Paper Planes

Basic

Stimulate problem solving	**Gold**	**Stimulate entrepreneurship**	**Gold**
Stimulate creativity	**Gold**	**Informal learning enviro.**	**Bronze**
Stimulate critical thinking	**Silver**	**Technology use**	**Bronze**
Stimulate group work	**Platinum**		

Practicalities

Preparation: 0.5 h

Duration: 1 h 40’ (or 2 lessons of 50’)

Material needs:

- Paper: 100 pages (size A4): this can also be scrap paper, just make sure it’s not crumpled!
- Card board: 10 pages (size A4)
- 2 pairs of scissors
- 2 glue sticks

Group size range: 10-30
Ideal sub-group size: 7

Workshop made for: -12/12-16/+16,
Easily transferable to workshops for ages between: /

Environment FabLab necessary: no

Educational area:
* Engineering

Precognition

The participants don’t need to know anything about actual planes, but it would be an advantage if somebody in each group knows how to fold a paper plane.

Preparation

Create groups of 7 (ideally), if this results in 2 groups, create 2 work stations far away from one another, but in the same room. If this results in 3 or 4 groups, put each group in a corner.

Each group gets 50 pages of paper, 5 pages of cardboard, 1 pair of scissors and 1 glue stick.

All these items should be in front of them at their work station (table).

People shouldn't touch or tamper with the material, doing this will only affect their possible outcome negatively (lack of paper). A small notice 'do not touch' is preferable with youngsters or teenagers.

Workshop Guidelines

Phase 1: Orientation and instruction phase

Material needs:
Essential: 100 pages of paper
Optional: 10 pages of cardboard, 2 pair of scissors, 2 glue sticks

Goals:

Skill Goals (**Blue**)
(S1) working together
(S2) leadership: natural leadership (without voting of without discussion who takes the lead) or democratic leadership (who takes up what role)
(S3) communication: listening, repeating the heard, explaining, asking questions at appropriate times, agreeing on certain aspects
(S4) problem solving
(S5) social skills: reading the group, reading the others, becoming part of a whole, adding personal value to the team
(S6) Self-regulation
(S7) Critical thinking
(S8) Creative thinking

Content Goals (**Green**)
(C1) *Spatial insight*
(C2) Aerodynamics
(C3) Research based learning

Background story:

This workshop is based on the 21st century skills and a first step in getting to know project management and scrum sprints. This means there are specific rules that need to be followed to win the game. Breaking rules will result in deduction of points or elimination of planes which will make it very difficult to win the game.

The groups are all a team. They will be able to choose a name, the teams will have a team leader, initial event the client will speak to all the teams and explain the first set of rules. All the next meetings only the team leader will speak directly to the client. Every team gets 1 token – this token can be used to ask additional help only once (time out). If a team did not use the token, they will get 10 extra credits at the end of the game.

Goals	Activities	Duration
S1-S8 C1-S3	**Introduction** Groups need leaders: you are all a group of people who are going to create/develop specific paper planes for a client. The client has several wishes and there are specific rules that you need to follow. **Briefing:** Listen very carefully, the rules WILL NOT be written down: 1) You can only fold a page 7 times (therefor ideally with 7 people) 2) Every person can only fold 1 time – every time someone cheats, this plane will be discarded and will not be admitted to be tested 3) The first stage is a development stage. 4) In the development stage you can test every plane you folded 5) In the development stage you can modify every plane you folded BUT you cannot use more than 7 folds – neither can one person administer changes. Everyone can do only one action. E.g. Unfolding a fold is 1 action! Cheat and your plane will be discarded. 6) Should you choose to use less than 7 folds, let the client know, in order to be able to achieve the Entrepreneurial badge. 7) Objective is to find the ideal form to let your design travel the length of the lab. The length of the lab (minimal length the plane has to travel) has to be indicated now to all! 8) Each team will be assigned a testing ground 9) Each team has 20 minutes to test and develop one or more prototypes 10) TIP: do not discard prototypes! They may come in handy later. 11) Each team has 50 pieces of paper. You will only get these pieces of paper. 12) When the timer/bell rings (after 20') the group leader will bring the prototypes to the client and he will state the group's name	15'

