Transgenerational Technology and Interactions for the 21st Century

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Transgenerational Technology and Interactions for the 21st Century: Perspectives and Narratives

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List of Abbreviations

AARP	American Association of Retired Persons
ADL	Activities of Daily Living
AFCC	Age-friendly Cities and Communities
AI	Artificial intelligence
AR	Augmented reality
ARPA	Advanced Research Projects Agency
AT	Assistive technology
ATAT	Adapt Tech, Accessible Technology
AWOC	Ageing without children
BA	British Academy
BBC	British Broadcasting Corporation
BMBC	Barnsley Metropolitan Borough Council
BME	Black, Minority Ethnic
CASE	Concept of Age-friendly Smart Ecologies
CCT	Controlled clinical trials
CDC	Center for Disease Control
CF	Consultative Forum
CV	Curriculum vitae
DCW	Digital Communities Wales
DD	Digital divide
DDR	Deutsche Demokratische Republik
DIAW	Digital Inclusion Alliance for Wales
DIY	Do it yourself
DNR	Do not resuscitate
DSHS	German Sport University Cologne
ECR	Early career research
ERDF	European Regional Development Fund

ESA	Entertainment Software Association
EU	European Union
GCSEs	General certification of Secondary Education
Geron	Gerontology
GEVH	Grimethorpe Electronic Village Hall
GP	General Practitioner
GT	Gerontechnology
H&W SRA	Health and Wellbeing Strategic Research Area
HCI	Human Computer Interaction
HEFCE	Higher Education Funding Council
HEI	Higher Education Institute
HGV	Heavy Goods Vehicle
ICT	Information Communication Technology
IDR	Interdisciplinary research
IoTs	Internet of Things
ISG	International Society of Gerontechnology
IUD	Intrauterine Device
IVF	in vitro fertilization
KESS	Knowledge Exchange Seminar Series
LGBTQ+	Lesbian, gay, bisexual, transgender, queer
LLTCs	life-limiting/threatening health conditions
LTC	Long-term care
mHealth apps	Mobile health applications
MIT	Massachusetts Institute of Technology
MoD	Ministry of Defence
MR	Mixed reality
NATO	North Atlantic Treaty Organization
NCB	National Coal Board
NFP	Not-for-profit
NHS	National Health Service
NI	Northern Ireland
NIA	Northern Irish Assemble
NPL	National Physical Laboratory
NUM	National Union of Mineworkers
NVQ	National vocational qualification

ONS	Office for National Statistics
PAHO	Pan American Health Organization
PC	Personal computing
PhD	Doctor of Philosophy
PHE	Public Health England
PHW	Public Health Wales
PTSD	Post-traumatic stress disorder
QoL	Quality of Life
R&D	Research and Development
RCT	Randomized control trials
RCUK	Research Councils UK
RDD&D	Research, development, design and distribution
RDG	Research development groups
SAfE	Smart Age-friendly Ecosystem
SD	Standard deviation
SES	Socio-economic status
SSAFA	Soldiers, Sailors, Airmen and Families Association
TAM	Technology Acceptance Model
TART	Transgenerational Assistive Robotic Technology
TAT	Transgenerational Assistive/Accessible Technology
TG	Transgenerational Gaming
TILL	Technology In Later Life
TLCC	Transgenerational Living Communities and Cities
TT	Transgenerational Technology
UCD	User Centred Design
UK	United Kingdom
UKRI	UK Research and Innovation
UML	Unified Modelling Language
UN	United Nations
USA	United States of America
UX	User Experience
VAs	Virtual assistants
VR	Virtual reality
WDH	Wakefield District Housing
WG	Working group

WHO	World Health Organization
WI	Women's Institute
XR	Extended reality

About the Authors

Hannah R. Marston conducts interdisciplinary research and holds a PhD from Teesside University, UK in Virtual Reality and Gerontology. Since 2010 she has worked in Canada and Germany as a researcher, prior to moving back to the UK in 2015. She has published over 40 peer-reviewed journal papers, and most recently she was part of the 'The Smart Homes and Independent Living Commission'. Her research areas include gerontechnology, UX (User eXperience) of transgenerational technologies and videogames, gender, age-friendly cities, and communities and in 2020 she led an international, multi-site COVID-19 research project focusing on technology use.

