

HSE Scenario Project: The Digital Rose Garden

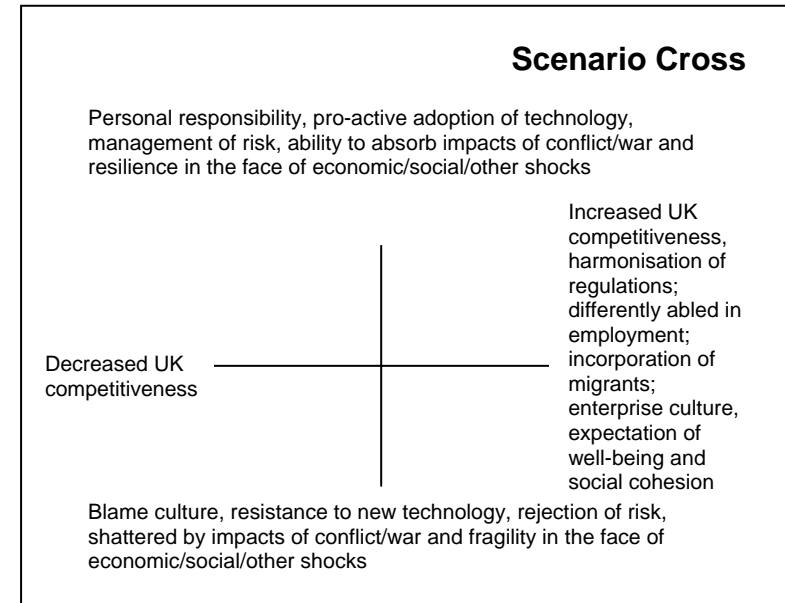
Introduction:

This scenario is one of a set of four comprising HSE's Scenarios for the Future of Health and Safety in 2017. The scenarios resulted from discussions and group work during a scenario-building workshop (20-21 July 2006) hosted by HSE's Horizon Scanning team as part of a wider scenario-planning project. Participants prioritised change issues and created the 'scenario cross' to the right that provided the logical framework for the four scenarios. The time horizon targeted was 2017. This scenario, 'The Digital Rose Garden', is driven by increased personal responsibility and increased risk tolerance combined with increased UK competitiveness in the global political economy (illustrated lower right).

Scenarios are not predictions of the future - they are vivid stories about possible futures. They help us explore the boundaries of uncertainty defined by specified drivers of change. Scenarios written for interactive exercises are typically brief, depicted in personal rather than institutional anecdotes, and salted with humour (laughter aids impact and memory). But these are best based on research scenarios: longer narratives, depicted in broader terms. The research scenario for 'The Digital Rose Garden' begins with a brief overview of conditions in 2017 and the historical changes that created them. It then explores how life is different in this future in greater detail:¹

- What concepts, ideas and paradigms **define** the world around us?
- How do we **relate** to each other – what are the social structures and relationships that link people and organisations?
- How do we **connect** with each other -- what technologies connect people, places and things?
- What are the processes and technologies through which we **create** goods and services?
- How do we **consume** goods and services – how do we acquire and use them?

The scenario finishes by focusing on the changing workplace, and changed health and safety issues.



The Digital Rose Garden

Personal responsibility, pro-active adoption of technology, management of risk, ability to absorb impacts of conflict/war and resilience in the face of economic/social/other shocks

Increased UK competitiveness, harmonisation of regulations; differently abled in employment; incorporation of migrants; enterprise culture, expectation of well-being and social cohesion

These Scenarios were produced by Infinite Futures working with SAMI Consulting and the Health and Safety Laboratory. They are intended to stimulate thought and are in no way predictions of the future. They do not represent HSE views on how the future may develop.

'The Digital Rose Garden'

Overview

As the 20th century ended, analysts wrote '2020' forecasts, scenarios, and visions – for cities, provinces, and countries; for companies, agencies, and entire sectors; and for species, ecosystems, and planetary dynamics. From the vantage of 2017 – within hailing distance of 2020 –

Britain has harnessed the creativity of its diverse society in service to both the economy and the environment. This renewed, cohesive spirit of innovation looks likely to create the 'Roaring Twenties' of the 21st century. A bumper crop of new businesses has energised the national economy. Graduates in the sciences and mathematics are partnering with the best in British design, generating economic value in biosciences, materials sciences, and nanotechnology, and attracting a brain *gain* internationally. Expert youth are working with experienced seniors on the real millennium challenges: global climate change, poverty, and sustainability.

