

"Is reducing the number of pilots in commercial aircraft (below two) desirable?"

Questionnaire Results April 2021

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1. Survey Preliminary Remarks

A survey with the headline ***"Is reducing the number of pilots in commercial aircraft (below two) desirable?"*** was conducted in February/March 2021, with participants as shown in Chart 1 below (the original questionnaire as a reference on page 8).

Since the questionnaires results are part of a publication planned for later which will be greatly delayed, the main results are shown here in advance, but without any interpretative comment. Do not hesitate to use them publicly if you inform me in advance and mention the source with the citation:

"Single Pilot Operation survey, Bergmann/Europairs, March 2021 (<https://europairs.de>)".

This survey is not a scientifically robust study. Rather, it shows an opinion from a limited number of very experienced aviation experts who are familiar with the present discussion about the development of higher cockpit automation / autonomous CAT operation – hence reducing the cockpit-crew from two down to zero in the longer term.

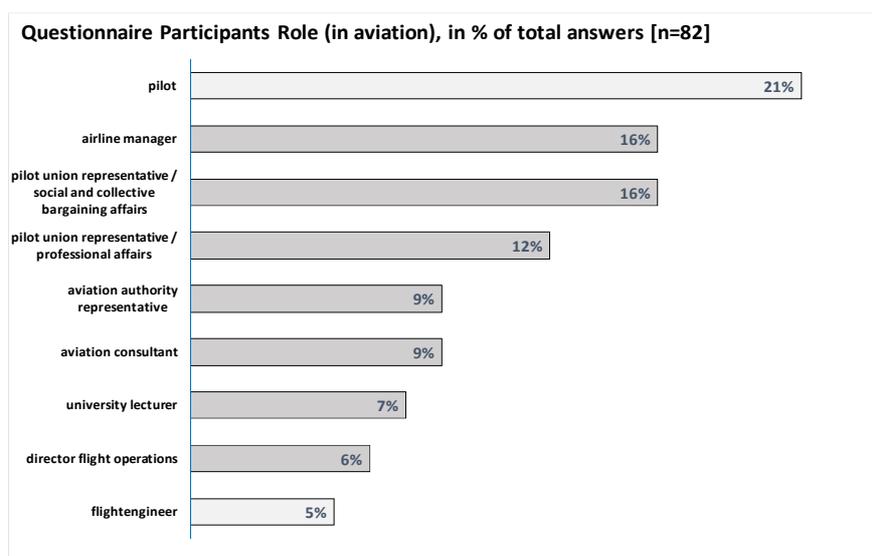
The decisive strength - and at the same time weakness - of the survey is the selected group of participants. As mentioned, they are all experienced professionals who are familiar with the issue, but the average age is relatively high; there was no participant under 45 years of age. The group of younger pilots most likely to be affected by the discussed development in the midterm future was not surveyed. The yet-to-be-convinced group of passengers was also not consulted.

The following charts beginning with Chart 2 next page show the mean values and also the maximum dispersion (grey frames) of responses figures from 0 = "do not agree at all" to 9 = "fully agree".¹



The survey participants:

Chart 1



¹ For the evaluation, the values of the answers to b) were "converted" into a)-values in case there were no answers in a) by subtracting the b) values from 9, i.e. $a = 9 - b$. This was possible due to the "reciprocal" redundancy of a) and b) answers.