Linda Shore is a UX Designer/Researcher and currently works as part of the DHI (Digital Health & Care Innovation Centre) at Glasgow School of Art, Scotland. Her research areas include User-Centred Design (UCD) approaches that explore perceptions and adoption of emerging wearable technologies by older adults and the impact of amputation/age-related conditions on quality of life. Additional areas of research interest include service blueprint development for healthcare and transgenerational technology that adapts to users' needs. She is excited about the possibilities of technologies for the future and how these can enhance the worlds, lives, and experiences as we age.

Laura Stoops is the Impact and Evaluation Manager at Age NI, a charity that supports older people in Northern Ireland to love later life. Her professional interests are using technology-based solutions to support older people or those with a disability and assessing the impact and evaluation. She has a keen interest in using research skills to support the voluntary sector and to share this knowledge widely. She holds a PhD (2011) in Computer-Based Assessment and Diagnosis of Parkinson's Disease from the University of Ulster, Northern Ireland. As part of her PhD work, she has written and published five journal papers including a paper entitled *Assessment of Bradykinesia, Akinesia and Rigidity Using a Home-Based Assessment Tool* which was published in the International Journal of Assistive Robotics and Systems (2009).

Robbie S. Turner is a Co-founder and Senior Consultant at Spektrum-Group, a company that supports potential suppliers in penetrating government, defence, and humanitarian markets by lending them over 20 years of experience in this field. He is regarded and foremost an expert in this specialist market, and

thoroughly enjoys the process of knowledge exchange and translation, knowledge that directly impacts and enhances a company's ability to participate and succeed in a perceivably exclusive environment.

Foreword

Listening to the views of older people and giving them a voice is central to Age NI's work. Through this book, we were delighted to have the opportunity to work in consultation with older people to better understand their digital technology needs, now and in the future.

Age NI has witnessed first-hand the impact that the pandemic, and its resulting social isolation, has had on older people in Northern Ireland. It has also dramatically affected the way we deliver our services, which are so heavily focused on social, face-to-face interaction.

The COVID-19 pandemic has made us all realise the power of technology. Thinking about all generations, from home-schooling through to zoom quizzes, we might wonder how we would have coped without it. For older people, with the help of digital devices, many were able to connect to friends and family – and to our services, newly delivered online.

For some, this involved adopting a new mindset, and often required offering one-to-one support to utilise the technology. For those who succeeded, the benefits of this new connectivity greatly outweighed the challenges.

However, while many have gained from digital technology, we know that there is a large section of older people missing out. Without their normal social interactions, a lack of digital connectivity has left them desperately isolated and lonely. Very sadly, we know that loneliness can be a killer, and as a nation renowned for its warm welcome, friendliness and sense of community, we believe it shouldn't have to be this way.

Although the number of older people who are digitally connected continues to rise, across the UK there are still around 5 million people over the age of 55 who are not online. And while factors such as income and levels of education play a part, age is still the biggest indicator of digital exclusion.

Through our work on this book, hearing the experiences of those older people who are embracing technology has thrown into stark relief the experiences of those who are still missing out.

Through research and innovation, we're looking at ways of supporting older people to get online, to benefit from digital communication and to do confidently and safely.

We are very grateful to the older people who have given so generously of their views and time to inform the content and narrative of this book.

The insight of this publication offers on what older people want and need, is pivotal to the current and future connectivity of older people. We believe this has a vital part to play in the mission to end loneliness.

