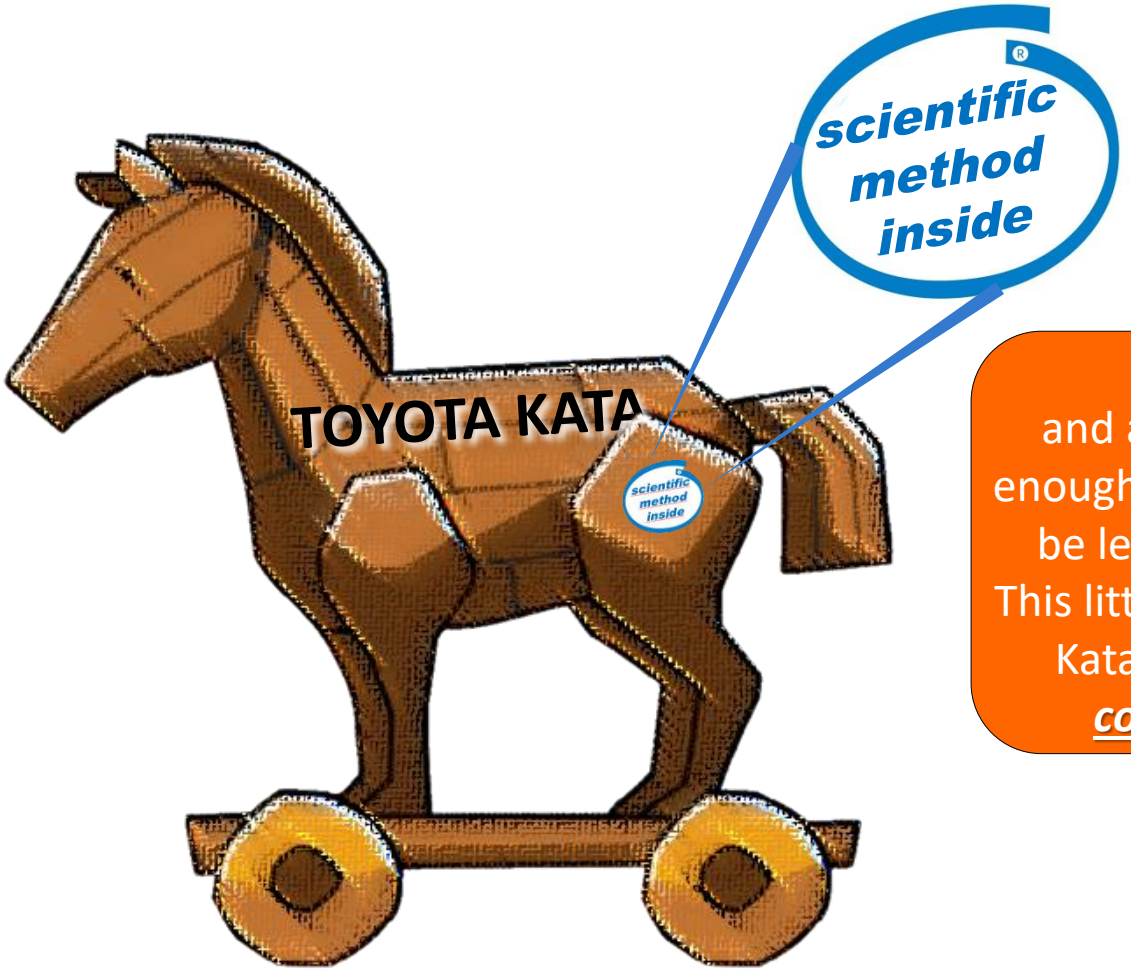
Learning by doing!

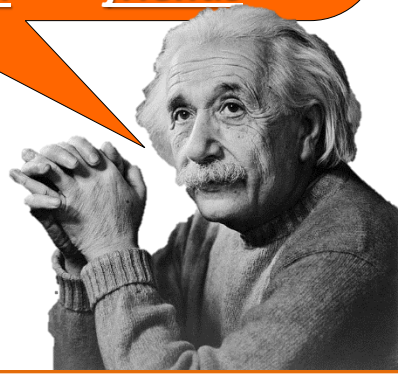
„Folding Paper Airplanes Incredibly Fast“
Coaching-Kata Exercise

Gerardo Aulinger

The Kata are like a Trojan horse, a means to develop scientific working and thinking habits for everyone

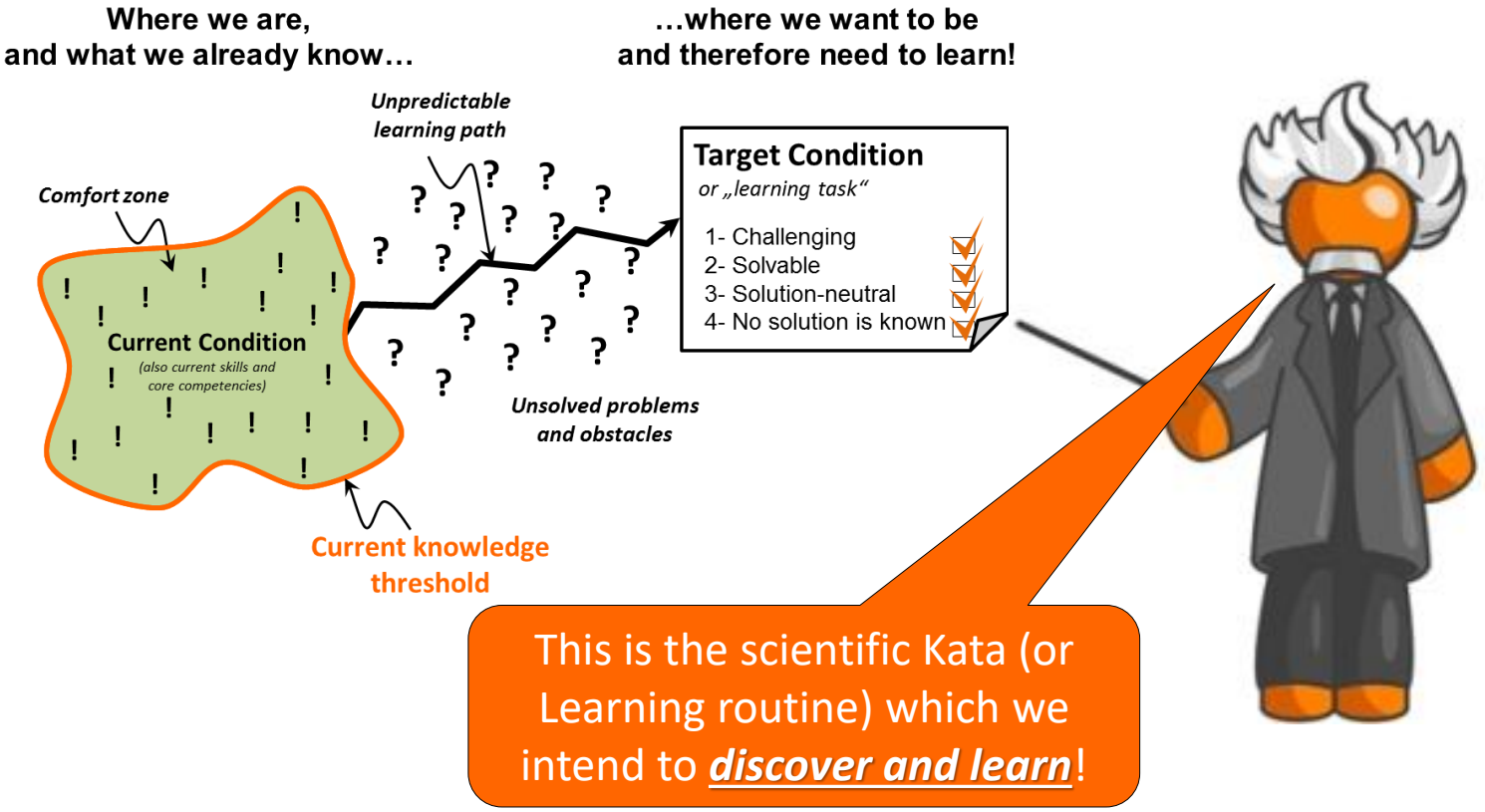


Targeted, scientific thinking and acting are skill that are not tought enough in our schooling system and should be learned and practiced by ***everyone***!
This little exercise is intended for you to try Kata at business and home with your ***colleagues***, ***children*** and ***friends***!