2. Evaluation Results - Overview

Chart 2

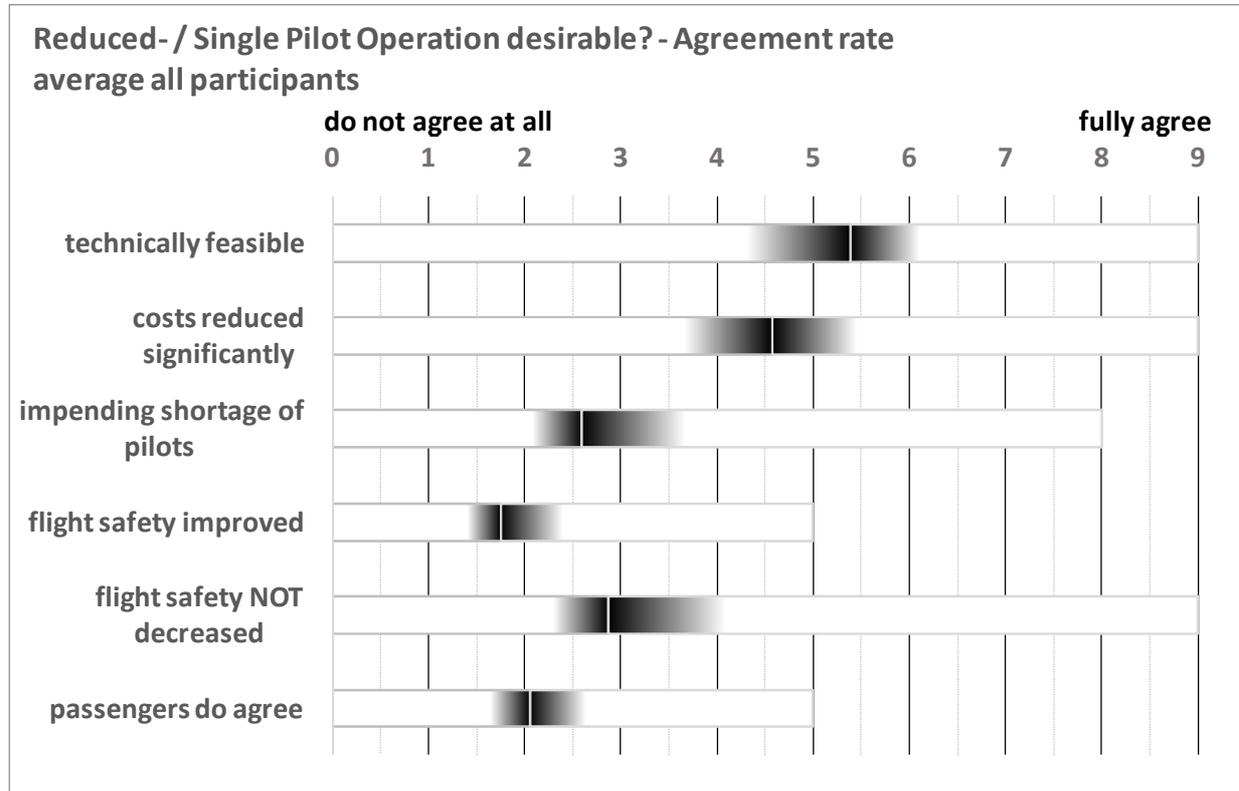
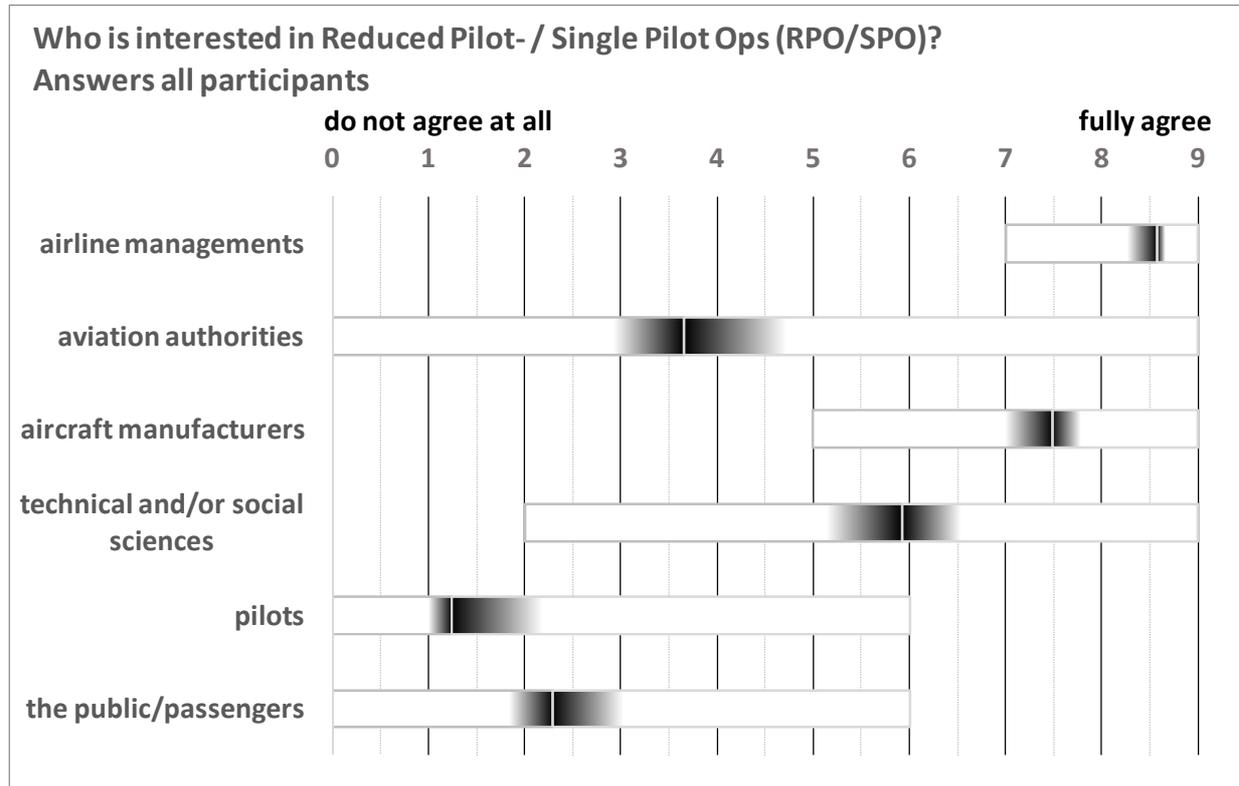


