Navigraph

FlightSim Community
Survey 2021

Final Report
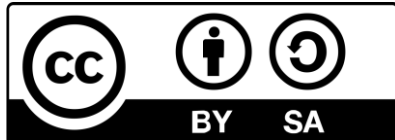
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Preamble

Another year is about to close, and it is time to summarize the flight simulation year. It amazes me what the collective efforts of the community can accomplish. Last year 23,500 respondents participated in the survey. I was convinced that this had to be some sort of plateau. Just thinking about 23,500 people is mind-boggling. That's more people than citizens in the little country town where I grew up! It blew my mind when my colleague Andreas Goodholm reported on closing date that this year no less than 24,200 respondents had contributed to the survey!

In this report we summarize the results of the 93 questions in the survey. We cover flight simulator preference, flight simulation habits, flight training, various demographics, virtual reality, graphics card, Xbox usage, preferences in addon software, and much more.

While the respondents' input are crucial, they are not the only ingredient in this Christmas cake we call the survey. In fact, this survey is the result of a collaborative effort between partners – developer, companies, organizations and media outlets in the flightsim community. Navigraph's role is to organize, design and compile the survey and make the results freely available for the common good of the flightsim community to guide future projects and ultimately to attract new pilots.

At Navigraph Andreas Goodholm, Stephen O'Connell, and myself have coordinated the efforts in producing this survey. It's been hard work, but also fun and interesting. We hope you enjoy reading it!

Stockholm, December 2021

Magnus Axholt
CEO & Co-Founder

Table of Contents

1. Introduction

1.1. Partners

The FlightSim Community Survey 2021 is a collaborative effort conducted by the developers, organizations and companies alphabetically presented in the list of partners below.

- Aerosoft
- Carenado
- Cruiselevel.de
- Digital Flight Dynamics
- Drzewiecki Design
- Fenix
- Flight1
- FlightGear
- FlightSim.com
- Flightsimactu.fr
- FlightSimLabs
- FlightSimulator.blog
- Fly By Wire
- FSElite
- FSExpo
- FSMagazin
- FSNews
- Gaya Simulations
- GeoFS
- HeliSimmer.com
- Honeycomb
- Infinite Flight
- IVAO
- Laminar Research
- Little Navmap
- Meteonautics
- MilViz
- Navigraph
- ORBX
- PC Pilot
- Pinpoint Simulations
- PMS50
- ProSim
- RealSimGear
- REX
- Salty Simulations
- Sim4Flight
- SimFlight
- Synaptic Simuations

- TFDi
- Thresholdx.net
- VATSIM

Navigraph was responsible for coordinating, designing, compiling and funding the survey, as well as authoring this document.

1.2. Purpose and Target Audience

The primary purpose of the survey is to provide the participating partners with information about the flight simulation community so that they are better able to:

- recruit new pilots to the flight simulation community
- develop products and services in response to pilots' needs and requests

The secondary purpose of the survey is to provide all members of the flight simulation community with information so that they are better able to:

- find resources to develop their flight simulation interest
- maintain and develop the community

1.3. Data Protection

The data was collected from the respondents anonymously without storing any personally identifiable information. The results are presented in aggregated form, never individually. The data was collected in the legitimate interest pursued by Navigraph and the partners. To the best of our judgement, the survey was conducted in a fashion compliant with the General Data Protection Regulation (EU) 2016/679. For any questions regarding user privacy, please contact contact@navigraph.com.

1.4. Previous Work

VATSIM conducted a survey in 2006[1]. It had 6,691 respondents.

AVSIM has previously published a demographic survey for the flight simulation community. The most recent one was made in 2013[2]. It had approximately 2,800 respondents.

Laminar Research has collected usage data from its X-Plane simulator and published two reports[3] in November 2017, and June 2018.

Navigraph has previously conducted customer surveys. In 2017[4] it had 3,187 respondents. In 2016 2,200 participated. While these surveys had significant portions aimed at product feedback specific for Navigraph, it also had demographics questions included from the AVSIM survey.

Navigraph has also, with the help of partners, conducted a previous flight community survey in 2018[5] which has 15,000 respondents, in 2019[6] which had 17,800 respondents, and 2020[7] which had 23,500 respondents.

It is our impression that there have been additional small surveys completed in the past. Either they have been published by various developers with the intent of obtaining specific product feedback; or

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[1] https://www.flightsim.com/vbfs/content.php?7782-VATSIM-User-Survey-Results
[2] https://www.avsim.com/forums/topic/430855-results-of-the-2013-avsim-community-demographics-survey/
[3] https://developer.x-plane.com/category/x-plane-usage-data/
[4] http://blog.navigraph.com/post/167492052421/survey-results-prepar3d-x-plane-up-fsx-down
[5] https://blog.navigraph.com/post/181243982766/2018-survey-results
[6] https://blog.navigraph.com/post/190623949491/flightsim-community-survey-2019-results
[7] https://blog.navigraph.com/post/640055551804489728/flightsim-community-2020-survey-results

they have been published by interest organizations with the intent of obtaining feedback of the particular operations of that organization.

The flightsim community surveys 2018, 2019, 2020 and 2021 are different in that they have:

- a larger sample size, i.e. many more respondents compared to any previous flight simulation community survey to date
- a sample which represents multiple user groups, i.e. users from various developers and members from various organizations

2. Method

Navigraph began by posting an official invite on social media and in the Navigraph newsletter for partners to collaborate on the survey. Partners who participated to the survey earlier years were contacted directly via email. To get a representative sample of the community partners were chosen from as many different parts of the flightsim community as possible.

Partners were asked to submit areas of particular interest to them. Navigraph edited, consolidated, and designed questions based on the partners' areas of interest.

All partners were asked to publish an individual survey link at a specific date and time. The partners were free to choose how to distribute the link, but many chose to publish on social media, forums, websites, and in newsletters. The individual links permitted tracking of how successful each partner was at gathering respondents to the survey.

The respondents were not compensated for their contribution. The incentive for the respondents to contribute to the survey is the possibility to guide development in the flightsim community. The incentive for the partners to contribute to the survey is the possibility to direct the survey into various areas of interest and reach a wider audience compared to publishing an individual survey themselves.

The information presented in this survey report is only diagrams over aggregated data. No other analysis as to statistical significance, power, or confidence interval has been done.

3. Analysis

3.1. Respondents

The survey had 24,200 (23,476) respondents out of which 70% (62%) completed the 93 (119) questions in the survey and spent on average 21 (22) minutes. (Last year's values within parentheses.)

The diagram below illustrates the number of respondents clicking a link published by a survey partner over time starting from November 26 when the link to survey was first published, until noon of December 6 when the survey closed. Navigraph, illustrated at the top of the diagram contributed with the most respondents followed by Orbx, Honeycomb, GeoFS, and FSElite. All partners who contributed with less than 100 respondents are aggregated into the bottom bar.

Survey Respondents by Partner

Partner	Respondents
Navigraph	8,500
Orbx	2,500
Honeycomb	2,000
GeoFS	1,500
FSElite	1,500
Fly By Wire	1,200
Infinite Flight	1,000
VATSIM	1,000
Thresholdx.net	500
FSA	300
Synaptic	300
X-Plane	200
IVAO	200
SimFlight	200
Helisimmer	150
flightsim.com	150
Pinpoint	150
Digital Flight Dynamics	150
Carenado	150
Sim4Flight	100
cruiselevel.de	100
Simmarket	100
FlightGear	100
FSNews	100
Salty Simulations	100
Partners < 100 respondents	400

3.2. Demographics

3.2.1. Age

The rather even distribution suggests that flight simulation is interesting to people of all ages. While the bulk of the users are in the range of 15-85 years, we notice a peak around 20 and an impressive tail towards 85.

The age distribution this year is very similar to those of the three previous surveys, in terms of range but also with the distinct peak around 20.

How old are you?

Years	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
%	0%	0%	6%	11%	8%	7%	8%	8%	8%	8%	7%	7%	7%	6%	5%	2%	1%	0%	0%	0%

Last year's result:

How old are you?

Years	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
%	0%	0%	7%	12%	8%	7%	7%	8%	7%	7%	7%	7%	6%	6%	5%	2%	1%	0%	0%	0%

14
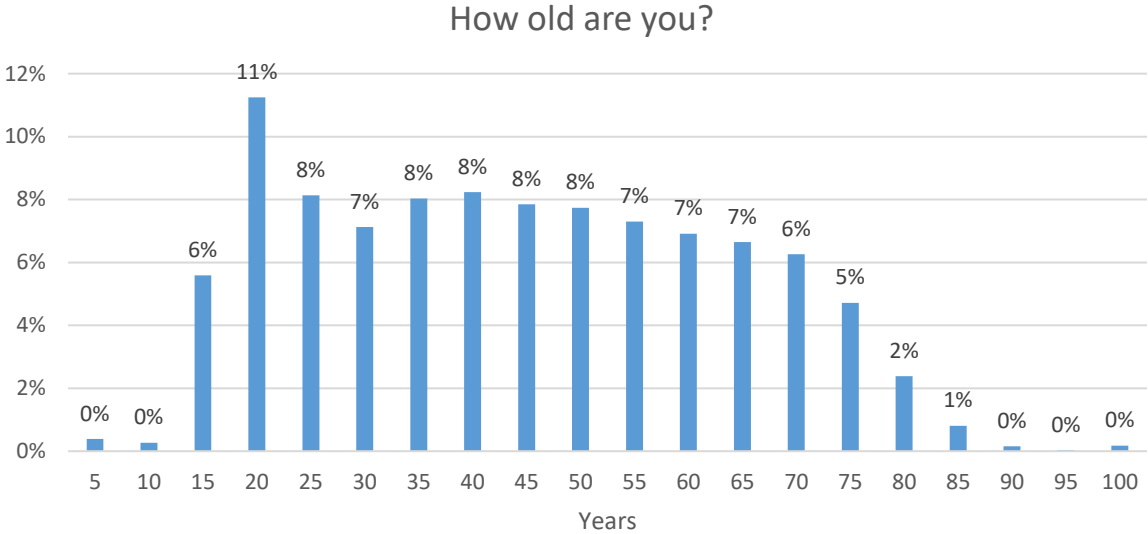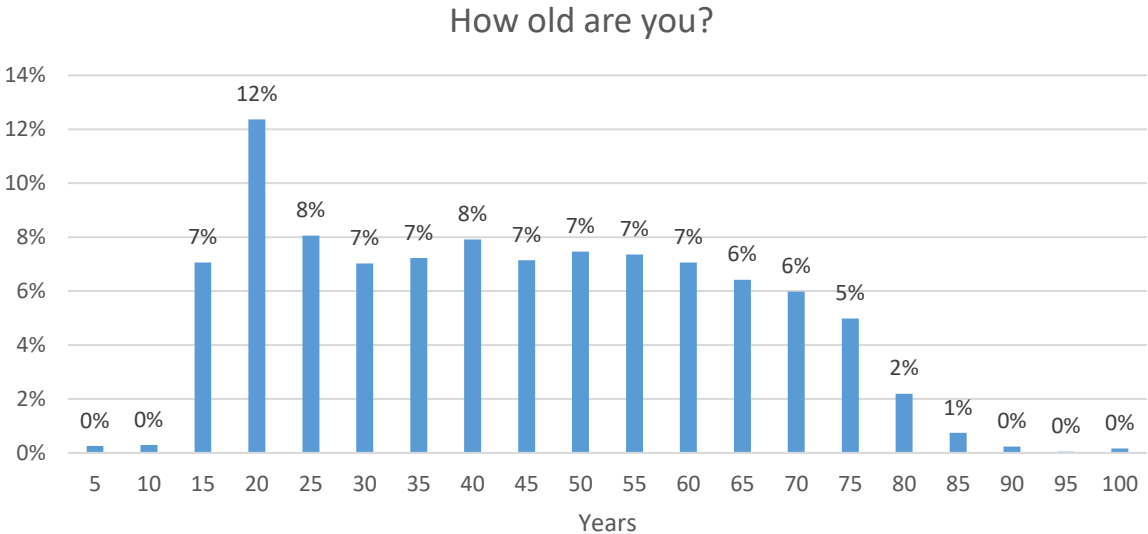
3.2.2. Gender

Flight simulation continues to be a predominantly male activity. The results are the same as the previous years.

What best describes your gender?

Female	Male	Non Binary	Other	Prefer not to say
1.0%	96.9%	0.5%	0.2%	1.4%

Last year's result:

What best describes your gender?

Female	Male	Non Binary	Other	Prefer not to say
0.9%	96.9%	0.3%	0.2%	1.6%
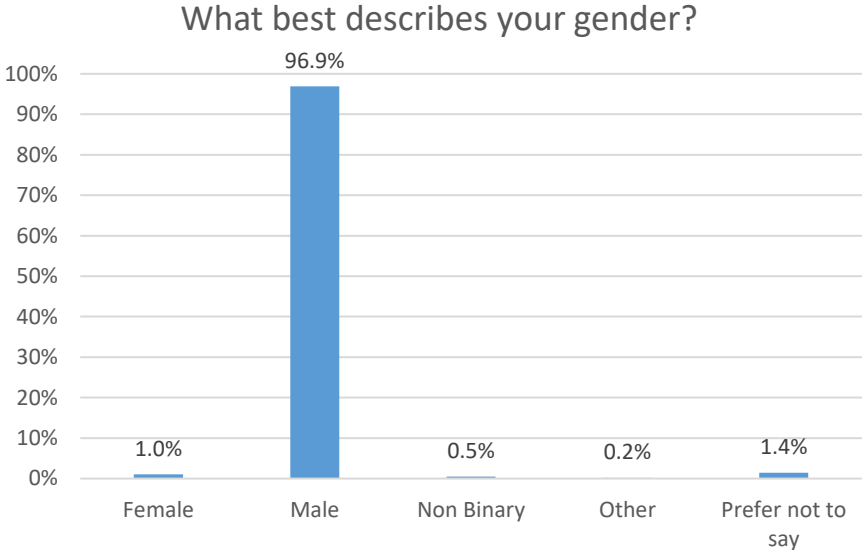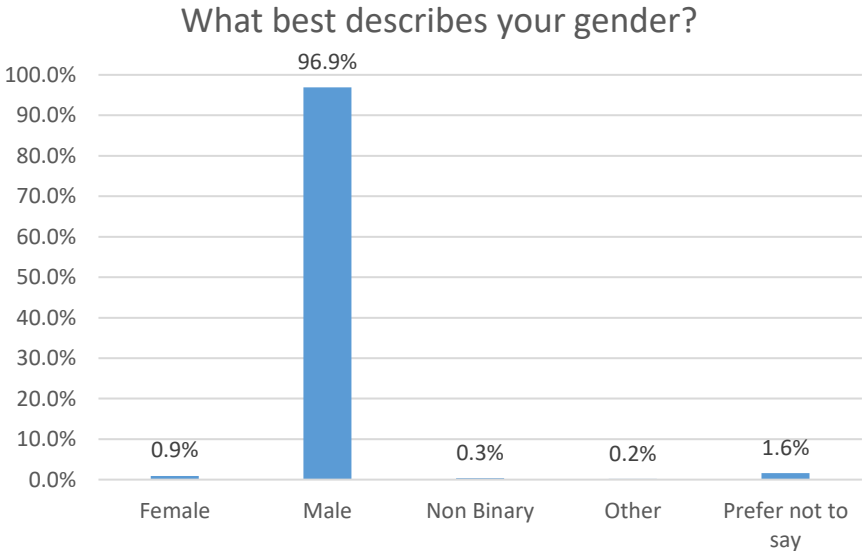
3.2.3. Employment Status

Most flight simulator pilots are either employed full-time or fully retired. Compared to the previous year, the number of furloughed flight simmers went down from 1.4% to 0.4%, and the number of full-time employees went up from 46.5% to 50.5%.

