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From the Earth to the Moon Analysis

The space program was needed because Russia was the first to reach outer space, and the pilot, Yuri Gagarin, was a communist. Gagarin was a pilot of Vostok 1 and successfully flew to outer space and landed safely in the Soviet Union. Gagarin and the Vostok 1 were the first manned space flight to orbit the Earth. Prior to humankind reaching outer space, the Soviet Union launched Sputnik 1 four years prior into Earth’s orbit. (Part One, 6:14-7:07). The Soviet Union, at the time, was more advanced than the US at creating new technologies, and the US interpreted these actions as a security threat. To counter the Soviet Union, the US decided to also send a man (Alan Shepard) to outer space and back. This created what we now know as the space race. Following the successful flight of Project Mercury, President Kennedy announced that he wanted to put a man on the moon and have them return safely before the decade ended.

The first objective of the overall mega-project is to get a spacecraft into orbit and stay there for a bit. During the mission objectives briefing, the leader of the group mentioned that there were “mercury flights coming up” (Project Mercury), and those flights should be long enough to figure out how to stay in orbit (which the Soviet Union has already done) (Part One, 20:55-21:15). The second objective is the EVA spacewalk. They want to create a suit to protect humans in space to allow them to walk around, maneuver, and get back into the spacecraft. The suit is needed for emergencies and allows man to explore the moon’s surface rather than sit in the spacecraft and take pictures (Part One, 21:18-21:38). The third objective is “Rendezvous, two spacecrafts meeting up in orbit.” (Part One, 21:39-21:42). The fourth objective is docking and joining up with the rendezvous spacecraft. This objective also ensures everything comes together safe and stable (Part One, 22:07-22:16). The fifth objective is studying and understanding the effects of long-duration space flights. They’re estimating the flight to take two weeks to fly to the moon and back and want to determine what being at zero gravity for that time will do to the human body (Part One, 22:17-22:37). The last objective is to find many new astronauts (Part One, 22:52-23:03).

The triple constraint theory of projects consists of budget/cost, scope, and time. The time the mega-project should take is by the end of the decade (Part One, 18:26-18:38). The movie later panned to a scene where three men discussed the reality of sending a man to the moon, and one of them said it was doable in nine years (20:17-20:32). It was also later mentioned that the actual flight to the moon and back would take two weeks (22:18-22:22). There was no exact budget mentioned which we can assume there was no budget for this project. The project's scope is to create a spaceship (and space suit) to send a man to the moon and back to Earth safely.

In the second movie called “Spider,” the project or sub-project is lunar orbit rendezvous or sending the fuel and other supplies the astronaut needs to get back from the moon to the moon. This cuts down the weight of the spacecraft itself and would make it slightly easier to get to the moon. This project ties with objectives three and four from the first movie. The goal/objective of the sub-project is to send extra fuel and supplies to the moon, so when the astronauts arrive, everything they need is already there (Part Two, 6:28-6:39 and 7:46-8:35). The time constraint for this project is seven years (Part Two, 14:38-14:43). The project's scope is to create a spacecraft small enough to land on the moon (the lander) and have other spacecraft pieces in rendezvous to get back to Earth. The budget for this project is $500 million (Part Two, 14:04-14:12).

Overall, the space program was managed decently. The team building the landing part of the spacecraft started with a concept design of what the real thing would look like. They were agile and adaptive and went through many designs and updated the design to what led to the final product (for example, the specs called for five legs, and they opted for four because it would be less trouble [Part Two, 14:48-14:57]). The original goal was to have the lander built in seven years, but they had difficulties with timing, and the project was delayed by two years. The communication among the team was good. The team talked to each other about the design and came up with ways to improve the lander's design. An example of good communication is when a team member confessed to a miscalculation when they recalculated the figures (Part Two, 22:29-23:53). Admitting they were wrong when they found out allowed the team to remake their calculations for everything else. As mentioned earlier, they were also agile and learned throughout the process of creating the lander. As they were designing it, the team tried to innovate new ways to lessen the lander's weight and make it more efficient. Additionally, as they were testing, they learned what the issue was and resolved it promptly.

