Impact case study (REF3b)

Institution: University of Oxford
Unit of Assessment: 32
Title of case study: Are We Living in a Computer Simulation?
1. Summary of the impact (indicative maximum 100 words) In 2003, Professor Nick Bostrom published a ground-breaking article entitled 'Are You Living in a Computer Simulation?', in which he advanced arguments to suggest that it is more than just a sceptical hypothesis that we might be living in a computer simulation, it is almost certainly the case. This article generated considerable interest, both within the philosophical study and beyond it. It inspired: a popular 'wiki site' devoted to the idea; a highly acclaimed play *World of Wires* (winner of the 2012 Obie Award for Best Direction), which ran in New York and Paris in January and November 2012 respectively; a very successful novel *Bedlam*, published early in 2013; and another novel *The Simulator*, published in July 2013.

2. Underpinning research (indicative maximum 500 words)
 	
Professor Bostrom published his original article 'Are You Living in a Computer Simulation?' in 2003. The idea that we might be living in a computer simulation—a twentieth-century descendant of the Cartesian idea that all our thoughts and experiences might be caused by some malicious demon who is out to deceive us—had been familiar to both philosophers and non-philosophers for some while before then. What was novel in Professor Bostrom's article was his combined use of conceptual and empirical considerations to show that, unless two other plausible ideas are rejected, then this idea is more than just a horrific sceptical hypothesis: it almost certainly represents our actual situation. What had appeared up until then as nothing more than an item of science fiction, a philosopher's artifice designed to test our intuitions concerning how much we know about our environment, suddenly took on the appearance of a hypothesis that demanded to be taken with the utmost seriousness. This naturally captured the public's imagination. Professor Bostrom has continued to refine, develop, and adapt his argument ever since then, partly in response to various counterarguments. He published summaries of his ideas in *The Times Higher Education Supplement* in 2003, in a collection of essays on *The Matrix* in 2005, and in *New Scientist* in 2006. He responded to counterarguments by Brian Weatherson in 'The Simulation Argument: Reply to Weatherson' in 2005 and by Anthony Brueckner in 'The Simulation Argument: Some Explanations' in 2008. In an article entitled 'A Patch for the Simulation Argument', written jointly with Marcin Kulczycki and published in 2011, he noted and addressed a problem with his original argument. Finally, he has created a website devoted to his argument on which there are links to these and other related publications, and on which he addresses a number of frequently asked questions about his ideas.
 	
      The argument of the original article is designed to show that at least one of the following three propositions must be true: first, that the human species is very likely to become extinct before it reaches what could be called a 'post-human' stage of development, i.e. a stage of development at which the capacities of its members radically exceed those of present human beings; second, that a post-human civilisation is extremely unlikely to run computer simulations of its own evolutionary history; and third, that we are almost certainly living in a computer simulation. If the argument is successful, then anyone who wishes to reject the first two propositions is forced to accept the third.
 	
      In his reply to Weatherson, Professor Bostrom rebuts an argument that the third of these propositions needs to be weakened. In his reply to Brueckner, he counters a misunderstanding of his original argument that turns on the issue of whether beings in a computer simulation could themselves create beings in a computer simulation. And in his joint article with Kulczycki, he notes a possibility that he overlooked in his original argument—that civilisations that eventually reach a post-human stage of development have unusually brief prior histories compared to other civilisations—before proceeding to outline two ways of repairing this problem, both of which maintain the original conclusion.
 	
      Professor Bostrom was appointed to a postdoctoral research fellowship in the Faculty of

Philosophy at the beginning of 2003, shortly before he published his original article. Since 2005, he has been Director of the Future of Humanity Institute and, since 2011, Director of the Programme on the Impacts of Future Technology, both under the auspices of the Oxford Martin School.

3. References to the research (indicative maximum of six references)

Nick Bostrom, 'Are You Living in a Computer Simulation?', in *Philosophical Quarterly* **53.211** (2003): 243–55 [DOI: 10.1111/1467-9213.00309]

Nick Bostrom, 'The Simulation Argument: Reply to Weatherson', in *Philosophical Quarterly* **55.218** (2005): 90–7 [DOI: 10.1111/j.0031-8094.2005.00387.x]

Nick Bostrom, 'Do We Live in a Computer Simulation?', in *New Scientist* **192** (2006) [http://www.simulation-argument.com/computer.pdf]

Nick Bostrom, 'The Simulation Argument: Some Explanations', in *Analysis* **69.3** (2009): 458–61 [doi:10.1093/analys/anp062]

Nick Bostrom and Marcin Kulczycki, 'A Patch for the Simulation Argument', in *Analysis* **71.1** (2011): 54–61 [doi:10.1093/analys/anq107]

The website 'Are You Living in a Computer Simulation?', which contains links to these publications, is: http://www.simulation-argument.com/.