Chart 3



3. Detailed Survey Results

Chart 4

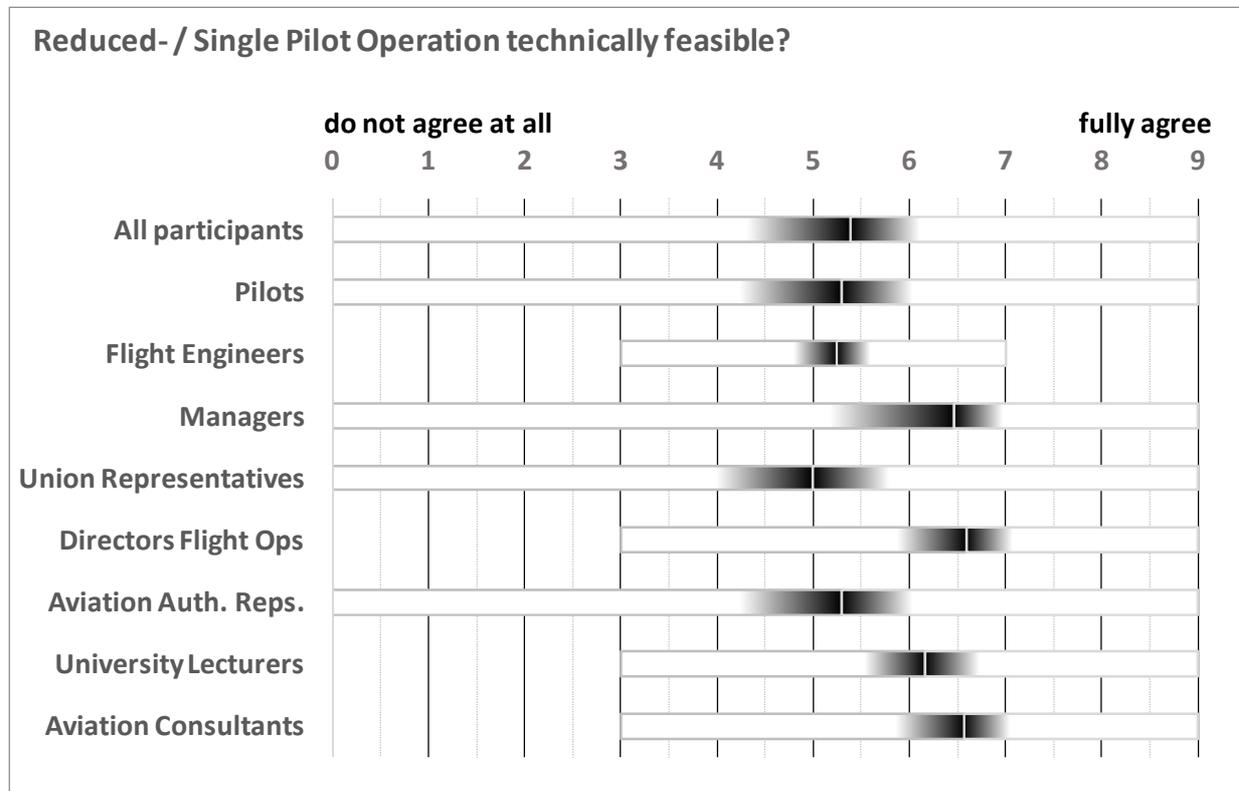