What is your employment status?

Category	Percentage
Prefer not to say	3.4%
I am unemployed	3.4%
I am semi-retired	4.0%
I am in school and employed part time	3.3%
I am in school	9.0%
I am furloughed	0.4%
I am fully retired	16.4%
I am employed part time	3.2%
I am employed full time	50.5%
I am a full time student	6.3%
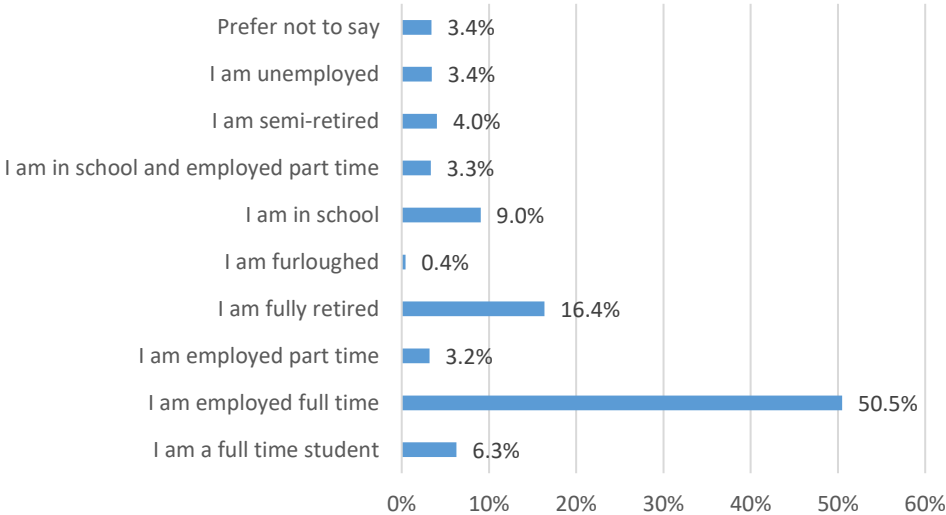
Last year's result:

What is your employment status?

Category	Percentage
Prefer not to say	3.4%
I am unemployed	4.3%
I am semi-retired	4.2%
I am in school and employed part time	3.2%
I am in school	10.4%
I am furloughed	1.4%
I am fully retired	16.0%
I am employed part time	3.4%
I am employed full time	46.5%
I am a full time student	7.3%
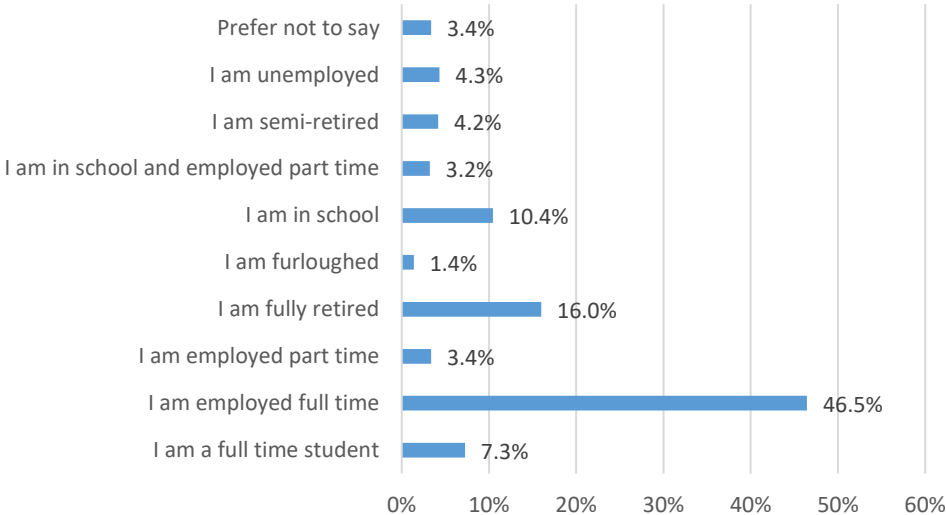
3.2.4. Country

The top five countries are the same this year as the two previous years. France, the Netherlands, Italy and Spain and Switzerland follow next, just like previous years, but in varying order.

Where do you live?

Country	Percentage
United States [US]	27.5%
United Kingdom [GB]	12.4%
Germany [DE]	11.1%
Canada [CA]	5.1%
Australia [AU]	4.2%
France [FR]	4.0%
Netherlands [NL]	3.3%
Italy [IT]	2.1%
Spain [ES]	1.8%
Switzerland [CH]	1.7%
Russian Federation [RU]	1.5%
Brazil [BR]	1.4%
Belgium [BE]	1.4%
Austria [AT]	1.3%
Norway [NO]	1.3%
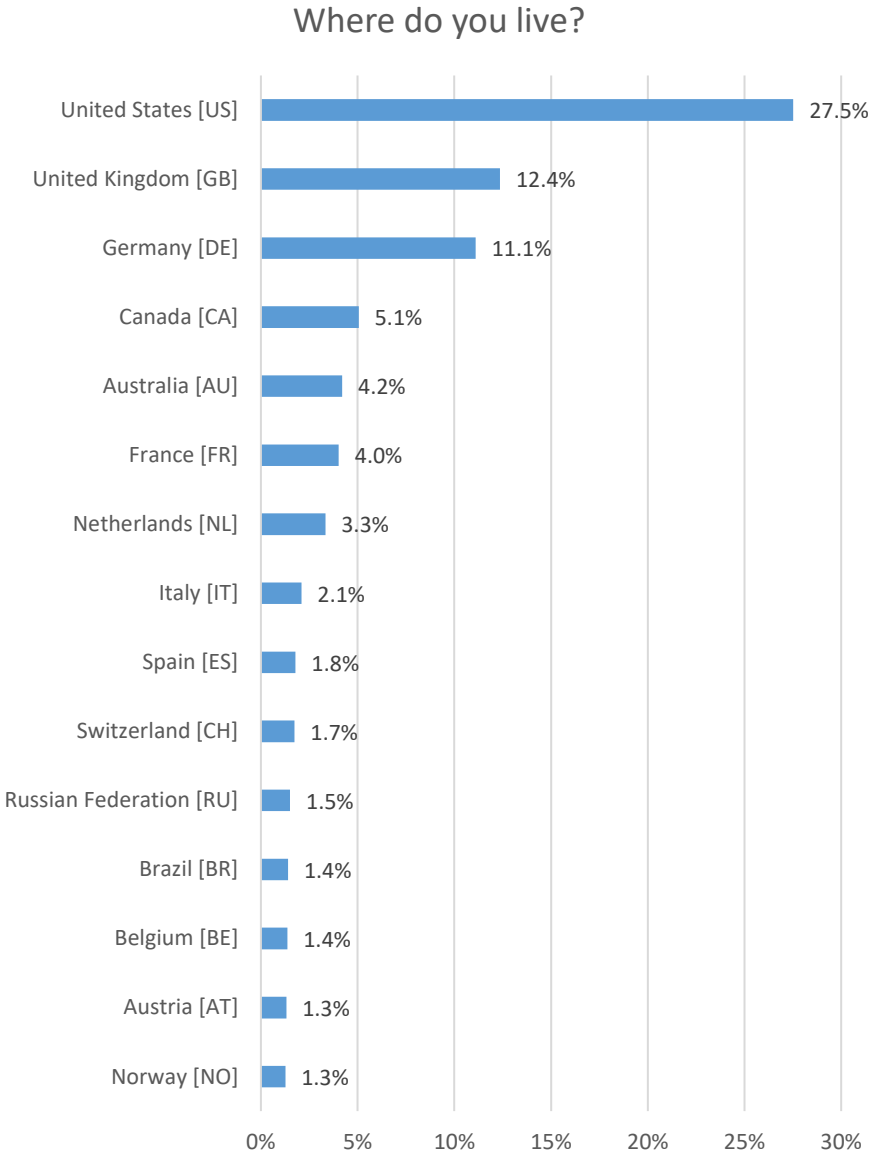
Last year's result:

Where do you live?

Country	Percentage
United States [US]	26.7%
United Kingdom [GB]	13.9%
Germany [DE]	10.4%
Canada [CA]	5.0%
Australia [AU]	4.3%
France [FR]	3.9%
Netherlands [NL]	3.3%
Spain [ES]	2.2%
Italy [IT]	2.1%
Switzerland [CH]	1.8%
Sweden [SE]	1.5%
Belgium [BE]	1.4%
Norway [NO]	1.4%
Austria [AT]	1.3%
Brazil [BR]	1.2%
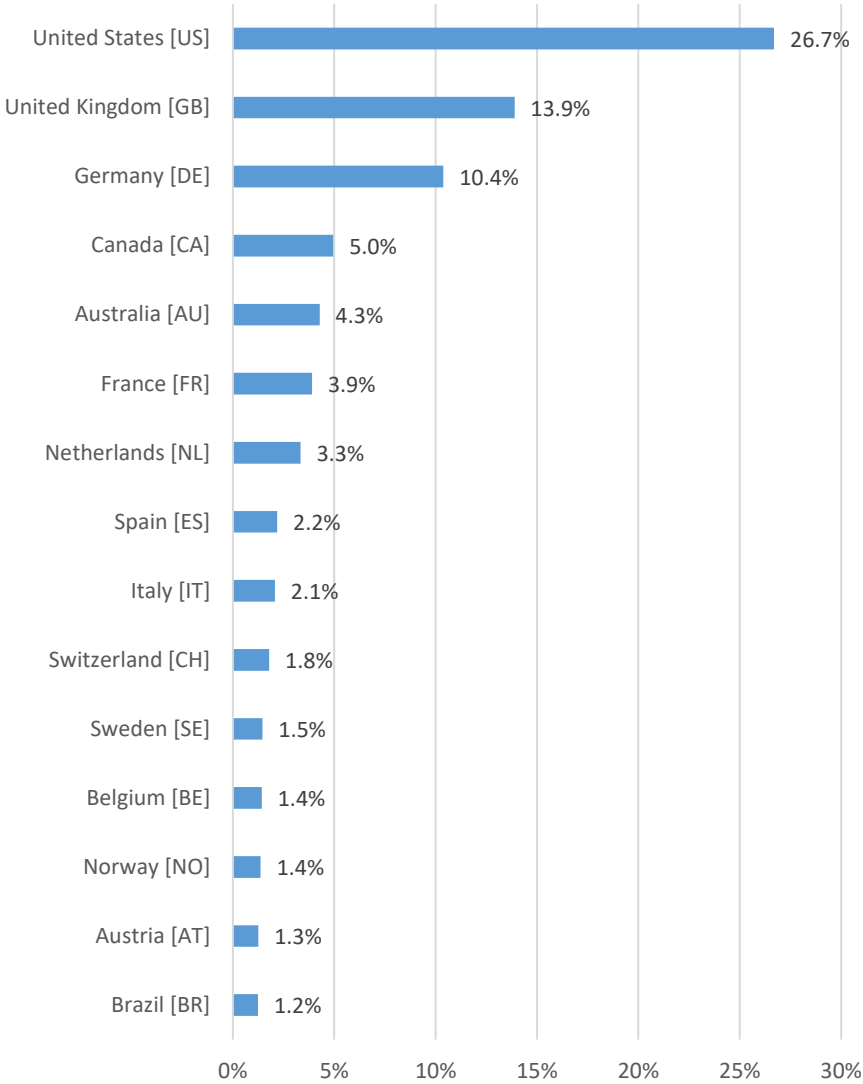
3.2.5. Education

Secondary School and Bachelor's were the most common levels of education this year. This is the same result as the last two years. In 2018, however, Bachelor's was the most common one, followed by Secondary School.

What is the highest level of education you have completed?

Level	Percentage
None	1%
Primary School	4%
Secondary School / High School	26%
Technical or Vocational degree	14%
Associates degree	5%
Master's	16%
Bachelor's	24%
Doctor's	4%
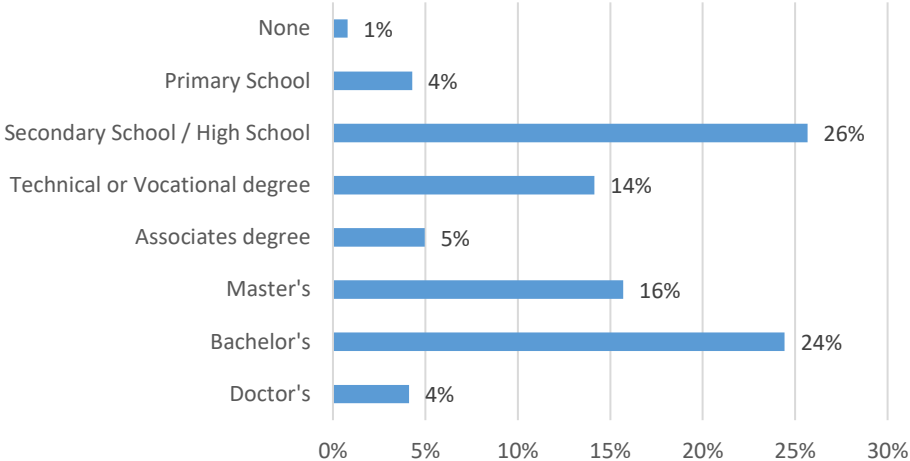
Last year's result:

What is the highest level of education you have completed?

Level	Percentage
None	1%
Primary School	5%
Secondary School / High School	28%
Technical or Vocational degree	14%
Associates degree	5%
Master's	15%
Bachelor's	23%
Doctor's	4%
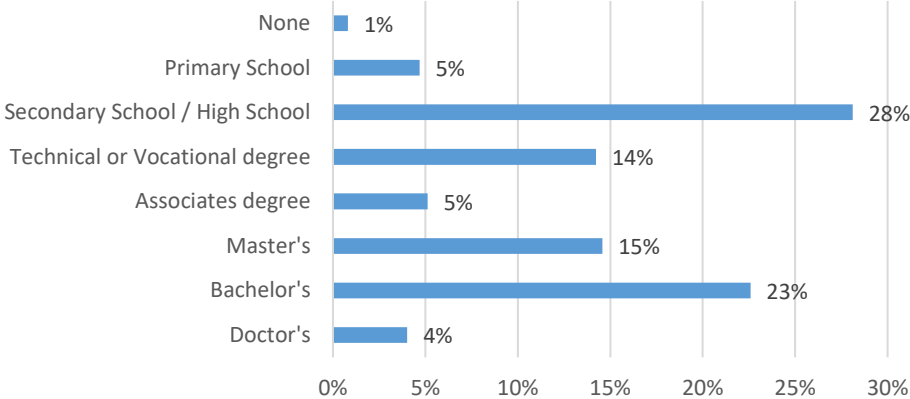
3.2.6. Income

Respondents were asked to enter their annual income before tax in their local currency. Exchange rates as per December 2021 were then used to calculate the income in US Dollars.

