Once computers were designed just to crack codes – now they're part of every aspect of life

Brave new world

Martin Ince talks to Professor Bill Dutton about the legacy of Alan Turing and the internet's ability to empower

2012 MARKS THE 100th anniversary of the birth of Alan Turing. Now regarded as one of the creators of the computer age, Turing died by his own hand just before his 42nd birthday. He was receiving drug treatment imposed by the court after a conviction for homosexual behaviour, then a crime in Britain. Since then, the enigmatic Turing has become a hero. He is remembered for his theoretical insight that a computer can be a 'general-purpose machine' that can solve any type of problem. And he is idolised for his role in World War Two, using some of the first modern computers to break German codes, a breakthrough thought to have turned the tide in the Battle of the Atlantic.

But what does Turing mean today? Professor Bill Dutton, director of the Oxford Internet Institute (OII) and one of the world's leading social science experts on the IT revolution, is in no doubt about his importance. "I think of him as one of the early inventors of computing, alongside Charles Babbage, and I am struck by how visionary he was. In his era, people thought computers were machines for doing calculations. Now we use computers in every aspect of life from work to entertainment, so they are true general-purpose machines." Professor Dutton points out that despite the universality of PCs, laptops, smartphones, tablets and the rest, there are still "far more stages" to go in the development of the general-purpose machine. "The leading edge now is in the recognition of facial expressions, voice and gesture," he says. "This is one key to better human-computer interaction that goes beyond the keyboard, keypad and mouse."

This is not merely a technical issue. OII's survey data shows that about 27 per cent of people aged 14 and over in Britain are offline. They tend to be less well-to-do or older people in need of government services. "These people would benefit from access to the internet, but it is hard for them to use the current interfaces. Our research shows that the internet is an experience technology. If you explain it to people, they don't get it. When they use it and realise it can do everything from showing them a film to filing their tax return, they do. Because many people who use government services are still not online, and governments need to reach all, e-government has been slower to develop than e-commerce." This divide is especially marked for older people. OII data shows that over 63 per cent of people beyond retirement age are not online. At the moment, says

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Professor Dutton, most recent thinking about information technology for the old is based on the "internet of things". This concept would involve people being tracked and monitored by devices, often while being left mainly on their own, and he finds this a frightening vision.

Instead, Professor Dutton's idea for the future of IT is that seniors might have what British computer scientist Yorick Wilks and his colleagues call a 'digital companion' that would support them and connect them to the rest of the world. He argues that older people are just like the rest of the population. "In general," he says, "people who use the internet socialise more in other ways than the rest of the population with their families and friends. The internet does not cut people off; it reconfigures who we know and what we know."

Professor Dutton also agrees that on occasion, the internet allows people to know too much about us. Internet developments such as location tracking allow new levels of intrusion into our lives. But he is optimistic about the long-term. He says: "Companies such as Google and Facebook are now competing to offer users more control of their personal information. People are becoming less naive about this issue and are asking for as much control online as they have in the physical world." He adds that privacy is a big concern in Asia, Latin America, South Africa and other areas where internet use is growing the fastest. "People in these nations do not have the range of open channels of communication that we are used to in Europe or North America. This might help explain why they value the internet as much or more, and are less likely than Americans or

Europeans to support government efforts to 'control' it." By contrast, he is highly sceptical about the idea, circulating after the summer 2011 rioting in Britain, that digital media can simply be turned off to avoid social unrest.

Instead, Professor Dutton believes that the internet is already empowering new forms of knowledge and awareness. Key to this is his concept of the 'Fifth Estate'. He explains: "The idea of the press as the Fourth Estate dates back to Edmund Burke in the 18th century, when the three estates of the realm were the clergy, the nobility and the commons. Now we might think of them as the intellectual, business and political classes respectively, while the fourth estate now includes broadcasting and other mass media."

THE FIFTH ESTATE AND BEYOND

The Fifth Estate goes beyond existing media to include a wide range of networked individuals and organisations that use online information – and which connect to others online – and which is not subject to central control or planning. Examples include the multiplicity of support groups for sufferers from specific medical conditions. They share information as well as support, and offer a new way to challenge established authority.