Chart 5

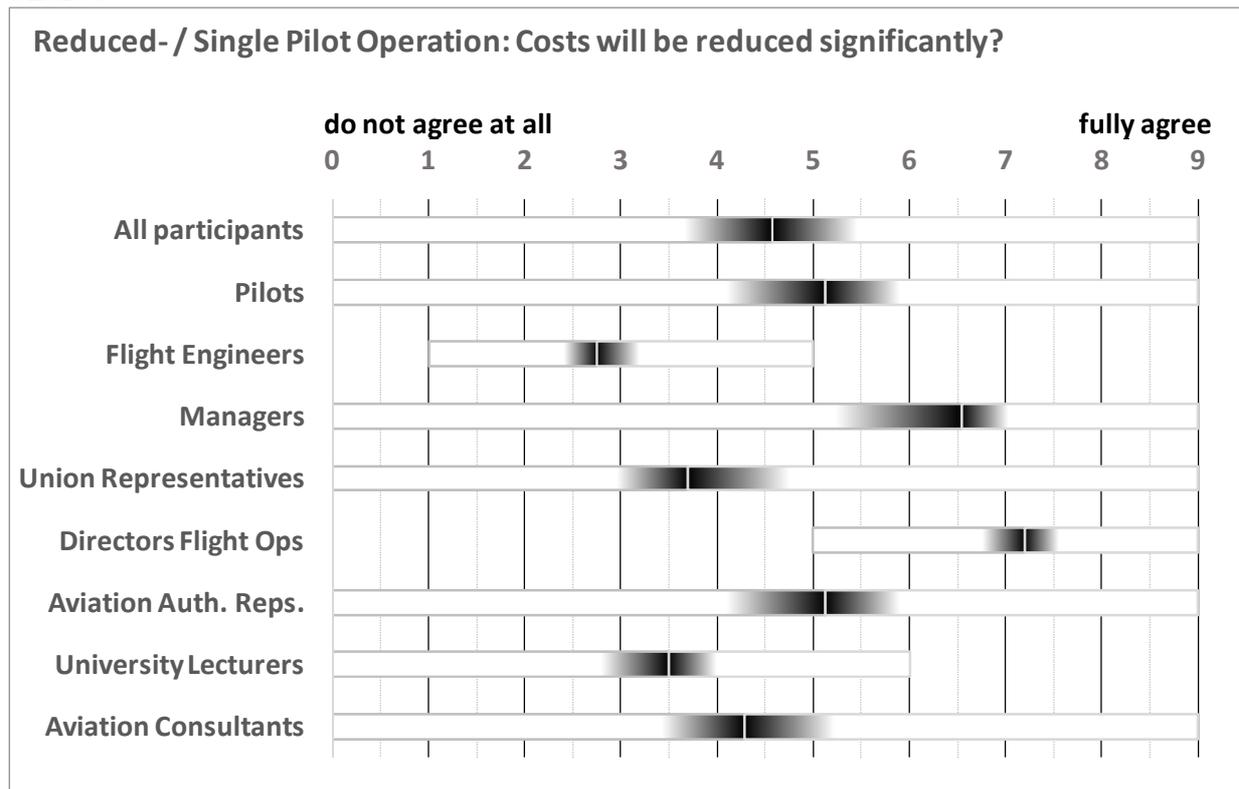


Chart 6

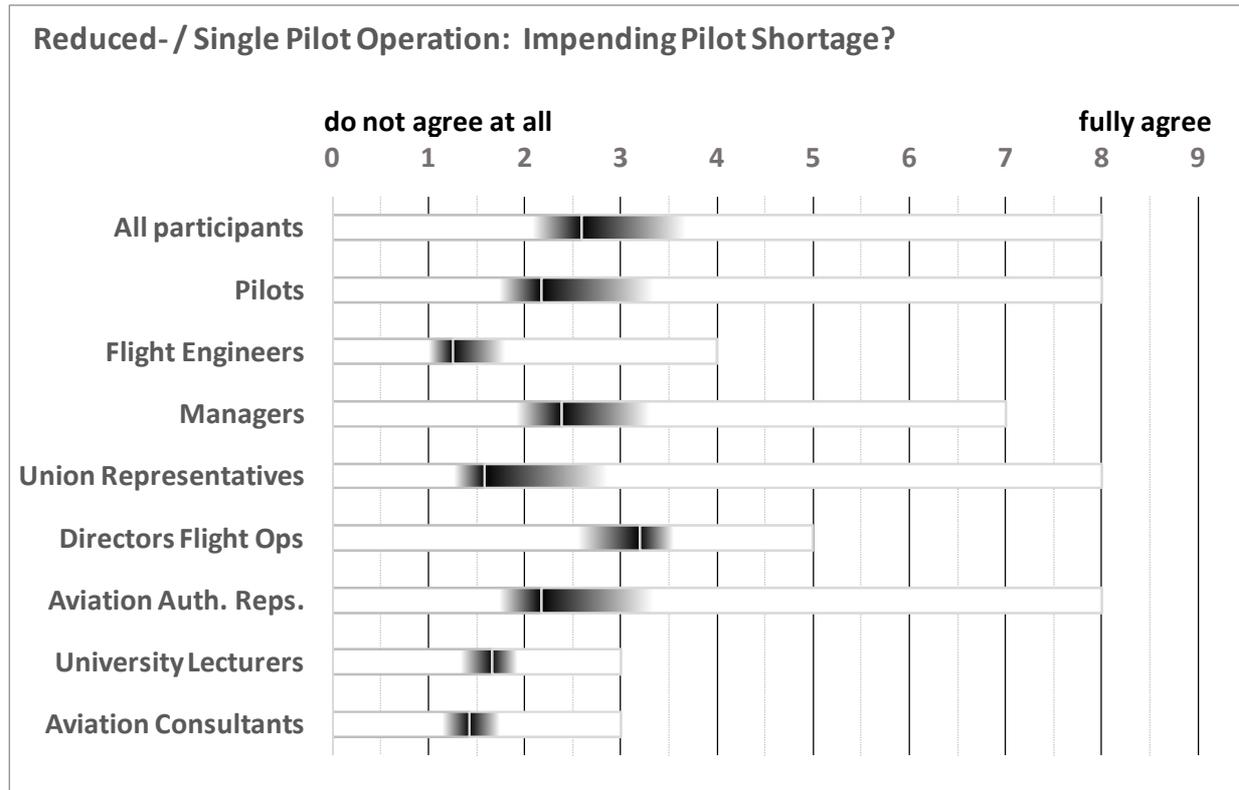


