

THE TECHNOLOGY OF STAR TREK

Design Research Seminar

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Approval sheet

The project titled 'The technology of Star Trek' by Divyanshu Thakur is approved in the partial fulfilment of the requirement for Master's degree in Mobility & Vehicle design.

Project Guide:

Declaration

I declare that this written submission represents my ideas in my own words and adequate references and citations have been provided where required along with the original sources. I have adhered to all principles of academic honesty and integrity and have not misinterpreted or fabricated or falsified any idea or information in my submission. I understand that any violation of the above will be cause for disciplinary action by the institute and can evoke penal action from the sources which have thus not been properly cited of from whom proper permission has not been taken when needed.

Signature:

Name:

Roll No:

Date:

Acknowledgement

I am grateful to Dr. Sugandh Malhotra for giving me the opportunity of working on this project and for his expertise and technical support in the implementation. I would like to express sincere thanks to all people who provided much needed information and insights during the research phase of this project.

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1. Introduction



Star Trek is an American science fiction media franchise created by Gene Roddenberry. It is cult television series that has received appreciation from all corners of the world. Created in the late 60's, the timeline of Star Trek is based after the 23rd century A.D. The original series, which portrays the USS Enterprise commanded by Captain Kirk, shows the adventures of the ship around the galaxy as they meet new species, get attacked by hostile sentient aliens and discover new technology.

This project tries to document the futuristic technology of the original series which have become a normal part of the lives of the people in the future. The methodology involved was to thoroughly analyse each hour long episode to look for subtle and obvious ways in which technology interacts with the environment, the crew and other organisms around the galaxy.

3. Methodology

Each episode of the original series is an hour long feature full of intense character interaction, drama, action and interaction with aliens and unexplained phenomenon. It is almost impossible to go through every little detail of every scene in the first watch itself. Although identifying technological equipment is quite easy, it is not true when something has an effect on the environment. This is often overlooked because they almost often occur on the background of the seen and is usually very subtle.

To cover each episode, the first play through was solely focused on following the storyline and noting down obvious technological interferences with the characters. In the second play through, each scene was observed for any missed references in the first play through while also noting down the effects of changes from actions that occurred earlier.

The technology that was featured in the episodes was systematically documented in a spreadsheet. After the documentation was completed, an analysis was done to map it using Maslow's hierarchy of needs.

3.1 Flowchart



3.1.1 Play through

During the first run of every episode, the focus was to plot down every visible technology showcased in the show and sometimes also during conversations. However, the main objective of the first play through was to get a grip on the storyline and understand the premise of the show. There are a number of events that occur which fall outside the timeline of the show.

There are a few episodes in the entire series in which the crew time travels into the past to relive some important moments in history (the first man on the moon for example) and also in some prehistoric times. These episodes needed to be marked down for further analysis.

During the second run, a lot of events had been occurring in the background of the show, the purpose of the second run was to note down all of these events. In the following pages, some peculiar technologies and events have been portrayed to give an example of the variety of technology that has been showcased in the series.

2. Motivation for the project

TV series, when compared to their movie counterparts, are spread over a longer duration of time. Unlike a movie, which lasts a mere 2 hours, television series are spread over a time period of several hundred hours if not less. This gives the creators more time to develop characters, build up the story and totally immerse the viewer into the world of the series if done right.

Science fiction series are a different ball game altogether. They have to convince the viewer into believing that a future as portrayed in the series is possible. This not just happens by use of special effects or visuals, but also through convincing acting, story and believable worlds. Star Trek relies heavily on story telling rather than giving a highly stylised image of the future of space travel. Due to this, the viewer is totally immersed into the series.

The fanfare for Star Trek has become so high that 'Klingon', a fictional language developed for the series is now being taught by some universities. Hard core fans of the series communicate with each other in this 'alien' language often.



Here Mr. Spock is seen using a communication portal with a round display that projects a hologram. This equipment is seen throughout the series on the USS Enterprise.



Captain Kirk tries to fix a communicator, which is nothing but a flip up mobile phone. It is quite interesting that the first flip up mobile phone came out in the late 90's, while the concept of a mobile phone didn't even exist till the mid 70's (Marconi). This is prediction of the future at it's finest.