The distribution is very similar to last year's survey result. Most respondents are in the interval between $40,000 and $70,000. We also notice a peak in the $10,000 bracket, which is consistent with recent survey results.
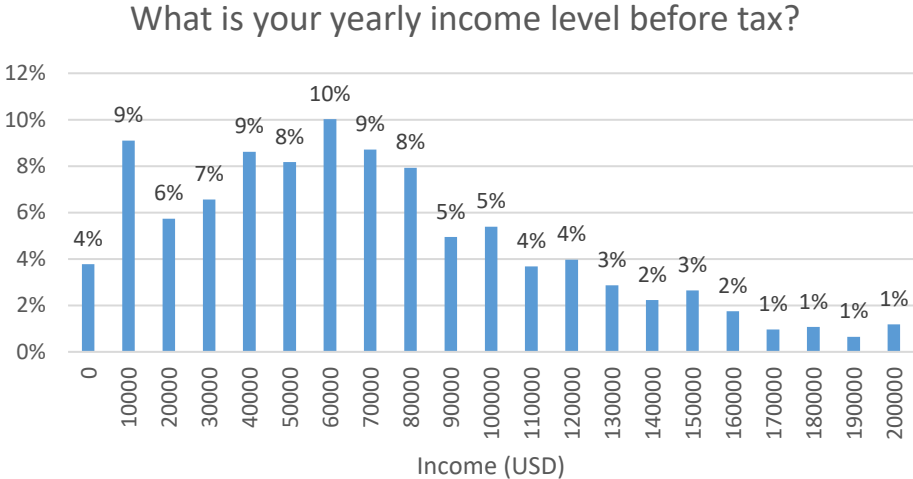
Last year's result:
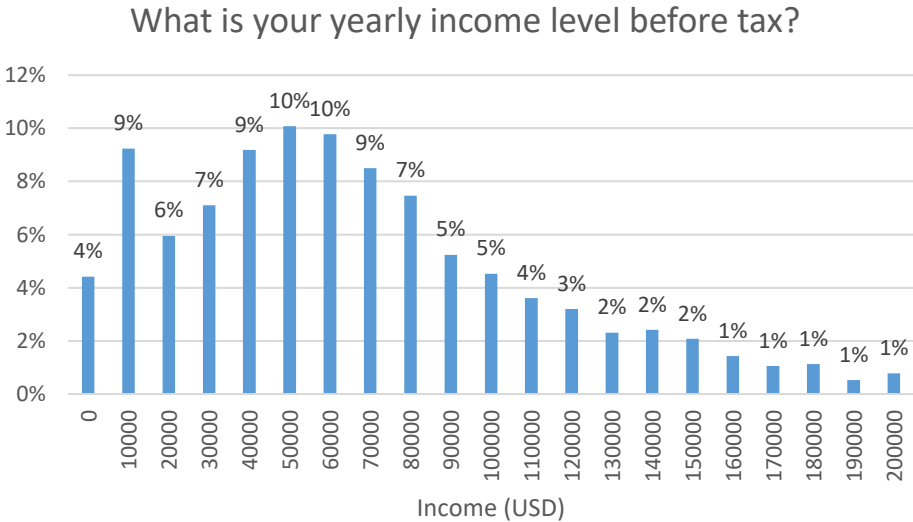
3.3. Relation to Aviation

3.3.1. Work

By asking this question we wanted to establish how many of the respondents work within the aviation industry. Almost one in five work within aviation. This is comparable to the previous year's results.

Do you work within aviation?

Category	Percentage
Yes, other	5.4%
Yes, as ground crew	1.2%
Yes, as dispatch	0.5%
Yes, as cabin crew	0.4%
Yes, as an instructor	0.9%
Yes, as an engineer/mechanic	2.3%
Yes, as an airplane pilot	4.4%
Yes, as an air traffic controller	1.0%
Yes, as a software developer	0.7%
Yes, as a helicopter pilot	0.3%
No	83.0%

Last year's result:

Do you work within aviation?

Category	Percentage
Yes, other	6.0%
Yes, as ground crew	1.3%
Yes, as dispatch	0.6%
Yes, as cabin crew	0.5%
Yes, as an instructor	0.8%
Yes, as an engineer/mechanic	2.4%
Yes, as an airplane pilot	4.7%
Yes, as an air traffic controller	0.9%
Yes, as a software developer	0.7%
Yes, as a helicopter pilot	0.2%
No	81.7%

3.3.2. Pilot License

One in four flight simulator pilots holds a pilot license. A total of 9% have a Private Pilot License (PPL). A comparable result was presented when we asked this question in the last year's survey.

What pilot license do you currently have?

License	Percentage
Student Pilot License	5.0%
Private Pilot License with Instrument Rating (PPL-IR)	2.0%
Private Pilot License with Enroute Instrument Rating…	0.2%
Private Pilot License Helicopter (PPL-H)	0.1%
Private Pilot License (PPL)	8.7%
Other (please specify)	2.6%
None	74.9%
Commercial Pilot License with Instrumental Rating…	2.8%
Commercial Pilot License Helicopter (CPL-H)	0.2%
Commercial Pilot License (CPL)	0.6%
Airline Transport Pilot License (ATPL)	2.7%

What pilot license do you currently have?

License	Percentage
Student Pilot License	5.0%
Private Pilot License with Instrument Rating (PPL-IR)	2.1%
Private Pilot License with Enroute Instrument Rating (PPL-EIR)	0.3%
Private Pilot License Helicopter (PPL-H)	0.1%
Private Pilot License (PPL)	9.0%
Other (please specify)	2.8%
None	74.2%
Commercial Pilot License with Instrumental Rating (CPL-IR)	2.8%
Commercial Pilot License Helicopter (CPL-H)	0.2%
Commercial Pilot License (CPL)	0.6%
Airline Transport Pilot License (ATPL)	2.9%

3.3.3. Simulation in Relation to Aviation

The respondents who stated that they have a pilot license were asked a follow up question to know if it was the flight simulation that sparked their decision to pursue a license, or the other way around. More than three out of four got their first flight simulator before obtaining their pilot license.
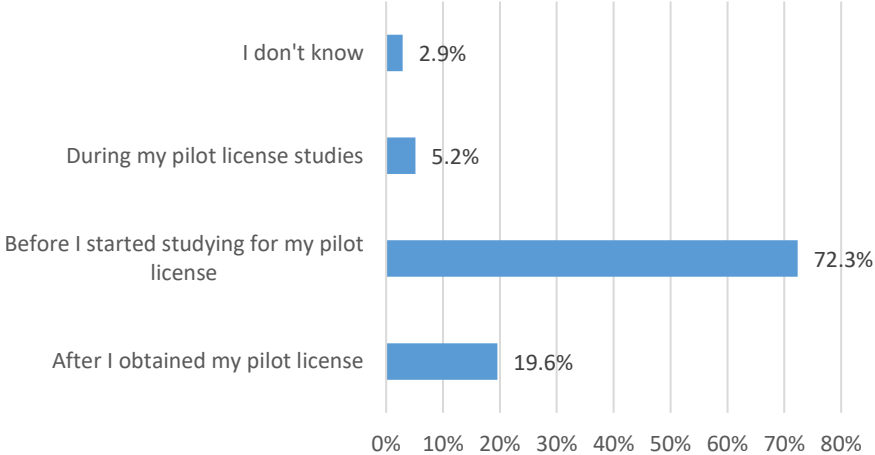
When did you get your first flight simulator?

Category	Percentage
I don't know	2.9%
During my pilot license studies	5.2%
Before I started studying for my pilot license	72.3%
After I obtained my pilot license	19.6%

Last year's result:

When did you get your first flight simulator?

Category	Percentage
I don't know	2.8%
During my pilot license studies	5.0%
Before I started studying for my pilot license	73.3%
After I obtained my pilot license	18.9%
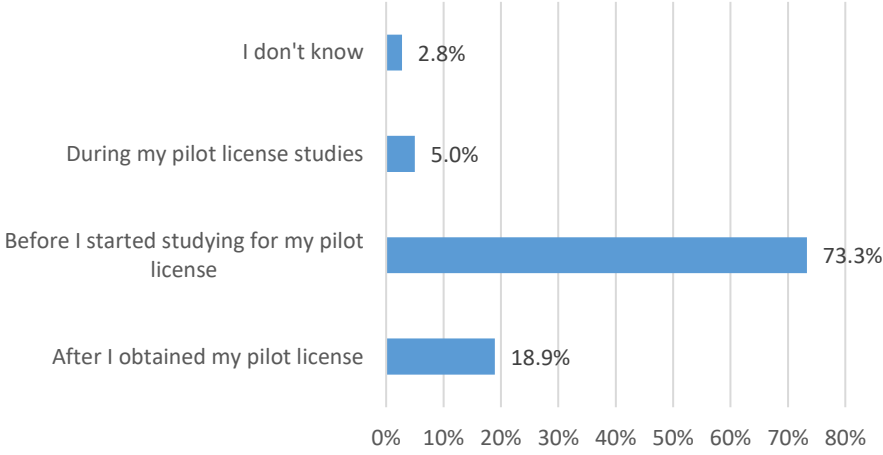
3.3.4. Flight School Enrollment

With just over 8% of the simulator pilots enrolled in a flight school, the distribution of respondents is this year is nearly identical to what was presented in the 2018, 2019 and 2020 survey.

Are you currently enrolled in flight school?

	Yes	No
	8.3%	91.7%

Last year's result:

Are you currently enrolled in flight school?

	Yes	No
	7.8%	92.2%
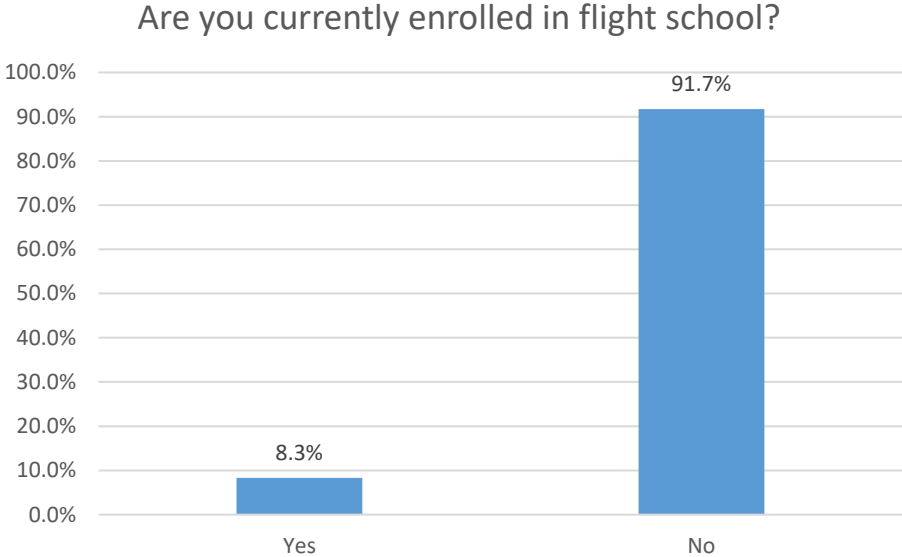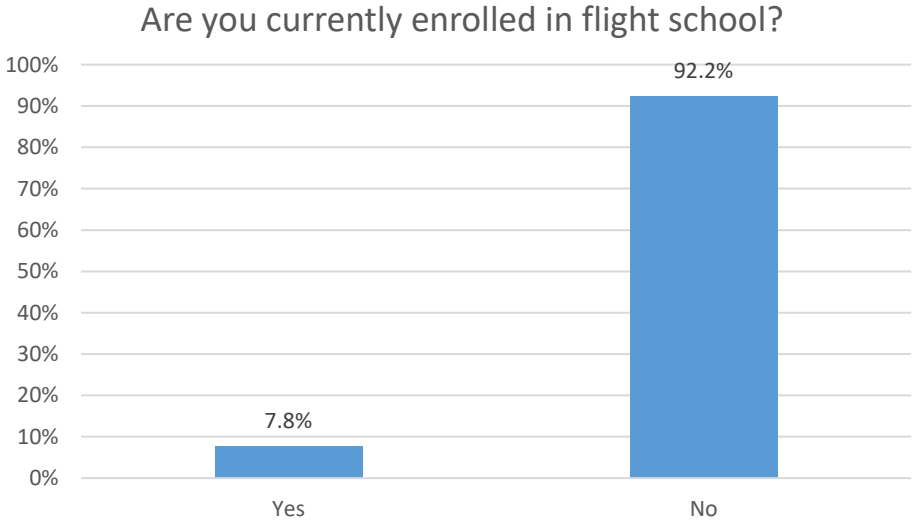
3.3.5. Flight Lesson Consideration

This question was presented only to respondents who stated that they are not enrolled in a flight school. In the vein of last year's result, one in four are considering taking real world flight lessons within the next year.

Are you considering taking real-world flight lessons within the next year?

	Yes	No
	25.6%	74.4%

Last year's result:

Are you considering taking real-world flight lessons within the next year?

	Yes	No
	25.7%	74.3%
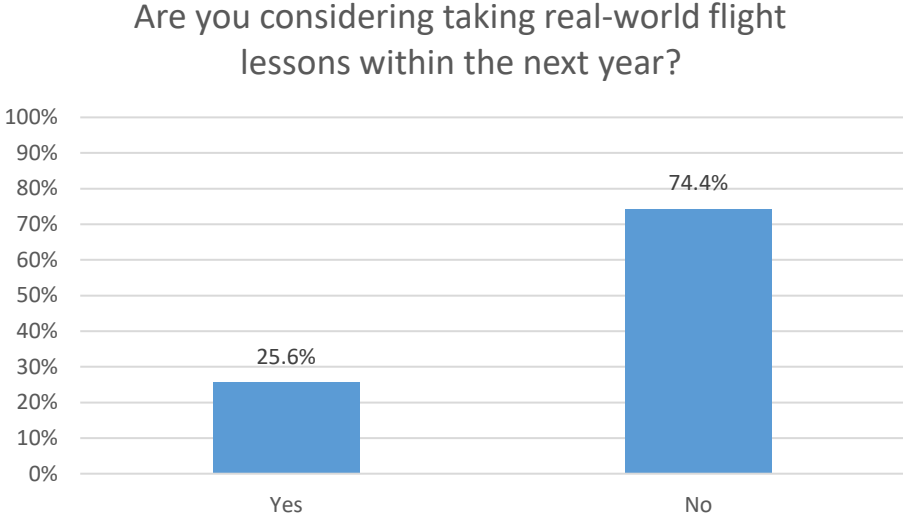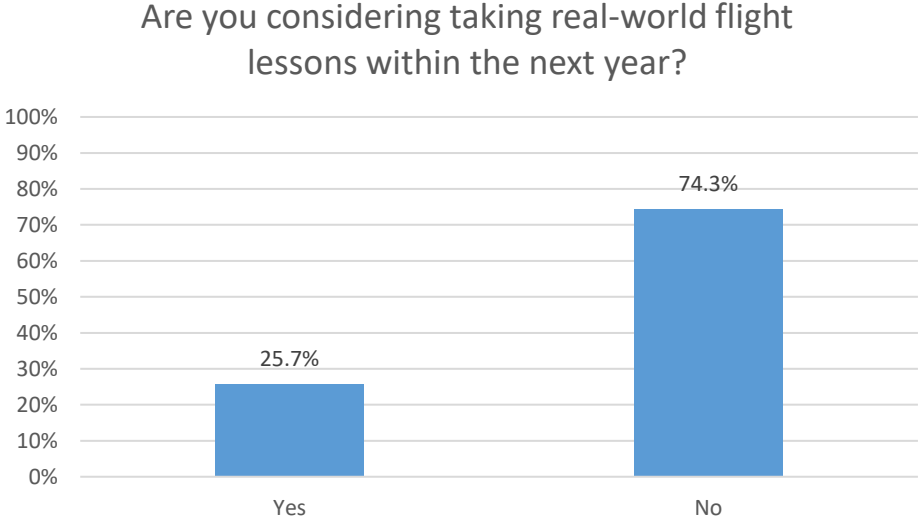
3.4. Simulator Habits - Mobile

3.4.1. Mobile Simulation Interest

In the 2019 survey, we introduced several questions regarding flight simulation on mobile devices. For those respondents who stated that they flew on mobile devices we proceeded to ask some additional questions. The percentage of respondents who stated that they fly simulators on mobile devices were 14% in 2019, 17% in 2020, and just over 12% in 2021.

