THE ANNUAL REGISTER 300TH EDITION: A PERSONAL FUTURE

To mark the 250th edition of The Annual Register*, we publish a piece of informed speculation about how the AR—and the world—might be 50 years hence, on the occasion of the book's 300th edition. The article by Richard O'Brien, Partner, Outsights, who has been the Royal Economic Society's representative on the AR advisory board since 1995, looks at the emerging trends of 2008 to suggest potential futures. The piece is written from the perspective of an AR reader in 2059.*

ONE of the great advantages of modern publishing is that we can instantly compile our own personalised version of *The Annual Register* on a theme of our choice, drawing on the erudite essays that are constantly fed into AROnline. This year, I have chosen as my theme "Spaces in the past 50 years". In true AR tradition, my personalised volume is based on the finest scholarship and is written in "plain English". It also always throws in enough anniversaries to remind me how long some things take to happen and how quickly the world can advance. My personal themed AR compilation supplements my regular AR from AROnline, which is also "personalised" but where the search engine decides what interests me: this at least keeps the information flow down to a manageable amount.

To develop my theme of "Spaces in the past 50 years", I have chosen to look at five spaces that extend my vision beyond a simple geographical review of the world. I have chosen to look at the new spaces that we now populate (on Earth, beyond the Earth, and in virtual reality); the spaces that we have had to abandon; and the developments in understanding what goes on inside our heads, in our "inner space". Hopefully, my personalised AR will give me some good ideas to discuss tomorrow evening with my great grandchildren, who somehow seem to be always one step ahead of me.

EMERGENT SPACES: THE POLES AND SIBERIA. Most of the coverage that the AR has given to the great emergent spaces of the 21st century—the North and South Poles and the Russian Far East—has been due to three interlinked reasons: governance, natural resources, and climate change. Fifty years ago there was intense focus on the melting Arctic ice, at the time the most visible manifestation of the impact of climate change as polar bears migrated and ice collapsed dramatically onto the last few tourist ships plying the region. We discovered our planet's climate history stored in the polar ice core readings. The melting of the polar ice, happening faster than expected, raised our sea levels and, most controversially, now does seem to be taking northern Europe closer to a new ice age, scientists always having been sharply divided on whether the North Atlantic "conveyor belt" of warm air would, indeed, shut down.

The Arctic governance question has been intense, ever since Russia dramatically planted its flag on the seabed 50 years ago (see AR 2008, p. 109). The Ilulis-

sat Declaration of 2008 (see Documents) between the five coastal states of Canada, Denmark, Norway, the Russian Federation, and the USA, agreed that the issues would be worked out within current legal regimes (such as the Law of the Sea Convention, the International Maritime Organisation, and the Arctic Council), as opposed to under a new regime or "Arctic treaty". Whilst that has held up as a framing principle, the competition for Arctic resources has involved many more countries and allies—not least the EU, through Denmark, its sole representative amongst the "Arctic five"—because, unlike Antarctica, there has been little land emerging from the ice. Early estimates of the Arctic accounting for almost one-quarter of the world's undiscovered, technically recoverable energy resources have, as always, proven very wide of the mark, and competition has intensified as the world's resources have become closer to their much predicted "final depletion". Policing the fabled Northwest Passage that opened in 2007 (see AR 2008, pp. 461, 465), bringing Asia much closer to Europe, has also had to be assured in a world of increasing sea piracy and crowded shipping lanes.

Literally at the other end of the world the change has been dramatic. The priest of Trinity Church, regarded back in 2008 as the only permanent resident of Antarctica (the population of which at the time fluctuated seasonally between 1,000 and 5,000), would have a hard time ministering to today's population of 3 to 4 million, equivalent to around one-half to two-thirds of that of countries such as New Zealand, Ireland, or Denmark. For a human touch, I see that last year, in 2058, the first person to be born on the Antarctic landmass, (and, curiously, also the only person known to us to have been the first human born on any continent), returned from Argentina to celebrate his 80th birthday there. In four years time they are also planning to mark the 150th birthday of the first person to be born in the South Polar region itself. Indeed, as the AR celebrated its first quarter century in 1786, sealers on South Georgia were becoming the first semi-permanent residents of the region; and it was back in 1775 (when the AR was less than 20 years old) that Captain Cook was the first to see Antarctica. The continent has grown up with the AR (and, of course, "Antarctica" has been a separate editorial section in the AR for quite some time).