The chief medical officer of the USS Enterprise examines a patient with a device called the 'tricorder'. It has a small scanner which is run over the patient without physical contact and it wirelessly transmits data to the handheld screen giving all the medical information about the patient.



Warfare is quite common throughout space, hence every commanding officer carries a laser gun along with him. This gun is the size of a small revolver but more lethal than a sniper rifle. It uses a highly energetic beam of light to penetrate and burn the victim from the inside.



Space is notorious for having extreme climate. Right from super sub zero temperatures to million degrees Celsius, the crew needs special gear to protect themselves. Here, Captain Kirk is seen wearing a weatherproof suit and casually walking around a deserted ship after it was hit by a 'cold wave' and everything froze instantly.



This is the commanding station of the USS Enterprise. The Captain and all the first officers operate from this chamber. All the information from the ship comes to this station and is handled by dedicated station staff. It has state of the art display technologies, scanners that can detect presence of life on a planet from space and even the composition of the planet.



When the crew travels to the past, Mr. Spock carries a camera with him. This camera has a live screen which instantly shows what has been captured. This is equivalent to today's digicams.



The station crew is seen wearing a earpiece through which audio is exchanged. This gives her freedom to operate the console comfortably while at the same time being in contact with her crew.



Captain Kirk is seen using the communicator while the medical officer in the background is studying some parasite through an electronic microscope.



This is the USS Enterprise using a planet's gravitational field to slingshot around it. It has crazy amount of tech in it which is not even properly explained in the series itself. Some of them are warp drives, force field barriers and also maybe a cloaking shield.

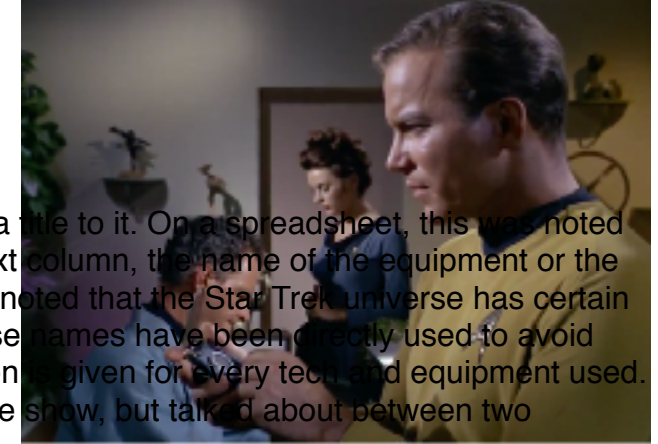
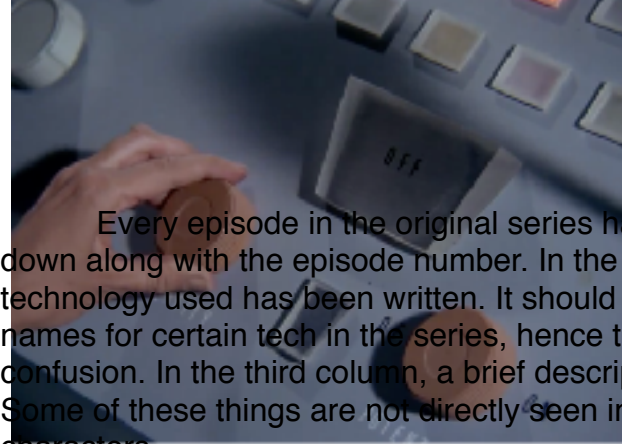


Aside from ships and small vehicles, transport in the series is majorly done by a teleporter. This teleport can literally transmit matter in any part of space by replacing the matter and recreating it at the desired location. The transporter is a device which has become an integral part of the lives of people in the 23rd century.



This is a very small recording device used by Captain Kirk to analyse voice and other aural attributes of the patient/victim. It is a kind of a hand held lie detector.

3.1.2 Documentation



Every episode in the original series has a title to it. On a spreadsheet, this was noted down along with the episode number. In the next column, the name of the equipment or the technology used has been written. It should be noted that the Star Trek universe has certain names for certain tech in the series, hence these names have been directly used to avoid confusion. In the third column, a brief description is given for every tech and equipment used. Some of these things are not directly seen in the show, but talked about between two characters.