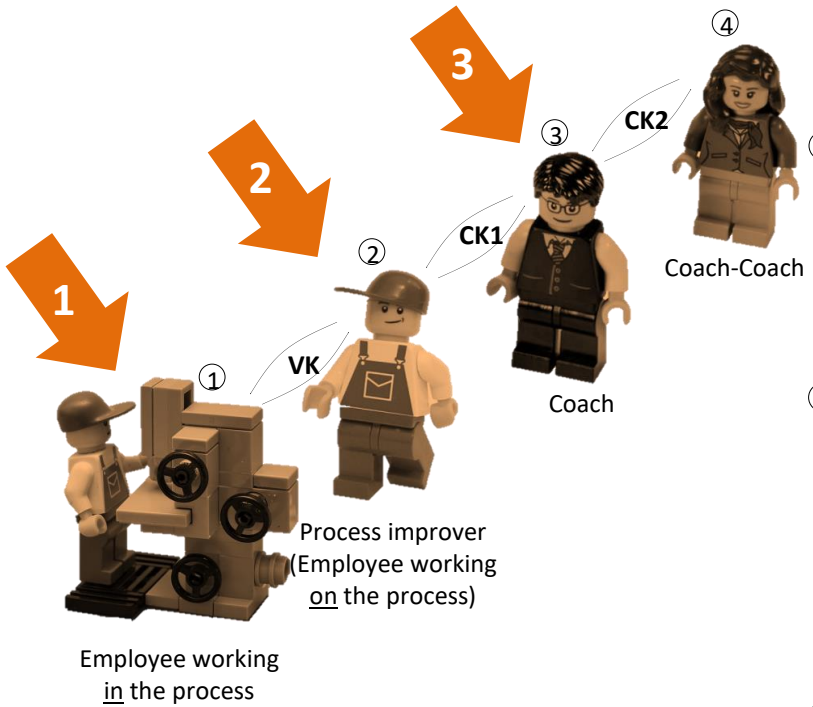


Why do we need to practice? Because Kata are difficult to explain, but easy to understand by „experiencing“!

The Improvement Kata:



We want to better understand 3 of the 4 Roles of the Coaching Cascade: form groups of 3 persons with 1 person per role



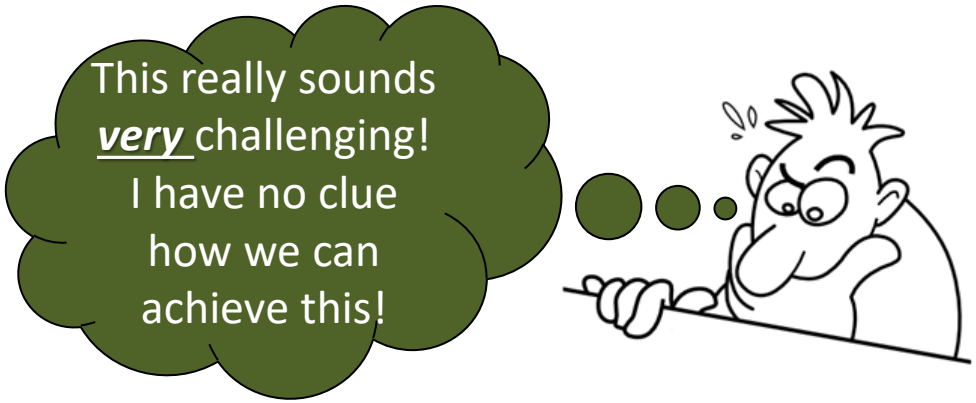
① **Employee in the process:** ***Am I able to work according to standard?***
Works cyclically, according to standard. His task is it to try to achieve the required performance in a given time and quality. As he is working productively, he has no time left for improvement. Nevertheless he is responsible for signaling problems immediately, and relay them to the process-improver as detailed as possible.

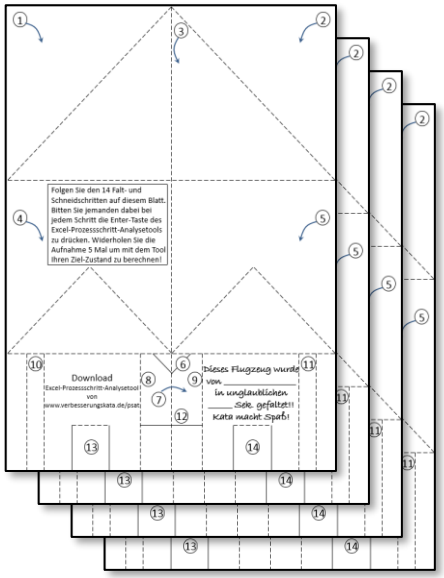
② **Process-Improver:** ***Is the (production-)process running according to plan?***
(often „Hancho", „Mentee" or „process owner ") Observes the process and is looking for deviations from the standard. Reacts to disturbances and fault reports coming out of the process. Develops process and standard according to the Improvement- Kata and performs experiments according to PDCA. Finds and produces solutions in dialogue with the employee and the coach

③ **Coach:** ***Is the improvement process running according to plan?***
(often „Master" or „Mentor ")
Ensures that the Mentee is working scientifically and experientially according to the Improvement-Kata, maintaining and practicing the routine. The development of the Mentee, and not the development of the process is his main focus. He regularly asks the 5 questions of the Coaching-Kata. He does not deliver nor suggest any solutions. He is responsible for setting targets and ensuring that they can be reached.

④ **Coach-Coach:** ***Is the coaching process running according to plan?***
Ensures that the Coachings are taking place regularly, structured and target oriented – according to Coaching – Kata. Makes sure that conditions – time, organization structure, etc.- enables that.

Our factory has received an order to produce 200,000 paper airplanes per year. We will need the Kata to master this Challenge!





Our raw materials

Our target:
1 airplane in 30 Sek*

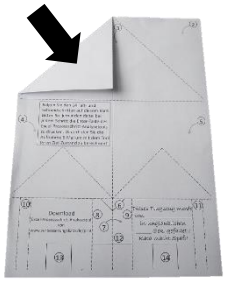
Our finished paper airplanes

*200.000 Stk, 240 working days per year, 1 shift per day, 440 min net working time per day

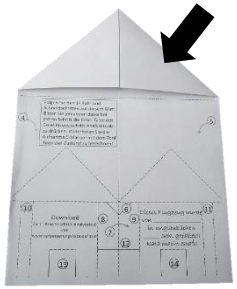
Assembly Instructions in 15 Steps

Steps correspond Excel Process Steps Analysis Tool. Printed paper should not be pre-folded nor pre-cut.