The quality of this research is evidenced in each case by the place of publication: the peer-reviewed journals concerned do not publish work that is of not of internationally recognised quality.

4. Details of the impact (indicative maximum 750 words)

The impact falls under three heads: (i) the media attention devoted to Professor Bostrom's work; (ii) the popular 'wiki site' inspired by it; and (iii) the play *World of Wires* and the novels *Bedlam* and *The Simulator* each inspired by it.

(i) Media Attention
Almost as soon as Professor Bostrom's original article appeared, it attracted considerable media attention, and this attention has remained extensive ever since. Prior to 2008, he was interviewed on the core argument by several radio stations, for several television programmes and for several periodicals. Since the beginning of 2008, the interviews have continued. He has been interviewed on his argument by *Sky Channel 200 (Edge Media television news*) in 2008, as part of a programme that was entirely devoted to the argument; by *Mladina*, a Slovenian magazine, in 2009; by Swedish radio in 2009; by *Discovery Channel* (*Canadian television documentary*) in 2009; by *Horizon* in 2010; by *Chilliwack Times,* a Canadian magazine, in 2010; by *IWC Media*, a BBC/Channel 4 science pilot programme, in 2011; and by *New Scientist Magazine* in 2011. One interview in particular, for the series of podcasts *Philosophy Bites* in 2011, has an accompanying on-line blog in which many members of the public have posted comments on the argument and on its subsequent refinements[i]. There is an outline of his argument on the US National Public Radio website[ii]. In 2010, a special issue of *The Philosopher's Magazine*, which provides a venue for philosophy in an accessible and entertaining format for as wide an audience as possible, included Professor Bostrom's idea in its list of 'ideas of the century'. An on-line blog accompanying the television series *Nova*, which describes itself as the most watched documentary series on public television, is devoted to his argument[iii]. In 2013, the University of Georgia Science Library created a library exhibit based on the argument[iv]. The media attention has recently been heightened by the attempt by physicist Silas Beane (in collaboration with others) to provide an empirical test for whether we are living in a computer simulation[v]: the article in which Professor Beane presents this test and in which he explicitly indicates Professor Bostrom's inspiration for his work, is itself cited, in connection with Professor Bostrom, on a number of websites, including TechSpot and i09, as well as receiving further extensive discussion in the media, including discussions in *Time* and on

the BBC programme *Today* [vi]. And the website devoted to Professor Bostrom's own argument has continued to attract considerable attention. It averages around 1,200 unique visitors per day.

(ii) Public Engagement Through the 'Wiki Site'
In 2006, a Dutch businessman named Ivo Jansch, founder of the mobile technology company Egeniq, established a 'wiki site' inspired by Professor Bostrom's article and devoted to the idea of a computer simulation[vii]. This site has continued to expand since. On it, Mr Jansch records his inspiration in the following terms: 'Ever since reading "The Simulation Argument" by Nick Bostrom, I've been planning to create a wiki about the subject, and to bring the information in a less academic, more accessible, format. The result is in front of you.' The site, which has been accessed nearly 200,000 times, has a link to the original article, summarises various arguments for and against Professor Bostrom's position, answers some frequently asked questions about the very idea of a computer simulation, and has links to related articles, discussions, and artwork of various kinds. Those who visit the site are able to create an account and contribute in various ways. Many have added essays of their own. Some have advanced further arguments for and against Professor Bostrom's position. There is even some poetry that has been inspired by the original idea.

(iii) The Play *World of Wires*, the Novel *Bedlam*, and the Novel *The Simulator*
At the beginning of 2012, a play *World of Wires*, adapted from an earlier screenplay by Rainer Werner Fassbinder and directed by Jay Scheib, was premiered in The Kitchen in New York [viii]. The advance publicity for this play made explicit mention of Professor Bostrom's influence and highlighted the importance of the idea that the simulation hypothesis is not just a sceptical hypothesis, but one to be taken seriously as an account of our actual situation. The play is described as 'a performance about the unveiling of a computer simulation so powerful that it is capable of simulating the world and everything in it,' and it is said to be inspired by the works of Professor Nick Bostrom, who, 'in his 2003 paper titled "Are You Living in a Computer Simulation?"... theorised that there is a high probability that we are currently living in a computer simulation'. Subsequent publicity has been similar. The play is described as 'an all-bets-off homage to the startling possibility that you too might actually really be ones and zeroes in someone else's immaculately programmed world' and is then said to be 'inspired by the works of Oxford University professor Nick Bostrom, including his compelling paper, "Are You Living in a Computer Simulation?"'