The ships two flying officers operate through a cell. They see through a super high definition television screen which has virtually no input lag from the source. This helps them to see distant objects from up close.

EPISODE	TECHNOLOGY	DESCRIPTION
0. The cage	Teleportation device	A device which transmits inorganic/organic matter into a different location
	Mind controlled imagery	Illusions which are projected through controlling the mind which makes the victim hallucinate about presence of objects/beings
	Laser beam guns	Laser beam guns that emit high power beams that can burn/damage solid objects
	Communicator	A mobile phone like device which flips open and transmits voice to the recipient
	Material scanner	A computer on the ship which can detect elements on a planet like oxygen/minerals in the surface and organic life forms present on it
1. The Man Trap	Portable medical device	A handheld medical device that can detect ailments/ foreign matter inside a patient's body when a probe/ scanner is hovered over the patient
2. Charlie X	Handheld computer?	A tablet like computer with a stylus, although it doesn't have a screen, it is fixed with a sheet of paper on a console with a few lights and buttons
	Holographic imagery	A built in system of the spaceship where images are displayed through holograms
	Intercom like device	A device which is present all around the ship, which detects the presence of an individual and the intercom directly transmits audio to that person itself
3. Where no man has gone before	video calling?	Two people are seen talking to each other over a television screen. Both of them are in different parts of the ship.
	side table television?	a small tv like object is kept next to a table with text on it.
	telekinesis	A character gains powers from a cosmic energy where he is now able to create and move objects just by thinking about it
4. The naked time	weatherproof suit	an orange suit seen in the beginning of the episode to protect the wearer from extreme weather conditions. Here it is seen to be as a cryogenic suit.
	medical scanning bed	the beds in the ship's medical bay instantly scan the status of patient and display it on the screen above the patient.
	instant food maker	a microwave like box where the user inserts a small card and the food practically appears ready to be eaten within seconds.
	breathing mask	a breathing mask without the tube connected to any oxygen cylinder. Rather it has a small metallic bulb at the end which supposedly filters in only a certain type of gas.
	handheld x ray scanner	a man can be seen using something like an x ray scanner to find some weak spot in an otherwise locked door.
5. The enemy within	pen shaped tranquilizer	a small tranquilizer in the form of a pen which is used to calm down rabid animals
6. Mudds women	polygraph machine	a voice operated polygraph machine which tells when the person is stating the truth or lying
7. What are little girls made of	androids	a robot which can't be told apart from a human unless their body parts are exposed
	mini laser gun	a high powered laser gun which is no bigger than the palm of the hand to burn objects/pulverise it
	replicator	a machine which replicates a complete human into an android's body right from the shape, size and even the mental patterns of the 'original'
	vaporiser	a small devices which instantly vaporises anything in its direct path, leaving no trace behind.
8. Miri	digital camera	a photographic device with what looks like a small crt monitor to see the preview. It seems to have more than just mere photographic functions. Probably material scanning and other sensors.
	object 'beamer'	the characters talk about 'beaming down' some parts from the ship to the earth. Possibly this machine converts matter to energy, transfers it to the earth at light speed and a receiver converts this energy into matter. Similar to a teleporter.