Linda Robinson BEM Age NI CEO

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Chapter 1

Introduction

> The anonymous writer referred for justification to precedents established in the United States and cited the case of an anxious mother who, convinced that her baby had the croup, called the infant's grandmother for assistance. The latter, in turn, telephone the family doctor at midnight and 'told him the terrible news'. Perhaps because of the lateness of the hour, the doctor asked to be put in telephonic communication with the anxious mamma. 'Lift the child to the telephone', he commanded, 'and let me hear it cough'. Both mother and child complied. 'That's not the croup', the doctor declared, and declines to leave his house on such small matters. He advises grandmamma also to stay in bed; and all anxiety quieted, the trio settle down happily for the night. (Aronson, 1977, p. 72)

When we talk about technology and digital practices in the twenty-first century, we seldom look back on history, and the developments, practices, and impact that inventions and innovations over the previous decades and centuries have had on our contemporary lives.

The opening quote (Aronson, 1977) details how, in November 1879, a medical professional, using the telephone, was able to ease the concerns of a mother and grandmother pertaining to the health of their child and grandchild. As the quote details, the telephone call was made late at night, and that is one reason why this method of giving a medical opinion was used. In addition, Aronson suggests this was possibly the first type of tele-healthcare assessment and prescription provided. When registering the patent for his new telephone, Alexander Graham Bell described this device as

> the method of, and apparatus for, transmitting vocal or other sounds telegraphically … by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sound. (History of Information.com, n.d.)

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Aronson suggested that 'the telephone might be of considerable use to doctors to ease their practice' (Aronson, 1977, p. 72) and while this approach may have been greatly accepted by medical professionals in the United States, British doctors were more reserved to some degree. Through editorials and anonymous submissions to the Lancet over a number of years, Aronson describes various tales and narratives, noting how British medical professionals adopted this new device to suit their own needs instead of waiting for the approval of the Lancet. Even more so, doctors living and working in rural areas saw benefits in implementing the telephone in their practice as described,

> […] country doctors saw the advantage of using it to make branch practices more manageable. Such joint medical ventures were designed, in part, to ease the patient load, to provide an occasional holiday for each doctor, and to broaden the pool of medical knowledge of the partners. Yet many of these benefits were lost because communication depended on the mails or the telegraph. (Aronson, 1977, p. 72)

A contribution to the Lancet was provided in 1888 by a Dr Alfred H. Twining, describing the experiences of adopting and using the telephone in the 'country' practice, '[…] Though five miles apart', he wrote,

> we are able to arrange our work each morning as to obviate the necessity of both going over the same ground – a distinct saving not only in horseflesh, but in time and personal fatigue. Moreover, the telephone is available for prolonged social or professional conference by day or night. (Aronson, 1977, pp. 72–73)

Dr Twining and his partner was unable to have their telephone connected via the Post Office switchboard, and instead had a private line connecting both of them (5-miles) to facilitate their communications. These descriptions and narrations illustrate how an invention of the latter part of the nineteenth century was already transforming healthcare and practice, and we will suggest that similar comments can be heard and shared in the twenty-first century society. The COVID pandemic has greatly increased the use of telehealth and telemedicine. In some countries such as Canada and Australia, taking this approach to healthcare delivery is already part of society because of the vast distances that some patients may have to travel for a 15-minute appointment. From the standpoint of the Coronavirus pandemic, the concept of using telehealth practices to access patients seems positive (Fisk, Livingstone, & Pit, 2020; Greenhalgh et al., 2021) for healthcare services and delivery.

Throughout history, innovations have facilitated not only advances in medical practice as, for example, visually narrated through the television series M.A.S.H. (Britannica, n.d.c.) but also within the homes of citizens, such as the washing machine, the television, and the radio. These products and devices situated within our homes today not only make our lives easier but also enable us to keep up with current affairs and can add to our leisure activities. For some people these products

can be controlled by the Internet of Things (IoTs) and accessed or set on timers via an app on our smartphones. While Bell is known for patenting the telephone, Martin Cooper is known as the inventor and pioneer of wireless communications and the father of the handheld mobile phone (Greene, 2011; Shiels, 2003). This significant invention and innovative device were created in the 1970s. Did Cooper wonder about the impact the mobile phone would have on society?