Phase 2: Design phase

Material needs:
Essential: same as above

Goals:
Skill Goals (**Blue**)
(S1) working together
(S2) leadership: natural leadership (without voting of without discussion who takes the lead) or democratic leadership (who takes up what role)
(S3) communication: listening, repeating the heard, explaining, asking questions at appropriate times, agreeing on certain aspects
(S4) problem solving
(S5) social skills: reading the group, reading the others, becoming part of a whole, adding personal value to the team
(S6) Self-regulation
(S7) Critical thinking
(S8) Creative thinking

Content Goals (**Green**)
(C1) *Spatial insight*
(C2) Aerodynamics
(C3) Research based learning

Goals	Activities	Duration
	Designing will take place during the R&D-phase under strict conditions	
S1,2,3,4,5,6,7,8 C1,2,3	**R&D** (research & development): Teams works together in creating prototypes, following the limitative rules and keeping an eye on their own time. When the time is there, the group leaders bring their prototypes (all of them) to the client and give the client the group name.	20’
	Testing 1: The client notes the team names on a board (gamification) If a plane has more than 7 folds they are discarded now	5’

	Every prototype plane is tested. For each successful prototype the team gets 1 point. Team leader keeps these prototypes and marks each team with a colored pen or marker. (necessary for later) All the planes stay with the client, he needs examples to show to his board of directors. In the unlucky event of no planes reaching the distance, the team will have to sacrifice their token now buy extra R&D time. The extra time will be during the brake and without the team leader. Same rules still apply. Every person can only do one action.	
	Briefing team leaders and the client 1: The rest of the team can have a short break. The client wants the team to create 20 planes which can travel the distance. For every successful plane, the team will gain 1 point, but not more than 20 points can be scored on the next sprint. The team will have 10 minutes to complete this task. Same rules apply. TIP for the team leaders: brief your team in advance of the production, this may cost you 2 minutes, but has a higher success rate (you can leave this out if you think the groups are ready for more self-regulation)	5’

Phase 3: Making Phase

Material needs:
Essential: same as above

Goals:
Skill Goals (**Blue**)
(S1) working together
(S2) leadership: natural leadership (without voting of without discussion who takes the lead) or democratic leadership (who takes up what role)
(S3) communication: listening, repeating the heard, explaining, asking questions at appropriate times, agreeing on certain aspects
(S4) problem solving
(S5) social skills: reading the group, reading the others, becoming part of a whole, adding personal value to the team
(S6) Self-regulation
(S7) Critical thinking
(S8) Creative thinking

Content Goals (**Green**)
(C1) *Spatial insight*
(C2) Aerodynamics
(C3) Research based learning

Goals	Activities	Duration
	Making will take place under strict conditions in R&D and production phases	
S1,2,3,4,5,6,7,8 C1,2,3	**Production 1**: The teams make planes. They can choose how many they make, but only 20 points are gainable. If anyone here has extra questions, they will have to use the token.	10’
	Testing 2: Team leaders bring the planes to the client. For every successful plane the team receives one point. Cheats on planes will be discarded. All the planes have to be destroyed, board of directors changed their minds.	5’

	Briefing team leaders and the client 2: all the others can have a 5' break Board of directors wants planes with a NON-pointy tip that boomerang = plane returns to where it came from, either by looping or turning (doesn't matter how). Money is low, so there is no time for more R&D. Maybe you can use some old prototypes? If not, just develop planes, WITHOUT TESTING. If you test, the planes will be discarded. Change of rules: you can fold 10 times. Should you be able to do it with less folds/actions, let the client know in order to save money and get 2 bonus points! The CLIENT accidentally forgets to state a number of planes that have to be developed or the time they get. If someone asks now, they get the number: 10 successful planes, 10 minutes. If nobody asks. They will need a token to ask this later on. They will get 2 points for every successful plane.	5'
S1,2,3,4,5,6,7,8 C1,2,3	**Production 2**: Team leader briefs his team. Extra questions? => token	10'
	Testing 3: Team leaders bring the planes to the client. For every successful plane the team receives 2 points. Cheats on planes will be discarded. The client wants one successful plane to take back to the board. The other planes will be returned to the team.	5'

Phase 4: Operational Phase

Material needs:
Essential: same as above

Goals:
Skill Goals (**Blue**)
(S1) working together
(S2) leadership: natural leadership (without voting of without discussion who takes the lead) or democratic leadership (who takes up what role)
(S3) communication: listening, repeating the heard, explaining, asking questions at appropriate times, agreeing on certain aspects
(S4) problem solving
(S5) social skills: reading the group, reading the others, becoming part of a whole, adding personal value to the team
(S6) Self-regulation
(S7) Critical thinking
(S8) Creative thinking