Inevitably, people, plus resources, and a landmass have raised the governance stakes. This year will mark the centenary of the signing of the first Antarctic Treaty (1 December 1959, see AR 1959, pp. 416-17), which has been the framework for intense debates in recent years. Antarctica remains a special place for the world's scientists. Better access has cut the cost of research, but scientists complain about the changing conditions: no longer is it the pristine place unsullied by human habitation. Like the Arctic, the melting of the region has been seen as a major cause of the rising sea levels, whilst researchers, such as those at Cape Roberts, are learning much about our climate history from their ice core investigations, still important in trying to understand how mankind can alleviate climate change and what still lies ahead.

When the Poles were less accessible, the risks of serious conflict were limited, even between the major powers who could "afford" to travel there. That

has all changed. The major powers now struggle to police both regions, although, as a result, they have tended to reach settlements between themselves in order to focus on disruptive forces, to manage the influx of climate change refugees and resource speculators with easy access to technology, as well as to protect the wildlife diversity, itself changing, for climate change refugees are not only human.

The third great space to emerge from under the ice has been Siberia. Though it continues to be located entirely within one sovereign state, the Russian Federation, this has not diminished the governance or territorial controversies. As with other emergent spaces, control over the resources has been a key variable. At the advent of the 21st century, Siberia alone accounted for almost 90 per cent of Russia's natural gas production, 70 per cent of its oil and coal output, most of its reserves of non-ferrous and rare metals, and large amounts of explored chemicals. It had half of Russia's forests (many now consumed by fire), and more than half of its water and hydropower resources. Lake Baikal held 20 per cent of the world's freshwater reserves (whilst neighbouring China suffered from one of the world's worst water deficits). Retaining control over the region has been a challenge for Russia, not least as the Russians are now a minority in their own territory. If you visit today, you will notice that most of the population is Asian in origin, with the Chinese constituting the largest ethnic group. At first, much of the Chinese labour in the region was transient, but as numbers have increased more have stayed. The challenge of "dual integration" posed by President Vladimir Putin many years ago remains key: integration of this vast landmass and growing population into Russia, and of the area into the Asian region. In retrospect, that the integration has taken place without conflict has been a success.

The other success has been in tackling the great methane question. Fifty years ago, one of the enormous uncertainties was the impact of the methane—a gas with 20 times more impact as a greenhouse gas than CO_2—being released from the Arctic seabed and the melting tundra. As a resource, it was said to dwarf global coal reserves. Global co-operative investment in technology by the world's scientists, and in infrastructure by the energy industry and governments, has enabled much of the methane to be tapped and controlled in ways that were unforeseen in 2008.

Much of the region is physically changed from 50 years ago, as the tundra has melted and been replaced by the thermokarst landscape of rounded grass hillocks, the appearing and then disappearing lakes, the grass and scrubland, the landslips and exposed rocks. Access is still difficult, with the old infrastructure built on ice no longer usable and huge costs involved in connecting this space to the rest of the world, with the priorities lying in piping and transporting its resources.

DISAPPEARING SPACES. As the ice has melted, so coastal lands have "disappeared" below the sea. Low lying islands and the highly populated delta areas have been the first to be affected—Bangladesh, the Nile, the Chiang Jiang or Yangtze delta in China, the Godavari River delta in western India—areas where people have

been traditionally vulnerable. But it took a long time for people living by the sea, everywhere, to understand that their seas would rise too. With more than half the US population living in coastal cities, the magnitude of the potential "invasion" was slowly realised. It was not necessary to be hit by Hurricane Katrina (see AR 2005, pp. 121-24), or be already below sea level, to be at risk; much of urban life has been affected. The communities that have coped the best have generally done two things: assessing realistically the size of the threat and developing a comprehensive plan. Strategies for dealing with the threat have ranged from raising barriers, which produced some alleviation, to planned relocation, which turned out not to be so hard for those countries such as the USA, which has either built or remodelled 80 per cent of today's buildings. The cost of rebuilding elsewhere, and better, clearly was not impossible, and it was sensible to build new capacity in safer areas for the additional millions in our cities. In the next 50 years the challenge will intensify in many ways, eroding coasts and the natural environment, not just our cities.