Over the decades we have seen the mobile phone evolve in many ways, from the size of the device to the functionality, capabilities, and costs. This was specifically so when in the late 2000s the smartphone was released which in turn transformed the way people interact and use their devices, with many people upgrading from their 'old fashioned' mobile phone (which had limited functionality and capabilities) to 'all singing and dancing' devices (e.g., access to the Internet, email, downloading apps, taking photographs, accessing social media platforms, listening to music, instant communication – WhatsApp, etc.).

Yet, many of us who own and upgrade our smartphones when our contracts are coming to the end of their 24-month shelf life, also live by our smartphones, using them as a means of tracking data such as exercise (e.g., running) (Fig. 1.1), biking or even tracking altitude when undertaking exercise (Fig. 1.1). Moreover, some women and girls may choose to use apps to track their menstruation (Earle, Marston, Hadley, & Banks, 2020), or if they are planning a family to check their most fertile days, while some women who are transitioning to the perimenopause may find apps useful to track their menstrual cycles.

Nevertheless, for some people in society the use of a smartphone is not for them, and they instead choose to continue to use the simpler mobile phone or landline phone.

The term Baby Boomers is used to describe the cohort who were born between 1946 and 1964, with many people encountering different life experiences to their predecessors – the Silent Generation (Lissitsa, Zychlinski, & Kagan, 2022) born between 1925 and 1945 (Strauss & Howe, 1991). The Silent Generation are those individuals who survived the Second World War, and the Great Depression, and were parents to the forthcoming generation – the Baby Boomers. The experiences of the Silent Generation through these events led individuals in this cohort to be conservative, pragmatic and patient (Olsen, Thach And, & Nowak, 2007). Conversely, the experiences of Baby Boomers in part also experience socio, economic and political events, and opportunities including the Cold War, the Civil Rights Movement (Krauss Whitbourne & Willis, 2006), the contraceptive pill, the sexual revolution of the 1960s and the National Health Service (NHS). Furthermore, many Baby Boomers faced an enhanced standard of living to that of their parents (the Silent Generation), and the opportunity to purchase their own homes.

Like Baby Boomers, each generation of society can be defined by a set of characteristics and Generation X (1965–1980) (Fry, 2018; Vogels, 2018) is no different. In the last two decades of the twentieth century, they witnessed phenomenal political events, such as the end of the Falklands war, civil unrest pertaining to the poll tax riots, and the miners' strike), and the continuing creation and transitioning of music genres coupled with one of the major technological developments of the twentieth century – the Internet. And many citizens in the succeeding cohorts, that is, the

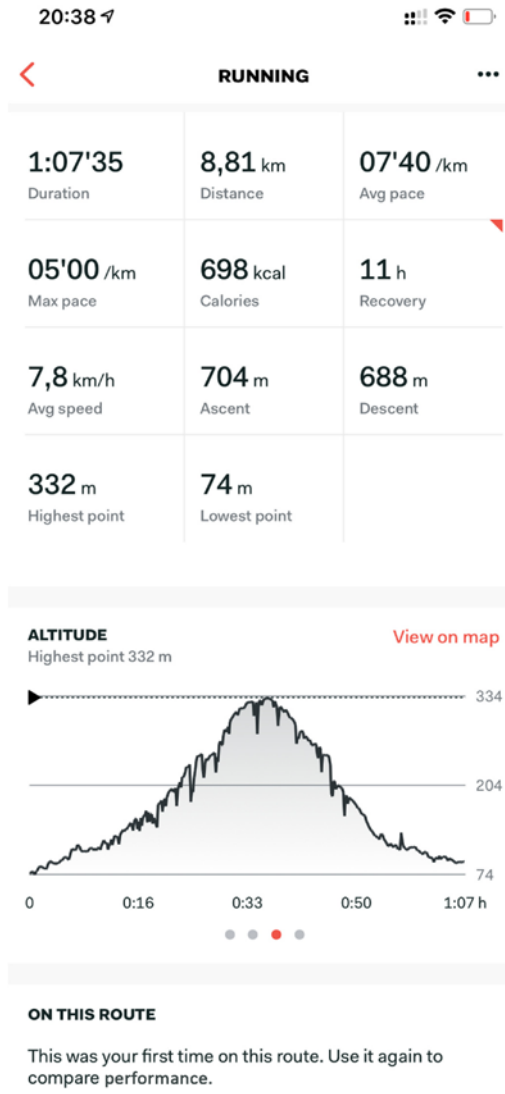

Fig. 1.1. Overview of Running Metrics, Tracking and Analysis. *Source:* Owned by and permission granted by R. Tuner.