British employees are staying at home, and so are Britain's businesses. Offshoring is declining – as BRICs (Brazil, Russia, India and China) and emerging economies increase their wealth and the salaries paid to their workers, the comparative advantage of overseas labour has declined. Increasing international standardisation of

regulations has also raised overseas operating costs, particularly in comparison to the leaner, rationalised regulatory framework in the UK.

People are channelling their inner Edmund Hillary – or, more appropriately, their inner Kevin Warwick (pioneer in the human-machine interface; he embedded a microchip in his arm). It's the age of cool explorers and new adventures; risks are acknowledged, weighed, and managed in cooperative public-private partnerships that enable a continuous stream of responsible innovation. This heightened comfort with managing risks heightens comfort with transformative technologies on an individual level as well; history may come to know this new 'Roaring Twenties' as the 'Transhumanist Twenties'. Britain's next decade will transform its economy and environment for the better, but how will history judge the increasing transformation of humans themselves?

Recent History (2007 – 2017)

2007: Attitudes towards risk were in flux at the beginning of the 21st century. Generation X and Millennials both exhibited a love of risk with their penchant for 'extreme' sports like snowboarding, base jumping, free running, or

zorbing.ⁱⁱ An emerging generational value shift embraced the conscious management of risk by individuals.

This was accelerated by advances in human performance enhancement and bionic technologies. The line between rehabilitative prosthetics and human augmentation was blurring, as evidenced by the similarity between Otto Bock's spring-based prosthetic foot and Poweriser spring stilts.ⁱⁱⁱ If extreme activities risked physical damage, but the resulting rebuild of your body improved it beyond its 'natural' levels of ability, what was the downside?

The downside was the uncertainty surrounding the long-term effects on individuals of such 'rebuilt'. Yet many pressed ahead anyway. This was widely interpreted as a sign that private individuals were increasingly prepared to manage risks for themselves. This contributed to the growing erosion of the so-called 'Nanny State' worldview.

Excitement about the still untapped potential of the new biotechnologies and biosciences snapped public patience with the more aggressive elements of the animal rights lobby. There was widespread support for policies to preserve the pharmaceutical industry and aggressively support the UK's biosciences sector, both academic and private.

2009: In spring of 2009, West Nile Virus crossed British borders, with over 30 cases identified within a week. The outbreak was swiftly contained, with no fatalities,

highlighting once more the strength of the UK's biosciences sector, and the effective 'tripod' partnership strategy linking health and biosciences academics, the health industry, and the public health agencies.

2011: The significant environmental breakthrough of the early 21st century was political rather than scientific: The USA signed the Kyoto accords. Initiatives to address global climate change and its impacts finally had both teeth and resources.

China's economic momentum suffered a hiccup after the August 2011 political meltdown in Beijing. Devolution to greater regional autonomy slowed business growth as political and economic power structures reconfigured.

2013: A joint government and insurance consortium analysis of risk behaviour introduces the 'Safe as Houses' campaign. This sought to educate technologically enhanced people about the relative risk of expecting too much from their 'technological enhancement' when carrying out common activities: carrying shopping, DIY and leisure pursuits such as jogging and gym.

2015: With China bouncing back economically from the restructuring of 2011, Chinese policy-makers and businesses look abroad for assistance in regularising health and safety standards, protocols, and regulations. HSE wins the contract to develop and launch an 'HSE for China' by leveraging its track record and expertise.

2017: The UK's global strength in nanotechnology research and design bears fruit as Nanomed Plc's research division announces still more breakthroughs in cancer detection and prevention.

In the past decade, personal augmentation and human performance enhancement have given an entirely new twist to 'marginalisation' and 'differently-abled'. The 31 October 2017 "100% organic human bean" demonstration in Hyde Park was organised by a backlash movement celebrating the joys of simplicity (remaining augmentation-free), and has created a public debate on the responsible design of future humans.