Content Goals (**Green**)
(C1) *Spatial insight*
(C2) Aerodynamics
(C3) Research based learning

Goals	Activities	Duration
	Operational phases will take place in production and testing (feedback on designs)	

Phase 5: Evaluation Phase

Material needs:
Essential: same as above

Goals:
Skill Goals (**Blue**)
(S1) working together
(S2) leadership: natural leadership (without voting of without discussion who takes the lead) or democratic leadership (who takes up what role)
(S3) communication: listening, repeating the heard, explaining, asking questions at appropriate times, agreeing on certain aspects
(S4) problem solving
(S5) social skills: reading the group, reading the others, becoming part of a whole, adding personal value to the team
(S6) Self-regulation
(S7) Critical thinking
(S8) Creative thinking

Content Goals (**Green**)
(C1) *Spatial insight*
(C2) Aerodynamics
(C3) Research based learning

Goals	Activities	Duration
	Evaluation will take place every testing phase. Feedback will only be possible in this phase.	
	Briefing all: final briefing: The board will put these planes in production, but wants a spin off: card board planes! These planes are obviously not made out of paper but card board. You can use glue and/or scissors for the development of these planes, but you don't have to! Goal is to create a cardboard plane which can boomerang = return (by looping of by turning, doesn't matter). Time for this endeavor is 8'. For each successful plane the team receives 2 points. No testing. Initial rules apply: each person can do one action. Cutting or applying glue is considered 1 action. 1 rule changed: you can perform a max of 12 actions.	5'
S1,2,3,4,	**Production 3**:	8'

5,6,7,8 C1,2,3	Teams go to work following the rules	
	End game: All prototypes are tested, scores are given and teams are celebrated. Don't forget to give points for unused tokens: 10 extra points. **Reflection**: how did they experience this group work? What did it feel like? What frustrated them? What gave them a feeling of success? What did they learn from the other team without working with them?	7'

Pedagogical tips

The younger the group, the more the focus can be on the designs and the gamification. The older the group, the more you can put emphasis on the client, the board, the project leader (scrum master) and you can add theory on Agile and Scrum project management should you use this workshop on starting adult project leaders . E.g. Entrepreneur badge: if you can make your design with less than 7 folds (action) you get the badge because of the Lean principle: less is more. The less effort with same result = optimalisation and should be rewarded.

Strive to make teams of 7 or near 7 participants.

Use a large room with an open path for the flight tests.