Millennials (1981–1996) (Fry 2018; Vogels, 2018) and Generation Z (also known as Post-Millennials and born from 1997-present) (Fry, 2018; Vogels, 2018), will also have experienced and remembered the outstanding events of their time.

One of the key transformative technological developments of the late twentieth century was the Internet which at that time had only been available for a handful of years to the public (Murphy, 2019). This new technology was for a while coupled with

the possible impending doom of the new Millennium (Marston, Musselwhite, & Hadley, 2020). For many businesses and community leaders there were fears that all computers and interconnected systems would crash, resulting in chaos within the banking systems, that traffic light systems were not going to sequence and would cause accidents, and that, overall, at the stroke of midnight, on New Year's Eve 1999 the technological apocalypse would unfold (National Geographic, n.d.; Uenuma, 2019). To those who were celebrating and seeing the new Millennium in with friends and family – as Big Ben chimed, and Auld Lang Syne was sung across the UK – it became evident very quickly that we had survived into Y2K (Marston et al., 2020). There was no apocalypse, the banking systems were not affected, and all services and systems which used various computing systems continued to function. This Millennium experience is now archived into historical records which allows citizens to read, understand, and learn lessons from the past, including strategic policies which were followed through by an array of decision makers from national and regional sectors and business leaders (Marston et al., 2020).

In the proceeding section, we explore and reflect upon historical events which occurred in the latter part of the twentieth century whereby many people categorised as Baby Boomers and Generation X (or Gen X'ers) were either directly involved in or were passive players because of their age and circumstances (e.g., young children).

Historical Events of the Twentieth Century – the 1980s–1990

The twentieth century saw many medical and associated technological developments to improve the lives of people on a global scale. Drugs and vaccines, such as antibiotics (1932), and polio vaccines (1952) afforded people the opportunity to recover from illness rather than die or be severely impaired. While implantable devices such as pacemakers (1958) afforded individuals suffering with severe heart conditions the opportunity to lead healthier lives than expected, the development of in vitro fertilisation (IVF) (1959) has and continues to afford many people the opportunity to start families. We have seen during the pandemic several vaccines being created and rolled out across Western society. Throughout the twentieth century, there were many vaccines discovered including the measles (1963), and rubella vaccines (1965), the latter becoming available on the market in 1970. More recent developments can be seen in many fields including the military and medicine (Olanrewaju, Faieza, & Syakirah, 2013) enabling the use of robotics.

To provide some context specifically to 1984, the miners' strike (Adney & Lloyd, 1988) which was led by the National Union of Mineworkers (NUM) and who were opposing the decision of the then Conservative government to close the pits in various regions across the UK, including South Wales, Yorkshire, County Durham, Kent, and Scotland. South Wales mining communities witnessed 21,500 employees (99.6%) voting in favour of strike action, and 12-months later, 93% of miners voted again in favour of strike action (Pittam, 2019). While Yorkshire miners voted 97.3% in support of going on strike in November 1984 (19.11.84), this dropped to 90% by the 14th February 1985, and by the 1st of March 1985 a further reduction occurred leading to 83% (Sheffield City Council, 2009–2018). Yet, the strike was later deemed illegal (Adeney, 1988). Overall, the miners' strike lasted