In-Depth Exploration

Define: *what concepts, ideas, paradigms, and values define this world?*

Pundits have suggested that experts finally exhausted the public's ability to absorb the 'warning of the week': "Butter's bad for you - use margarine!" "The trans-fats in margarine are bad for you – use olive oil!" Out of the absurdities has emerged the age of the considered rational response: "Cleanliness may be next to godliness, but we survived childhood without all those antibacterial cleansers; all things in moderation". Kids are allowed to fall out of trees; the occasional scuff or bruise is part of

growing up.^{iv} The public demands transparency of information, but rejects alarmism.

As a result, open debate and engagement about new technologies and emerging health and safety issues characterise policy formulation. The corollary in the private sphere is a heightened acknowledgement of personal and organisational responsibility and accountability. An explicitly stated moral response to decision-taking and impact assessment is now highly valued in brand strategy. Fair trade, sustainability, and corporate social responsibility are essential elements of success in business. Both the public and private sectors see working in partnership as key to achieving transparent accountability. This increased public and private sector transparency has widened the pool of early adopters. People are now more likely to embrace innovations perceived as beneficial, such as expert-system-based and robotic healthcare, gene therapy, and even health and safety products arising from nanotechnology.

The global scientific and policy consensus that climate change is upon us demonstrates international confidence in climate models. More generally, it demonstrates how deeply rooted the systems perspective has become in science, policy, and business. More and more insights and innovations emerge from concepts based on chaotic system behaviour or intelligent agents and self-organising complex adaptive systems.

Relate: *how do people relate to each other – what are the social structures and relationships that link people and organisations?*

People are more politically engaged. The **government** is currently reaping the benefits of increased public respect for institutions, specifically leveraging the power of self-organising groups to address complex challenges. A decade of social networking amplified by web resources like LinkedIn, MySpace, and LiveJournal created a complex web of personal interconnections across diverse populations. The inclusiveness of online communities with regard to previously marginalised groups like the elderly, the differently abled, and ethnic communities is reflected in real life by increased social cohesion.

Consequently, today's policy arena sees far fewer single-issue campaigns. In addition, the consensus on climate change proved a unifying challenge that catalysed increasing public support of sustainability. The resulting 'War on Carbon' helps focus policy priorities among politicians, civil servants, and constituents.

Global relationships have achieved a new balance, as economies outside the West grow and strengthen, particularly those of Brazil, Russia, India, and China (BRIC). Financial and legal services are more global and more liberalised (WTO), and are a substantial share of global GDP. This convergence of economies worldwide is

vastly expanding the global middle class, meaning more potential consumers, and more potential tourists. Closer to home, Britain's links within the EU have strengthened.

British **society** has reduced the have-have not gap, but not eradicated it entirely. The wealth divide still follows the education divide, although with increasing prosperity more public resources are being invested in education to address that issue. The generation gap is being rapidly erased by the trend in 'vigorous ageing'; more sophisticated healthcare, a greater understanding of the ageing process, and human performance enhancement have swelled the over-65 workforce. This also means the average disposable income for over-65s has increased considerably.

In addition, advanced gerontology and assistive technologies enable greater independence even for frailer seniors. Home health systems interconnected with local clinics and hospitals allow OAPs to remain home longer, and make it easier for children to care for their parents themselves. Real estate agents report a boom in granny flats and demographers concur that the number of multi-generational homes is increasing. The generations are closer knit within **families**, and the families are more closely tied to their interest groups and social networks, creating entirely new forms of extended families.

Our relationship with the **environment** has changed. Global climate change is now a given, which throws

issues of sustainability into stark relief. Schoolchildren are taught to consider the impact of lifestyle choices on their ecological footprint. The government is discussing restricting carbon use by instituting carbon ration cards and carbon lotteries for both individuals and organisations. The upside is an enhanced sense of connection to the national landscape and the global biosphere. Britain is growing perceptibly warmer and wetter, and seaside towns – like Southport – are increasingly under flood threat.

Connect: *how do we connect with each other -- what technologies connect people, places, and things?*

This may be the first generation that finds themselves thinking, “Grandma would call my kids cyborgs.” Kevin Warwick^v of Reading University was the first person to embed a microchip into his nervous system – although he didn’t originate the idea – and once we’d chipped jewellery and clothes, skin was the next obvious layer.