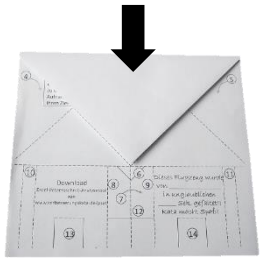
1



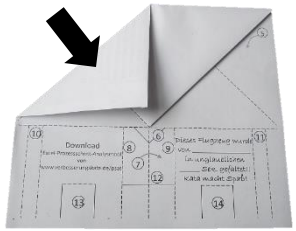
2



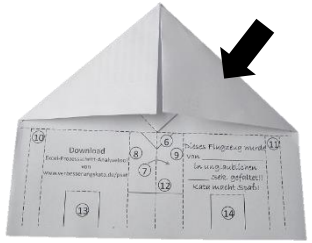
3



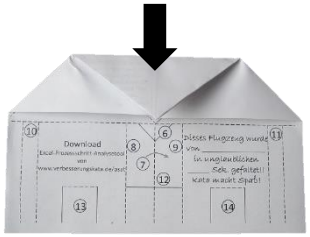
4



5



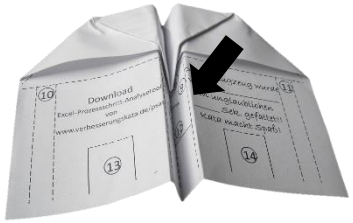
6



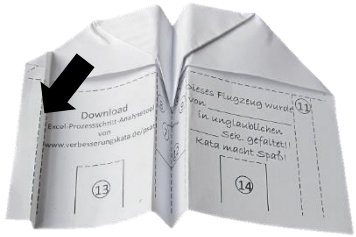
7

8

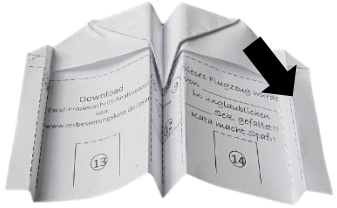
9



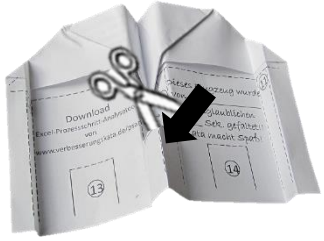
10



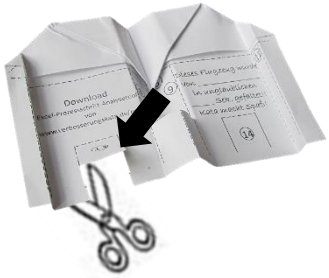
11



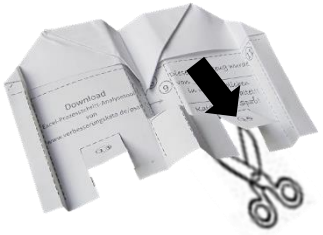
12



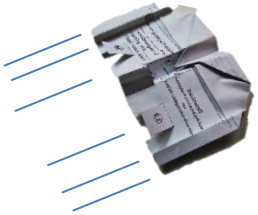
13



14



15 Take off!

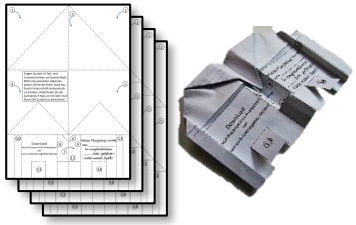


Demonstrate flight stability by 4 meter long flight!

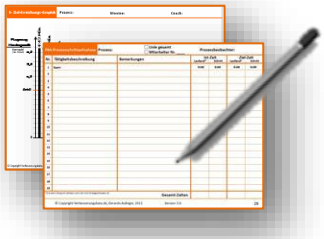
The game lasts aprox. 2 hs: as soon as the Target-Condition is clear, we start Coaching and Experimenting towards it

1- Planning Phase

Introduction, Process Analisis, Target-Definition



Understand the Current Condition, aprox. 20 Min



Define the Target Condition, aprox. 20 Min

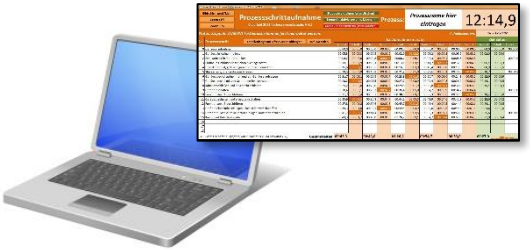
2- Executing Phase

Iterate towards Target Condition

Coaching Cycles, 3-5 min each

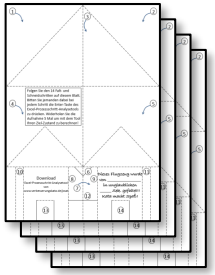
Testing Hypothesis, aprox. 5 Min

These are the Materials you need for each group

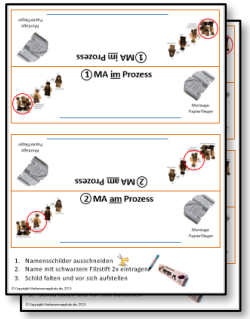


1 Laptop with Excel Process Step Analysis Tool
(Download: www.verbesserungskata.de/psat)

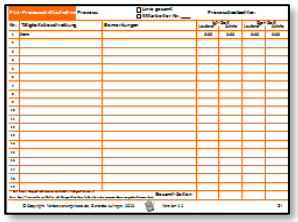
One scissor, one pencil, one eraser per group



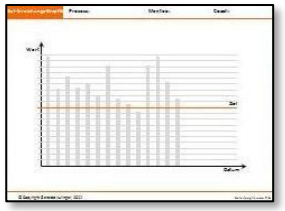
30x printout paper airplane per group



2x name tags per group



1x Process Steps Analysis Form

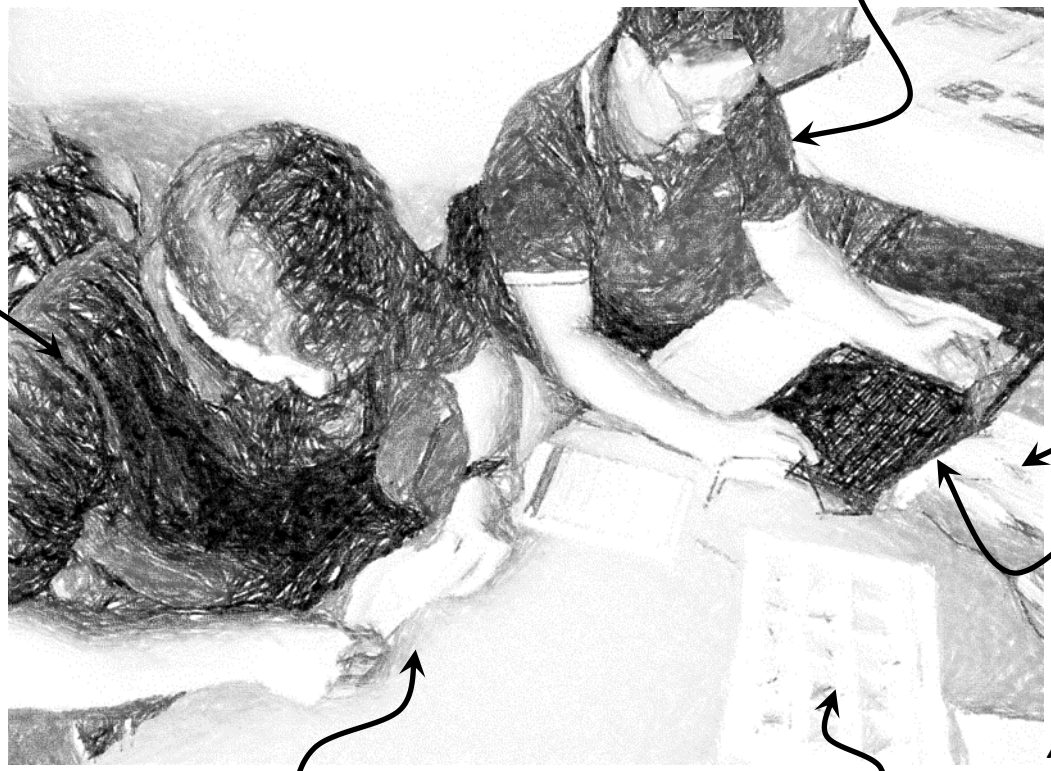


1x Target Achievement Form per group

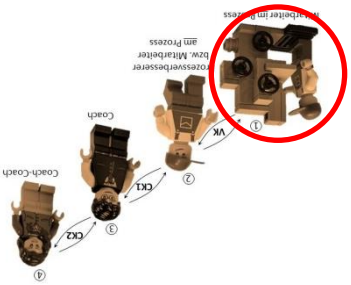
2x Coaching Forms per group

3x Coaching-Kata per group

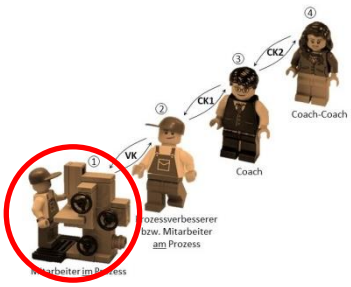
Set up the table like this…



Assembly
Paper Plane

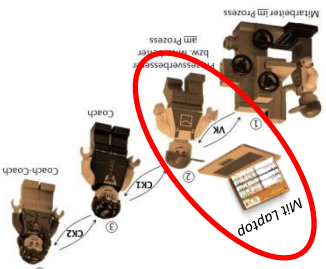


① Employee in process



Assembly
Paper Plane

Assembly
Paper Plane



② Process improver

Assembly
Paper Plane

1. Cut out name tags
2. Complete your name using a black marker
3. Fold name tag and place it in front of you

① Coach

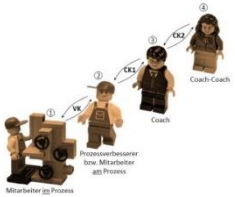
① Coach

1. Cut out name tags
2. Complete your name using a black marker
3. Fold name tag and place it in front of you

Preparing the Kata Coaching Excercise

1- Planning Phase

1- Divide participants in groups of 3 per table: who will have wich of the 3 roles?



