

The Agility of SpaceX

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Purpose: Make humanity a multi-planetary species. Goal: Build a city on Mars

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Agree on a mission first!

Example by Space X

As a person who wants to build a city on Mars, I need to learn how to fly people safely.”

Task: Crew Dragon capsule boosted by Falcon 9 to ISS. Demo 2 mission, May 2020

Working rules

Elon Musk publishes rules for his workers to follow. These rules emphasize:

- Efficiency
- Common sense

Rule 1 – No large meetings

“Who needs large format meetings?”

Large “all hands” type meetings waste time and produce little value. People should be working, not meeting.

Rule 2: No frequent meetings

“No frequent meetings unless an urgent problem is being solved.”

People in meetings are not doing their normal work, so such meetings should only be called when an extraordinary situation must be handled.

Rule 3: Leave meetings if you are not adding value

“If you are in a meeting where you feel you are not adding value, you should leave at once.”

Some people think it is rude to leave a meeting. In fact it is rude to waste everyone else’s time.

Rule 4: Speak in a way that is easy to understand

“Do not use confusing jargon. Speak in a way that is easy to understand.”

In technical areas, there are plenty of TLAs and FLAs. The essence of expertise is to be able to explain concepts to others who do not understand them as well as you do.

Rule 5: Forget hierarchies

“Forget hierarchies. Questions and answers should follow the shortest paths.”

If there is a question, don’t ask for your boss’s permission to get it answered. Go directly to the resource that can give you the information you need.

Rule 6: Do not follow silly rules

“Do not follow silly rules.”

If a rule makes no sense, don’t follow it. At the same time, be ready to explain why you think it is silly.

Rule 7: Don’t talk to the press

“Don’t talk to the press. Leave that to me.”

Rule 8: Everyone is Chief Engineer

“Everyone is Chief Engineer.”

If some aspect of the work makes no sense, do not assume it is correct just because a talented and experienced person specified it. Question everything.

Elon Musk's Engineering principles

"The effort to design a product amounts to a rounding error when compared to the effort needed to manufacture that product."

"The trick is not to design the product. The trick is to design the factory that can build the product."

Principle 1: All requirements and specifications are wrong

"All requirements and specifications are wrong. Learn how they fall short and make them less wrong."

Principle 2: Deletion is the best way to add value

"Deletion is the best way to add value."

The best part or process is no part, no process. It can never break, costs nothing and takes no effort. "What have you deleted today?"

"If you are not adding back at least 10%, you are not deleting enough."

Principle 3: Requirements and/or constraints must have a person's name attached

"Requirements and/or constraints must have a person's name attached, not just a 'department' name."

"That person must be able to defend the need for the requirement when asked about it."

Principle 4: Don't optimize unnecessary things

"Don't optimize things that should not be there in the first place."

Principle 5: Do not automate until you have deleted the unnecessary

"Do not automate until you have deleted the unnecessary, simplified everything else, optimized the whole, and accelerated it. Delete, simplify, optimize, accelerate, and only then should you automate."

Principle 6: Once a test has served its purpose, remove it

"Once a test has served its purpose, remove it. If final testing shows no problems, remove the intermediate tests as they are no longer needed."

Principle 7: Try it and see

"Try it and see (ie. iterate). Failure is not a failure if you learn something valuable. Trying something is the only way to learn about 'unknown unknowns'."

Principle 8. Innovate rapidly

"Innovate rapidly. Don't let past decisions restrain you."

Booster 5 and 6 are under construction with lessons learned from Booster 4, even though Booster 4 has not yet flown.

Raptor engine is now at "version 2" even though Raptor 1 has not yet flown to space.

Principle 9. Recognize 'residual capability'

"Recognize 'residual capability'"

Making more things possible also makes more things practical.

--Starlink, a \$30 billion business

--Tesla Robots – based on AI work for self driving cars.

--Tesla power wall – based on Tesla car battery technology.