How to transfer to non-Fablab environment

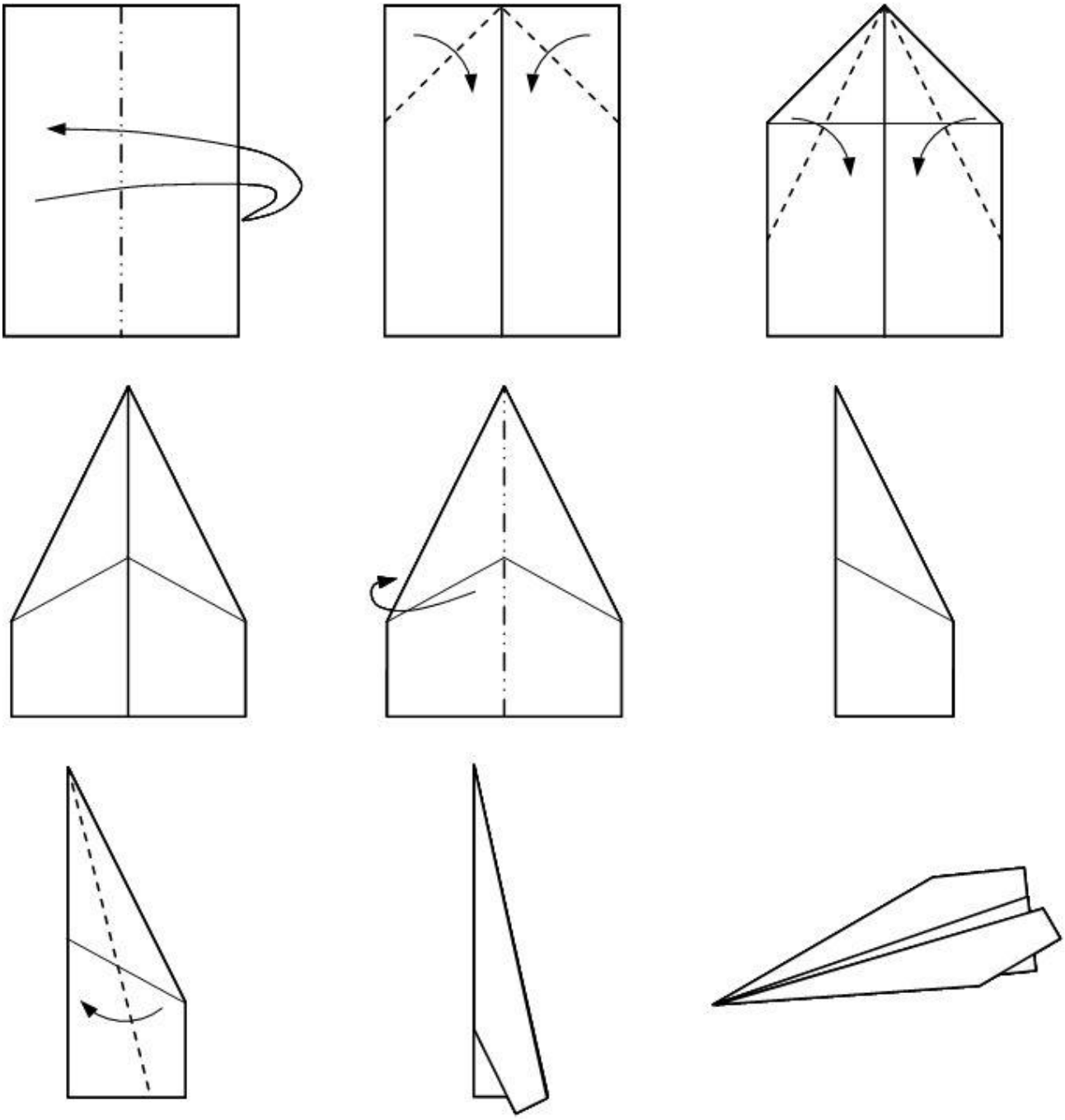
Workshop is non-fablab environment.

Evaluation of achievements

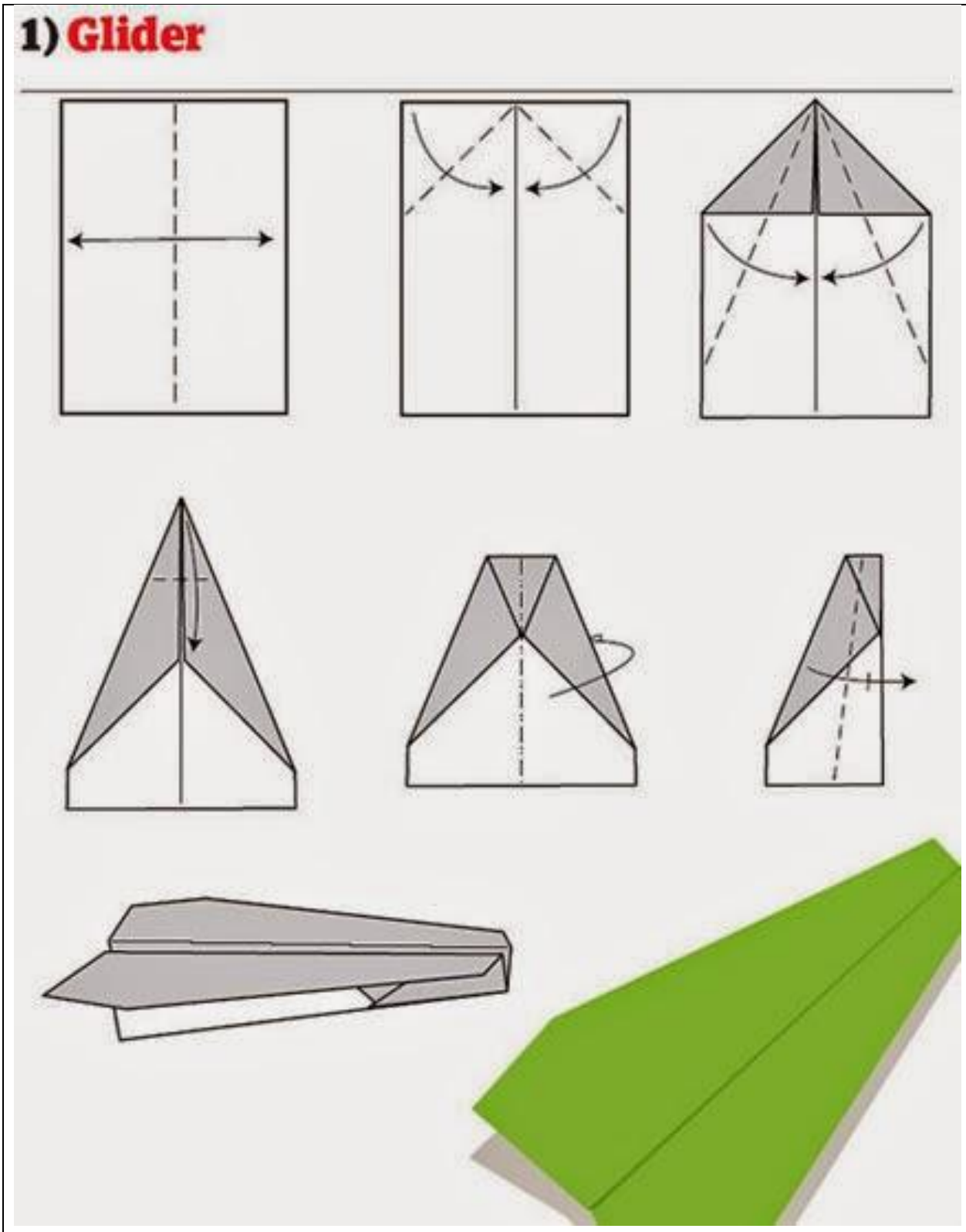
Every test-moment is an evaluation, but the final feedback round is the moment to gather the entire group (all the teams) and ask what they learned from each other during the testing of the planes.