Managing risks was something they did well as well. They had to handmake every part of the limbs and did rigorous testing with the astronauts. The team thought about the different things the limb would encounter, such as heat and dust (Part Two, 20:58-21:38). The project manager and leaders did a decent job as well. Even though the manager shot down some ideas, when the team built a mock design of the ideas, the manager agreed that it was better than the original design and approved for it to be implemented. Additionally, the manager treated others equally. There was no berating and name-calling, and there were also no cancelling things just because it wouldn’t work out. As mentioned, teamwork was also important and well done. The build/design team worked with the astronauts to find and fix problems with the lander (Part Two, 24:46-24:58). Additionally, everything done was being documented/filmed (Part Two, 20:33-20:35). To manage stakeholders, the team came up with an alternative plan of sending a spacecraft to the moon, which they called the C Prime Mission. They were going to send the command, service, and lunar modules on a flight around the moon (Part Two, 33:53-34:12). Additionally, they started the apollo missions, which were sending man around the moon and back. Unfortunately, the space program couldn’t escape from scope creep. The lander (limb three) that the crew was working on was ready in February 1969, two years later than the expected finish year (Part Two, 36:02-36:12). The project cost also increased drastically from half a billion to over one billion dollars (Part Two, 32:22-32:30). The team tried to avoid scope creep by resolving the problems they encountered as soon as they could, but the time and cost kept increasing as well.

Although the space program took longer and cost more than expected, the project was successfully launched and fulfilled its purpose. Some of the innovations from the projects are still used today, such as firefighting equipment and shock absorbers. Nasa helped develop polymers, which is fireproof and helps resist heat for firefighters. Polymers are used in spacesuits, vehicles, firefighting, military, motorsports, and other applications (Nasa.gov). Additionally, newer suits have circulating coolant to allow for breathability and make it cooler for firefighters. Shock absorbers were initially built to protect spacecraft and launchpad equipment during extreme conditions of shuttle launches (Nasa.gov). However, they realized shock absorbers could also be used in buildings and bridges to make it harder for Earthquakes to destroy them. Nasa also claims that the shock absorbers used in the buildings and bridges haven’t suffered damage during an Earthquake. If it weren’t for shock absorbers, taller buildings like the Empire State Building or the Burj Khalifa would collapse if an earthquake happened.

Some takeaways from this movie are that no matter what happens, like scope creep, we should develop a plan to maintain stakeholder satisfaction and continue with the project. In this movie, the project managers decided to create an alternative plan that was “good enough.” Additionally, you shouldn’t always rely on previous experience to work on a new project. For example, the narrator said they were behind schedule and over budget because they based it on previous experience with similar projects. However, not all projects are the same, and each should be given its own numbers based on previous experience. For example, you can start with a number such as a cost based on an earlier project, but you should give it a new number based on the reality of what happened with those projects. Essentially, you should expect scope creep and add that to your project plan and allow for more time than what you think you’ll need. Of course, the main goal is to reach the demands of the stakeholders and the project requesters. Another thing that I learned is that testing is essential, especially for a project like this. Without adequate testing, different components could fail without you even knowing, and you would have to retrace your steps and figure out what went wrong where.

Something I learned that we should not do when working on a project is not have alternatives. Projects need to be flexible and have alternatives. The project manager in the movie was very adamant about getting the lander to be fixed. Although the original plan was to send the spacecraft to land at the moon, they should’ve thought about alternative ways to get to the same outcome. Something that I would’ve tried is to see if one of the apollo spacecrafts could be used to land. Perhaps newer technology was being made at the time, and the team was so invested in trying to fix the one thing they built that they decided to ignore the new technology. I would try to see if I could implement that technology into what currently exists. Another thing I learned that we shouldn’t do is to have the project made in one go. Having a project in multiple phases/parts means the project will be more manageable, and if for whatever reason the project needs to be scrapped, not all the money will be gone. Knowing when to stop the project if necessary is crucial, and if one phase of the project (and its alternatives) doesn’t work out, then the project should be stopped. It would be much easier to stop than if you’ve spent billions and years working on a project that doesn’t seem possible. I would’ve split the building of limb three into multiple phases, such as building the landing pads and testing, working on a different component, testing it, and continuing the process.

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