for 12 months and was led by Arthur Scargill who was the president of the NUM (1982–2002) (BBC News, 2010) and Ian K. MacGregor, head of the National Coal Board (NCB) (BBC Home, 1983). Because of the change in government legislation relating to the Social Security Act 1980, Clause 6 – prohibiting the dependents of strikers from receiving (Pittam, 2019; UK Government, 1980) government payments, thousands of miners, and their families, across the UK were plunged into poverty. And although there were many communities and families experiencing hardships (Bannock, 2015) there was a sense of community and brotherhood (Bannock, 2015) with many of the communities' miners' wives becoming involved in the cause (Ali, 1986; Spence, 1998); such as helping in the soup kitchens and supporting and 'standing by their men' (Ali, 1986; Spence, 1998) on the picket lines. In addition some women engaged in the political sphere and in fundraising activities (Ali, 1986; Spence, 1998). These varying forms of engagement facilitated and challenged the gender roles within the home between husband and wife, with many women seeking to upskill and, re-enter education to seek employment (Ali, 1986).

Some people may think such historical insights and events from over 30 years ago should be resigned to the history books and should not have a place in a book like this. But the events and experiences of the past for many people now in society have not changed and have been repackaged and extended into other forms of poverty, such as digital poverty. This new form of 'poverty' emerged in contemporary society and was brought to the forefront during the COVID-19 pandemic. The Digital Poverty Alliance posits,

> 70% of households earning £17.5K or less have minimum digital skills, 25% of vulnerable children do not have access to a suitable device for learning, and 82% of jobs advertised require digital skills.

Furthermore, The Good Things Foundation report 1.5 million households in the UK do not have Internet access, with a further 2 million households struggling to afford Internet services and 14.9 million people have a low level of digital engagement, with 10 million people lacking fundamental digital skills (2021).

The film 'Brassed Off' (1996) depicts many of these forgotten communities, with the plot of the film based on the struggles of the Grimethorpe community (Baker-Green, 2013) and the film soundtrack provided by the Grimethorpe Colliery Band. In 1994, the Grimethorpe area of South Yorkshire was identified by the European Union to be the poorest village in the UK (Baker-Green, 2013; McVeigh, 2015). Additionally, Baker-Green (2013) notes how the 2010 Indices of Deprivation measure shows this village (in the ward of Cudworth) to be one of the most deprived areas in England. More recent statistics published by Barnsley Metropolitan Borough Council (BMBC) shows there has been little change, whereby the Index of Multiple Deprivation 2019, displays how Barnsley is ranked the 38th most deprived area out of 317 local authorities in England (BMBC, 2019). Former mining areas as described here, coupled with ongoing levels of deprivation impact the residents across the life course and within different age cohorts. For

example, young people today who have limited or no access to the Internet are unable to complete their schoolwork, while individuals in these communities who are seeking employment and who have limited or no access to the Internet, or own technology devices are disadvantaged in their abilities and opportunities to improve and upskill their digital skills engagement and improve their overall living.

From a European perspective, the 80s and early 90s witnessed the end of Communism, with the fall of the Berlin Wall in November 1989 (BBC News, 2019). The Wall had been built in 1961 (UPI.com, 1998), and the built-spatial environment being adapted segregated family members who resided in East Berlin in the DDR. With the fall of the Berlin Wall, many citizens in both East and West Berlin, in addition to those citizens who had been living in West Germany, were reunited with friends, and loved ones.

1990–2000s

People categorised as Generation X will be able to remember key conflicts such as the end of the Cold War and Communism. Whereas those living in the 1990s as adolescents and young adults witnessed the rise of several conflicts such as the 1st Gulf War (1991) (Atkinson, 1995), led by a US coalition and including 35 nations. At this point in history, many Millennials (Howe & Strauss, 2000) were being born and Generation Z was not even conceived.

The 1st Gulf War initiated live news broadcasts from the front lines (Johnson, 2015; Norman, 1991) which in turn set a precedence for future media coverage of conflicts and events in the following years and decades including the Balkans war – 1991–2001) (Prunk, 2001), and the collapse of the twin towers of the World Trade Centre (Graff, 2019; Jackson, 2021). This highly significant event of the new Millennium led to the Afghanistan War (2001–2014) (Britannica, n.d.a) and the invasion of the Iraq war (2003–2011) (Britannic, n.d.b). Moreover, and closer to home, many Baby Boomers and Generation X'ers will remember the 'Troubles' (Dorney, 2015) in Northern Ireland (1960–1998), with the Good Friday Agreement devolving power to the Northern Ireland Assembly in 1999 (UK Government, 1998). Yet, many Millennials and Generation Z's living across the UK and Ireland having grown up in the nineties with differing experiences and perspectives, with many in some instances living in a different community and society to that of their predecessors.