Do you fly simulators on mobile or tablet devices?
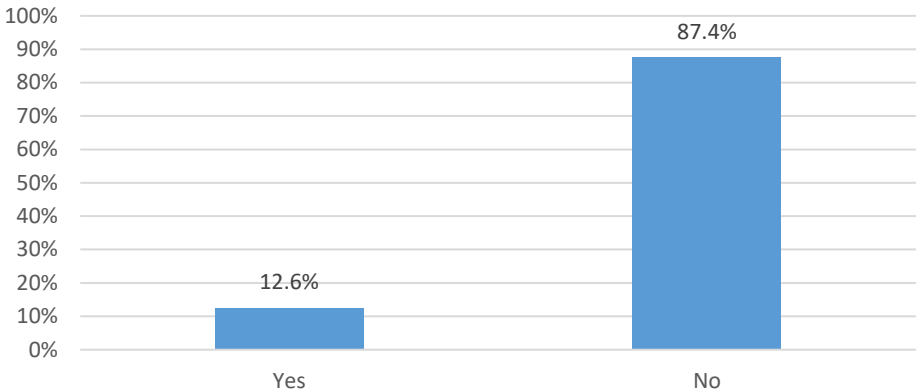
Last year's result:

Do you fly simulators on mobile or tablet devices?
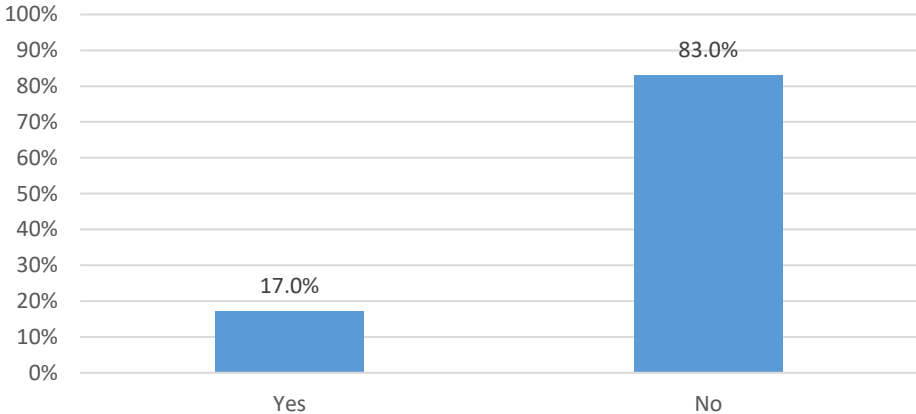
3.4.2. Online Simulation

The following question is new for this year. We wanted to know how many users fly online versus offline and can establish that almost half of the respondents fly online to some extent.

Do you fly online in your mobile flight simulator?

	Yes	No
	48.8%	51.2%
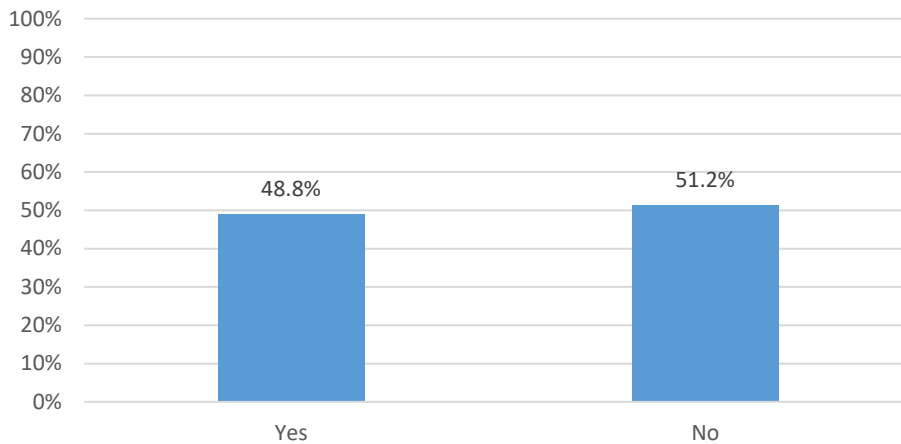
3.4.3. Air Traffic Control

By asking this question, we wanted to determine what type of Air Traffic Control is most popular for mobile flight simulation. It turned out that almost one in three use human controlled ATC, almost one four use computer controlled ATC. Most of the users, however, don't use any ATC in their mobile flight simulator.

What type of Air Traffic Control do you mainly use in your mobile flight simulator?

Computer Controlled ATC	Human Controlled ATC	I don't use any ATC	Live (Real world) ATC chatter
23.7%	30.9%	39.9%	5.5%
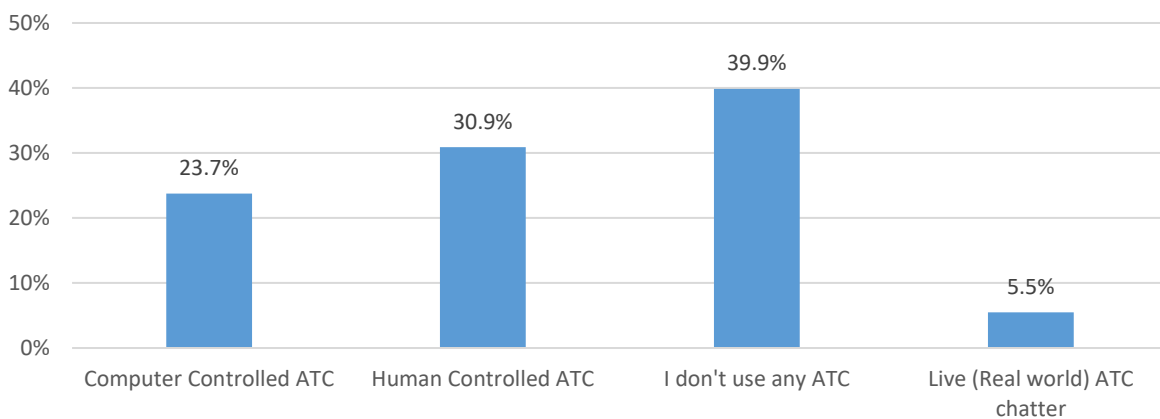
3.4.4. EFB Usage

Another new question for this year is if mobile flight simmers use an external Electronic Flight Bag (EFB) for their mobile flight simulator. It turned out that almost one in five use an external EFB for their mobile flight simulator.

Do you use an external EFB for your mobile flight simulator?
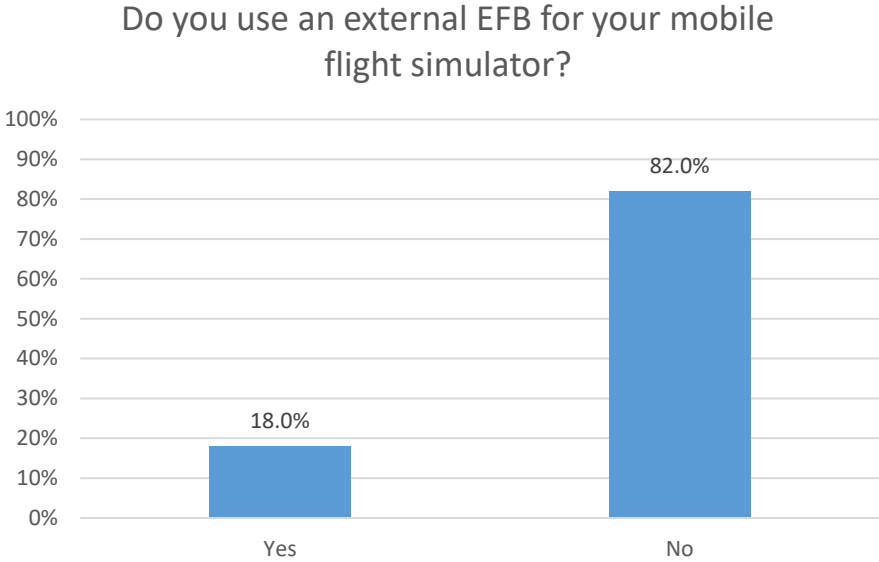
3.5. Simulator Habits - Air Traffic Control

3.5.1. ATC Simulation Interest

A total of 10.8% of the respondents say they operate as virtual air traffic controllers. The purpose of this question is primarily to screen for the coming follow up questions.

Do you operate as a virtual Air Traffic Controller?

Last year's result:

Do you operate as a virtual Air Traffic Controller?
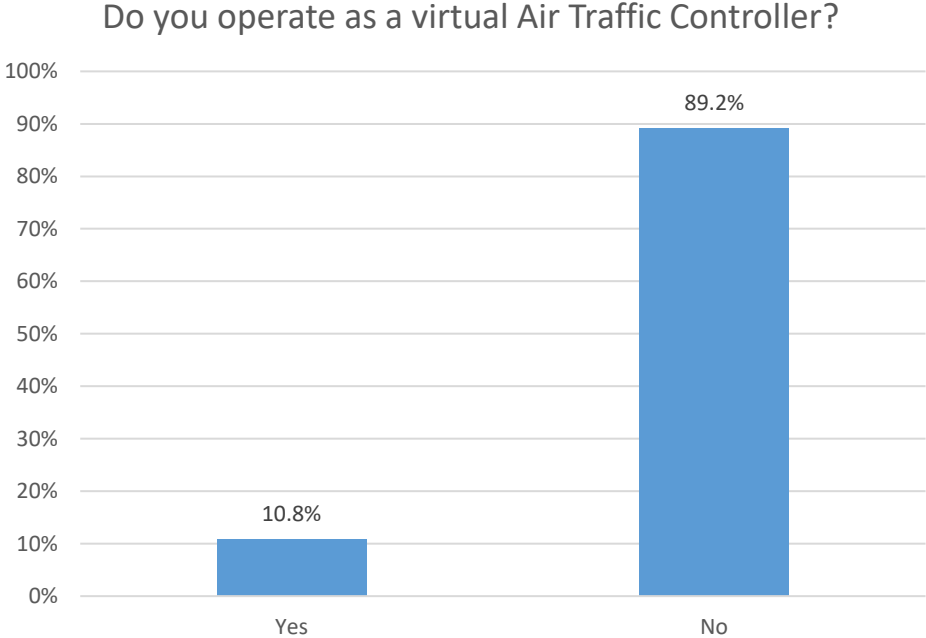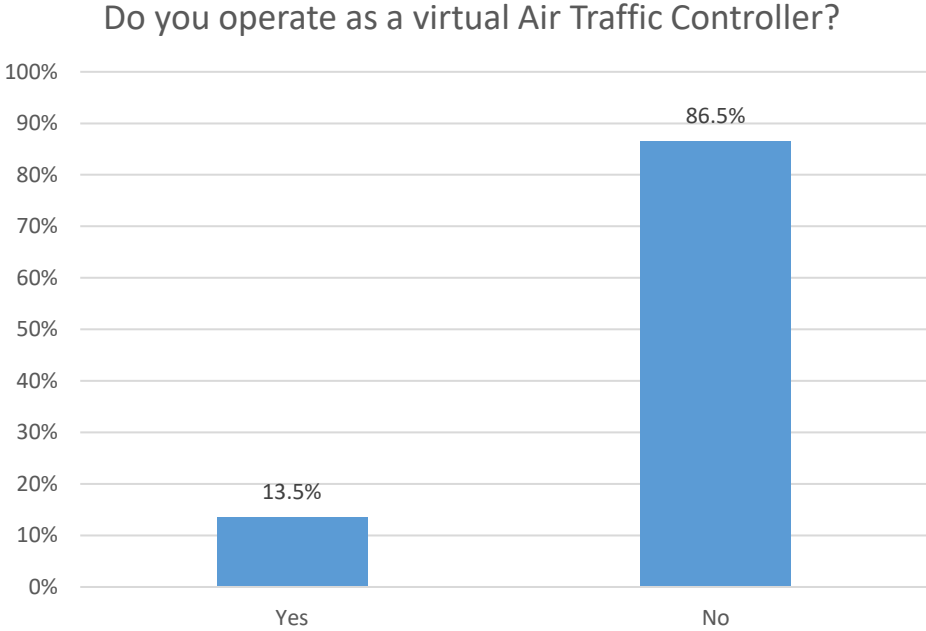
3.5.2. ATC Simulation Usage

Among those who stated that they operate as air traffic controller, we asked how many times per week respondents operate as air traffic controllers. The outcome of this year is similar to last year's results.

How many times do you operate as virtual Air Traffic Controller per week, on average?

Times	0	1	2	3	4	5	6	7	8	9	10	> 10
%	8%	36%	20%	12%	7%	6%	2%	2%	1%	0%	2%	4%

Last year's result:

How many times do you operate as virtual Air Traffic Controller per week, on average?

Times	0	1	2	3	4	5	6	7	8	9	10	> 10
%	12%	32%	18%	12%	7%	7%	2%	3%	1%	0%	2%	3%
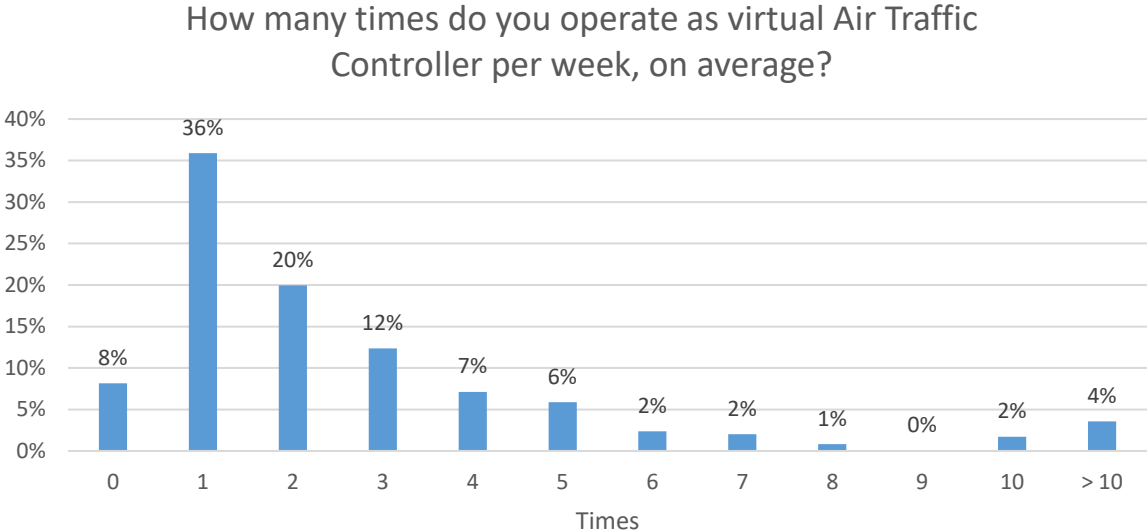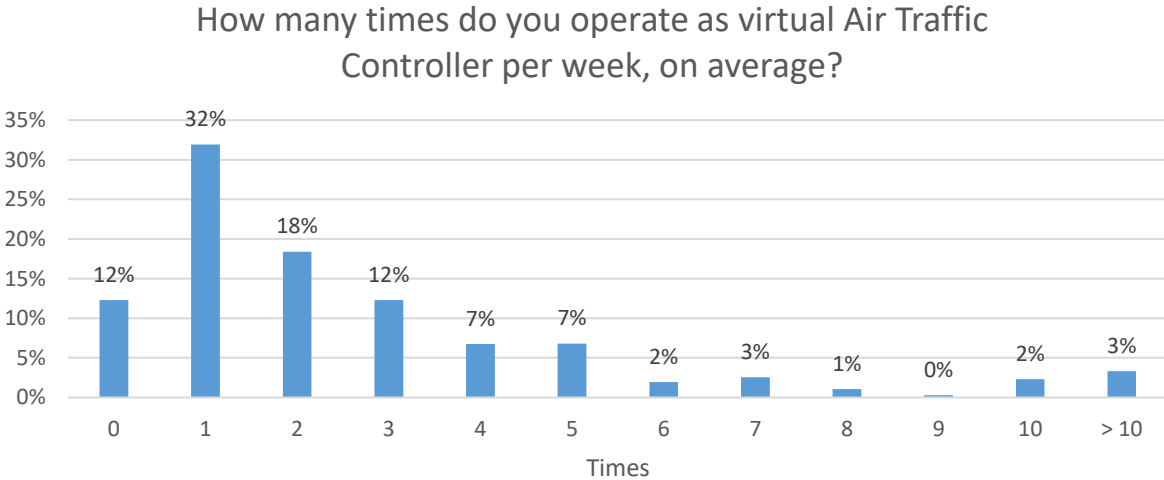
The following question was conditional and only presented to respondents who stated that they operate as air traffic controller. We wanted to know how many hours a virtual air traffic controller operates during a typical session on average. We find out that a typical session ranges between 1-4 hours.