2- Fill out and fold name tags, place on table

3- Employee in process: get familiarized with the assembly of the airplane

- fold 2 planes, understand the assembly sequence, speed is irrelevant at this point

4- Process improver: get familiarized with Excel-Process-Step-Analysis-Tool

- Read instructions sheet (2nd sheet on Excel Tool)
- write step numbers 1 to 15 in column „Process step“
- Complete the processes name in the white field top right
- With button Activate (delete everything) activate stopwatch
- Use ENTER to test tool and practice some time stopping

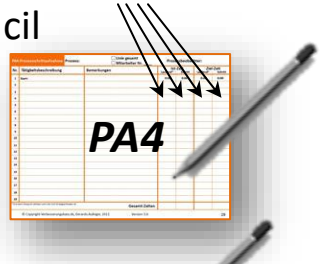
5- Repeat assembly processes five times, time each repetition with the Excel-Tool:

- Employee in process says „Start“ and after every single step „one ready!“, „two ready!“ etc.
- Don‘t forget to save your times on your computer!
- Do not improve the process during these 5 cycles

Fill out these 4 columns!

6- Current Condition with PA4-Sheet: Copy TC from green column to PA4, use a pencil

Copy values from Target columns „step“ and „running“ from Excel-Tool with pencil to the left to columns of the PA4-sheet



7- Total Target Assembly Time in PA4: defining a ***challenging Target Condition*** is very important for your learning success. Your target is 30 seconds, write this value at the bottom of the Target Column of the PA4-Form

8- Correct Target Step Times with Excel Tool: press the green button AUTO, write „30 secs“ when asked. Copy the automatically calculated numbers to column 3, 4.

9- Prepare coaching boards (one pinboard per group):

- pin PA4 left, note target on Form 5 and draw 5 columns with the 5 times you stopped
- add three obstacles which you think you should tackle next

The Coaching Board is ready! The Coaching Cycles can begin!

Instructions Prozess Steps Analysis-Tool 5.0

With these three buttons you can optimize the size of the sheet on your computer display.

The stopwatch must be ACTIVE in order to be able to stop your step and cycle times.

The stopwatch must be INACTIVE in order to edit text areas.

Here you can write the name of your process.

Here you can see if the watch is running and the time ellapsed.

With the AUTO function you can automatically calculate the needed step times necessary to achieve your target time.

Reduce, expand screen | Zoom +1% | Zoom -1%

Process Step Analysis-Tool

Activate stopwatch (delete all) | Activate stopwatch (no delete) | Deactivate stopwatch (no delete)

Process: *Case assembly example*

00:23,0

Status: Stopwatch is ACTIVE! Text sections CAN NOT be edited now.

Hancho/Trainer: Michael Müller | *Operator:* Hans Fischer | *Date:* 13.8.24 17:32

Adjust sheet length to 3 free rows | Expand to 150 rows

Nr	4 process steps	Current condition (max. 5 time recordings)										Ziel-Zeiten		Auto
		Cumulated	Step	Cumulated	Step	Cumulated	Step	Cumulated	Step	Cumulated	Step	Cumulated	Step	Correction
	Total time:	00:21,6		00:22,9		00:00,0		00:00,0		00:00,0		00:17,5		
0	Take plastic case from bin	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0
1	Take plastic case out from package, place in fixture	00:04,1	00:04,1	00:07,1	00:07,1							00:04,1	00:04,1	
2	Place harness on PCB and connect plugs	00:09,5	00:05,4	00:12,0	00:04,8							00:08,9	00:04,8	
3	Place PCB in housing, take lid, close lid, place and thighten 6 screws	00:13,5	00:04,0	00:18,4	00:06,4							00:12,9	00:04,0	
4	Put housing in bag, put bag and instructions into box, place box on pal	00:21,6	00:08,1	00:22,9	00:04,6							00:17,5	00:04,6	
5														
6														
7														

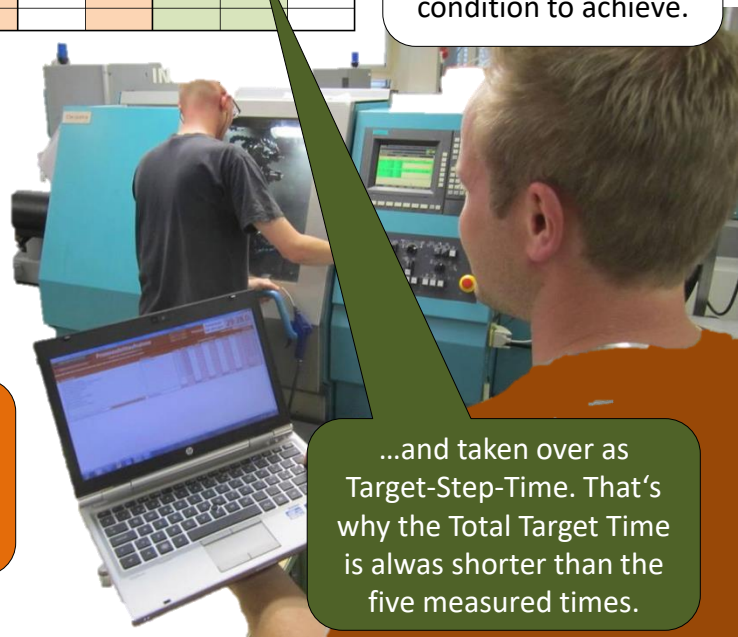
Target-times can be corrected by hand to define the target condition to achieve.

Processes can be broken down in as many as 150 single steps.

The length of the sheet can be adjusted anytime just by clicking these buttons.

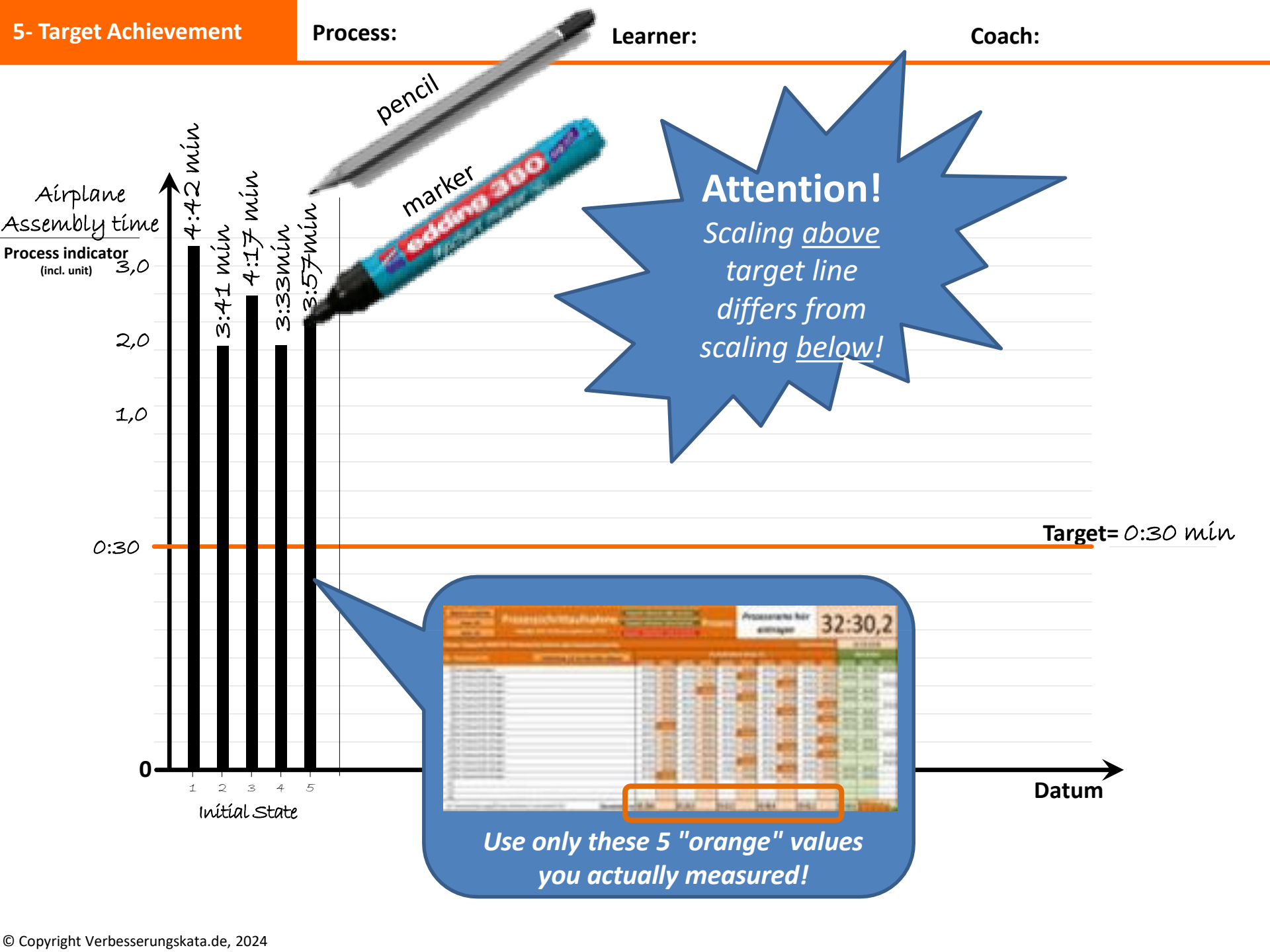
The five time measurements consist of cumulated, step and total times.