People are, however, seeking other ways of looking at the rise of sea levels, by starting to populate the sea itself. This idea has not really caught on yet, but as population and seas rise further then maybe 50 years from now we will have to think differently about the notion: we are still losing usable land to desertification, to falling water tables, and to mankind's continued destruction of the quality of land. While some of the more dire predictions made in 2008 of the impact of climate change could be ignored as they concerned a date long in the future—2100—we now find ourselves more than halfway there.

OUTER SPACE. It is now just over a century since mankind achieved what once would have been purely a journey for the imagination: travelling into Space (a capital "S" is still warranted). Very recently, we have had a spate of centenary anniversaries. The year 2057 marked the centenary of the launch of the first man-made Earth satellite, the Soviet *Sputnik* (see AR 1957, pp. 468-70); in 2058 we celebrated 100 years since the first attempt at a direct hit on the Moon, the 100th birthday of the USA's National Aeronautics and Space Administration (NASA), and the coining of the word "aerospace"; and this year, of course, marks 90 years since the first Moon landing (see AR 1969, pp. 376-81). Perhaps the initial leg of this journey was just over 150 years ago with the first powered flight in 1903. But since the flurry of the Soviet-US Space race, things seemed to slow down, budgets were cut, and Space became less important. With hindsight, we can see that this was a classic S-curve, where, after the first flurry of attention, and after the dramatic breakthrough and event, things settled down to consolidate, before the next advance was made.

Travel to Space has started to become routine, with civilians booking their tourism tickets and plans to develop space hotels. The famous nanotube Space elevator has been built. We have also seen 50 years of steadily pushing back the frontiers of our knowledge and achieving an even better familiarity with Space. Three dimensional mapping has helped people grasp the geography, while cheap microsatellites have slashed the cost of access to Space. We know so much more about the physical

attributes of the planets. We are now mining the Moon. Perhaps our familiarity with Space was raised several notches during the 2029 and 2036 close encounters with Apophis, the asteroid that threatened twice to collide with Earth.

We have extended our political and economic governance of Space. This has not been without its tensions, given the competition to lay claim to the resources of Space and the need to govern the territory where the world's communications network is located and where, now that access is so much easier, rogue elements could be devastatingly disruptive. It is also now 100 years since the first proposals were made to the UN to avoid Outer Space becoming a battleground. These were put into legislation a decade later, in 1967, with the Outer Space Treaty (see AR 1967, p. 143), which was modelled on its predecessor, the 1959 Antarctic Treaty, the first of these so-called non-armament treaties (see AR 1959, pp. 416-17). Keeping Outer Space conflict free in the past 50 years has been hard and the risks are clearly rising alongside the opportunities. Perhaps most disappointing are the new risks we have created, the immense Space debris problem not only constantly disrupting communications but also a greater potential danger to us than any asteroid.

INNER SPACE. If travel to Space was once a journey to the imagination, so also was the journey to somewhere much closer: into our minds, physically close, but far from being properly understood. Scientific revolutions have been truly phenomenal in the past 50 years, even if the famous "singularity" (the explosion of intelligence caused by self-improving machines) has not come to pass. We have been able to create artificial life. Robots are part of our daily lives and have "rights and responsibilities". Nanoscience has revolutionised the ways in which we can manipulate our environment. But one science that has truly taken us into uncharted territory has been neuroscience. Just as medicine floundered for centuries before the body itself was properly understood, so before the 21st century neuroscience was quite primitive. The real revolution for mankind, however, has come from the consequences of this development. Our understanding of how the mind works takes us so close to what we have labelled values, beliefs, or the soul, and challenges our own sense of personal responsibility. The advances have been shaped in combination with other sciences, such as the neuroimaging advances in information technology, the advances in biology and genomics, and the linking with behavioural sciences.

For the world's religions this has been as revolutionary as the advances in geology in the 19th century, when fossils challenged the stories of Noah's Flood and the theory of evolution challenged the Biblical story of the Creation. Already 50 years ago, as neuroscience began to be able to predict more of what people would think or do, our Nobel laureates were asking, "Is there free will after all?" Now we seem to take for granted our new knowledge about what we know: 50 years ago it was pretty clear that we were on the edge of some "tipping point". Coming alongside the new ability to create "artificial life"—the physical side of ourselves—mankind has truly been transformed.