In a contemporary arts and culture website called Culturebot, Jay Scheib was interviewed about the play. He was asked how the disciplines of computer science and artificial intelligence had helped him generate material for his play and about 'the interface with professionals or research in these fields'. He responded as follows:

> For this production, someone approached me after a performance of *Untitled Mars* [i.e. an earlier play in a trilogy of which *World of Wires* is the third part] and said, 'Oh my God, do you know the work of Nick Bostrom?' So I found this guy who is the Director of the Future of Humanity Institute and Professor of Philosophy at Oxford University. He wrote a paper called 'Are You Living in a Computer Simulation?' [to which there is a link]. In the white paper he speculates that there's a pretty high probability that we are in fact living in a computer simulation. It turns out that the idea has a healthy following. The article is brilliant and synthesizes a number of interests that I've had over the years growing up, reading about simulation and finding myself drawn into the world of MIT and artificial intelligence, so it's been an interesting ride. [ix]

Reviews of the play have also highlighted Professor Bostrom's influence. In the *New York Times* review, the reviewer remarks that the play 'was... inspired by an essay in *The Philosophical Quarterly* (by Nick Bostrom) titled "Are You Living in a Computer Simulation?"' [x]. In the on-line version of the review this remark includes a link to Professor Bostrom's website on his argument.

In 2013 ,Christopher Brookmyre published a novel entitled *Bedlam*, whose main character Ross Baker is much exercised by Professor Bostrom's argument because his mind has somehow been rerouted into a computer game. The enthusiastic *Guardian* review of *Bedlam*, by Sam Jordison, opens with a summary of Professor Bostrom's argument and proceeds to expand on its

critical relevance to the novel, quoting Ross Baker's own account of the argument [xi]. Later in the review, Mr Jordison says: 'Ross's journey into knowledge takes in more Bostrom-inspired philosophy about the nature of existence and ethical considerations about our growing digital heritage.' In July 2013, Nicholas Hark published a novel entitled *The Simulator*, which takes place at a time in the future when technology has advanced enough to allow for realistic computer simulations. The main conceit of the novel is that the military has set up special intervention units that take part in both real and simulated homeland security exercises, but with the twist that they never know which. In an e-mail to Professor Bostrom, just after the publication of the novel, the author wrote, '[My novel] has been inspired by your work.' [1]

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5. Sources to corroborate the impact (indicative maximum of 10 references)

Testimonials
[1] E-mail from author of *The Simulator*

Other evidence sources
[i] The blog of responses to Professor Bostrom's *Philosophy Bites* podcast appears at:
http://philosophybites.com/2011/08/nick-bostrom-on-the-simulation-argument.html.
[ii] The outline of his argument on the NPR website appears at:
http://www.npr.org/blogs/13.7/2012/11/20/165528528/the-reality-of-reality-may-not-be-reality?ft=1&f=114424647.
[iii] The blog accompanying the television series *Nova* appears at:
http://www.pbs.org/wgbh/nova/physics/blog/2012/03/do-computers-dream-of-electric-people/.
[iv] The University of Georgia Science Library exhibit can be viewed at:
http://www.flickr.com/photos/95808521@N02/sets/72157634199265595/.
[v] The article by Silas Beane (and others) can be found at: http://arxiv.org/pdf/1210.1847v2.pdf.
[vi] The places mentioned in which this article is referred to in connection with Professor Bostrom are:
http://www.techspot.com/news/50468-physicists-may-prove-we-exist-in-a-computer-simulation.html
http://io9.com/5950543/physicists-say-there-may-be-a-way-to-prove-that-we-live-in-a-computer-simulation
http://techland.time.com/2012/12/13/red-pill-blue-pill-is-the-universe-just-a-giant-computer-simulation/.
[vii] The wiki site established by Ivo Jansch appears at:
http://simulism.org/Simulism_Home.
[viii] The advertisements for *World of Wires* appear at:
http://www.jayscheib.com/wires/
http://www.theatermania.com/off-off-broadway/shows/world-of-wires_188183/.
[ix] The interview with Jay Scheib for Culturebot appears at:
http://culturebot.net/2012/01/12128/world-of-wires-at-the-kitchen-an-interview-with-jay-scheib/.
[x] The *New York Times* review of *World of Wires* appears at:
http://theater.nytimes.com/2012/01/17/theater/reviews/world-of-wires-at-the-kitchen-review.html.
[xi] The *Guardian* review of *Bedlam* appears at:
http://www.guardian.co.uk/books/2013/feb/14/bedlam-christopher-brookmyre-review.