How many hours do you operate as virtual Air Traffic Controller during a typical session?
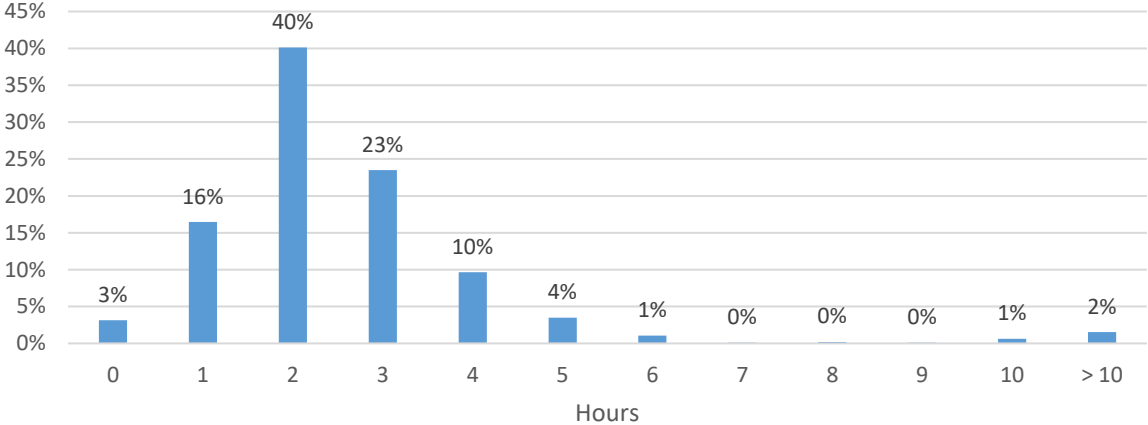
Last year's result:

How many hours do you operate as virtual Air Traffic Controller during a typical session?
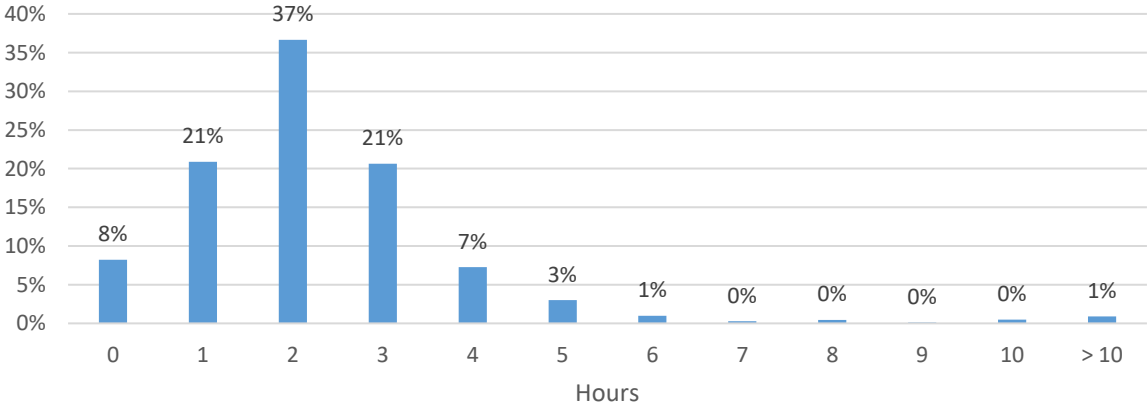
3.7. Simulator Habits – General

This section on general simulator habits was presented to all respondents.

3.7.1. Aircraft Types

This question was redesigned for last year's survey when response alternatives were renamed for improved clarity. Just like last year, Single Engine Piston and Narrow-body Commercial Airliner are the most common aircraft types to fly. More respondents claimed to Always or Often fly Narrow-body Commercial Airliners compared to a Single Engine Piston aircraft.

Drones and Gliders are the least popular types to fly, a result that is consistent with recent survey results.

What do you normally fly?
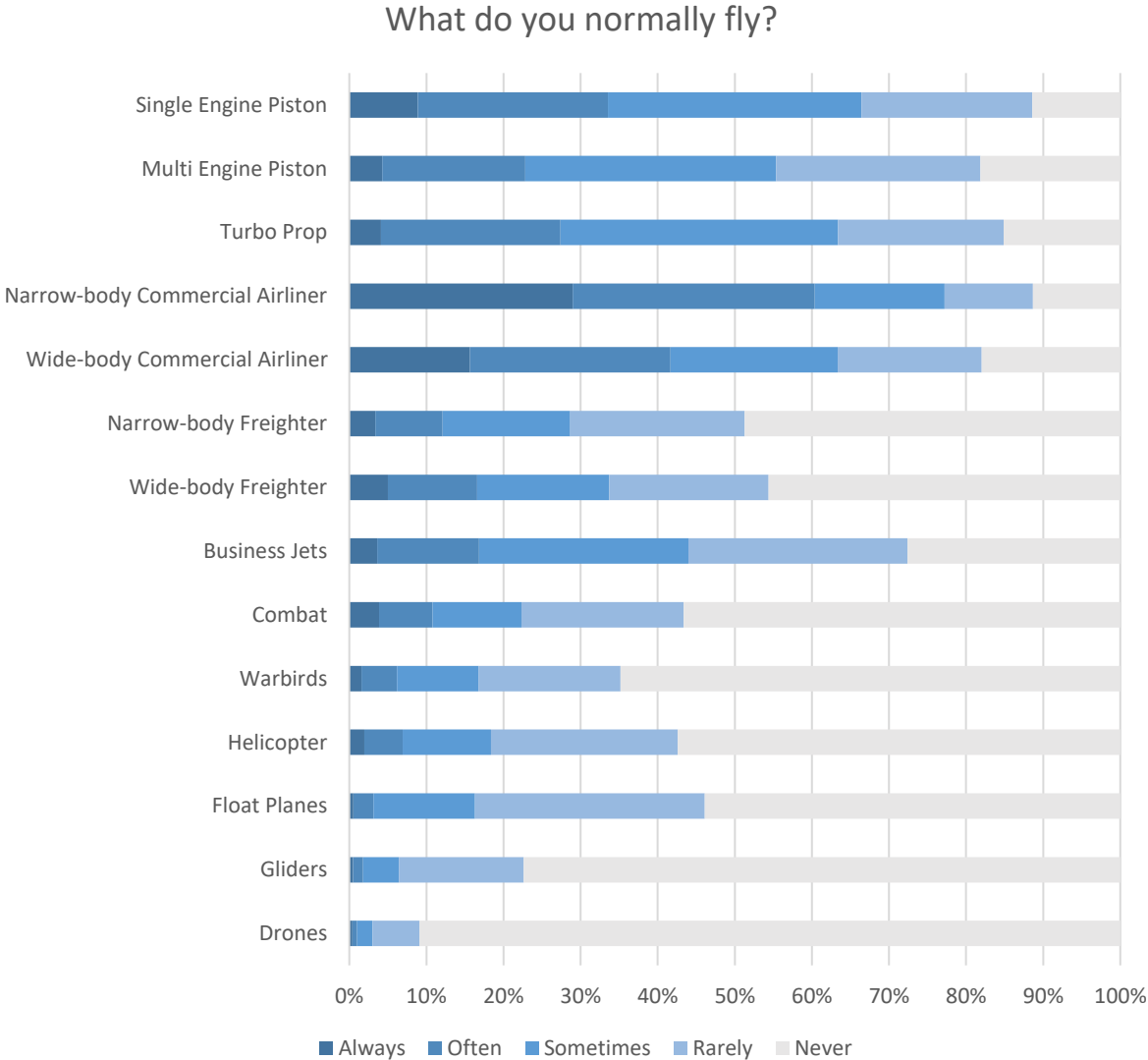
Last year's result:

What do you normally fly?

Legend: Always, Often, Sometimes, Rarely, Never

Categories (top to bottom):
- Single Engine Piston
- Multi Engine Piston
- Turbo Prop
- Narrow-body Commercial Airliner
- Wide-body Commercial Airliner
- Narrow-body Freighter
- Wide-body Freighter
- Business Jets
- Combat
- Warbirds
- Helicopter
- Float Planes
- Gliders
- Drones
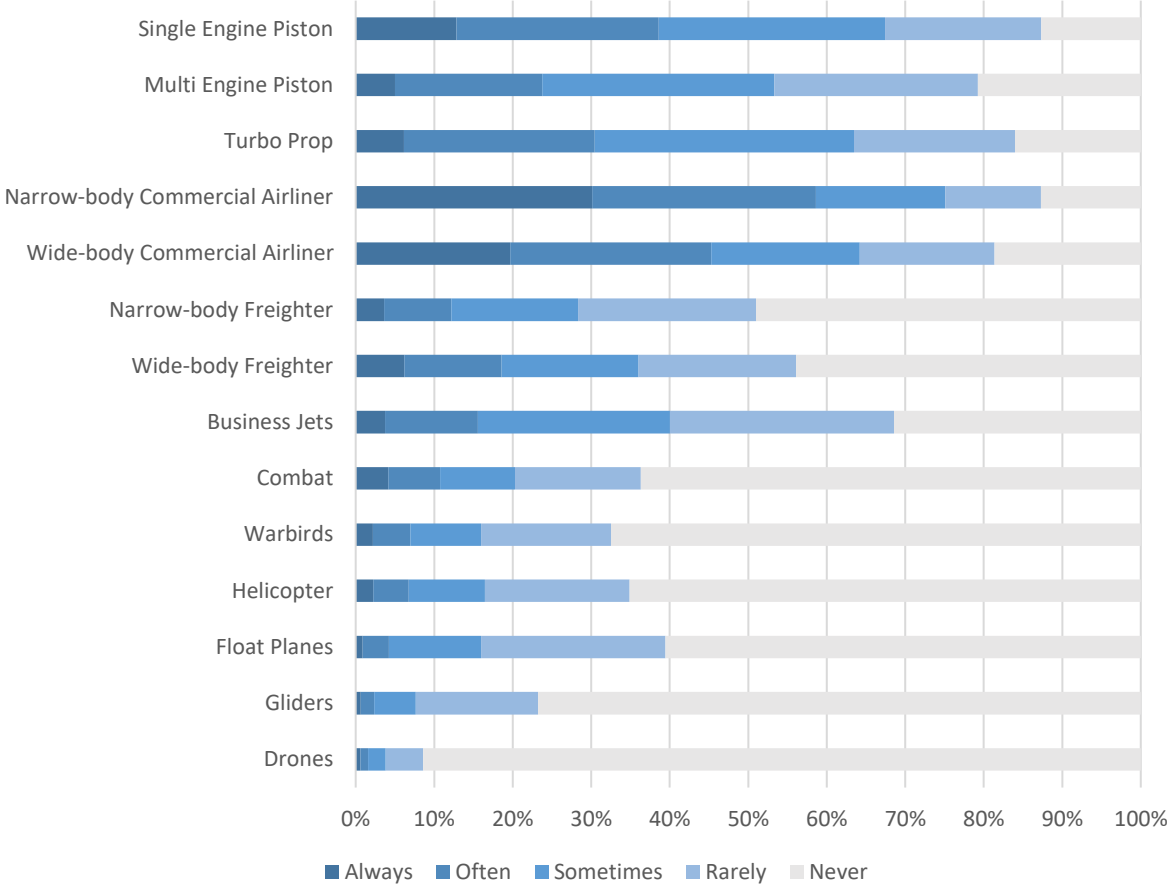
3.7.2. Usage

All respondents were asked how many times per week they use a flight simulator. The distribution is similar to 2018, 2019 and 2020.

How many times do you use the flight simulator per week, on average?

Last year's result:

How many times do you use the flight simulator per week, on average?
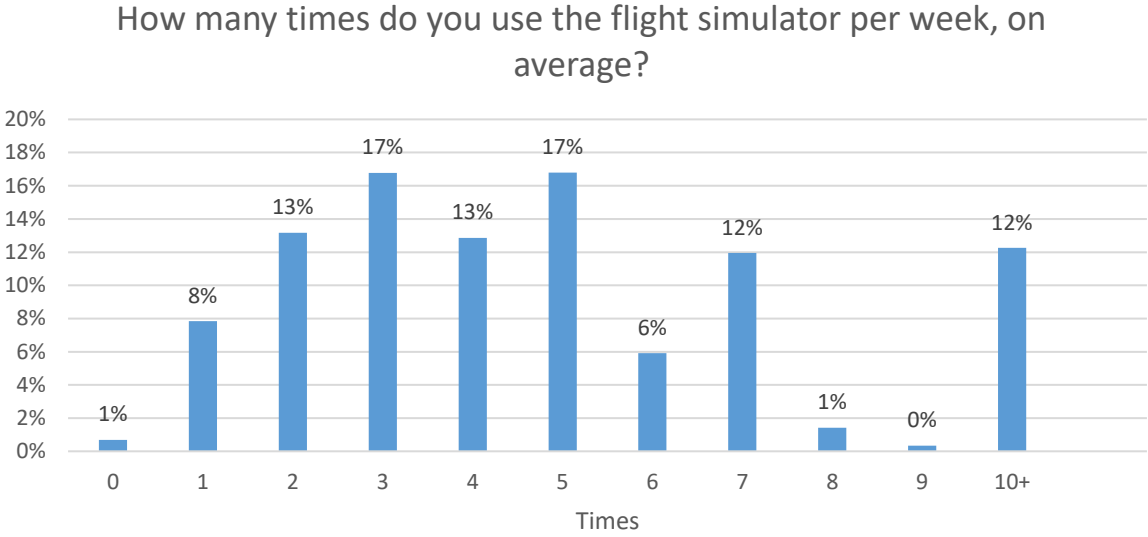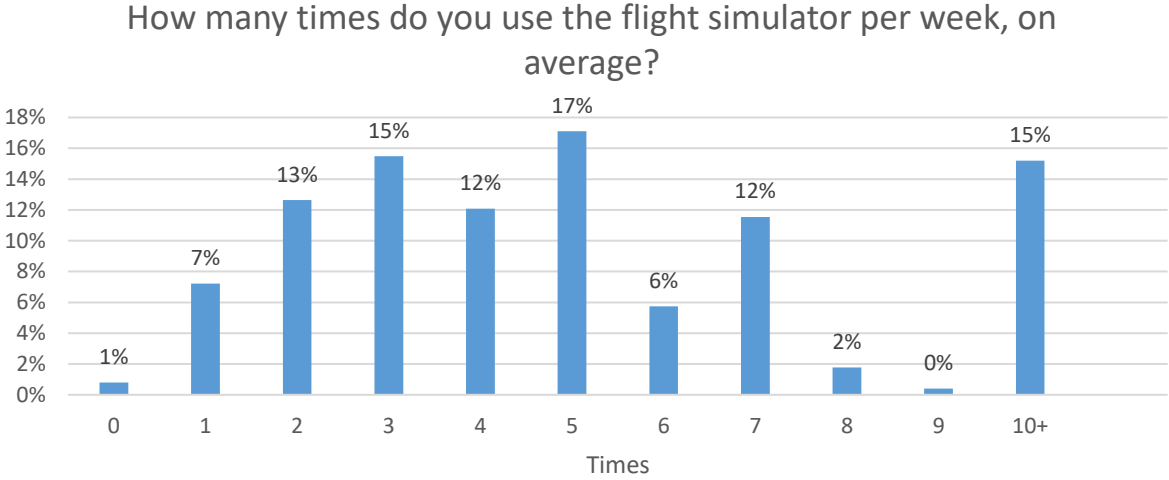
All respondents were also asked how many hours they use the flight simulator during a typical session. We find that most sessions range from 1-4 hours, just like the last year when this question was introduced.

