



In search of science's final frontier

How does science fiction
influence scientific progress?



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Abstract

This dissertation seeks to explore the impact of science fiction shows on the advancement of science, particularly focusing on the influence of the celebrated Star Trek television series. This impact will be demonstrated by examining a number of different case studies, where science fiction concepts and technology have been shown to have inspired or influenced scientific and technological advances in the real world in fields ranging from medicine to theoretical physics.

These case studies aim to illustrate the different ways in which science fiction influences scientific progress by raising awareness of the crucial importance of science; publicising new and emerging technologies and research that could help the world; leading young people to careers in the sciences and providing inspiration and goals for scientists and researchers. This dissertation also proposes a number of ways in which the potentially powerful influence of science fiction can be used in education, media, and academia to further aid in scientific progress.

Introduction

I have had an ardent interest in science since a very young age. This is largely due to the fact that I was introduced to many science fiction television shows, such as Star Trek, Stargate and Battlestar Galactica, which nurtured a passion in the topic. As I grew older and began to study science as part of my formal education I could not help but notice the remarkable similarities between the latest scientific discoveries and advances I read about with what I had seen in the science fiction franchises I loved so much. This dissertation hopes to examine any evidence supporting this idea and present ways in which science fiction can be used to its fullest to catalyse further scientific advancements in the future.

The world today is faced by multiple global threats, ranging from climate change to the growing danger of pandemics. Science will play a critical role in preventing and mitigating these challenges and science fiction can be an invaluable tool that will increase awareness about the importance and uses of science in an accessible and interesting way.

This is relevant because if more people learn about the sciences and their uses more people will go into careers for sciences or support sciences through funding or spreading knowledge of new advancements, resulting in more progress in technology and science, which eventually causes an increase in quality of life too. In addition to this, better science fiction and better use of science fiction can be used to potentially inspire more advancement in science.

Challenges facing science

In a recent survey in the United States by the Pew Research Centre, 86% of respondents said that they have at least “a fair amount” of confidence in scientists to act in the public interest, with 35% who have “a great deal” of confidence. However, while most of the public generally values science and its contributions to society, there are problems and challenges related to the public perception of science today. There is a growing amount of misinformation and scepticism about science, easily spread due to everyone’s access to the internet, particularly around controversial issues such as climate change, vaccines, and genetically modified organisms. This can lead to confusion and mistrust among the public and can hinder support for progress on important scientific initiatives. Many people may also have a poor understanding of science or its methods, which can make it

difficult to interpret scientific findings, know the difference between misinformation and truth or engage in informed debate about these scientific issues.

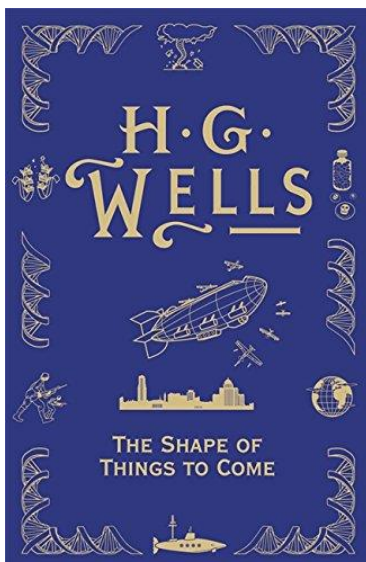
This issue is made worse by the fact that scientists and researchers can also sometimes struggle to communicate their findings and ideas in ways that are accessible and engaging to the public, leading to a gap between the scientific community and the wider public. Misinformation expert, Claire Wardle at Harvard University said that with the explosion of fake and pseudo-science in the wake of the COVID-19 outbreak, the best way to fight misinformation is to swamp the landscape with accurate information that is easy to digest and engaging, such as Star Trek and other science fiction

Finally, the public perception of scientific research can be influenced by political or corporate interests, leading to accusations of bias or manipulation of data. The public may also perceive scientists as being elitist or out of touch with the concerns of ordinary people.

Addressing these challenges and improving the public perception of science will require a range of efforts, including better science education, increased diversity and inclusivity in the scientific community, more effective communication strategies, and a focus on promoting scientific literacy and critical thinking skills among the public. The hypothesis of this dissertation is that science fiction can provide an effective avenue for achieving these.