Professor Dutton agrees that journalism as practised by the Fourth Estate is still needed, although a business model to pay for it remains elusive. And he says that people who are often online also watch a lot of TV and read newspapers. But he is struck by the flexibility and scope of the internet as a news source, and as the enabler of the Fifth Estate. "A newspaper covers a small number of subjects with a single article about each," he says. "In the online world you can find more articles on a specific subject. And there is coverage of a wider range of issues, such as minority as well as mainstream election candidates." He sees the Fifth Estate as a whole new machine for holding authority to account. Its remit even reaches the Fourth Estate, with a website dedicated to exposing journalists who reprint press releases instead of getting their own stories. Another favourite is the Indian site ipaidabribe.com.

The Fifth Estate, says Professor Dutton, is under the radar of most academic research, which has an institutionally blinkered view of the effects of the internet. It tends to focus on issues such as moving present-day systems of government online. He says: "These networks exist outside government, do not have international boundaries and can support action against the powerful. Their emergence is the most dramatic current consequence of the ways we use the internet." ■

microsites.oii.ox.ac.uk/oess

Professor Bill Dutton *is Principal Investigator of the Oxford e-Social Science Project, supported by the ESRC*

Testing technologies

Non-invasive prenatal diagnosis technologies raise ethical questions about antenatal screening and testing

PREGNANT WOMEN FACE a range of examinations. But sometimes a test or examination requires consideration. Amniocentesis, for example, most often used to test for Down syndrome in the foetus, is an invasive procedure that carries some risk of miscarriage (estimated by the NHS to be between 1 in 100 and 1 in 200). Because of this, most pregnant women are offered some form of screening to identify whether their pregnancy has a sufficiently high likelihood of abnormality to justify such a test. Prospective parents in this situation must weigh the miscarriage risk against factors including the value of the diagnostic information and what steps they might take. These are difficult choices, requiring careful counselling and support.

Technological advances now allow for the clinical introduction of Non-Invasive – and therefore safe – Prenatal Diagnosis (NIPD) for a range of genetic conditions. A simple blood test removes the risk of miscarriage – making management of some clinical conditions in pregnancy easier – but also opens up a new world of information about the foetus. The development of NIPD testing coincides with a number of other developments in the broader world of genetics, including direct-to-consumer genetic testing. Currently, foetuses diagnosed prenatally with Down syndrome are frequently aborted, but the numbers of women undergoing diagnostic testing are small. With more widely available NIPD, will the number of terminations rise? How will prospective parents make decisions about whether to test, and what to do with the information, for an expanded number of conditions? Will there be limits? And who should decide?

Researchers Dr Susan Kelly and Dr Hannah Farrimond at the ESRC Centre for Genomics in Society (Egenis) have been exploring the ethical, legal and social implications of NIPD, including a survey of public attitudes. "Although there was a wide range of views, we did find a consensus of concern about NIPD being offered directly to consumers," explains Dr Kelly. "Participants argued for the need for

Prospective parents will need support to understand and to deal with the results

health professionals to act as gatekeepers to and interpreters of these testing technologies. Prospective parents will need guidance to understand the implications of testing before it takes place, and support to understand and to deal with the results." Is our healthcare system ready to provide this?

NIPD technologies raise new questions about the public health justifications for routine antenatal screening and testing, but there is a major ethical dimension too, not least in considering attitudes towards disability. The Egenis researchers are bringing together experts from around the world engaged with NIPD to consider emerging practice. A symposium hosted by the Brocher Foundation in Geneva will consider development efforts in the light of the ethical and social implications and of intellectual property and regulatory issues. It is hoped the event will lead to the creation of an international, interdisciplinary 'network of expertise' among scientists, bio-ethicists, social scientists and health policy researchers. Such a network could be called upon to advise governments and other regulators as they develop policies on clinical implementation. ■

www.genomicsnetwork.ac.uk/egenis

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Less invasive tests are now available in pre-natal care, offering women safer choices