The shortest step time is marked in darker orange…



…and taken over as Target-Step-Time. That's why the Total Target Time is alwas shorter than the five measured times.

Process: **Learner:** **Coach:**



EVER TRIED? EVER FAILED?

NO MATTER! TRY AGAIN, FAIL AGAIN, FAIL BETTER!

Samuel Beckett

EXPECTED

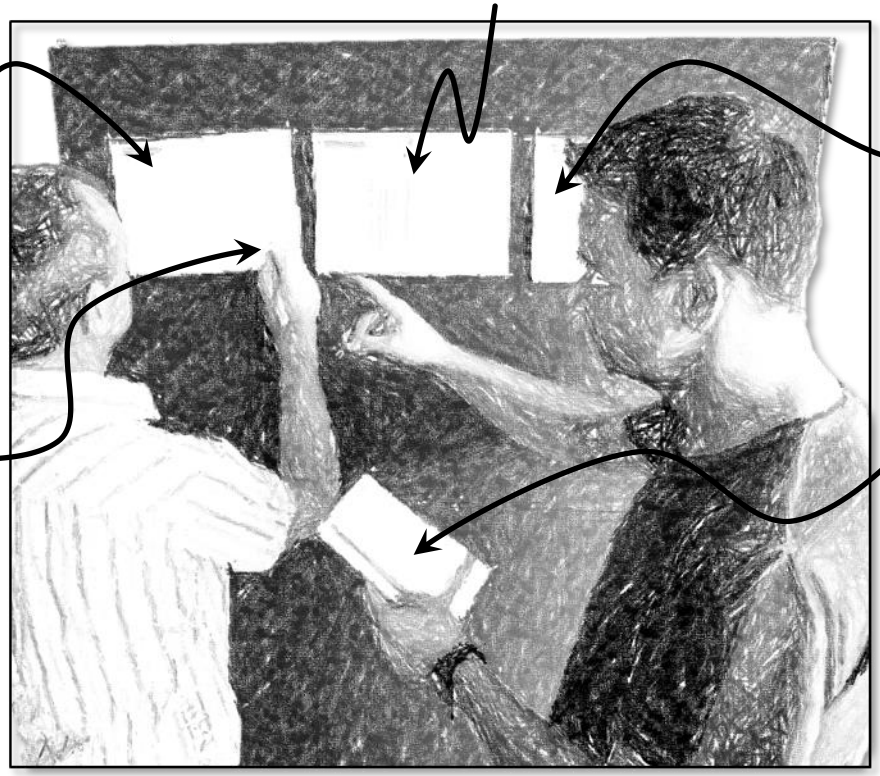
ACTUAL

Set up the Coaching Board like this…

Filled out PA4-Form

Target Achievement form with 5 bars

Coaching Form



Only use pencil when Filling out forms

Coaching Kata Form or 5Q-Card

(2) *„Learner“ or „Process improver“*

(3) *„Coach“*

(Attention: we do not coach the (1) assembly worker!)

COACHING KATA

The 5 Questions*

1 - What is the Target Condition of this process?
2 - What is the Current Condition now?

Go to the process, Turn Card to Reflect on the Last Step

3a - What Obstacles do you think are preventing you from reaching the Target Condition?

3b - Which One Obstacle are you addressing now?

Turn Card to Detail the One Obstacle

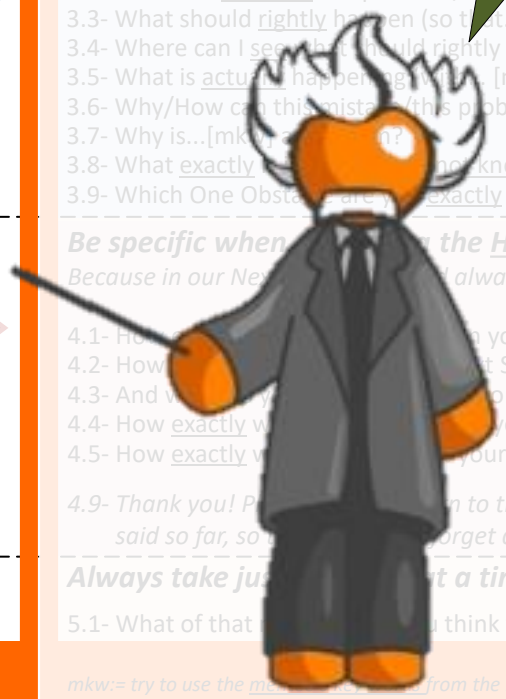
4 - What is therefore your Next Step and what do you expect to Learn from it?

Turn Card to Detail the Next Step

5 - When can we go and see what you have Learned from taking that step?

** The 5 Questions on the front side of this Card and Question 2.1 on the rear side must be asked every time and always with the same wording as written here.*

During the first Coaching Cycles just use these ***5 Questions*** on the left side of the Coaching Kata Sheet!



Blatt hier falten!

COACHING KATA

The 5 Questions*

1 - What is the Target Condition of this process?
2 - What is the Current Condition now?

Go to the process, Turn Card to Reflect on the Last Step →

3a - What Obstacles do you think are preventing you from reaching the Target Condition?

3b - Which One Obstacle are you addressing now?

Turn Card to Detail the One Obstacle →

4 - What is therefore your Next Step and what do you expect to Learn from it?

Turn Card to Detail the Next Step →

5 - When can we go and see what you have Learned from taking that step?

** The 5 Questions on the front side of this Card and Question 2.1 on the rear side must be asked every time and always with the same wording as written here.*

0.1- Hello [Name]! We had agreed on doing a Coaching Cycle now. Is it OK with you?

Reflect on the Learnings of the Last Step Taken

2.1- What did you Plan as your Last Step and what did you learn from it?
2.2- What did you Expect?
2.3- And what did you learn from it?/from taking that Last Step?
2.4- What actually happened?
2.5- What Value(s) have you measured?
2.6- Is there anything else you learned beyond what you already told me?

2.9- [Don't forget to praise!] Thank you! Please, let us (return to the board and) write down what we have learned so far, so that we do not forget anything.

Be very specific when describing the One Obstacle to tackle next

A very detailed understanding of root cause and it's numerical, unwanted effects are crucial in order to describe a meaningful, targeted next step! Please do not jump to solutions in this phase!

3.1- What exactly is the problem with/why…[mkw]? Can you show me, please?
3.2- Could we simulate the problem/…[mkw] right here?
3.3- What should rightly happen (so that…[mkw] can be avoided)?
3.4- Where can I see what should rightly happen (with…[mkw])?
3.5- What is actually happening (with… [mkw]?
3.6- Why/How can this mistake/this problem happen/be done?
3.7- Why is...[mkw] a problem?
3.8- What exactly is it that you do not know (about…[mkw])?
3.9- Which One Obstacle are you exactly addressing now?

Be specific when describing the Hypothesis und Experiment

Because in our Next Step we should always be testing refutable hypothesis!

4.1- How exactly will you…[mkw]? Can you show me, please?
4.2- How exactly will you take that Next Step?
4.3- And what do you expect to learn from it?
4.4- How exactly will you measure/test your expected result?
4.5- How exactly will you document your measurement(s)?