9. Dagger of the mind	wireless earpiece memory altering device	an object that resembles a handsfree calling device planted on the ear. a device which can alter the stored memory of a patient and the person operating the device can verbally plant specific memories into the patient, thus totally altering the way the patient looks at certain people and their outlook towards life. It also change the physiological state of the patient. i.e; make them feel hungry, happy, emotionless, etc.
10. The corbomite maneuver		
11. The Menagerie Pt. 1		
12. The Menagerie Pt. 2	laser cannon	a high powered laser cannon that can melt through rocks and any metal. It also shows a person operating it with just her voice
	welding glasses?	a pair of glasses worn by a person to protect them from high intensity light and lasers. Probably a polarising glass.
	automatic doors	doors that sense the proximity of a person and opens/closes automatically when the person approaches it.
	virtual reality	the victim's mind is controlled and he's seeing and feeling different objects and environments. All controlled through his brain.
13. The conscience of the king	voice assistant	the captain is asking a computer some questions directly by conversing with it.
14. Balance of terror	phaser cannon invisibility	a laser type cannon which explodes exactly at a certain point in space from it's origin. a cloaking device which makes it visually impossible for other ships to detect it.
15. Shore leave		
16. The Galileo seven		
17. The Squire of Gothos	geophysical scanner breathing apparatus freeze ray? faster than light communication?	can detect volcanic matter/vegetation/constituency of the planet's surface and sub-surface breathing masks attached to a very small oxygen tank that can be tucked on the waist with the belt. a person can totally freeze another person in time, making the person unable to move. the communicator can apparently contact in space vessels without any time delay.
18. Arena		
19. Tomorrow is yesterday	time travel	the ship is seen using a massive star's gravity to accelerate and move backwards in time.
20. Court Martia.	AI	one of the ship's crew is noted for playing chess with an AI.
21. The return of the archons		
22. Space seed		
23. A taste of armageddon	photon torpedos	a weapon which is talked about during the episode, which is a light based high energy bomb that passes undetected and explodes at a certain distance
24. The side of paradise		
25. The devil in the dark	telepathy mining machine	Mr. Spock is seen touching an alien and he is able to understand the alien through touch. an underground mining machine which can directly extract elements like gold and platinum in its purest form from the earth.



This is the most interesting piece of technology in the entire series. This is an instant food maker. Here, the user enters what he wants to eat and it is instantly made in the microwave like box. It is believed to share the same working technology as the teleporter.



This is a small space pod used while trying to land on planets. It has these round globe like displays through which the user looks and gets all the information necessary. This display can be folded aside to focus on the glass screen in front of the crew.



One of the first instances where the modern day version of the computer is shown. Captain Kirk is seen reading out data from the screen and also operating a keyboard.



When Captain Kirk is captured by super sentient beings, he is kept in a cage which has an unbreakable glass. He is seen to use weapons to try and break the glass but fails every time to escape the enclosure.



This is one of the rare scenes where a utopian society is shown. It is clean, has people walking around and marked by tall towers everywhere and everything seems to be in peace. Although from the sky we can tell that this utopia is definitely not Earth, there is not much talk going on about Earth in the series.



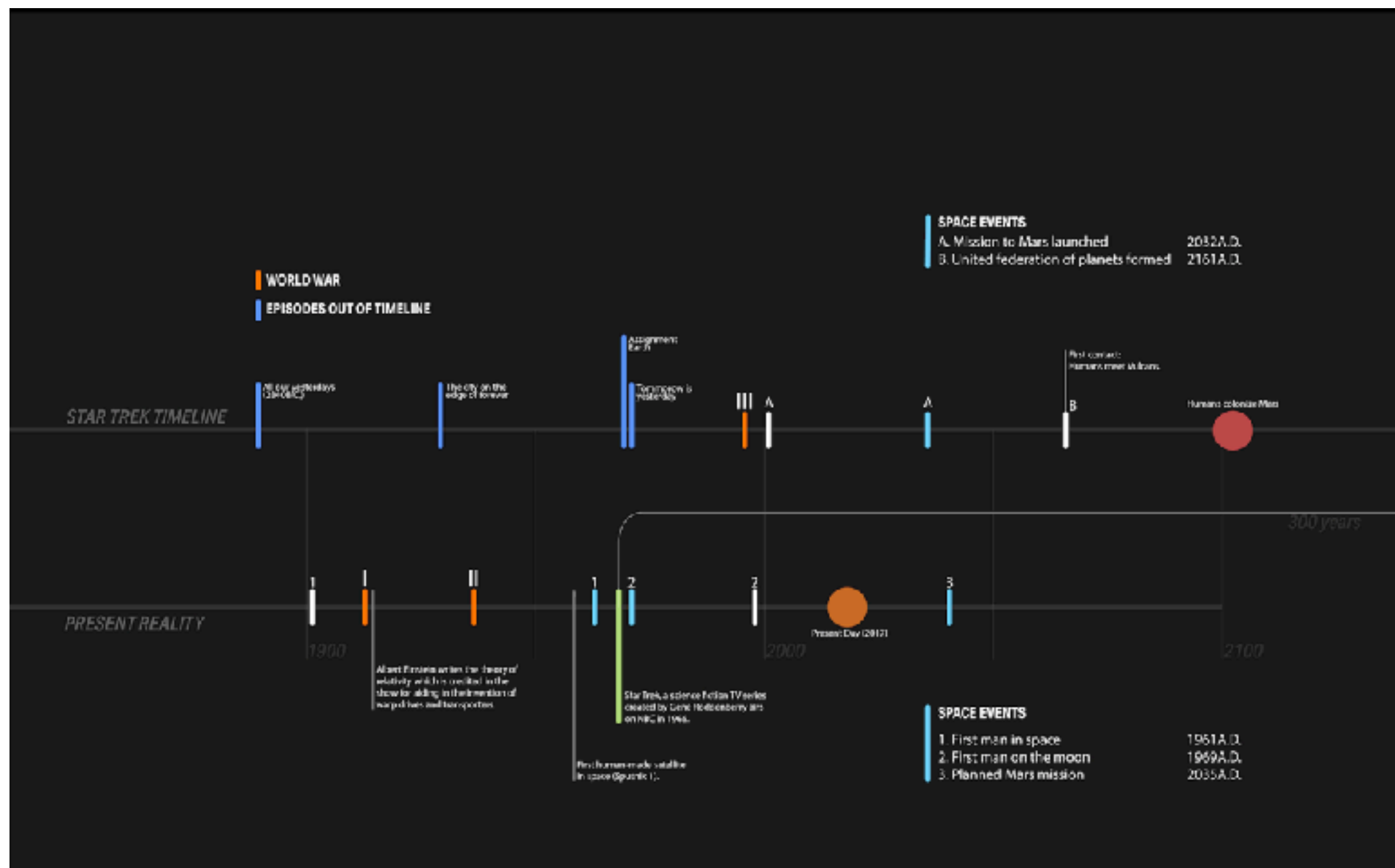
A science officer operating in the tech bay of the ship who over sees all the operations and technical problems. It is quite interesting to note that things like computers, tablets and phones are shown as a common part of the lives of people as it is right now in the 21st century.