History

Science fiction, often referred to as sci-fi, is usually fiction based in a world with futuristic technology and scientific advancements, frequently involving themes such as space, life on other worlds and time travel. It is defined as “a type of book, film, etc. That is based on imagined scientific discoveries of the future, and often deals with space travel and life on other planets” (Oxford English Dictionary, 2023). Well, known examples of science fiction range from the literary novels of Jules Verne, H. G. Wells and Isaac Asimov to popular television shows such as Star Trek, Stargate and Battlestar Galactica.



Science fiction authors like H.G. Wells provided science fiction readers with a vision of the future.

While science fiction follows certain criteria there are multiple subgenres of science fiction, which differ from each other a lot. Many subgenres of science fiction focus more on the human condition and how a society in a future world can be either a utopian fantasy or a dystopian nightmare, rather than the possible technology of that future. The main subgenres that include futuristic technology that we will usually be referring to are space opera (such as Star Trek), cyberpunk and other subgenres that are based in the future with technology far above what we can achieve now. I chose subgenres like these instead of other genres such as mundane science fiction, which focuses more on a realistic future based on our current scientific and technological capabilities (this includes shows such as in the Black Mirror and The Handmaid’s Tale television series). This is because those subgenres display the most futuristic technology and often are the most influential to science based on the evidence this dissertation has gathered.



Science fiction has evolved and changed over time, especially with the development of film and television. The paper 'The influence of science fiction films on the development of biomedical instrumentation', divides the stages of science fiction's development into 4 periods, early cinema (1900-1930), golden cinema (1930-1955), pre-modern (1955-1977) and modern (1977-present), based on both how films could be presented and how science fiction was shown at the times. Each of these periods are in detail below:

- Early cinema includes films from the start of movies to the use of sound in movies and while this period of science fiction did not have much evidence of having an influence of scientific advancement, most likely due to lack of interest from the public and a lack of scientific knowledge to build on at the time.
- Golden Cinema is made up of films from the use of sound in movies to the invention of the television and due to the use of sound films during this period were more popular among the public, resulting in increased viewing. Additionally, there was an increase of films that influenced scientific advancements, like the defibrillator, which was inspired by the use of electricity to create life in Frankenstein.
- Pre-modern consists of films from the invention of the television to the commercialisation of the VCR and this period saw an increase in science fiction based on real concepts, with much more advanced technology, with at least some grounding in real science. Due to the increased viewership of science fiction due to the use of the TV, many people could be influenced by it and also due to increased scientific knowledge at the time science fiction influenced multiple scientific advancements. As well as that, at this time more popular science fiction shows, like Star Trek started to appear.
- Modern includes films from the commercialisation of the VCR to now, with science fiction shows having a lot more funding and special effects compared to the previous periods, allowing for more technologies and concepts to be visualised so that they're easier to understand and more visually appealing. This allows science fiction to be an excellent indicator of what technology we should aim for and useful inspiration for scientists. This is why the modern period has shown the most evidence of the influence of science fiction on scientific advancement, from research into warp like technology to competitions to build real life tricorders. This is the time period that will be focused on in this dissertation due to its wealth of examples of science fiction influencing scientific progress.

This dissertation focuses on Star Trek, which is a science fiction show, created by Gene Roddenberry in 1966, with several different series highlighting different aspects of its universe, set hundreds of years in the future. It's specific subgenre of science fiction is a space opera, emphasising dramatic adventures set in space. In the world of Star Trek humanity has developed faster than light space travel and has formed a union of planets called the United Federation of Planets, based on the core ideas of improving quality of life for all using their advanced technology, peace among worlds and exploration. Each episode usually shows a new challenge which is usually solved by using the advanced technology and scientific knowledge available to the protagonists.

While there are many other possible science fiction shows I could have used, I decided to use Star Trek as my main subject of this dissertation because of its major impact on how the public views science compared to other science fiction shows. There is also a wealth of resources available for researching the franchise and the benefit of my previous knowledge of its lore from watching it from a young age.

The influence of Star Trek/science fiction on technological/scientific advancement: Methodology

This dissertation seeks to demonstrate evidence that science fiction has influenced technological advancement to an appreciable degree, through the visualisation of futuristic technology seen in science fiction shows like Star Trek. This is because many real world technologies today were directly inspired by technology seen in Star Trek or other science fiction, meaning that without having seen the concepts featured in that fiction, the creators may have never had the idea to create them in the first place. This dissertation also hopes to provide evidence that, science fiction has influenced technological advancement by fostering an interest in science in many people, leading them to eventually pursue careers in the sciences and contributing to research and development of new scientific concepts and technologies.