Content links

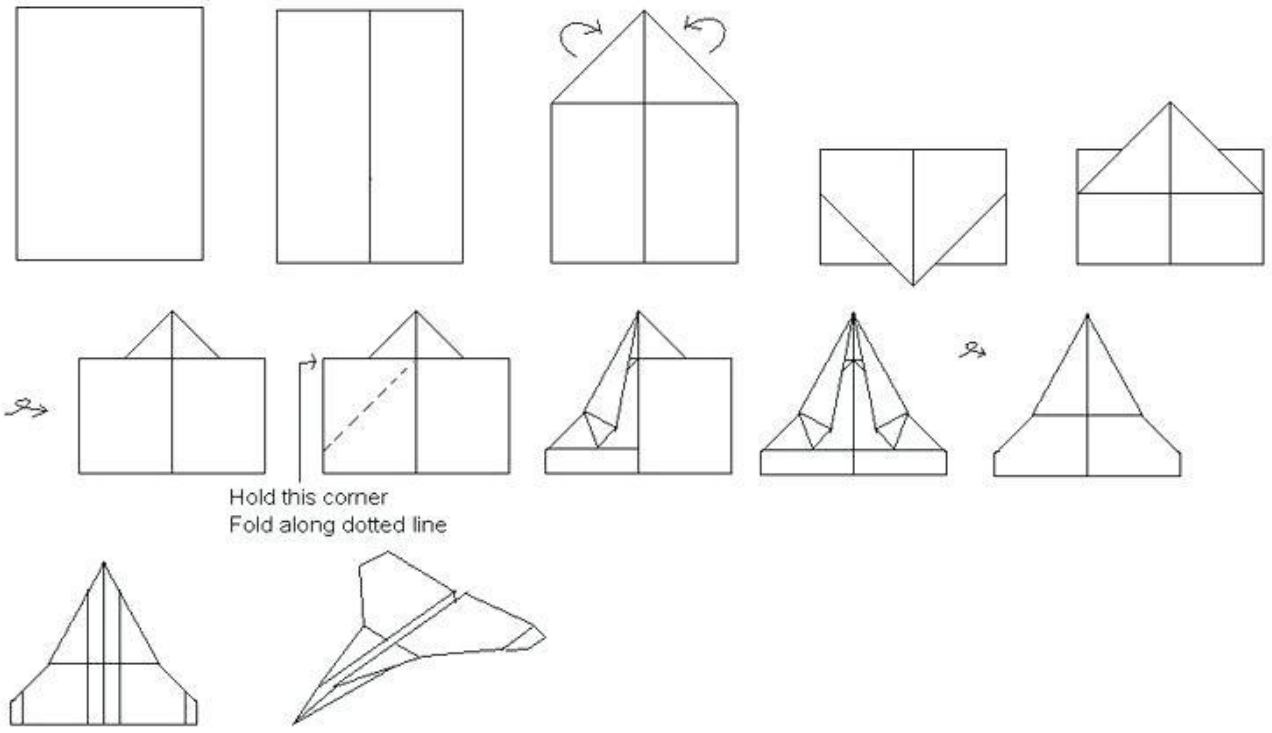
Tips/background on folding planes:



7 movements

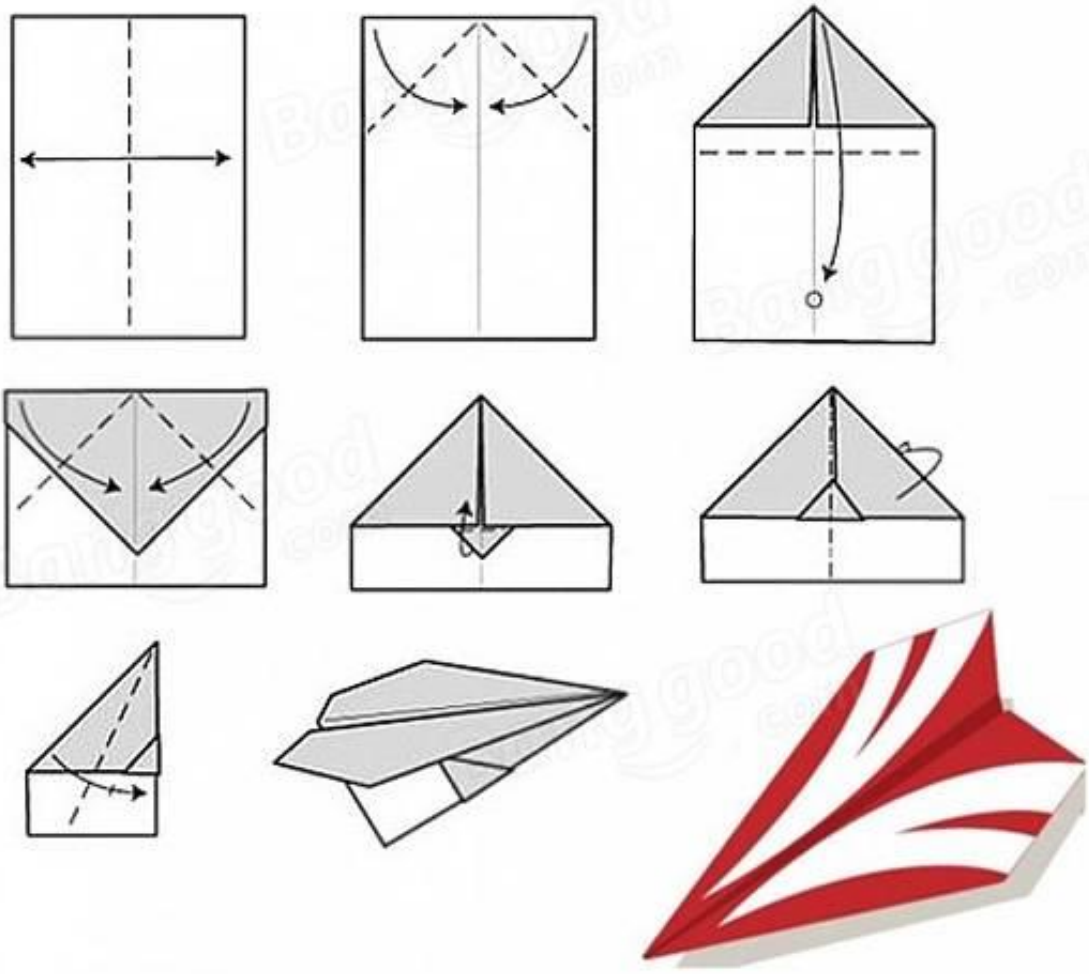


8 movements (folds)



9 movements

Paper plane folding artcraft



10 movements (folds)

Resources

Introduction movie:

https://www.youtube.com/watch?v=wedcZp07raE

Scrum and Agile projectmanagement for non-IT:

https://www.agilescrumgroup.nl/wp-content/uploads/Whitepaper-Scrum-voor-de-non-IT-.pdf

https://labs.openviewpartners.com/scrum-for-non-technical-teams/#.W65oa2gzZPY

https://www.nqicorp.com/en/2016/10/27/how-non-it-or-non-software-teams-can-use-agile-methodologies/