26. Errand of mercy	portable video player?	Mr. Spock gives Cpt. Kirk what looks like a storage device which he plugs it into another larger handheld device and reads out information from it. Possibly a video device.
27. The alternative factor	personal space shuttle	a single seater space shuttle, not much bigger than an entry level car. It has a bubble canopy made of glass/transparent material for 360 degree visibility.
28. The city on the edge of forever	time distortion field/worm hole	Around 50 technologies and devices have been identified in the entire series, of which some are organic based technologies (for e.g. mind controlled imagery). These had to be classified into groups with similar attributes. The groups that have been chosen are technology, device, weapon, appliance and organic.
29. Operation annihilation	tractor beam	
30. Amok Time		
32. Who mourns for adonals	focus beam energy at the fingertips	Technology refers to anything which portrays a scientific advancement to carry out a process or a breakthrough. Device can be anything which is carried by the crew to perform some particular function. Weapons are those which are used in the line of defence to kill or destroy. Appliances can be instruments used to carry out a particular function which are deployed on the ship. Organic relates to anything which a life-form does that is out of the ordinary.
33. The changeling	advanced non organic AI	
34. Mirror mirror	taser surveillance camera	
35. The apple		
36. The doomsday machine	warp drive impulse drive	Using the Maslow's hierarchy and the above groups, a table was created and all the elements were classified accordingly. On the following page is an attached screenshot of a portion of the infographic which portrays the classification.
37. Catpaw	life form detector voice control?	