Conversely, one could argue that these linkages could just be coincidence after all, if someone is invested in the sciences they are more likely to watch science fiction than others. It is also possible that technology in real life is possibly acting as a template for the technology instead of the other way round. There are certainly many examples where this is the case, however this dissertation will seek to provide evidence of times where there is a direct link between science fiction technology and its emergence in real life later, including direct quotes and statements by the creators of that technology. Nevertheless, keep in mind that some of these cases may not show cases in which science fiction is fully proven to have influenced scientific progress, but where it is heavily likely or implied.

The main form of evidence which this dissertation hopes to use to demonstrate the influence science fiction has had on scientific development is through a series of case studies in different fields of scientific endeavour, from medicine and theoretical physics to communications and computer technology. The majority of the information in these case studies is derived from secondary research, of authoritative and credible sources, such as published or broadcast interviews with people who have had a great influence on science, academic papers about the topics discussed, scientific and industry journal articles and so on. Additionally, some of the information below is also sourced from primary research, specifically a trip to an event at the London Science Museum called Science fiction: Voyage to the edge of imagination.

Case studies

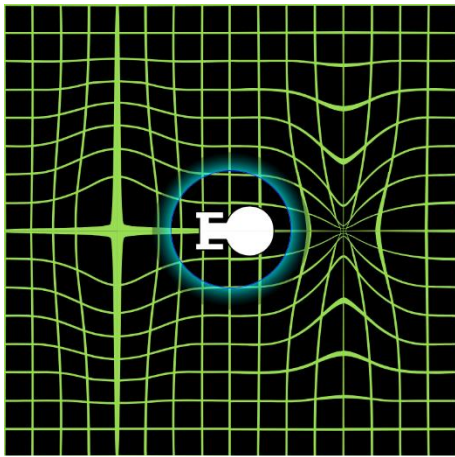
Case study: Faster than light travel

In Star Trek the warp drive is a device that allows spaceships to travel faster than the speed of light, which is 299,792,458 metres per second, to travel vast distances in extremely short times. However, conventional physics, of course dictates that no normal object can travel as fast or faster than the speed of light.

Due to how such technology would aid in our exploration of space in ways we can hardly imagine, many researchers have looked into its feasibility. In one case a paper published in 1994 by astrophysicist Miguel Alcubierre states that a warp drive could theoretically be achieved using a concept called the Alcubierre drive. This can be done within the rules of general relativity, without using the concept of wormholes, by using the local expansion of spacetime behind a spaceship. The Alcubierre drive makes use of a supply of negative energy whose gravitation creates a carefully shaped distortion in space time, which he called a “warp bubble” because Alcubierre was a Star Trek fan. Alcubierre stated in an email to Star Trek actor William Shatner that his theory was directly

inspired by the term used in the TV series Star Trek and cites the “warp drive of science fiction” in his 1994 paper “The warp drive: hyper fast travel within general relativity”. In an interview with futurist and start up founder Tim Ventura, Alcubierre said that it was watching Star Trek: The Next Generation gave him the idea of warping space time in order to travel at faster than light speeds.

Unfortunately, the concept of the warp drive is currently only theoretical due to the lack of the technology to implement it. For example, it would require exotic matter (matter with exotic physical properties), which violates all currently known laws of physics. However, while concepts such as this seem almost impossible right now, new technological and scientific advancements in the future may make them a reality one day.



An illustration of a warp bubble from the warp drive of a ship in Star Trek.

In this case, science fiction can act as a template for future scientific research and provide inspiration for new ideas, no matter how advanced the ideas and technology required to prove them may seem or how impossible the science behind it appears to be.

Case study: Quantum teleportation

The concept of quantum teleportation is the transmission and reconstruction of particles over an arbitrary distance using a quantum system. This has been demonstrated/proven experimentally, where a photon carries polarization to another pair of photons, making them entangled. Then the second photon of the entangled pair can get the polarization of the initial photon from any distance.