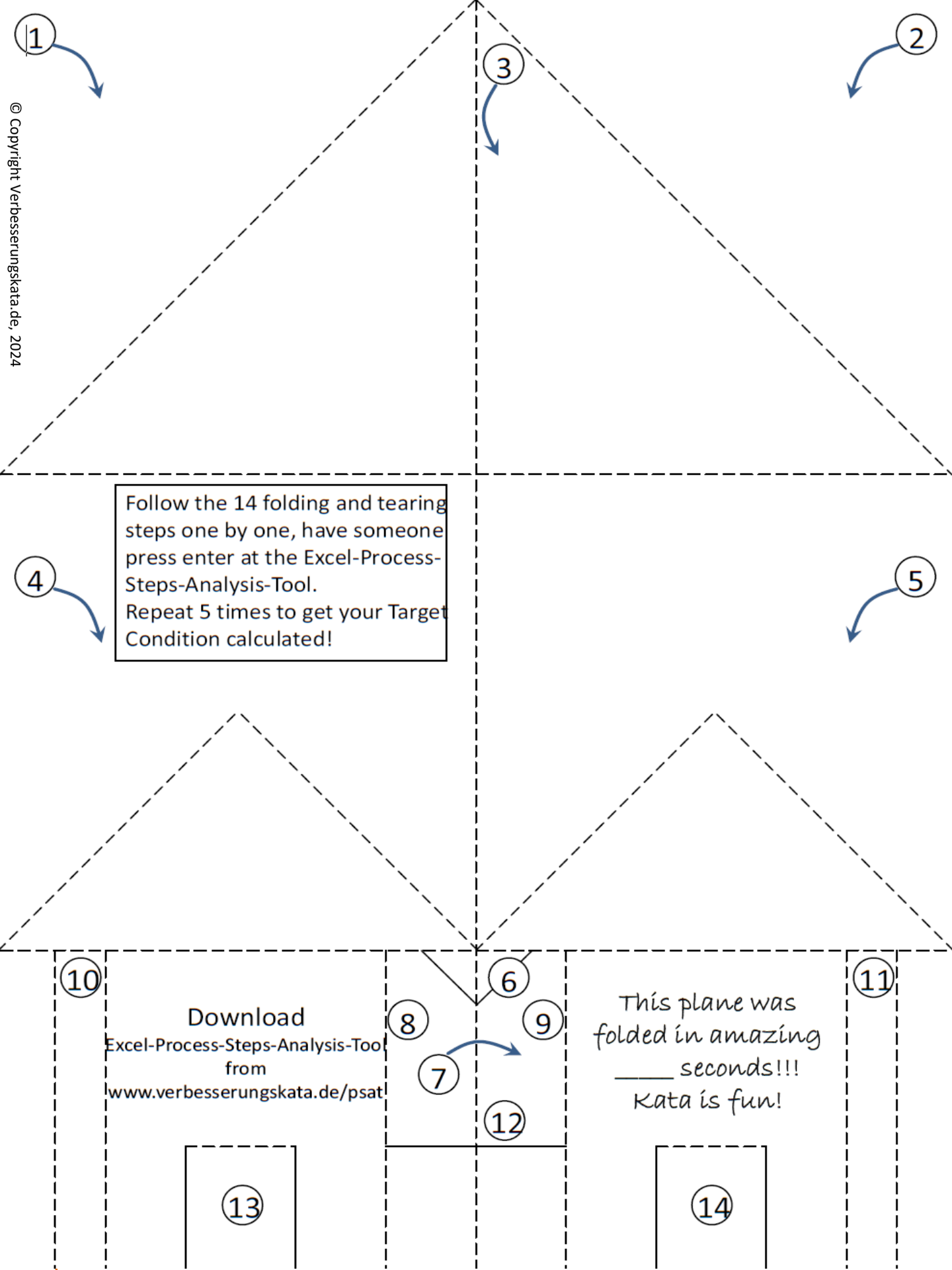
4.9- Thank you! Please, let us (return to the board and) write down what you have said so far, so that we do not forget anything.

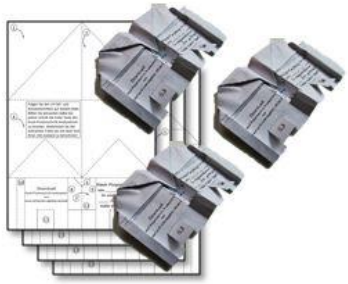
Always take just One Step at a time

5.1- What of that next step do you think you could do today/until…[propose time]?

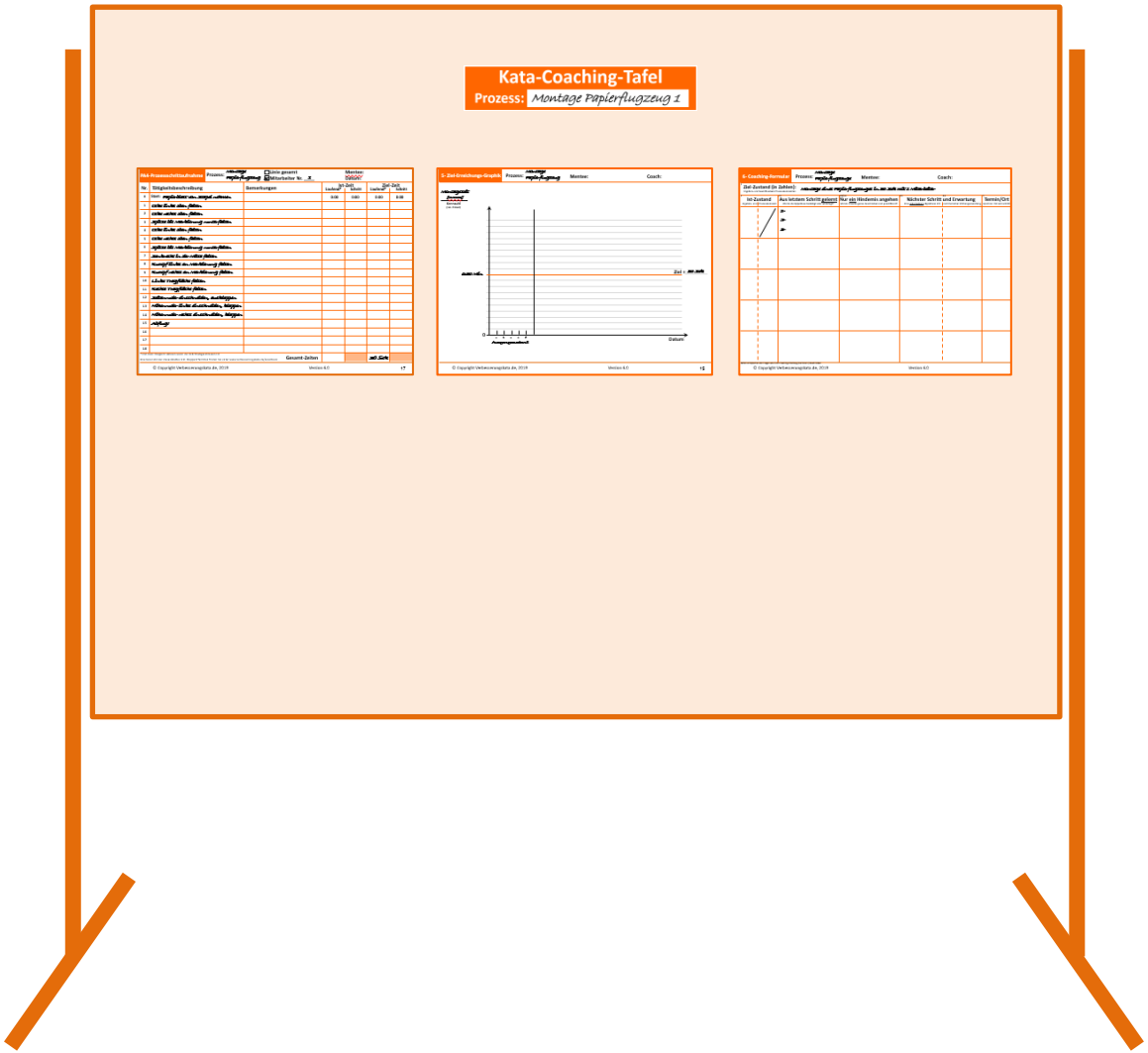
mkw:= try to use the mentee's key words from the last answer he gave you in your next detailing question. He will appreciate that you are actively listening to him!