How many hours do you use the flight simulator during a typical session?
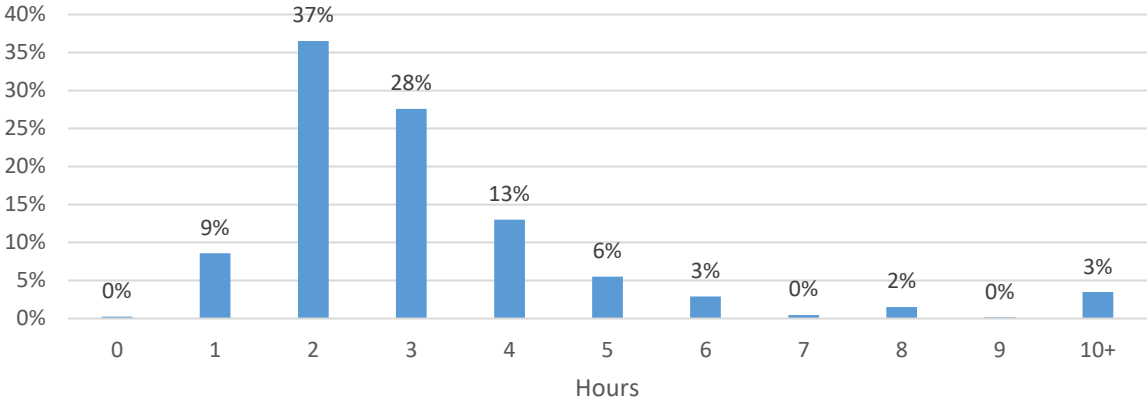
Last year's result:

How many hours do you use the flight simulator during a typical session?
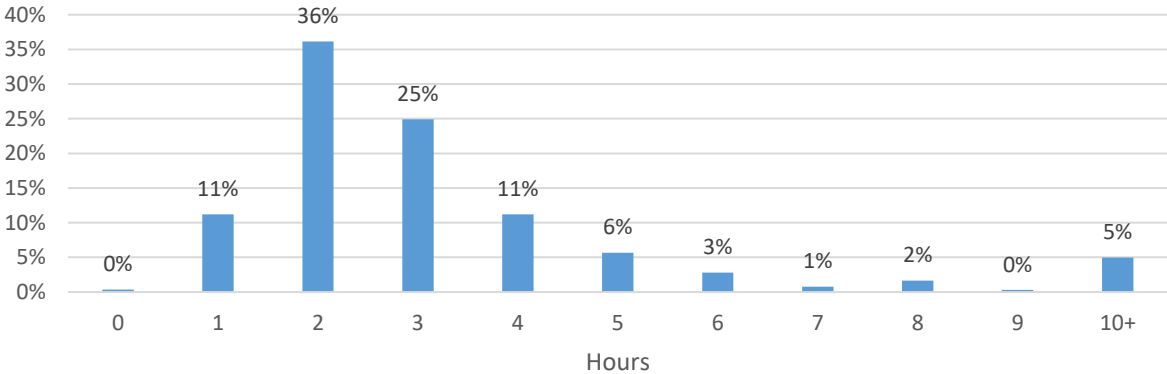
3.7.3. Roles

We asked this question to distinguish which type of simulation is the most common. Just like last year, civilian airplane pilot simulation is the most common, followed by helicopter and combat pilot.

Which type of simulation do you normally do?
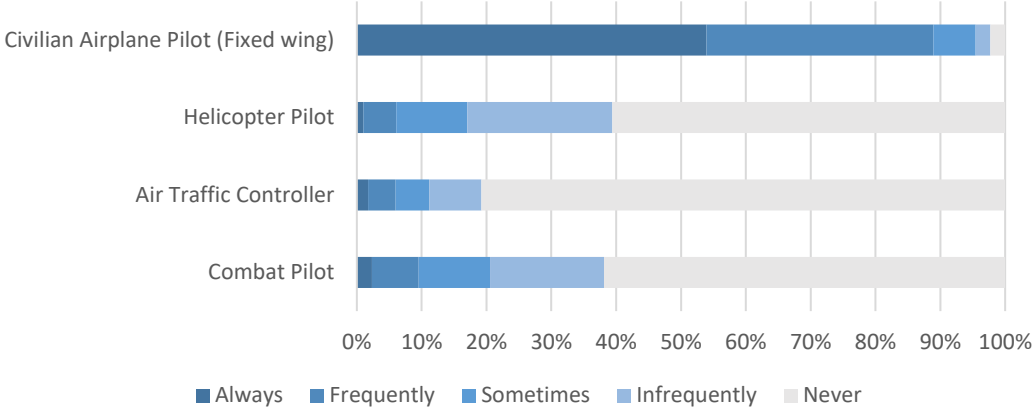
Last year's result:

Which type of simulation do you normally do?
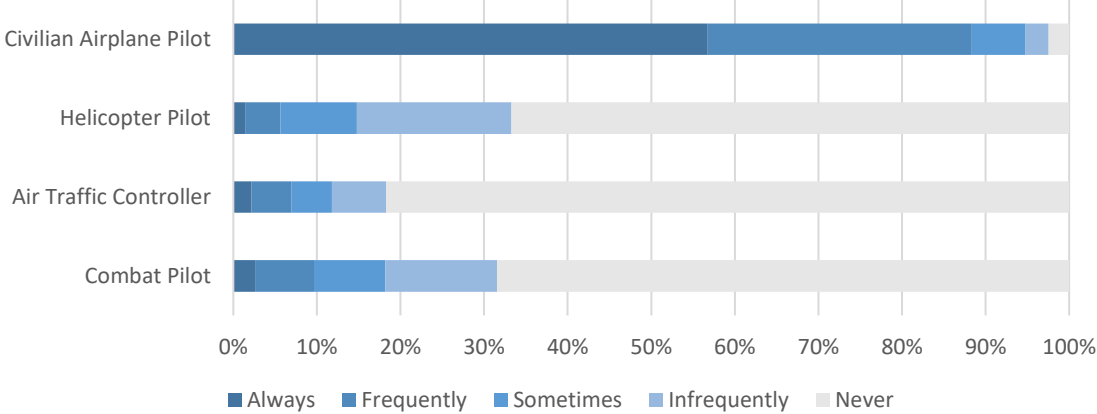
3.7.4. Platforms

Respondents tend to use a desktop as a flight simulation platform, but sometimes a mobile device too. Not many respondents use a gaming console for flight simulation yet, however, there is a slight increase in console usage compared to the previous year.

How often do you fly simulators on the following platforms?
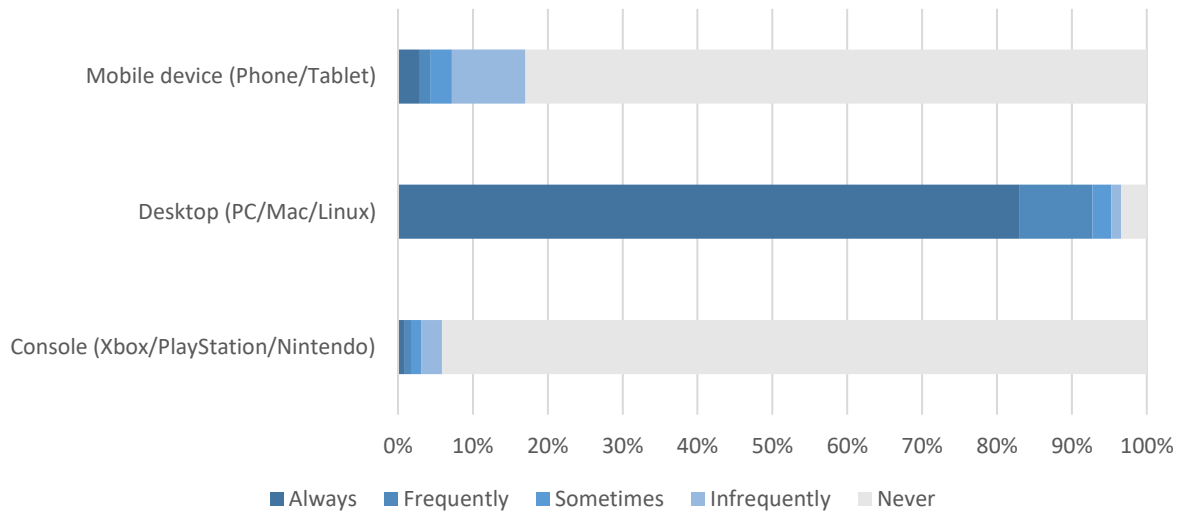
Last year's result:

How often do you fly simulators on the following platforms?
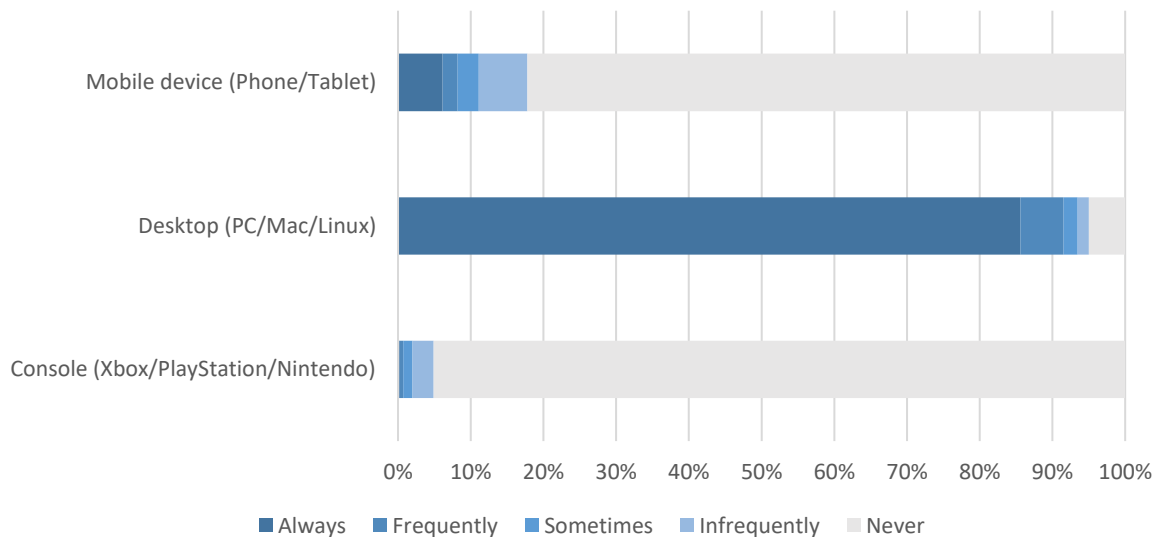
3.7.5. Purpose

Last year, almost one fifth (19.6%) of the respondents stated that they fly simulators for casual gaming/entertainment purpose. This year, more than one fourth (25.2%) fly simulators for casual gaming/entertainment purpose. Curiosity/interest in aviation is still the main purpose for more than every other flight simmer, however, that percentage has dropped from 55.3% to 51.0%.

The rest of the results in this graph are very close to what was presented in the previous year's survey.

What is the main purpose for your flight simulation?

Category	Percentage
Casual Gaming/Entertainment	25.2%
Curiosity/Interest in Aviation	51.0%
Familiarization of Cockpit/Airport/Airspace	12.1%
Other (please specify)	4.3%
Research or academic education	1.3%
Training towards a pilot license	6.2%
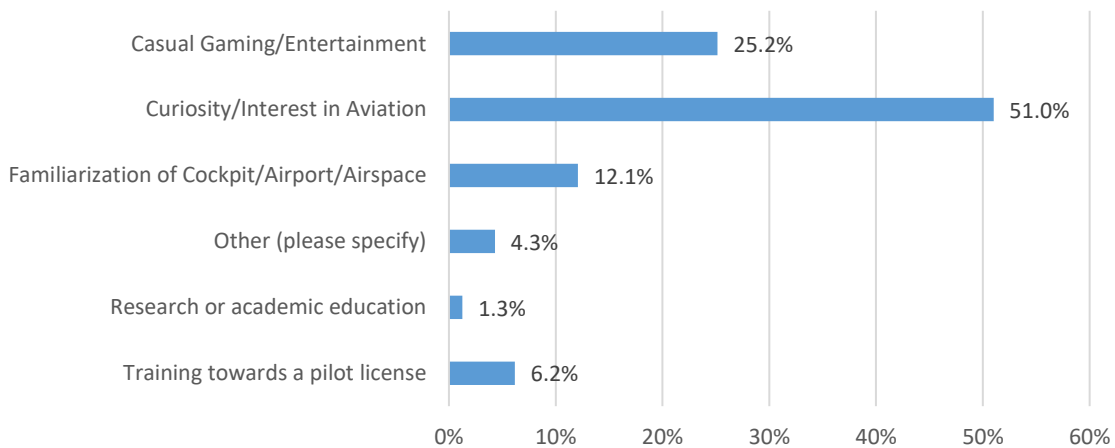
Last year's result:

What is the main purpose for your flight simulation?