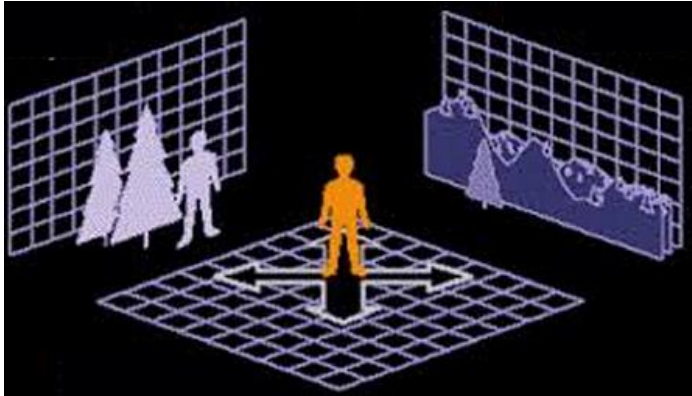
Quantum teleportation gained a lot of recognition by the general public due to its association to transporter and replicator technology in the science fiction show Star Trek. This recognition allows more people to be aware of the uses of science, increasing the amount of funding that institutions will put into its research and the amount of scientists interested in pursuing it.

A major proponent of this technology is renowned theoretical physicist Michio Kaku. “You know the expression “Beam me up Scotty?” We used to laugh at it” Dr Kaku said in an interview with the Daily Mail. “We used to laugh when someone talked about teleportation, but now we don’t laugh anymore. Quantum teleportation already exists and I think within a decade we will teleport a molecule”. Kaku was responding to the results of an experiment in September 2016 when researchers at the National Institute of Standards and Technology (NIST) managed to teleport photons carrying quantum information over 102 kilometres of optical fibre, a distance that is four times greater than the one achieved in the previous record breaking experiment. This provides further evidence of science fiction’s influence on research into quantum teleportation where it not only helps to publicise the research but also gives the researchers a goal to work towards.

Case study: Holodeck

In Star Trek the holodeck is a device that creates a virtual reality, using photons shaped by forcefields to visualise a program in its database, first seen in the episode of Star Trek the animated series in The Practical Joker in 1974. In later series of Star Trek, primarily Star Trek: The Next Generation the holodeck became a frequently used plot device to explore stories in settings other

than the starships in Star Trek. The virtual reality created by the holodeck is almost indistinguishable from the real world, allowing for extremely immersive and lifelike recreation and simulations, from flight training to trying to be Sherlock Holmes. The Holodeck is a prime example of science fiction technology which may not currently be available in the way it is portrayed in television but has equivalents and can be compared to our current technology in many ways.



In this case, the holodeck's vision can be seen in real life in the form of current technologies such as holographic, virtual and augmented reality, where you are placed in a digital simulation of reality, incorporating a mix of digital reality and real life objects. Kalin Stoyanchev is the Project Lead at RNDR, a leading cloud graphics company, and he wants to make the Star Trek holodeck a reality working in partnership with holographic

technology company Light Field Lab to deliver the industry's first end to end holographic content display technologies without the use of VR headsets. "With new technology and systems like RNDR that will decentralize and improve computer power across multiple industries, the far-out idea of a holodeck is becoming more of a not-so-distant reality," Stoyanchev, said.

Another project, the Mission Rehearsal Exercise (MRE) Project at the University of Southern California's Institute for Creative Technologies, is creating a virtual reality training environment in which real-life scenarios be played out. A report on the prototype clearly stated the project was "inspired by Star Trek's Holodeck".

In this case science fiction has provided a goal for technology, making artificial and virtual reality technology as close as possible to the technology of the holodeck. The advances and developments that have been publicised so far demonstrate how we are gradually getting closer today to that level of technology.

Case study: Tricorders

Tricorders are scanning devices often used in Star Trek, which can scan for things ranging from illnesses in the ship's crew to anomalies in space time. They are one of the best examples of technology in Star Trek that are almost possible using current technology, such as the diagnostic tools EchoNous' KOSMOS and the Butterfly IQ.



The KOSMOS is a three in one device, using ultrasound, an electronic stethoscope and an electrocardiogram all in one device at one time. These technologies have already been used to evaluate patients with COVID-19 and the Butterfly IQ has found to be a better diagnostic tool than x-rays to diagnose COVID-19 pneumonia.

In the future these technologies could become even more advanced, further resembling technology in science fiction. Although it seems

distant from now, the Butterfly IQ also seemed extremely distant in the 1960s.