In practical terms, it means that we can now treat and often avert many of the so-called diseases of old age, such as Alzheimer's and Parkinson's. This has proved crucial now that (in richer countries at least) we expect to live to at least

90 years and want to enjoy a full life. Becoming a centenarian is no longer so special, even though holding down a full time job at 100 is still quite remarkable. We are expected to work until 90 years old before we qualify for any full pension, although many people "retire" earlier if they have saved enough to be able to make that choice. We can now repair our brains with replacement parts, which have become as commonplace as other body part substitutes. IBM's plan to create a "brain" by 2030, combining neuroscience with information technology, was completed well ahead of time. Again there has been a major practical advance: we can link our own brain signals directly to our computing equipment, now that we can identify the way in which particular brain signals work. It certainly seems to help those with brain injuries and the mentally impaired, where lost capabilities can be supplemented or "replaced".

Some of our discoveries have perhaps not been a big surprise, but merely confirmed what we used to call "common sense" and observed behaviour. In the same way, the limited genetic information we gained some 50 years ago was no more predictive than just knowing about our parents and grandparents. Combined with other advances in cognitive psychology, genomics, and biology we can now manage behaviours much better: for example, drug additions can be both understood and treated. Perhaps predictably, this has not reduced our use of drugs, the variety of which has increased greatly, but only made us more liberal in their use, knowing that there is a "cure".

Neuroscience has also taken communication to a new level: indeed, we now "talk to the animals" or, rather, we are better interpreting their sounds and influencing animals themselves. Animal rights groups have been strongly opposed to much of this work, especially that which has led to the greater use of animals in warfare. As ever, science has created new challenges for society simultaneously with the solutions that it has provided. Looking back, though, one great relief is that societies have at least not rejected science, something that has been a constant danger.

VIRTUAL SPACE: EVERYWHERE AND NOWHERE. The "net" is getting close to its centenary from its earliest creative days. Fifty years ago, it was well embedded in society, taken for granted in fact, and now we work in multiple worlds. In 2007, it was being said that "by 2050, the first child will be born that does not actually distinguish between the virtual world and the real world, because these virtual worlds will be that convincing." Why did they think it would take that long? Whilst the success of the pioneering online commercial site, "Second Life", was often dismissed with the counter-reaction of "get a life", online activity soon became as acceptable as personal interaction, just as, over time, the telephone became a perfectly acceptable way of dealing with people.

It took a few more breakthroughs to get us where we are today. Embedding chips in everybody has been essential. First, it was made near essential as a means of monitoring and administering health to our bodies and of carrying private information and literally all that people once had to remember: a great improvement on a losable plastic card, memory stick, or any of the various devices one can see in

the online (virtual) museum. Secondly, data security has had to be well protected. It is still not perfect, but the legal world remains one step ahead of the illegal (yes, that distinction holds). Thirdly, socially we have had to accept that the virtual world is a truly alternative space in which to spend our lives. Fifty years ago "gaming" was one of the hot trends in information technology, creating new worlds in which people could play. In some senses, this was no different from the escapism enjoyed in films, art, and books for centuries; and, just as films and television were once believed to distort and influence people's visions of reality, gaming became more than escapism, as people began to find it harder to differentiate between their real and their virtual lives. Meanwhile, so-called "reality TV" was often quite the opposite, with its artificially created environments in which to watch selected people play out a so-called life reflecting modern mores, a laboratory experiment deliberately cordoned off from the rest of us.

Ultimately, the big achievements of virtual space have been threefold. First, in the extension of who and what participates in the virtual world, linking humans with other forms of biological life and with artificial life. Secondly, in overcoming the danger that we would be smothered by the avalanche of knowledge: we take it for granted now, but managing the volume of data and the complexity of the connections has been an immense task. Thirdly, the fact that we have been able to deliver on the great hopes for artificial intelligence.

Because we now live our lives on- and offline, to use the old distinction, we have, as with all other spaces, had to develop governance mechanisms. Although it was developed by the US military in conjunction with relatively closed research environments, the Internet had a culture of openness and freedom, regarding governance as a necessary evil to be minimised. It now has the full trappings of governance, based on the early efforts of ICANN (Internet Corporation for Assigned Names and Numbers) and multilateral intergovernmental arrangements. There really is no distinction between online and offline governance, any more than there is any sense of difference between virtual and real. As many have said, it's all in the mind, and one century and one decade after the publication of George Orwell's *1984*, we each still have one of those, don't we?

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