Category	Percentage
Casual Gaming/Entertainment	19.6%
Curiosity/Interest in Aviation	55.3%
Familiarization of Cockpit/Airport/Airspace	12.3%
Other	5.3%
Research or academic education	1.4%
Training towards a pilot license	6.1%
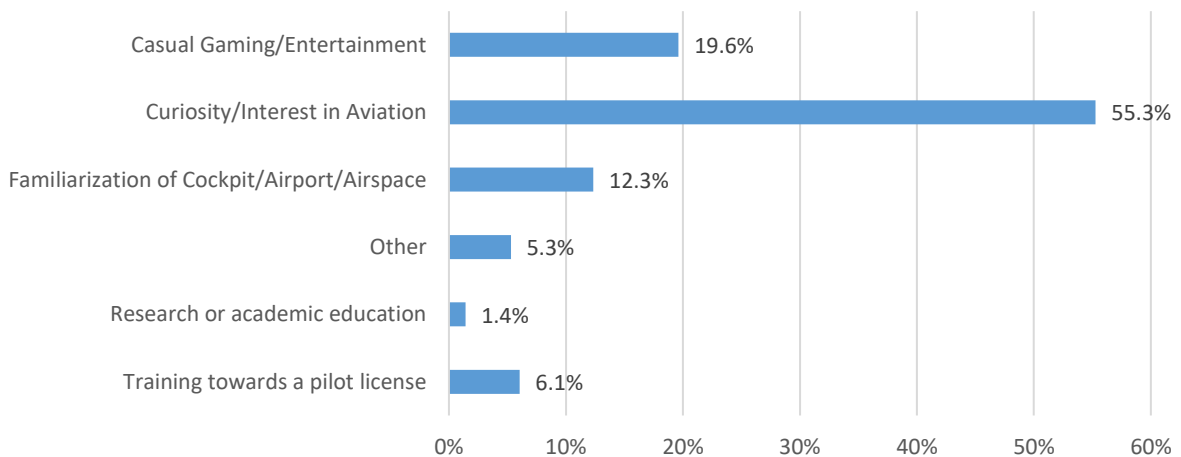
3.7.6. Flight Rules

The results are comparable to the last year's survey in terms of flight rules: IFR and VFR are still more popular than the option of flying "casually without rules" which was introduced as an option in the 2019 year's survey.

How do you normally fly?

	Most of the time	Frequently	Sometimes	Infrequently	Never
VFR	13%	27%	34%	18%	8%
IFR	46%	29%	14%	6%	4%
Casually without rules	5%	9%	22%	31%	33%

Last year's result:

How do you normally fly?

	Most of the time	Frequently	Sometimes	Infrequently	Never
VFR	15%	30%	32%	16%	7%
IFR	46%	29%	15%	6%	4%
Casually without rules	6%	9%	22%	29%	34%
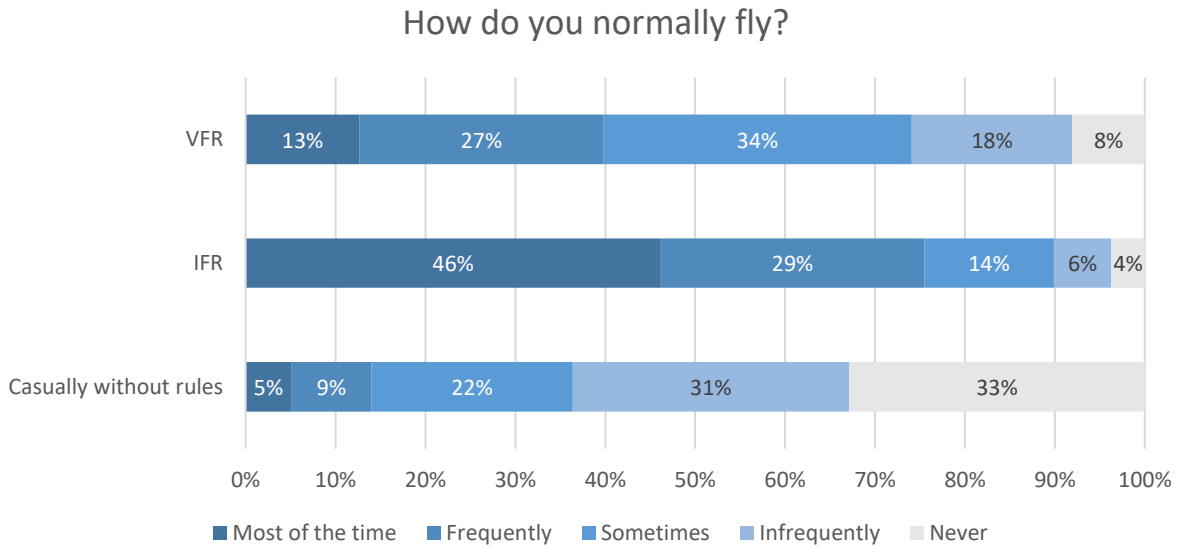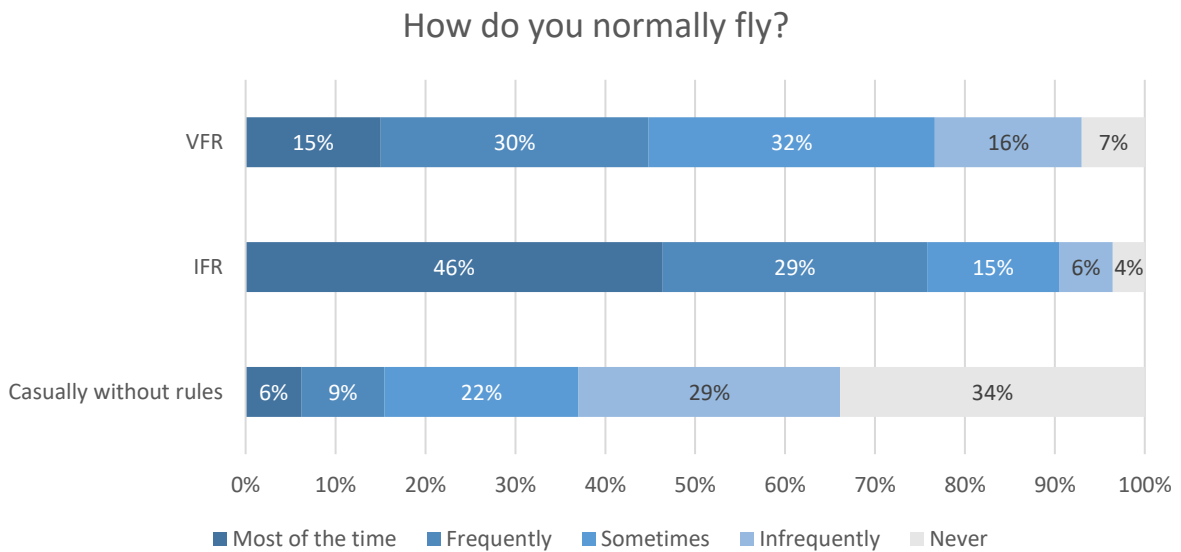
3.7.7. ATC

By introducing the following question in the last year's survey, we wanted to establish which types of ATC services the respondents mostly use. The answers have been subject to amendment this year for clarification. We added "Add-on ATC (Offline)" as an answer alternative and changed "Computer Controlled ATC" to "Default Simulator ATC (Offline)".

Default simulator ATC (Offline) (previously referred to as Computer Controlled ATC) is still most popular among our respondents. Almost one in three use Human Controlled ATC most of the time, just like last year.

What type of Air Traffic Control do you mainly use when flying?
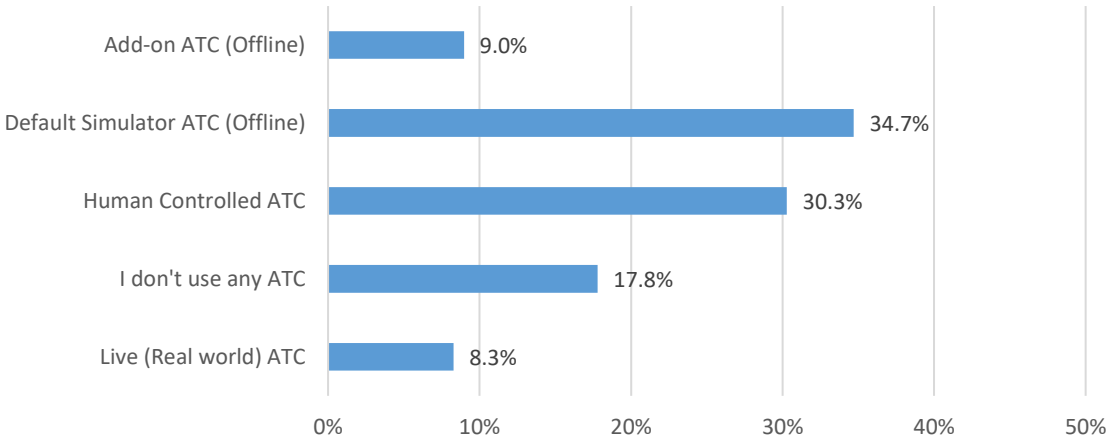
Category	Percentage
Add-on ATC (Offline)	9.0%
Default Simulator ATC (Offline)	34.7%
Human Controlled ATC	30.3%
I don't use any ATC	17.8%
Live (Real world) ATC	8.3%

Last year's result:

What type of Air Traffic Control do you mainly use when flying?

Category	Percentage
Computer Controlled ATC	40.9%
Human Controlled ATC	31.1%
I don't use any ATC	20.6%
Live (Real world) ATC	7.4%
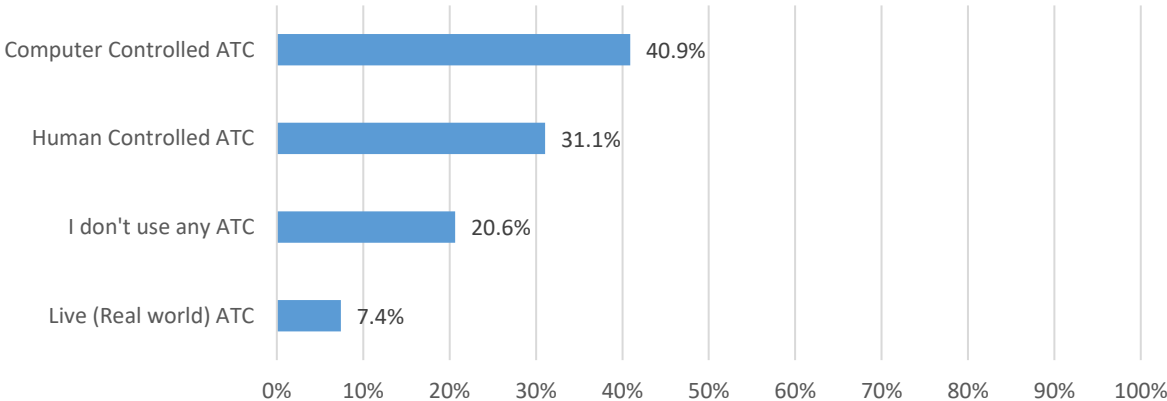
3.8. Consumption Habits

3.8.1. Software Expenses

This question has been a part of the survey 2018, 2019 and 2020, but since 2019 we only present a cumulative graph. The way to read it is: "52% have spent at least $300 per year." Obviously, 100% have spent at least $0.

This year 74% have spent at least $200. Last year 77% spent the same amount. This year 94% have spent at least $100, just like last year.

Generally speaking, the distributions are very similar over all four years. For example, in all four years about one in four have spent at least $500 per year.

After removing one of the outliers, the average software spending gives us an average spend of $705 dollars, which is comparable to last year's $703 dollars. A more reliable measurement is the median which is the same as the previous year, $223 dollars. In 2019 the median was $250, and in 2018 the median was $245.

How much do you estimate you have spent on flight simulation software and addons in the last 12 months (cumulative)?
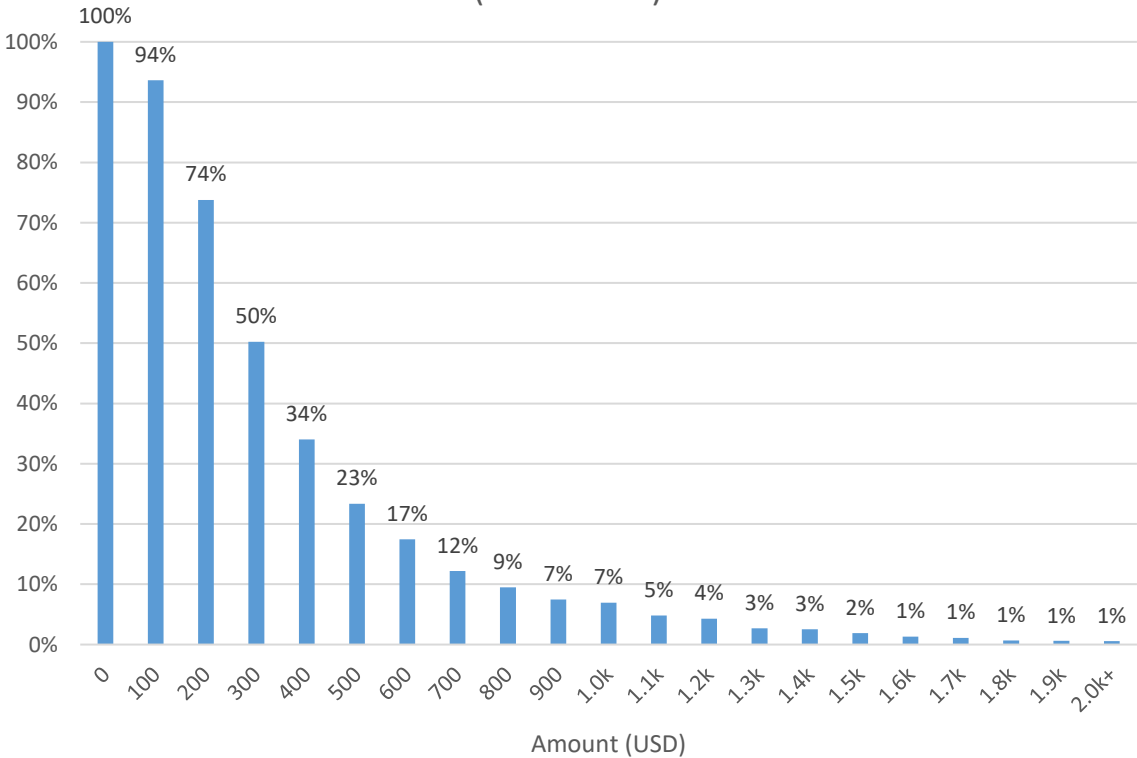
Last year's result:

How much do you estimate you have spent on flight simulation software and addons in the last 12 months (cumulative)?