Check4 another affordable handheld device for molecular disease diagnostics, including for detecting COVID-19 (and other pathogens). Gregory Hummer, the Founder & CEO of IdentifySensors,

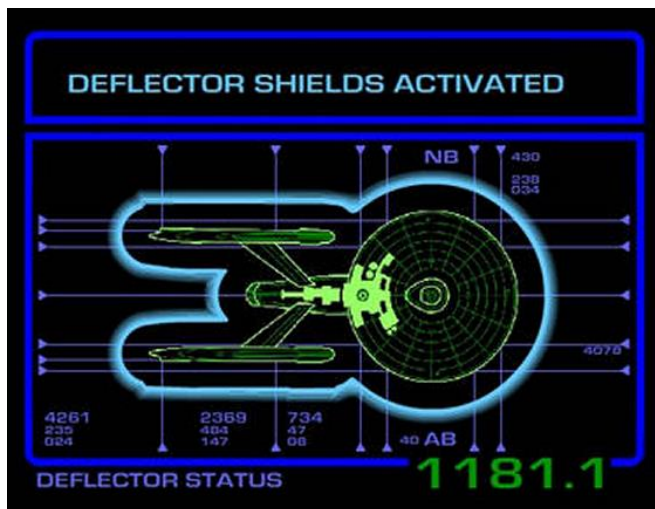


the company which developed Check4, recounts his inspiration for the invention. "Personally, I'll never forget that moment in Star Trek: Voyager where Ensign Harry Kim hands The Doctor the wrong Tricorder. The Doctor scolds the young Ensign by saying, "Medical Tricorder". Instantly I was curious about what this device could do".

Moreover, due to how close the tricorder is to technology we have now it can be used as a goal for technological advancement, as seen when there was a competition in early 2017, the Qualcomm Tricorder XPrize competition, awarding over \$10,000,000 to teams that could recreate a tricorder. This is a clear example of how Star Trek has motivated people to make advancements in science and set goals for our

development. The fact that this serious industry competition specifically refers to the word "tricorder" speaks volumes about the influence that Star Trek has had on this technology.

Case study: Shields and forcefields



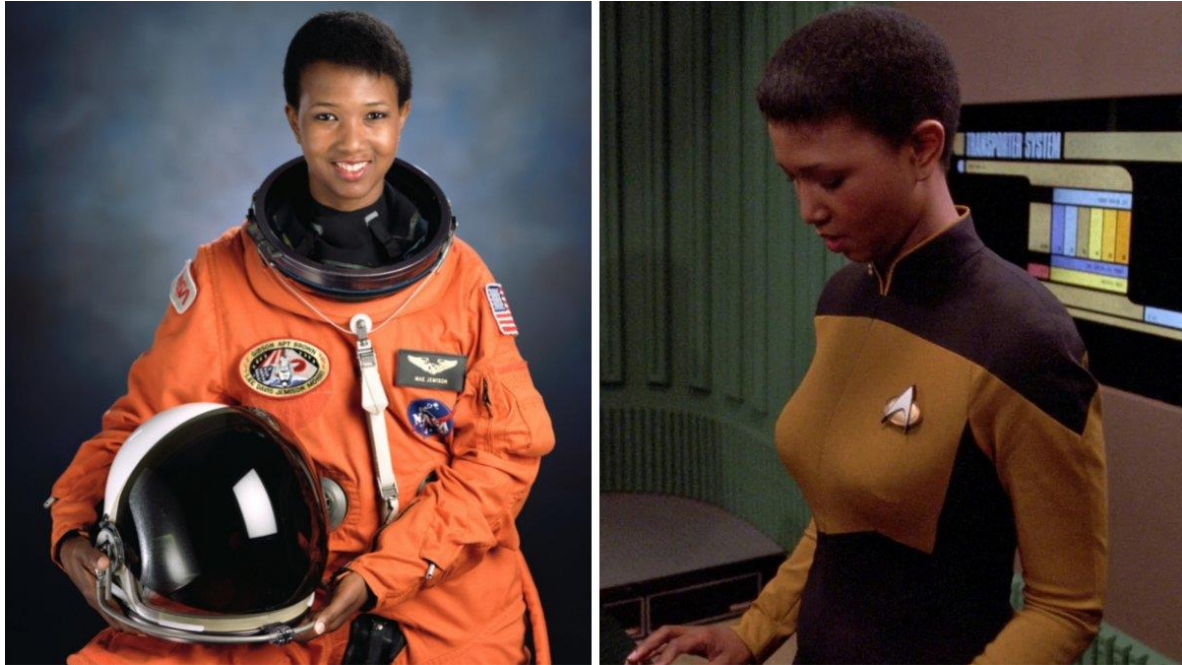
In Star Trek shields are barriers between space and a starship, used to protect the crew from a wide range of phenomena from solar flares to alien weapons. Shields and forcefields are great examples of how technology that seems unattainable can actually be realistic if the correct technology is applied. In this case we need to highlight why shields are important, because in space we need protection so that our biology does not interfere with our advancement as a civilisation.