In the first years of the 21st century, software mashups created new products by layering and interconnecting existing software and databases in new ways.^{vi} This was paralleled by hardware mashups - the seamless web of computing, communications, media, and gaming devices that were embedded in cars, clothes, jewellery, contact lenses, and finally, ourselves. Individuals can walk down the High Street in real life and in virtual life

simultaneously, switching between their physical selves and their various avatars from one conversation and one data stream to the next.

Second Life^{vii} ceased to be merely a social and games environment on 5 April 2010, when the several Far East nations opened digital embassies there.^{viii} Offices and real-world income-generating businesses had been thriving for years prior to that. The blurring of boundaries between the real and digital worlds has imploded the boundaries between politics, work, family life, leisure, art, and spirituality. This generation of digital neo-romantics sees no distinction between life and art.

Create: *what are the processes and technologies through which we create goods and services?*

The new processes of design and production are based on the convergence of the biosciences and the material sciences, and on the connection between genetic engineering and nanotechnology. ‘Biomimicry’, popularised by Janine Benyus’ book of the same name, is a staple of industrial design, drawing inspiration for new products and even services from nature.^{ix} The UK’s intellectual resources in biosciences, material sciences, nanotech, and design have given UK companies a decisive edge in this sector. The ‘bionano boom’ recalls the dotcom boom of the late 90’s; inventors and entrepreneurs are creating biosciences and materials

sciences start-ups with an end-goal of buy-out by a larger company. Large companies are in turn creating more skunkworks; acting as angels to small entrepreneurs; and partnering with universities. Getting customers involved via 'peer production' strategies turbo-charges creativity by layering multiple perspectives.^x All these strategies enliven the UK's enterprise culture and make Britain the workplace of choice for global 'knowledge nomads'.^{xi}

At the same time, accountability and corporate social responsibility are critical in attracting customers. How something is created, its ecological footprint, and its 'cradle-to-cradle' lifeplan, are major selling points. Customers consider the quality of the process as important as the quality of the final product or service. The use of RFID chips on all consumables enables auto-recycling and more efficient re-use, as well as efficient tracking for pollution and waste-monitoring purposes. As a bonus it increases security for customers since ownership data is easy to add post-purchase.

Manufacturing in Britain has stabilised after the rocky road to enhancing its processes for sustainability and re-positioning to capture the lead in the bionano/design markets. With the looming threat of carbon rationing, companies keep an eye on transport miles associated with their products. This has reduced offshoring and encouraged local manufacturing and delivery of goods. As a result, UK agriculture is experiencing something of a renaissance.

Consume: *how do we consume goods and services – how do we acquire and use them?*

Environmental values have put paid to 'shop 'till you drop'; instead we have a generation of 'mod your bod' cyber-tribals. They grew up thinking tattoos and piercings were chic. The fact that the tattoos now contain digital ink, and the navel rings sport wifi RFID chips, is simply a bonus. The newest generation is extremely comfortable with augmentation, whether cognitive augmentation via smart software, metabolic and synaptic augmentation via HPE drugs, or physical augmentation via embedded microprocessors and bionics.

And it's not just the young - more seniors are augmenting as well. Bionics – technological augmentation – reduce physical frailty, or the perception of personal physical frailty. Similarly, augmented cognition via software or HPE drugs reduces mental frailty. Both enable extended independence. One wag referred to the growing community of augmented OAPs as 'high-tech wrinklies'. While humorists joke about wind-powered zimmer frames, prosthetic manufacturers have begun to market hydrogen-fuel-cell-powered exoskeletons instead. They assist movement in a wider range of circumstances than, say, Segways – which have also become popular with the senior set now that the price has dropped.

Consumers have downshifted. Hyperconsumption of goods is no longer popular; it is nearly considered a vice.

What people do consume avidly is experience, whether actual or virtual; their own or other people's; as live events, interactive games, or as expressed in blogs, podcasts, or other media. Experience addicts and the adrenalin junkies are constantly looking for new combinations of extreme sports or games, and entertaining combinations of sports and peer-produced entertainment. Risks are made explicit, and relative costs for varying risks are a transparent choice: "James got quotes to repair his gutter: £500 with scaffolding, £50 if he holds the ladder for the workman and gambles on the liability."