Chart 7

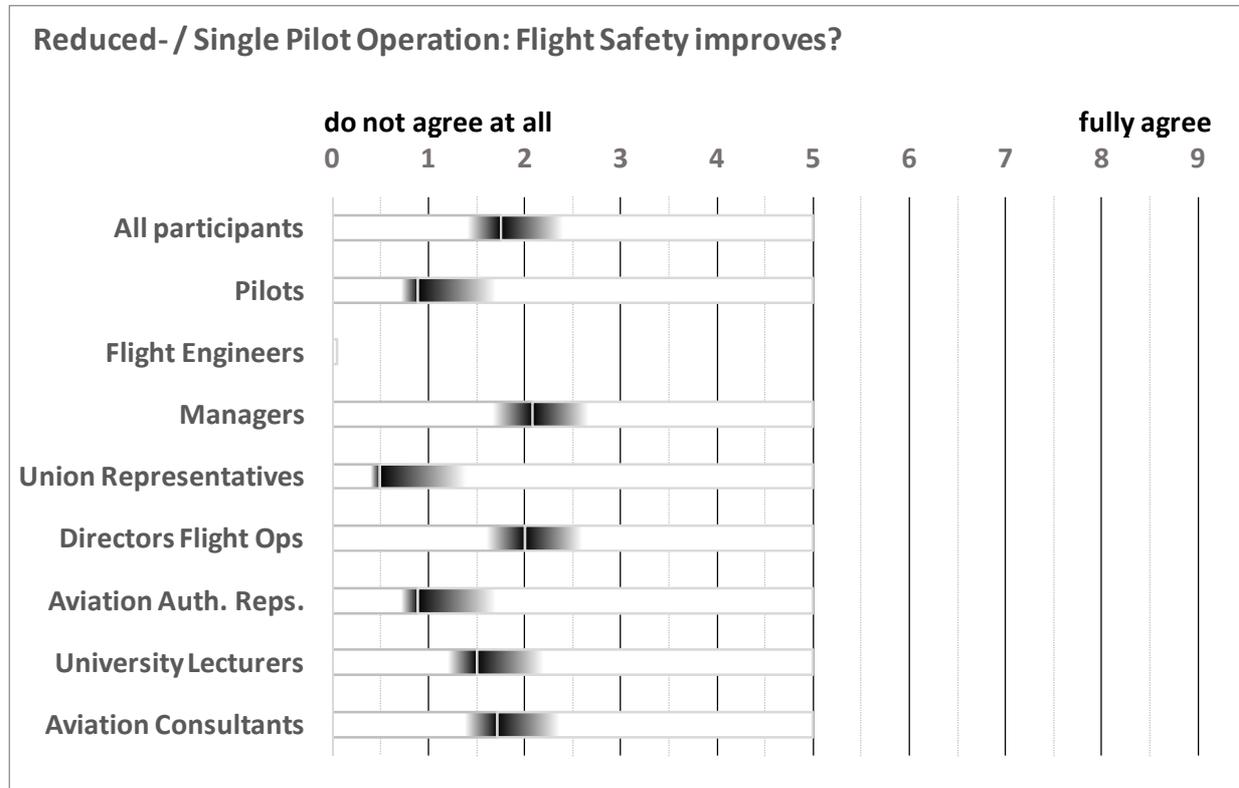


Chart 8