Three of the main examples of how shields could be implemented in the future are an electrostatic field generator, a magnetic field generator (using plasma that is shaped by a magnetic field) and an inflated magnetic bubble (using a ring of confined plasma).

The Rutherford Appleton Laboratory (RAL) in the UK is examining the feasibility of shields that could make the difference between survivable and certain death for astronauts on their way to Mars. Ruth Bamford, the lead researcher for RAL's space deflector shield project said that as a child, she was inspired to explore a scientific career by the Apollo moon landings and is a fan of the Star Trek series. She believes the concepts explored in the science fiction films are a useful shorthand for scientists when trying to explain their work. "Scientists enjoy science fiction, as long as it is based on science, and then extrapolated with imagination".

Case study: Dr Mae Jemison and Nichelle Nichols

Dr Mae Jemison is an American engineer, physician and former NASA astronaut, who also appeared in an episode of Star Trek: The Next Generation. She was also the first African American woman to go into space with the U.S. space program.



Jemison in NASA spacesuit (left) and playing the role of a transporter officer (right).

She is a great example of the influence of science fiction on people's career paths. This is because at a young age she knew that she wanted to study science and go into space, a decision heavily influenced by Star Trek: The Original Series and the African American actress Nichelle Nichols' portrayal of Lieutenant Nyota Uhura. Astronaut Mae Jemison, the first African-American woman to go into space with the U.S. space program, In her opening speech at the Department of African and African American Studies' "Race in Space" conference in 2013, she noted how much Star Trek inspired her. "As a little girl growing up on the south side of Chicago in the '60s I always knew I was going to be in space." In a 1994 interview with C-SPAN, she noted how Star Trek was the first American television series that depicted an African-American woman who worked in a technical field and how she strongly identified with Nichols.

The character of Lieutenant Uhura was such a heavy influence on Dr Mae Jemison due to how she was an African woman with a scientific role, giving the message that anyone, no matter what ethnic group or gender can go into a scientific career if they want to.

Furthermore, Nichelle Nichols' work helped many other people going into scientific careers, "She also was very instrumental in recruiting the first women and minority astronauts for NASA" Jemison said in the C-SPAN interview.

It should be noted that Dr Mae Jemison is not the only eminent scientist who has appeared in a science fiction show. Stephen Hawking, a massively influential physicist, appeared in Star Trek: The Next Generation playing a game of poker on the holodeck with the series' famed android Commander Data. Two other well-known scientists, Bill Nye and Neil deGrasse Tyson appeared as themselves in an episode of Stargate Atlantis. The latter also portrayed himself in an episode of the science fiction animation series futurama. This further indicates that many scientists, such as these

acknowledge science fiction as an effective way to reach out to the public about science, helping to spark interest in and understanding of scientific concepts and issues.

Case study: The cell phone

Every day the cell phone is used by billions of people in their everyday lives and many could not live without it. Star Trek has long been noted as being the inspiration for this ubiquitous technology, which was first invented in the early 1970s by Martin Cooper at Motorola. Cooper is clear about what was the inspiration for his invention – the original series of Star Trek. “There’s captain Kirk talking on his communicator, talking with no dialling, that was not a fantasy to us to me it was an objective” he said during an interview in a Discovery Channel documentary called “How William Shatner Changed the World”.



This is one of the best examples of times when the apparent ease of use, convenience and functionality of a piece of technology in science fiction inspired the creation of new technology that has now been brought to the masses and, one could argue, has even surpassed the capabilities of the fictional technology it was supposed to emulate. Science fiction and as an inspiration and blueprint, or as

Cooper said, an objective for new advancements in science and technology.