Conversely, one of the great inventions of the 1990s was the Internet revolution which we experience in our contemporary society and has impacted society across all aspects of daily life (e.g., business, education, day-to-day living, access to services, social connectedness, etc.). The concept of the Internet had been around since the 1960s with the creation of packet switching and the 'National Physical Laboratory' (NPL) proposed a national commercial data network in the UK (Campbell-Kelly, 1987). Various departments of the US Department of Defense were involved, including the Advanced Research Projects Agency (ARPA) which was awarded funding to develop the ARPANET recommending the adoption of packet switching (Couldry, 2012). With additional developments continuing throughout the 1980s, leading a scientist (Tim Berners-Lee) based at CERN in Switzerland to connect

hypertext documents to the information system which in turn was accessible from any node on the network (1989–1990). This was the beginning of what we now know as the World Wide Web – the Internet (Couldry, 2012). It is beyond the scope of this chapter to explore the historical developments of the Internet. However, as the years passed into the 1990s and beyond, the power and impact of the Internet on a day-to-day living and business has been phenomenal.

The Internet revolution in the 1990s facilitated many Gen X'ers to access this network through universities and, businesses, and for citizens in their homes to access webpages through 'dial up'. For many people, 'dial up' was the key method of connectivity between the user and the Internet. If the Internet was going to be used, cables had to be connected via the telephone socket and this in turn resulted in other members of the household being unable to use the telephone or receive calls into the home environment at the same time. The speed of the Internet was nothing like it is today, and for many people reflecting back on this technology, Internet speeds were very slow, especially if one was uploading or downloading images, while also trying to view webpages or send electronic mail (email) (Murphy, 2019). Search engines at the time included Yahoo to facilitate information searching and many Gen X'ers created their email account via Hotmail. Some may still have the same email address as they created back in the late 90s. Now only an occasional feature in today's towns and cities, the Internet Café would seem like an alien concept to many, and yet a time existed when the Internet was available as a pooled resource and access was often shared in the community.

Many people categorised as Generation X will have grown up embracing technology as they interacted with consoles and arcades (Herman, 2001). Many younger people in this cohort enjoyed, well into the 1990s, a wide variety of game consoles such as the Nintendo NES (1987 in Europe), Nintendo Game Boy (1989), the Sony PlayStation (1995), the Sega Saturn (1995) and the Nintendo 64 (1996) (N64). This era of videogames witnessed significant transitions from 2D to 3D graphics enabling games such as *Virtua Fighter* to be the inspiration for games in the future (Feit, 2012).

In the early 1990s two games, were created and released by competitors, firstly, Nintendo had the *Mario Bros* franchise, and Sega's *Sonic the Hedgehog* (1991), accessible on the Sega Gensis (1990, released in Europe) console, depicting a blue, spiky hedgehog. The GUI (graphical user interface) (Levy, n.d.; Oxford Reference, n.d.) was throughout the 1980s, and the 1990s via the videogames industry was continually pushing the boundaries within their creations because of the hardware developments (Herman, 2001). This in turn led to games such as *GoldenEye 007* (1997) based on the 1995 James Bond film, which was specifically developed and released on the Nintendo 64 and received critical acclaim (Beaumont, 2017; Stuart & Webber, 2015).

To illustrate further the phenomenal technological developments of videogames, the game *REZ* (2001) was conceived in 1994–1995 taking inspiration from how people move to the music at events such as raves (Cocker, 2007; Hawkins, 2005; Wong, 2016). The GUI of *REZ* was taken from earlier game interfaces, and while the game is viewed as an arcade shooter, with each object being hit, *REZ* enables the gamer to feel different vibrations/feedback, and not solely through the game console being held (Mielke, 2006; REZ – the Game). The diversity of available