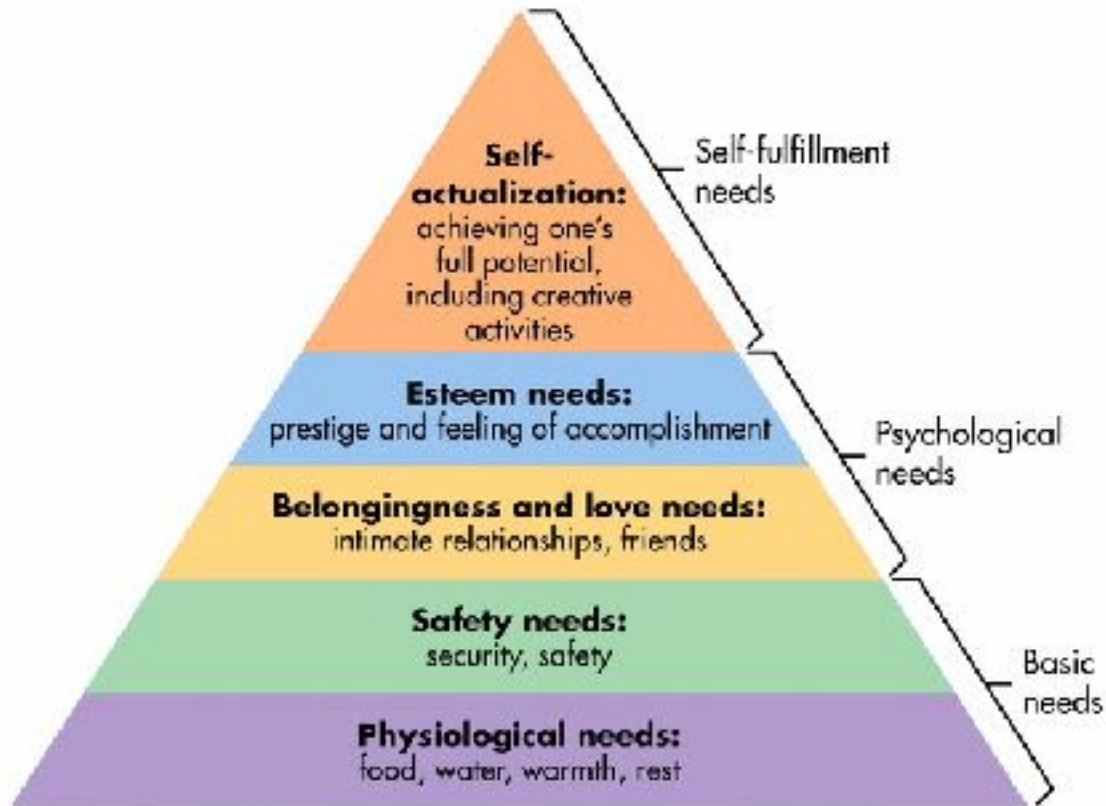
38. I Mudd		
39. Metamorphosis	surveillance shuttle	a small shuttle that can carry 4-5 people and is used for surveillance of planets and can carry basic supplies.
40. Journey to Babel		
41. Friday's child	vaporiser?	a handheld device that can instantly vaporize anyone in the beam's path.
42. The deadly years	accelerated aging	something causes the crew members to age quickly and become old.
43. Obsession		
44. Wolf in the fold		
45. The trouble with tribbles		
46. The gamesters of Triskellon	exploding neckband	a locked band that wraps around the neck which explodes if tampered with, killing the person it's locked on to.
47. A piece of the action		
48. The immunity syndrome		
49. A private little war		
50. Return to tomorrow	highly advanced beings	these beings are just a consciousness stored in an artificial brain. Their mental abilities are so powerful that they can take over any organic lifeform and control them.
51. Patterns of force	deflector shield	the USS Enterprise has an invisible force field called a deflector shield that protects the ship from damage against asteroids, physical projectiles and energy weapons by warping the space around the ship.

During the course of the show, a lot of references are made to scientific breakthroughs that had occurred in the real world. For example, Einstein's theory of relativity is credited for a lot of inventions in the show like the warp drive and the teleporter. All these important dates which have occurred in the real world have been plotted in the present timeline which we can call 'our reality'. On the other hand, a parallel timeline is created to showcase the events that occur in the Star Trek franchise over the period of several centuries.

The parallel timeline also serves a purpose to showcase a parallel universe in which the tv series takes place. Although the show is plotted 300 years into the future from the day it aired on television, there are several references and time travel events in which the crew goes backwards in time.



4 Analysis & Mapping



Maslow's hierarchy of needs has five attributes for humans. They are survival, safety, social, esteem and self actualisation. Although mapping the study to these five attributes directly is not easily understood. There is an underlying principle behind each technology that has some basis on Maslow's hierarchy.