Case study: Computer technology



While advancement in medical and communication technology are essential for progress, without a doubt one of the most prominent advancements in the last century has been the development of computers and how we use them to transform our lives. Even if you look at names of computers and programs on them alone you can see the influence of science fiction on them in some way or form. For example, the Altair is arguably the first commercially successful personal computer

released (1975) and its name was suggested to the inventor by Les Solomon, the editor of Popular Electronics magazine. He was asked to think of a name for the computer and his 12-year-old daughter, Lauren, who was following the 'new' sci-fi series Star Trek at the time, said "Why don't you call it Altair - that's where the Enterprise is going tonight". The voice-based virtual assistant programme on Microsoft Windows, Cortana, was named after the artificial intelligence in the science fiction computer game Halo. Apple’s original iPad was supposed to be called the iSlate but Apple founder Steve Jobs was so inspired by Star Trek that he wanted it called the iPad, after a similar device found in Star Trek: The Next Generation called the PADD (Personal Access Display Device).

While demonstrating real-time translation of Skype video technology at the Code conference in California in 2014, Gurdeep Pall, corporate vice president of Skype and Lync at Microsoft said, “It is

early days for this technology, but the Star Trek vision for a Universal Translator isn't a galaxy away, and its potential is every bit as exciting as those Star Trek examples".

Apple and Microsoft are particularly relevant in this case study not only because of the very close association of computer technology with science fiction but also because Star Trek was a large influence for some of the founders of computer companies, in particular, Steve Wozniak of Apple and Bill Gates of Microsoft.



Steve Wozniak once said during a 2017 Huffington Post interview, "I'm not sure I would have had the inspiration to ever start Apple and do all these technical things and had meaning in my life if I hadn't gone to Star Trek conventions when I was young". This sentence clearly indicates that without Star Trek one of the co-founders of one of the most influential companies for scientific development may have never even gone into the tech industry. Bill Gates, on the other hand, has been spotted wearing the uniform of a Starfleet science officer

from Star Trek: The Original Series at product launches in the 1990s, perhaps acknowledging the connection between his new technological developments and Star Trek.

These examples both show how science fiction can be used to influence others into going into fields that will have a positive impact on scientific and technological development and how many people already see the connection between science fiction and science.

Discussion

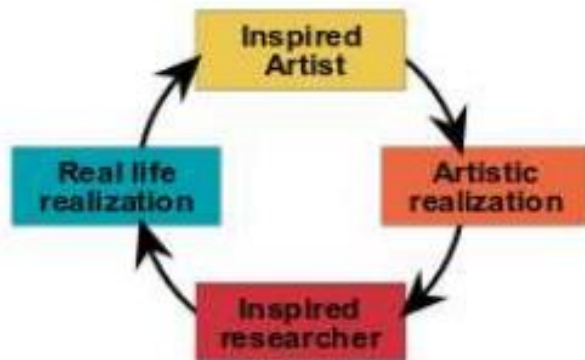
From the case studies above, we can clearly tell that science fiction has had a massive impact on scientific progress, from recruiting astronauts to NASA to creating real world tricorders. Using the information in the case studies, we can categorise the impacts of science fiction in a number of different main ways: raising awareness of the importance of science, publicising new technologies and research that could help the world, inspiring others to careers in the sciences, providing inspiration and goals for scientists and researchers, and even providing the template or conceptual principles for the creation of new technologies. These are all described below.

Science fiction can potentially solve many problems and challenges that science as a whole faces, such as people distrusting science and scientists or not knowing about the potential of science to engineer a brighter, more progressive future for our civilisation. Unlike conference papers, scientific journals and academic articles, science fiction shows are easy to understand, engaging and highly accessible to the general public, with almost everyone knowing about science fiction shows like Star Trek and Star Wars. This allows for the idea of science and technology being the way in which our civilisation advances and improves to be more widespread through the potential benefits of science being shown in science fiction, such as through the technological utopia portrayed in Star Trek.

It also helps to prevent science from being forgotten or ignored by the public, acting as a way to publicise possible future advancements and to create interest in and support for current advancements being made. An example of this can be seen with the development of quantum teleportation mentioned in the case study above, where science fiction may not have directly

inspired it, but it did help in its advancement by garnering public interest in it and making them understand how the complex science of quantum mechanics can lead to technologies and applications they understand and appreciate.