Lowering your ecological footprint is the new way to get ahead of the Joneses. The effect on the UK leisure industry has been skyrocketing interest in the 'Devon Riviera' as well as rediscovery of other jewels of the British natural environment.^{xii}

Focus on the Changing Workplace

Workers no longer face a simple blurring between the workplace and the home. Wrestling with the challenges that that presents to your work/life balance is relatively straightforward. Instead, the immersive computing and media mesh through which everyone now moves has created a blurring between the workplace and *everywhere* – *and everything* – *else*. Mobile phones are embedded in sunglasses, so videoconferences can find you in Devon.

Worse, an age of 'peer production' means people work even as consumers.

The emphasis on local manufacturing and short-haul delivery drove most companies to decentralise their offices. Smart software puts resources where they are needed with minimal miles travelled. The same software helps employees cooperate to reduce resource consumption in both work and leisure. While offices are smaller and local, they are consistent in their design, amenities, and operations, enabling consistent regulatory compliance across a company's establishments.^{xiii}

Health and Safety Issues

People think differently about risk and safety now, in what analysts call "a return to a more rational view." It is a world away from the legal micromanagement of personal risk that so characterised concerns about the 'compensation culture' a dozen years before. More funds and time are now invested in informing the public about the potential risks, costs, and benefits of new technologies, products and services. The efforts of public agencies and others over the past decade on managing risk have paid off. Of course, with technology developing at its current pace this public view can't be assumed to be forever lasting. It could in time swing back to the bad old days.

A simplified regulatory structure requires greater personal judgement. Relying on informed choice to navigate health and safety risks requires more transparent information of regulatory structures as well as risks. Streamlining the health and safety regulatory structure opened space for more flexible responses to health and safety issues and made it easier to achieve consistency with international health and safety regulations beyond the EU. As a result, overseas contract possibilities have blossomed for the HSE as an expert resource.

The last ten years have seen a proliferation of health and safety consultants with expertise in different sectors - hardly surprising, given what seems like the almost weekly emergence of new areas of production. It's a scientific and technological conveyor belt of innovation and the challenge now is for public agencies, consultants and others to agree what the risks actually are, how these risks should be managed and finally, how the resultant messages should be communicated. To compound the problem, the variety of software and hardware systems now marketed to assist both businesses and private individuals in managing health and safety seems to be growing exponentially. If historical business patterns hold, however, the 2020s should see a consolidation of smaller H&S hardware and software firms and a rationalisation of that market.

Winners and Losers

Winners abound – or so it would seem. New lifestyle products and services have revolutionised leisure further from even the heady days of 2007 and PlayStation 3, and huge steps forward in health biosciences hardware and software have made healthy, active ageing the norm.

Employment is at an all-time high, especially employment of previously marginalised workers like the elderly and the differently abled. More economic centres exist, and they are more widely distributed throughout the country. The environment itself is both benefiting from increased accountability, and returning those benefits; with the increase in 'low-carbon-cost at-home holidays', Preston by the Sea and the 'Devon Riviera' exemplify the revitalisation of the British seaside town – even while the risk rises of climate-change-intensified storms and storm surge.

The losers are insurance companies who see customers opting for lower levels of coverage. The increased understanding of relative risk makes people less litigious. With more food grown at home and a greater emphasis on 'buying British' to conserve transport fuel use and its carbon cost, import/export companies are also under pressure. The less well educated also lose, as they are less able to navigate the landscape of informed choice. Immigrants suffer a similar problem for a different reason; different cultural filters may make it difficult for them to

assess risks adequately in the British environment.
Finally, people who are unnerved by the emerging future

of transhumanism and want to reject it may well find
themselves marginalised.

References and Resources:

Foresight and scenarios resources which offer confirming evidence and insights for the HSE scenarios:

- ESRC Society Today, “Changing Our Behaviour, Not the Climate” available at:
http://www.esrc.ac.uk/ESRCInfoCentre/about/CI/CP/Our_Society_Today/Spotlights_2006/change1.aspx?ComponentId=15778&SourcePageId=15797
(accessed 15 September 2006).
- Institute of the Future Map of the Decade (2003, 2004, 2005), available at:
 - 2003 -- http://www.iftf.org/docs/SR-797_Map_of_decade.pdf (accessed 15 September 2006).
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- Office of Science and Technology, “Foresight: Drugs Futures 2025? The Scenarios,” available at:
http://www.foresight.gov.uk/Brain_Science_Addiction_and_Drugs/Reports_and_Publications/DrugsFutures2025/DTI-Scenarios.pdf (accessed 15 September 2006).
- Orange Future Enterprise Coalition, “Scenarios of Work and Technology in 2016,” available at:
http://www.orangecoalition.com/app/webroot/files/whitepapers/Orange_scenarios_of_work_and_technology_2016.pdf (accessed 15 September 2006).
- Taking Stock, “Futures Scenarios” available at: <http://www.takingstock.org/Futures.asp> (accessed 15 September 2006).
- The Workplace Intelligence Unit / DTI, “The Future of Work” scenarios, available at:
http://www.workplaceintelligence.co.uk/uploads/files/dti_future_of_work.pdf (accessed 15 September 2006).

ⁱ This organisational scheme is adapted from Global Foresight Associates’ “EthnoFutures Scanning Framework,” devised by Michelle Bowman and Kaipou Lum. Michelle Bowman and Wendy Schultz, “Best Practices in Environmental Scanning: The World Beyond Steep,” presentation at the World Future Society, Chicago, 30 July 2005.

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- ⁱⁱ Snowboarding and base jumping have become familiar; free running and its predecessor, parkour, are related activities mixing running and acrobatics as a means to traverse an urban landscape; zorbing involves rolling down landscapes encased in a large plastic ball (think human-sized gerbil playball). Information and links on all three are available at Wikipedia; see:
- Parkour: <http://en.wikipedia.org/wiki/Parkour> (accessed 22 September 2006);
 - Free running: http://en.wikipedia.org/wiki/Free_running (accessed 22 September 2006) -- see also Channel Four's "Jump London" page at: http://www.channel4.com/entertainment/tv/microsites/J/jump_london/ (accessed 22 September 2006).
 - Zorbing: <http://en.wikipedia.org/wiki/Zorbing> (accessed 22 September 2006).
- ⁱⁱⁱ Information on innovative prosthetic feet is available at: <http://www.spectrum.ieee.org/print/2189> (accessed 22 September 2006); information on Powerisers is available at: <http://eng.poweriser.co.kr/company/preface.html> (accessed 22 September 2006).
- ^{iv} For example, see the steadily rising popularity of Wendy Mogel's book, *The Blessings of a Skinned Knee: Using Jewish Teachings to Raise Self-Reliant Children* (Penguin, 30 October 2001). Related article in the New York Times, Sunday 1 October 2006, available at: <http://www.nytimes.com/2006/10/01/magazine/01parenting.html?th=&adxnnl=1&emc=th&adxnnlx=1159697045-+uXjoT2mml/fqlz0Vz6zQ> (accessed 1 October 2006).
- ^v See information available at: <http://www.kevinwarwick.org/> (accessed 22 September 2006).
- ^{vi} Zillow is one example, combining Google Earth with local real estate tax appraisal databases to create an interactive, online mapping of neighborhood house values as an aid to sellers deliberating on feasible house prices. Zillow can be experienced at: <http://www.zillow.com/> (accessed 22 September 2006).
- ^{vii} See the Business Week article on Second Life, and related material, here: http://www.businessweek.com/magazine/content/06_18/b3982001.htm (accessed 22 September 2006).
- ^{viii} Fouts, Joshua S. "Public Diplomacy and National Images: Theory and Practice," in *Public Diplomacy and the Korea Foundation: Past, Present, and Future*, proceedings of the Conference to Commemorate the 15th Anniversary of the Korea Foundation, September 2006; pages 29-32.
- ^{ix} Benyus, Janine. *Biomimicry: Innovation Inspired by Nature*. Harper Perennial, 1 September 2002.
- ^x See Anderson, Chris, "People power," in WIREd Issue 14.07, July 2006, available at: <http://www.wired.com/wired/archive/14.07/people.html> (accessed 15 September 2006).
- ^{xi} Office of Science and Technology, "Foresight: Drugs Futures 2025? The Scenarios," scenario 4: High Performance, p.11.
- ^{xii} The Workplace Intelligence Unit/DTI, "The Future of Work" scenarios, "Good Intentions" scenario, pp. 19-23.
- ^{xiii} Ibid.