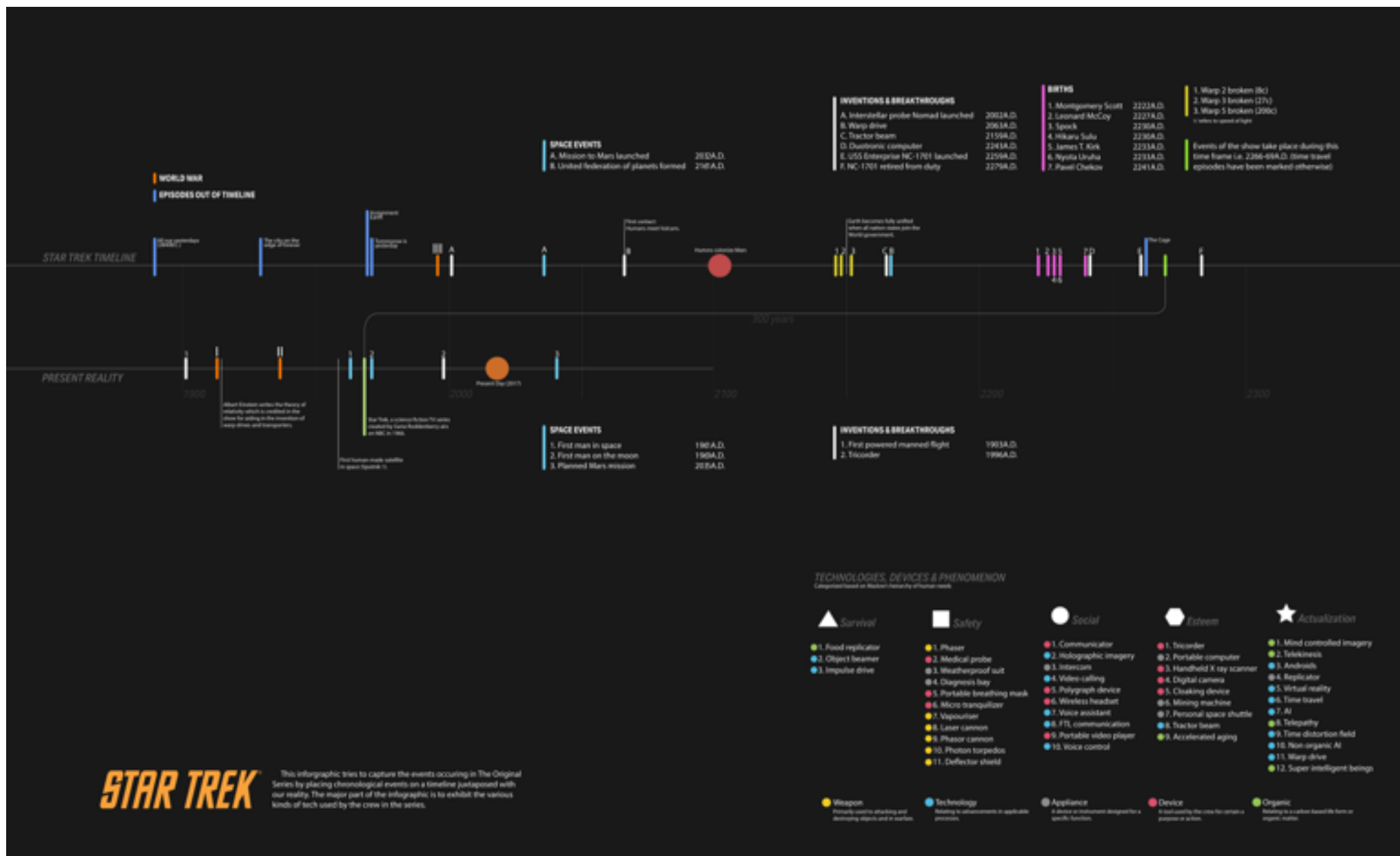
This mapping is done in the form of an infographic developed on adobe illustrator. It stretches horizontally to map every tech noted while being distributed over the five attributes.

4.1 Classification

For the complete infographic, the elements were placed on an A0 sheet so that every small detail text would be legible to read. Since the theme of the show was space travel, the background was kept dark to represent space and the events were given a vibrant colour to highlight them.