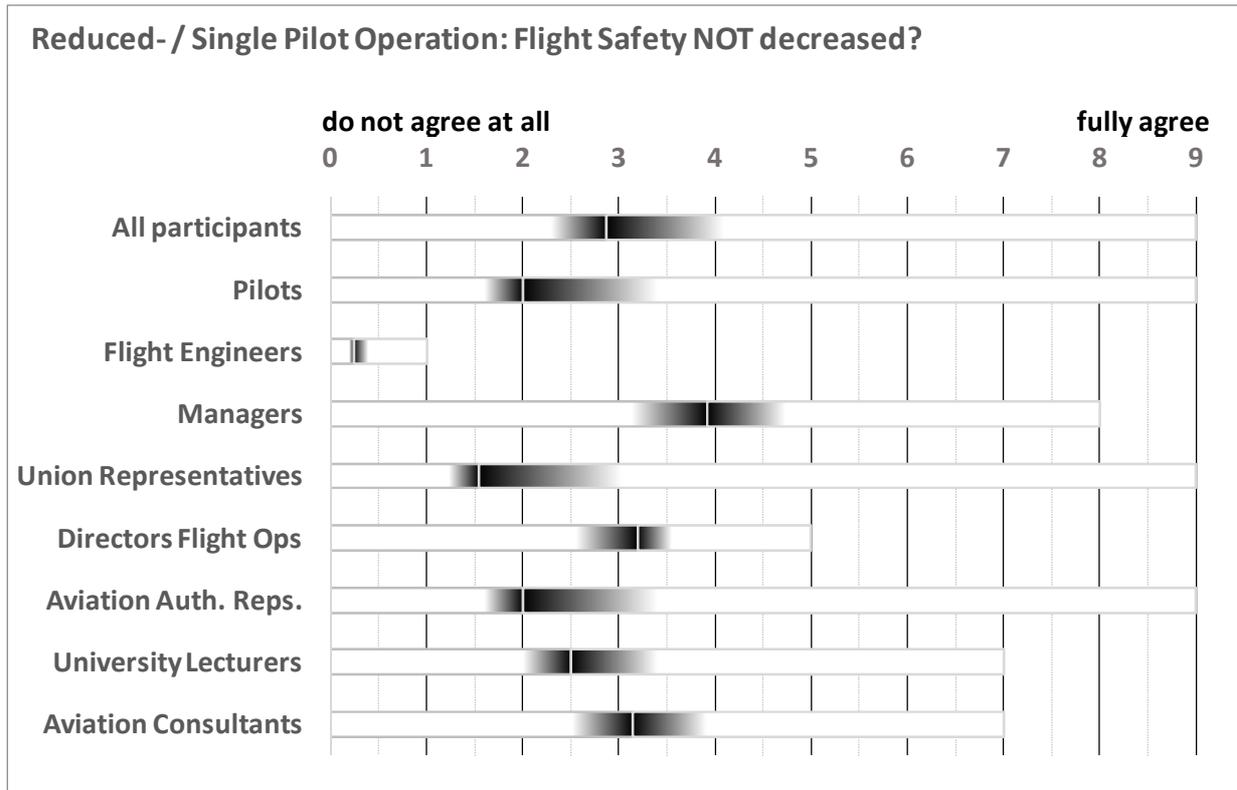


Chart 9

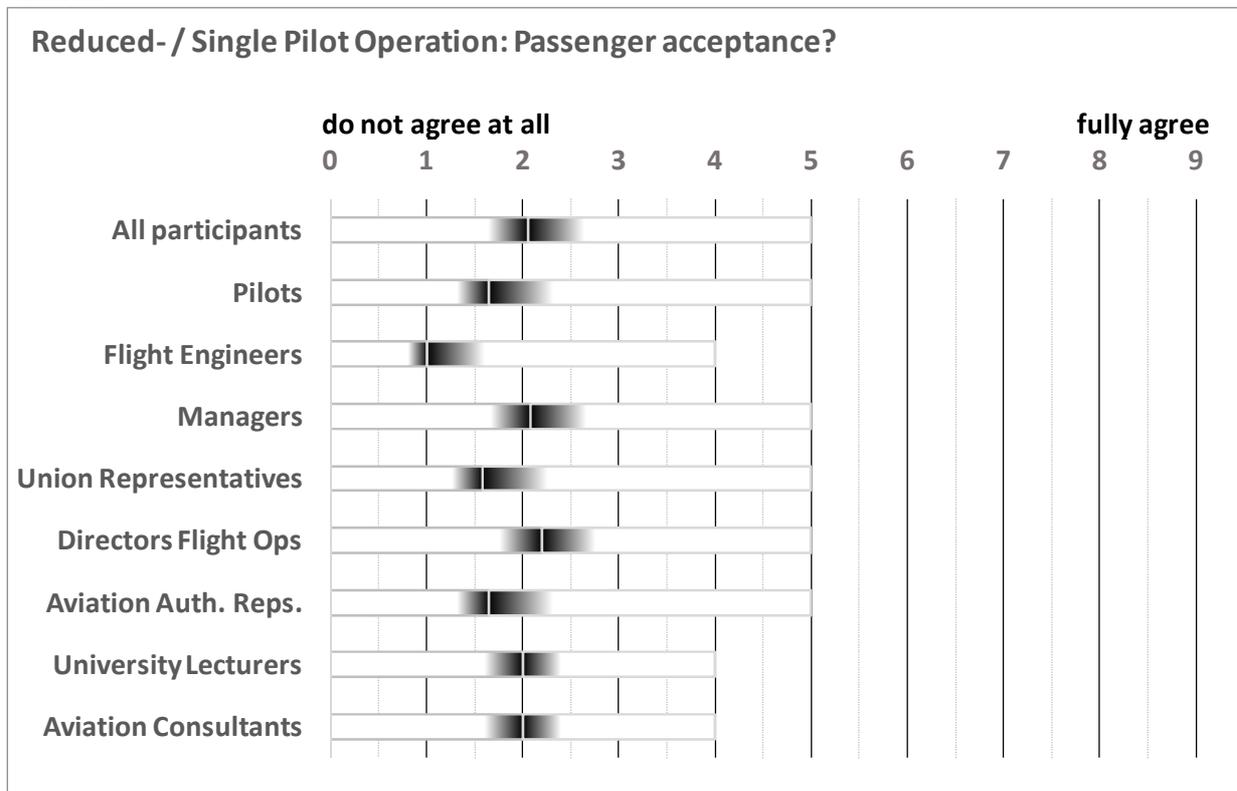