Blatt hier falten!

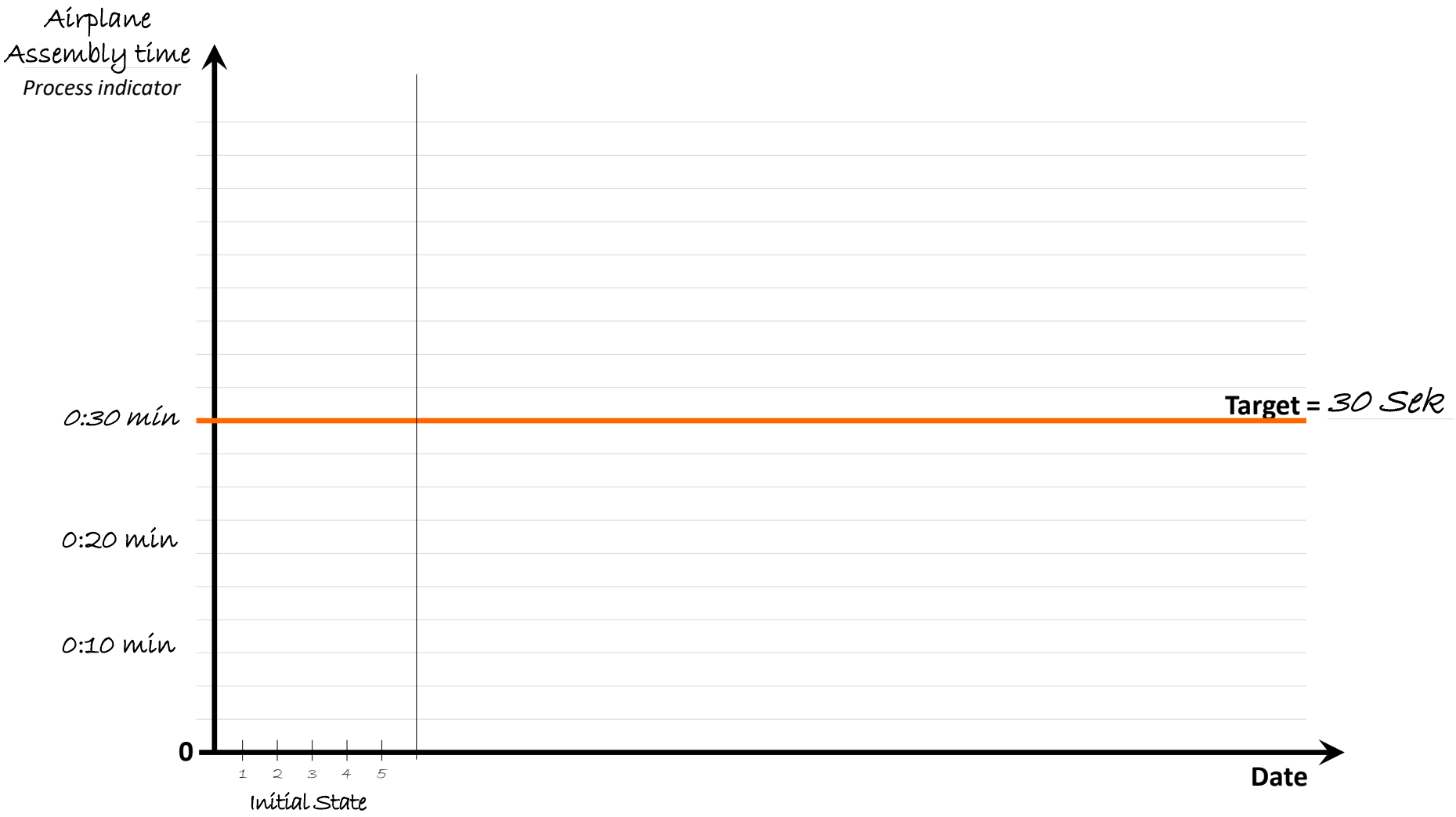




Layout of the four Coaching Boards



Process: Airplane assembly **Mentee:** **Coach:**



6- Coaching-Sheet

Process: Airplane assembly **Coach:** **Mentee:**

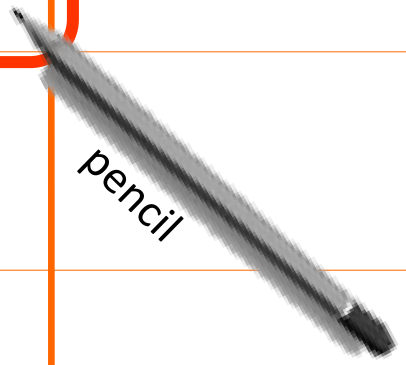
[1] Target-Condition (in numbers): Assembly of paper airplane in 30 seconds with 1 operator
Output and Process Indicators

[2] Current condition Output and Process indicator		[2.3] Learned from last step? Was the last hypothesis refuted or confirmed?	[3.8] Only one obstacle at a time Has root cause been described and quantified?	[4.0] Next stept and what you expect A refutable hypothesis with an expected, numerical effect		[5.0] Date/Place Synchronized with step?
		1- 2- 3-				

6- Coaching-Sheet **Process:** *Airplane assembly* **Coach:** **Mentee:**

[1] **Target-Condition (in numbers):** *Assembly of paper airplane in 30 seconds with 1 operator*
Output and Process Indicators

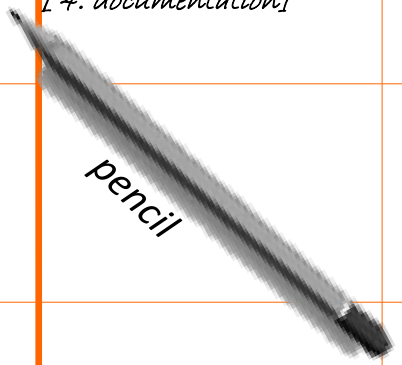
[2] Current condition Output and Process indicator	[2.3] Learned from last step? Was the last hypothesis refuted or confirmed?	[3.8] Only one obstacle at a time Has root cause been described and quantified?	[4.0] Next stept and what you expect A refutable hypothesis with an expected, numerical effect	[5.0] Date/Place Synchronized with step?
	1- Obstacle 1 *2- Obstacle 2* *3- Obstacle 3*			



6- Coaching-Sheet **Process:** Airplane assembly **Coach:** **Mentee:**

[1] **Target-Condition (in numbers):** Assembly of paper airplane in 30 seconds with 1 operator
Output and Process Indicators

[2] Current condition Output and Process indicator	2.3 Learned from last step? Was the last hypothesis refuted or confirmed?	3.8 Only one obstacle at a time Has root cause been described and quantified?	4.0 Next stept and what you expect A refutable hypothesis with an expected, numerical effect		5.0 Date/Place Synchronized with step?
[Current value(s)]	1- [Obstacle 1] 2- [Obstacle 2] 3- [Obstacle 3] 4- ...	[Root cause] costs me [undesired outcome]	[1. Measure] [2. measuring instrument] [3. sample size] [4. documentation]	Current value – undes. outcome = expectation	

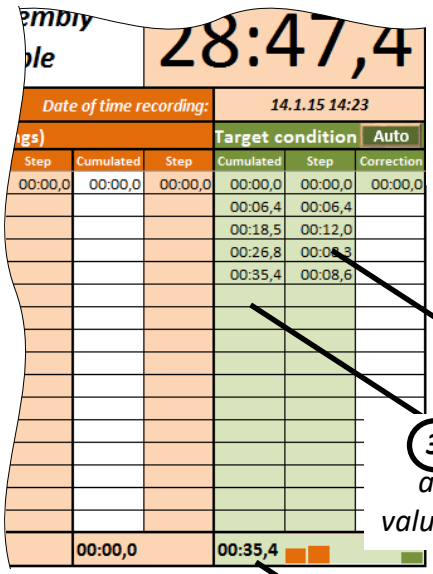


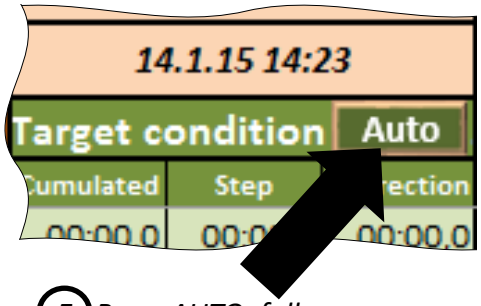
PA4-Process-Steps-Analysis

Process: *Airplane assembly* ☐ **Line** ☐ **Operator Nr. ____** **Process improver:**