Science fiction has made many people go into scientific careers, by showing them a glimpse of a positive future that they could make possible. Nichelle Nichols is an example of how science fiction can show people from underrepresented groups working in scientific roles in order to inspire people to aspire to those roles, “It put women in non-traditional roles, lieutenant Uhura was the first woman you saw on television who worked in a technical field and also she was African” – Dr Jemison, said in her C-SPAN interview about how Star Trek influenced her decision to join NASA.



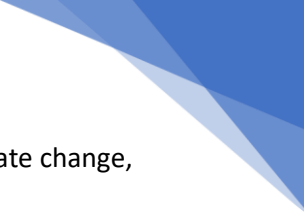
The most direct way in which science fiction has influenced scientific advancement is where it provided direct inspiration to researchers and engineers for technological and scientific advancements, “Star Trek is influencing the creativity of video engineers” said Neil deGrasse Tyson during a Nerdist interview with Will Wheaton. Some examples of this are the development of medical devices that resemble tricorders and the creation of the cell phone,

which today far exceeds the functionality and capability of what the producers of Star Trek could even imagine in the 1960s. This inspiration can work both ways, with artistic interpretations of new technologies in science fiction being influenced by real life technology being developed or pioneered today.

Conclusion

It is hoped that this dissertation has clearly demonstrated that science fiction plays an extremely important role in the advancement of science in many different ways. How can we best tap into this resource in order to ensure that its potential benefits are fully realised? A number of strategies can be developed to maximise the positive impact of science fiction and tap into this rich resource for the benefit of science, based on the different ways that it influences scientific advancement:

- 1) Highlighting scientific concepts – Star Trek is known for incorporating scientific concepts and ideas into its stories, from faster than light travel to almost magical devices that can cure any known disease. By highlighting these concepts and exploring their potential, Star Trek can help to inspire interest in science and encourage people to learn more about the real life scientific concepts that lie behind the imagined technology.
- 2) Promoting scientific literacy – Star Trek can be used to promote scientific literacy by exploring scientific concepts in accessible and engaging ways that are appealing to people who would not normally have any interest in science. By making science exciting and relatable, Star Trek can help to inspire people to learn more about science and its potential to transform society for the better.
- 3) Encouraging critical thinking – Star Trek often explores complex ethical and social issues, such as the impact of new technologies on society or the importance of diversity and inclusivity in the scientific community. By encouraging critical thinking and thoughtful discussion of these issues, Star Trek can help to promote informed and thoughtful debate



and engagement on scientific topics, including controversial issues such as climate change, genetic modification and vaccines.

- 4) Fostering innovation – Star Trek has inspired real-world innovation in a range of fields, from space exploration to medical technology. By showcasing new ideas and technologies that push the boundaries of what is possible, Star Trek can help to inspire the next generation of scientists and inventors.

As well as in the scientific community, we can also use science fiction, like Star Trek to aid in scientific progress in school and other educational environments. This is because if we try to use science fiction to teach scientific concepts, teachers can more easily engage students and inspire them to learn about how science can transform society. There are of course many ways to use Star Trek to inspire interest in science in a school environment shown below, particularly in relation to highlighting scientific concepts and promoting scientific literacy.

- Use Star Trek to teach scientific concepts – Star Trek incorporates many scientific concepts into its stories, from physics to biology to astronomy. Teachers can use Star Trek episodes or movies to introduce, explain or reinforce scientific concepts in an engaging and relatable way.
- Create science fiction writing assignments – Teachers can encourage students to write science fiction stories that explore scientific concepts and technology. This can be a fun and creative way to get students thinking about science and technology and their potential impact on society.
- Organize science fiction book clubs – Teachers can organize science fiction book clubs or reading groups that focus on science fiction books, including Star Trek novels or short stories. This can be a fun and engaging way to get students reading and thinking about science and technology.
- Plan science fiction movie screenings – Teachers can organize screenings of science fiction movies, including Star Trek movies or episodes. This can be a fun and engaging way to get students thinking about science and technology and their potential impact on society.

If we try to use science fiction in these ways it can be surmised that we could use it as an efficient and effective instrument to advancing our scientific knowledge and improving general quality of life as a result of that.