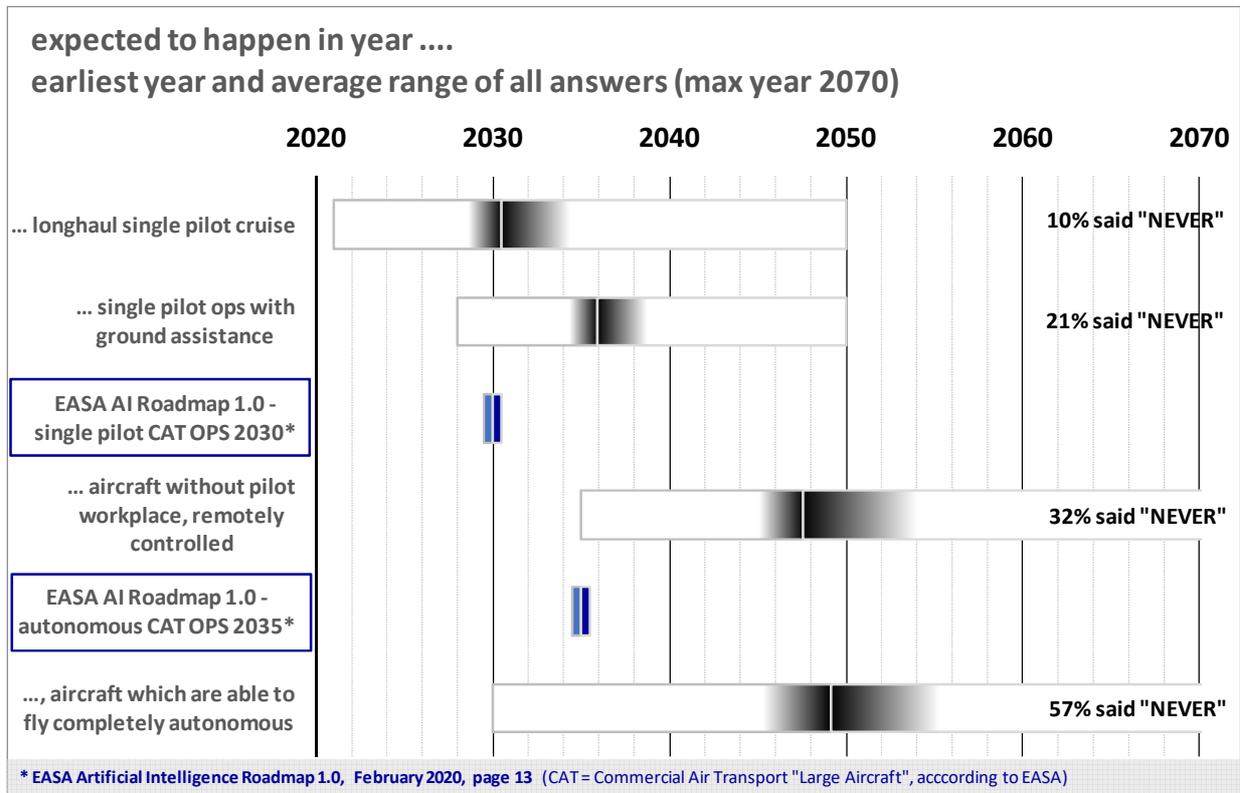
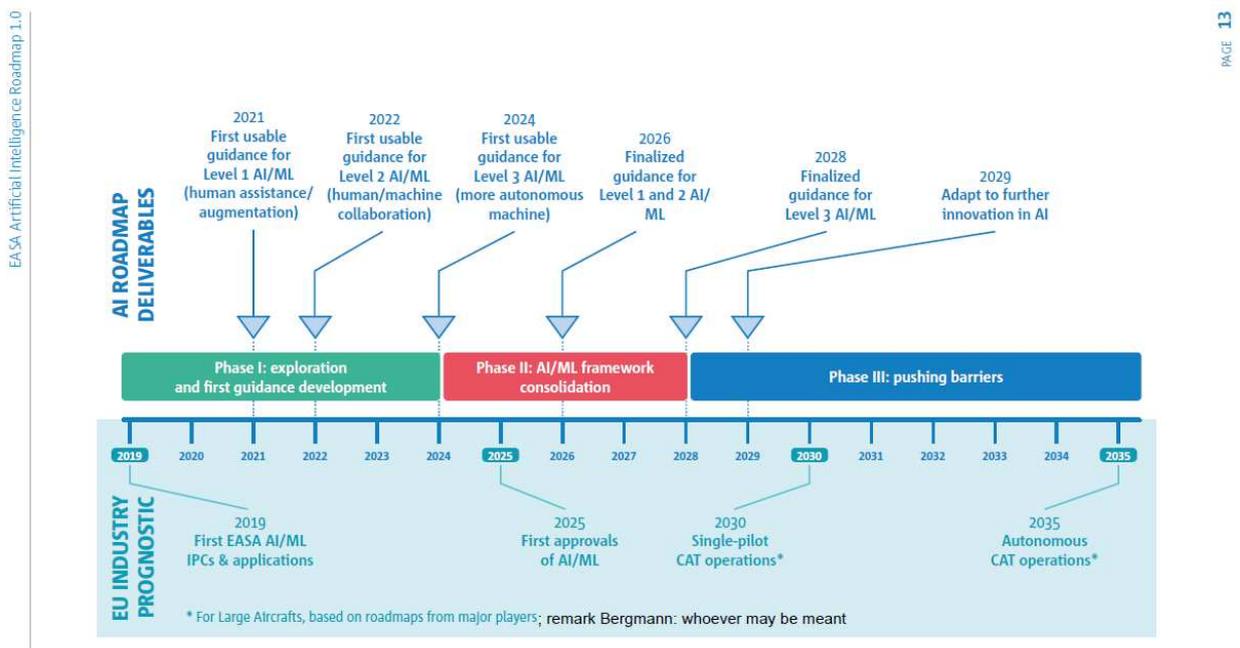