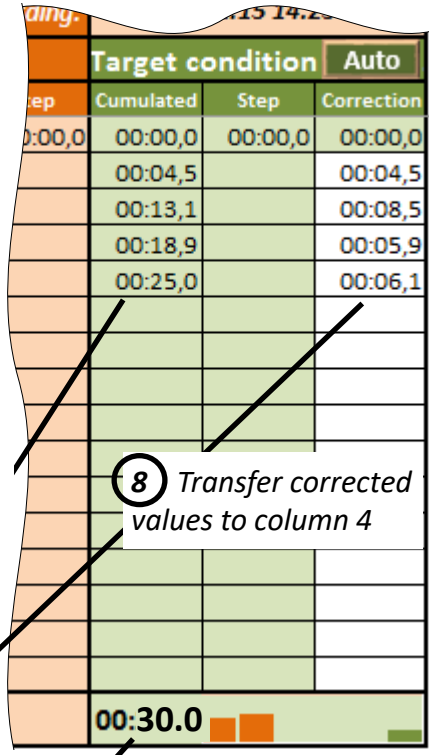
Nr.	Process step description	Comments	Current-State Running*	Current-State Step	Target-Condition Running*	Target-Condition Step
1	**Start:** *remove sheet of paper from stack*		0:00	0:00	0:00	0:00
2	*Fold top left corner*					
3	*Fold top right corner*					
4	*Fold the tip down to the marking*					
5	*Fold top left corner*					
6	*Fold top right corner*					
7	*Fold the tip down to the marking*					
8	*Fold vertically along the central axis*					
9	*Fold wing to the left at the marking*					
10	*Fold wing to the right at the marking*					
11	*Fold left winglets twice*					
12	*Fold right winglets twice*					
13	*Cut in rudder, fold out*					
14	*Cut left elevator and fold up*					
15	*Cut right elevator and fold up*					
16	*Grab aircraft by fuselage and take off!*					
17						
18						
19						
		Total time:			*30 secs*	

Follow these 8 steps to fill out the PA4 form





5 *Press AUTO, follow the instructions on the screen*



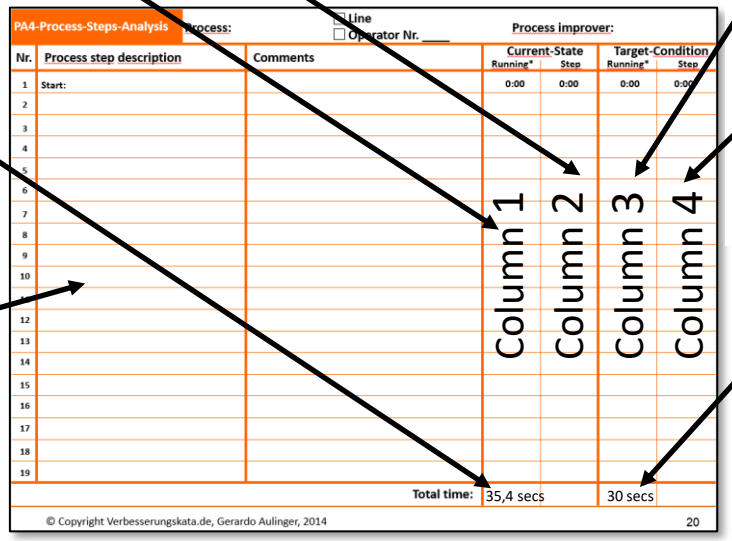
3 *Transfer accumulated values to column 1*

4 *Transfer cumulated times to column 2*

7 *Transfer accumulated times to column 3*

8 *Transfer corrected values to column 4*

2 *Enter the total time under column 1*



1 *Fill out the process steps on the left (if you haven't already done so!)*

6 *Enter the total time under column 3*

Kata coaching board

Process: Airplane Assembly Group 1

Kata coaching board

Process: Airplane Assembly Group 2

Kata coaching board

Process: Airplane Assembly Group 3

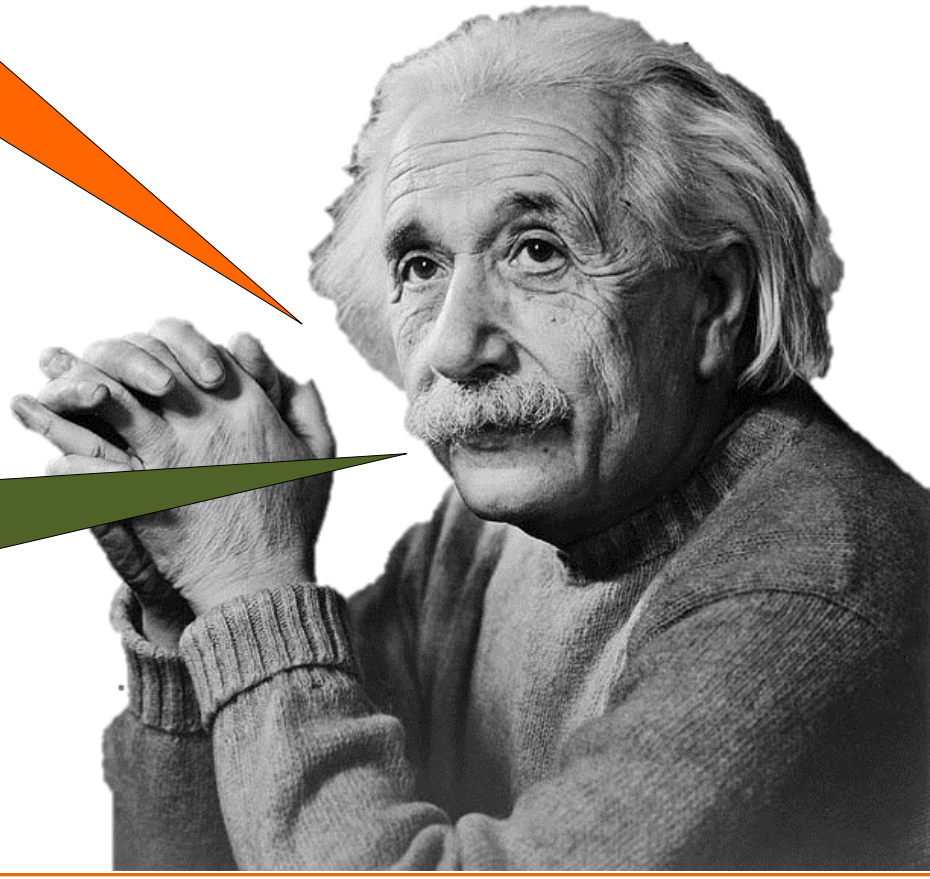
Kata coaching board

Process: Airplane Assembly Group 4

Scientific work always starts with getting an Accurate Understanding of the PROBLEM

If I only had an hour to save the world, I would spend 55 minutes trying to understand the ***PROBLEM***…

…just the last 5 minutes I would use to develop and implement the ***SOLUTION***!



Just jumped to a solution again?

Understand the PROBLEM

⇨ Solve Problem

The solution to a problem always presupposes the elimination of it´s Root Cause and its undesired Outcome

PROBLEM = ROOT CAUSE + undesired OUTCOME

„Understood and measured“

„defined in numbers which are mathematically linked to the Target Condition“

1

We MUST eliminate this…

2

… for this to NEVER happen again!

Example:

„The change over time for a process must be reduced from 32 to 12 min. Different sized screws need to be opened and tightened. The screws sizes are M6, M8 and M10, which cost an additional tool changing time of approximately 5 min. If we only used M8-screws, the tool changing times would be eliminated, we would save the resulting 5 min. The new EXPECTED change over time should go down to 32 – 5 = 27 min.“

These Five Key Figures should always be differentiated and clarified when describing a Problem

	Example:
1- Current value	*32 min*
2- Target value	*12 min*
3- Gap to Target	*Current – Target = 20 min*
4- undesired Outcome	*5 min*
5- Expectation	*Current – undes. Outcome = 27 Min*