believes humanity would be likely to survive.

This is because as a species we've already outlasted many thousands of years of disease, famine, flood, predators, persecution, earthquakes and environmental change. So the odds remain in our favour.

And in the time frame of a century, he says the risk of extinction from asteroid impacts and super-volcanic eruptions remains "extremely small".

Even the unprecedented self-inflicted losses in the 20th Century in two world wars, and the Spanish flu epidemic, failed to halt the upward rise in the global human population.

Nuclear war might cause appalling destruction, but enough individuals could survive to allow the species to continue.

If that's the feelgood reassurance out of the way, what should we really be worrying about?

Dr Bostrom believes we've entered a new kind of technological era with the capacity to threaten our future as never before. These are "threats we have no track record of surviving".

### **Lack of control**

Likening it to a dangerous weapon in the hands of a child, he says the advance of technology has overtaken our capacity to control

the possible consequences.

Experiments in areas such as synthetic biology, nanotechnology and machine intelligence are hurtling forward into the territory of the unintended and unpredictable.

Synthetic biology, where biology meets engineering, promises great medical benefits. But Dr Bostrom is concerned about unforeseen consequences in manipulating the boundaries of human biology.

Nanotechnology, working at a molecular or atomic level, could also become highly destructive if used for warfare, he argues. He has written that future governments will have a major challenge to control and restrict misuses.

There are also fears about how artificial or machine intelligence interact with the external world.

Such computer-driven "intelligence" might be a powerful tool in industry, medicine, agriculture or managing the economy.

But it also can be completely indifferent to any incidental damage.

### **Unintended consequences**

These are not abstract concepts.

Seán O'Heigeartaigh, a geneticist at the institute, draws an analogy with algorithms used in automated stock market trading.

These mathematical strings can have direct and destructive consequences for real economies and real people.

Such computer systems can "manipulate the real world", says Dr O'Heigeartaigh, who studied molecular evolution at Trinity College Dublin.

In terms of risks from biology, he worries about misguided good intentions, as experiments carry out genetic modifications, dismantling and rebuilding genetic structures.

"It's very unlikely they would want to make something harmful," he says.

But there is always the risk of an unintended sequence of events or something that becomes harmful when transferred into another environment.

"We are developing things that could go wrong in a profound way," he says.

"With any new powerful technology we should think very carefully about what we know - but it might be more important to know what we don't have certainty about."

And he says this isn't a career in scaremongering, he's motivated by the seriousness of his work. "This is one of the most important ways of making a positive difference," he says.

### **Chain reaction**

This eclectic group of researchers talk about computers able to create more and more powerful generations of computers.

It won't be that these machines suddenly develop a line in sarcasm and bad behaviour. But research fellow Daniel Dewey talks about an "intelligence explosion" where the accelerating power of computers becomes less predictable and controllable.

"Artificial intelligence is one of the technologies that puts more and more power into smaller and smaller packages," says Mr Dewey, a US expert in machine super-intelligence who previously worked at Google.

Along with biotechnology and nanotechnology, he says: "You can do things with these technologies, typically chain reaction-type effects, so that starting with very few resources you could undertake projects that could affect everyone in the world."

The Future of Humanity project at Oxford is part of a trend towards focusing research on such big questions. The institute was launched by the Oxford Martin School, which brings together academics from across different fields with the aim of tackling the most "pressing global challenges".

There are also ambitions at Cambridge University to investigate such threats to humanity.

Lord Rees, the Astronomer Royal and former president of the Royal Society, is backing plans for a Centre for the Study of Existential Risk.

**"This is the first century in the world's history when the biggest threat is from humanity," says Lord Rees.**

He says that while we worry about more immediate individual risks, such as air travel or food safety, we seem to have much more difficulty recognising bigger dangers.

#### **'Error or terror'**

Lord Rees also highlights concerns about synthetic biology.

"With every new technology there are upsides, but there are also risks," he says.

The creation of new organisms for agriculture and medicine could have unforeseen ecological side-effects, he suggests.

Lord Rees raises concerns about the social fragility and lack of resilience in our technology-dependent society.

"It's a question of scale. We're in a more inter-connected world, more travel, news and rumours spread at the speed of light. Therefore the consequences of some error or terror are greater than in the past," he says.

Lord Rees, along with Cambridge philosopher Huw Price and economist Sir Partha Dasgupta and Skype founder Jaan Tallinn, wants the proposed Centre for the Study of Existential Risk to evaluate such threats.

So should we be worried about an impending doomsday?

This isn't a dystopian fiction. It's not about a cat-stroking villain below a volcano. In fact, the institute in Oxford is in university offices above a gym, where self-preservation is about a treadmill and Lycra.

Dr Bostrom says there is a real gap between the speed of technological advance and our understanding of its implications.

"We're at the level of infants in moral responsibility, but with the technological capability of adults," he says.

As such, the significance of existential risk is "not on people's radars".

But he argues that change is coming whether or not we're ready for it.

"There is a bottleneck in human history. The human condition is going to change. It could be that we end in a catastrophe or that we are transformed by taking much greater control over our biology.

"It's not science fiction, religious doctrine or a late-night conversation in the pub.

"There is no plausible moral case not to take it seriously."

[Your comments \(735\)](#)

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533. [Scott0962](#)

24TH APRIL 2013 - 17:21

+1

Whether humanity may go extinct or whether it even deserves to survive are questions for scientists, philosophers, theologians, and perhaps science fiction writers to debate--the rest of us are busy living.

129. 33ten

24TH APRIL 2013 - 10:40

-26

Well, talk about obvious, as the planet changes the environment that allows our survival will disappear.

This has little to do with population, overfishing or anything else that mankind does. Those are only likely to reduce our numbers but will not directly lead to extinction.

121. newageoracle

24TH APRIL 2013 - 10:32

+51

The Oxford crystal ball has arrived at a logical conclusion about the future of mankind, which many people have already reached without extensive research. Unfettered science for financial objectives rather than conservational aims - pollution of the environment - wasteful exploitation of the earth's resources, slaughter of animals and warfare.....how the movie ends is pretty easy to predict.

119. Vamos Ye Azules

24TH APRIL 2013 - 10:31

+6

There is a massive global extinction event going on right now that we are causing and it is already one of the biggest extinction events in the planet's history. FACT.

It is wrong-headed to rule out "pandemics and natural disasters" because we have survived them in the past. There isn't the data available to be able to rule out the hypothesis that we have been incredibly lucky. OPINION.

30. The Arshavin Codex

24TH APRIL 2013 - 9:38

+35

Our society is incredibly fragile. Without the supports of a modern technological society, how many of us could survive more than a few weeks? Where would our food and water come from? Capitalism is a nanny system which has fostered our dependency in order to profit. In doing so it's brought environmental destruction in its wake but technological development may yet allow us to dodge the bullet.

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