All the events have been colour coded so it would be easier to identify all of them. The events in the Star Trek timeline have been assigned letters while the events in the present reality have been assigned numbers so there would be no confusion between the two.

The complete infographic is showcased on the next page.



4.2 Timeline

http://memory-alpha.wikia.com/wiki/Warp_five_engine

http://memory-alpha.wikia.com/wiki/23rd_century

https://en.wikipedia.org/wiki/World_War_I

https://en.wikipedia.org/wiki/Sputnik_1

<https://gomovies.to>

INVENTIONS & BREAKTHROUGHS

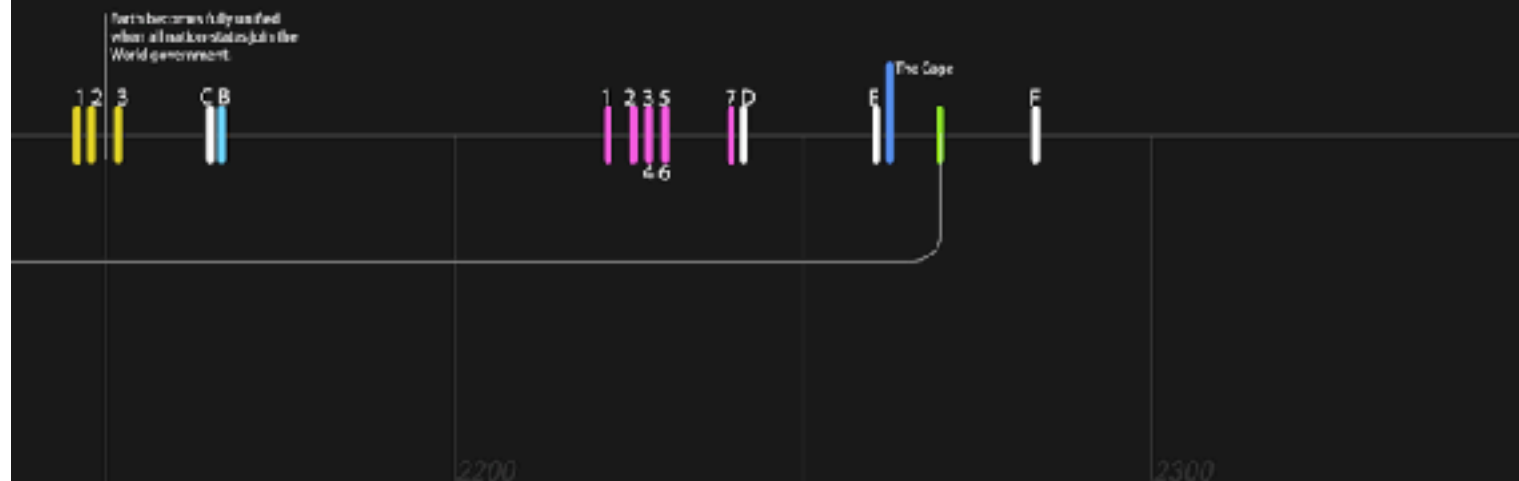
- A. Interstellar probe Nomad launched 2002 A.D.
- B. Warp drive 2063 A.D.
- C. Treader beam 2159 A.D.
- D. Duotronic computer 2243 A.D.
- E. USS Enterprise NC-1701 launched 2259 A.D.
- F. NC-1701 retired from duty 2279 A.D.

BIRTHS

- 1. Montgomery Scott 2222 A.D.
- 2. Leonard McCoy 2227 A.D.
- 3. Spock 2230 A.D.
- 4. Hikaru Sulu 2230 A.D.
- 5. James T. Kirk 2233 A.D.
- 6. Nyota Uhura 2233 A.D.
- 7. Pavel Chekov 2241 A.D.

- 1. Warp 2 broken (8c)
 - 2. Warp 3 broken (27c)
 - 3. Warp 5 broken (200c)
- Refers to speed of light*

Events of the show take place during this time frame i.e. 2266-69 A.D. (time travel episodes have been marked otherwise)



INVENTIONS & BREAKTHROUGHS

- 1. First powered manned flight 1903 A.D.
- 2. Tricorder 1956 A.D.

5. Complete infographic

6. References