Chart 10 Reduced-/ Single Pilot CAT Operations – when does it happen?



Since EASA has given surprisingly early dates – in particular the year 2035 for "autonomous CAT-OPS" – they have been included here for comparison.

Excerpt from "EASA artificial intelligence roadmap 1.0"²



² [EASA Artificial Intelligence Roadmap 1.0 - A human-centric approach to AI in aviation](#)

4. Original Questionnaire contents (excerpt)

2) Is reducing the number of pilots in commercial aircraft (below two) desirable?

* Your ratings from 0 (do not agree at all) to 9 (completely agree)

a) YES, because ... (multiple answers possible)*

0 - 9*

it is / will be technically feasible	<input type="checkbox"/>
costs will be reduced significantly	<input type="checkbox"/>
of impending shortage of well qualified pilots	<input type="checkbox"/>
flight safety will be increased with less pilots	<input type="checkbox"/>
flight safety will <u>NOT</u> be reduced with less pilots	<input type="checkbox"/>
passengers will welcome less pilots in the cockpit, or at least will have no problem with it	<input type="checkbox"/>
other reasons	<input type="checkbox"/>

b) NO, because ... (multiple answers possible)*

0 - 9*

it will be too difficult to realise technically	<input type="checkbox"/>
costs will <u>NOT</u> be reduced significantly	<input type="checkbox"/>
there is no impending shortage of well qualified pilots	<input type="checkbox"/>
flight safety will <u>NOT</u> be increased with less pilots	<input type="checkbox"/>
flight safety will be reduced with less pilots	<input type="checkbox"/>
passengers will <u>NOT</u> welcome less pilots in the cockpit and have a problem with it	<input type="checkbox"/>
other reasons	<input type="checkbox"/>

c) Who is most interested in this reduction of pilots (multiple answers possible)*

0 - 9*

airline managements	<input type="checkbox"/>
aviation authorities	<input type="checkbox"/>
soft- and hardware-developers / aircraft manufacturers	<input type="checkbox"/>
technical and/or social sciences	<input type="checkbox"/>
pilots	<input type="checkbox"/>
the public / passengers	<input type="checkbox"/>

3) When do you expect commercial aircraft above 14t TOM to be certified ...

	year	never
... with longhaul single pilot cruise and two pilots for takeoff and landing?	<input type="checkbox"/>	<input type="checkbox"/>
... with one pilot workplace and ground ("copilot") assistance when required?	<input type="checkbox"/>	<input type="checkbox"/>
... without pilot workplace, remotely controlled?	<input type="checkbox"/>	<input type="checkbox"/>
..., which are able to fly completely autonomous?	<input type="checkbox"/>	<input type="checkbox"/>

my additional comments

x

my (former) function in aviation (please tick, multiple answers possible)

airline manager	<input type="checkbox"/>
director flight operations	<input type="checkbox"/>
pilot	<input type="checkbox"/>
flightengineer	<input type="checkbox"/>
pilot union representative / social and collective bargaining affairs	<input type="checkbox"/>
pilot union representative / professional affairs	<input type="checkbox"/>
aviation authority representative	<input type="checkbox"/>
university lecturer	<input type="checkbox"/>
aviation consultant	<input type="checkbox"/>
other function	<input type="checkbox"/>