Chart data (cumulative %):
- 0: 100%
- 100: 94%
- 200: 77%
- 300: 52%
- 400: 35%
- 500: 24%
- 600: 18%
- 700: 12%
- 800: 9%
- 900: 7%
- 1.0k: 7%
- 1.1k: 5%
- 1.2k: 4%
- 1.3k: 3%
- 1.4k: 3%
- 1.5k: 2%
- 1.6k: 1%
- 1.7k: 1%
- 1.8k: 1%
- 1.9k: 1%
- 2.0k+: 1%

Amount (USD)
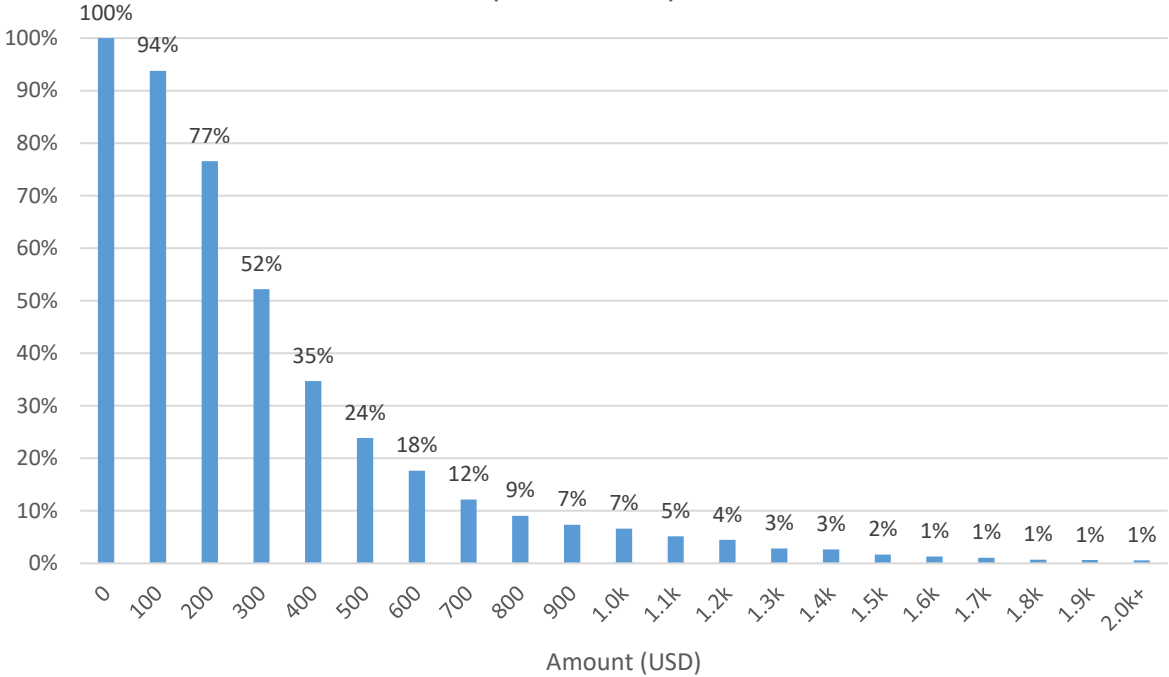
3.8.2. Hardware Expenses

This question has been asked in 2018, 2019 and 2020 as well. Just like software expenses, hardware expenses are expressed as cumulative graph. It should be read like this: 100% of the respondents have spent at least $0 dollars this year. 39% have spent at least $400 per year. 26% have spent at least $600 per year. And so on.

This year 69% have spent at least $100. In 2020 63% had spent at least $100, and in 2019 55% had spent at least $100. This year 59% have spent at least $200. Last year 51% spent at least $200, and in 2019 only 40% spent the same amount.

Just like software expenses, the distributions look very similar to the previous year, but looking closer we can determine that the respondents have spent more money this year than last year.

The average hardware spending is $888, but a more reliable measurement is the median which is $245. Last year the median was $167. The year before that it was $111.

How much do you estimate you have spent on flight simulation hardware in the last 12 months (cumulative)?

How much do you estimate you have spent on flight simulation hardware in the last 12 months (cumulative)?

Amount (USD)

3.8.3. Inability to Purchase Hardware

The pandemic has resulted in supply chain disruptions – longer delivery times as well as higher prices. By asking the following question, we wanted to investigate how the flight simulation community has been affected by the current supply chain situation.

We can see that 22 % of the respondents haven't purchased flight controls since it's out of stock. A total of 17% haven't purchased graphics cards since it's out of stock, and 33% haven't purchased a graphics card since it's too expensive.

In the past 12 months, have you not been able to purchase any of the following hardware for any of the following reasons?

Legend: ■ Not in stock ■ Too expensive ■ Too long delivery times ■ Not interested in buying
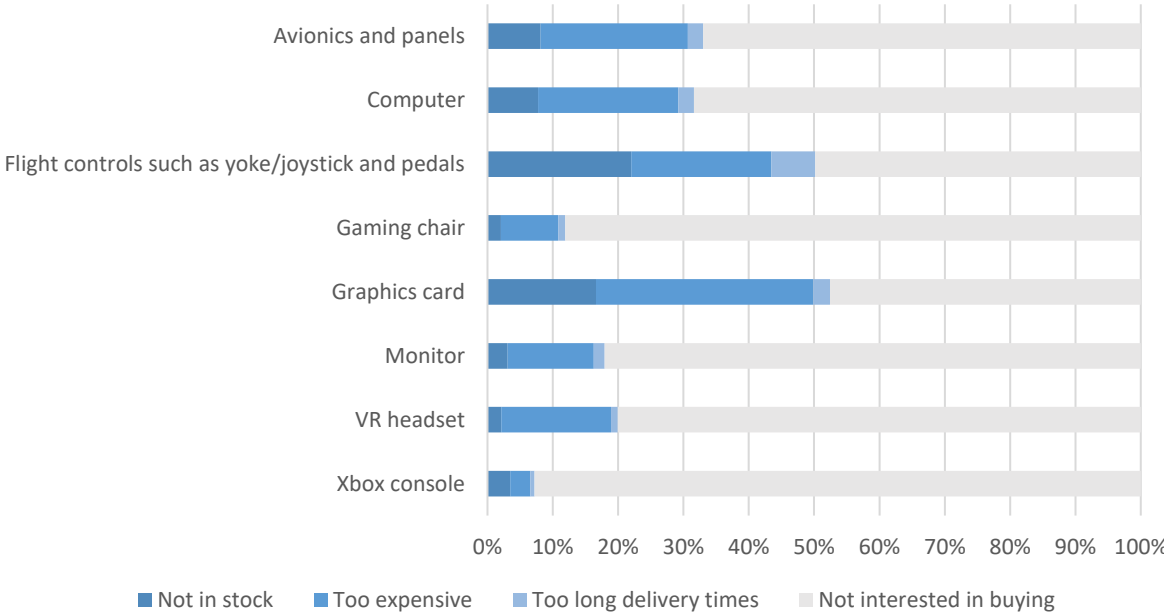
3.8.4. Preferred Online Stores

Google Play, Apple App store, contrail.shop and flightsim.to were added to the list of online stores this year.

Last year, Microsoft Flight Simulator in-game Marketplace was introduced as an online store following the Microsoft Flight Simulator release. Since then, it has grown to become one of the most popular stores just after Aerosoft, Orbx Direct, and SimMarket.

How often do you purchase flight simulation products from these online stores?
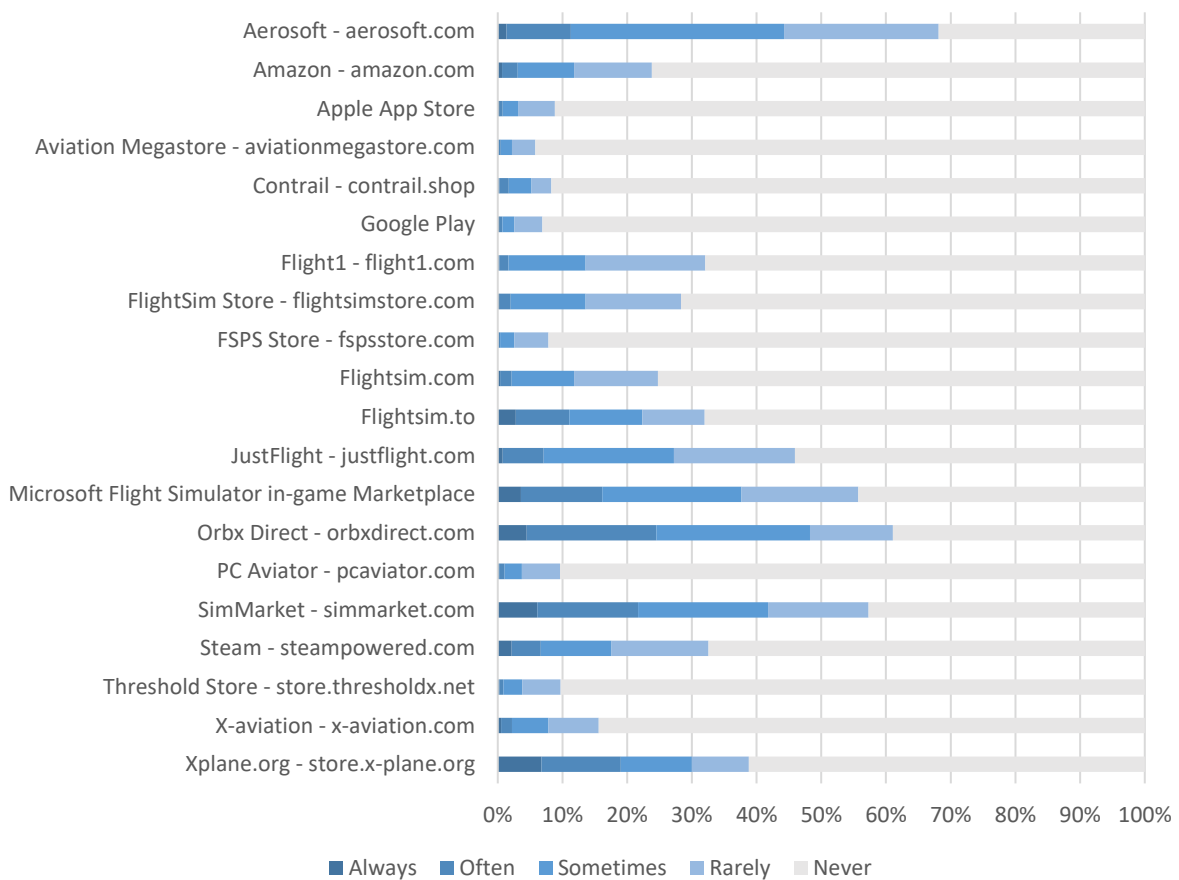
Legend: Always, Often, Sometimes, Rarely, Never

How often do you purchase flight simulation products from these online stores?
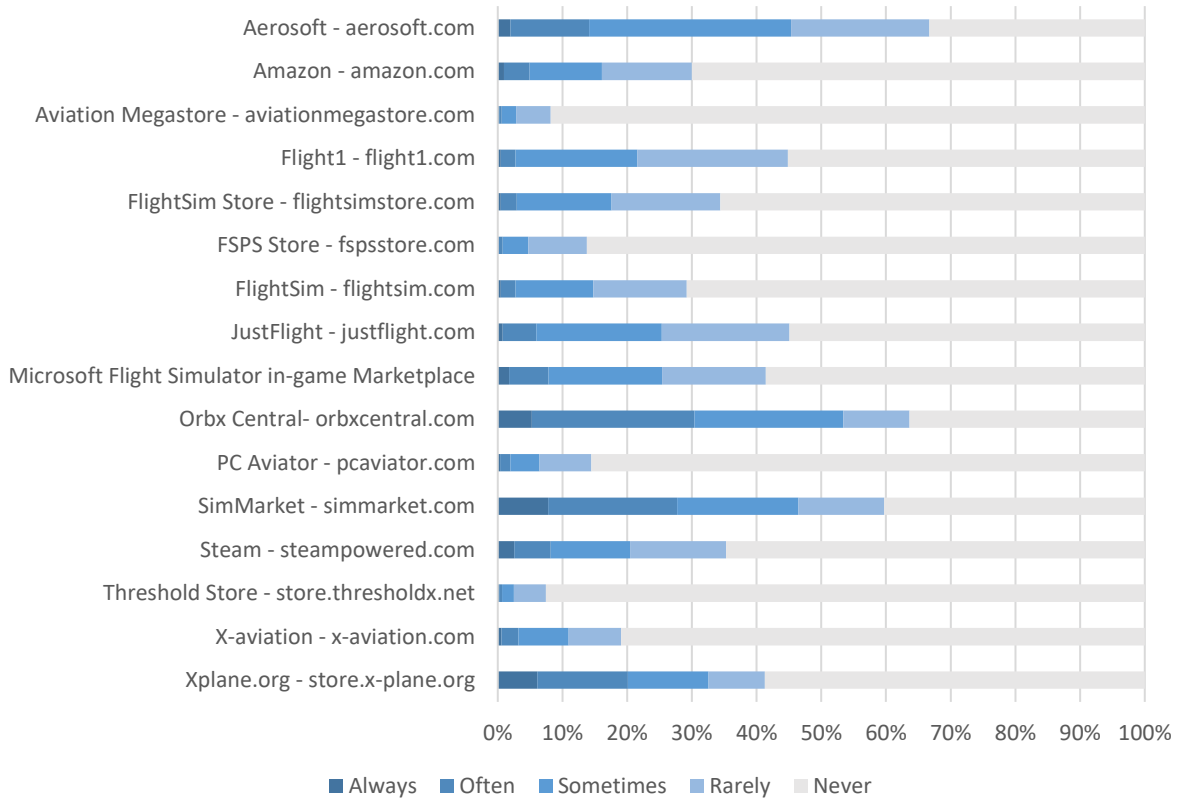
3.8.5. Freeware Versus Payware

The results from this question are comparable to last year's survey. We find that flight planning and ATC/Traffic software tends to be freeware, whereas simulator software tends to be payware.

Considering all the software and data which you use for flight simulation, what tends to be freeware versus payware?
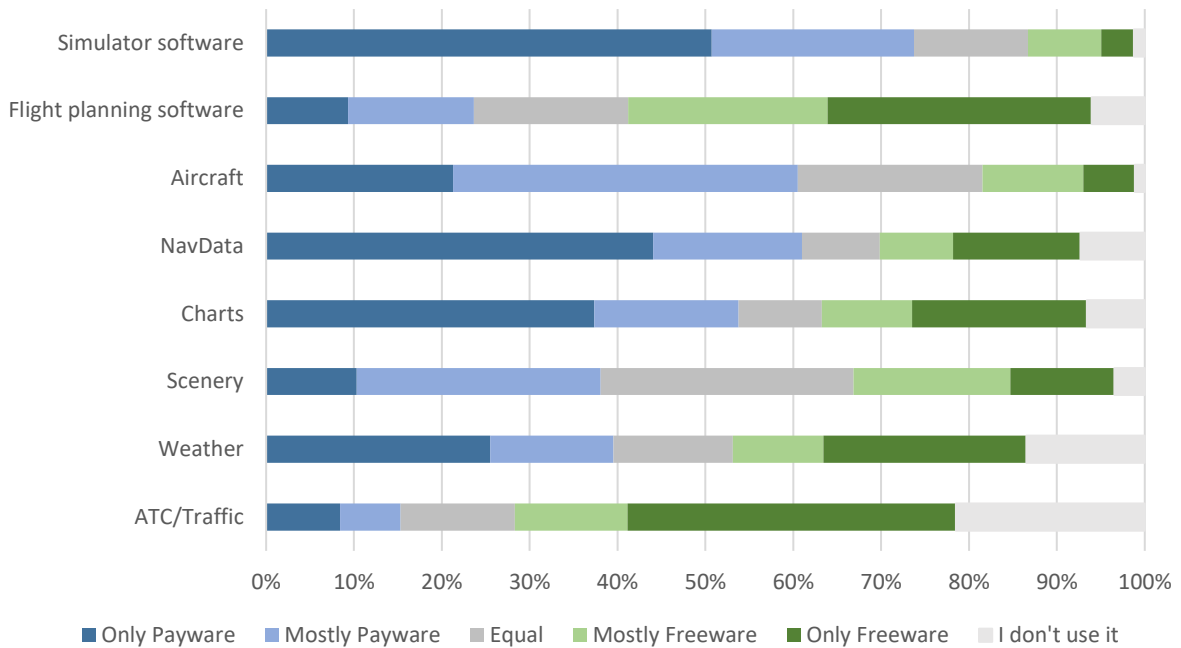
Last year's result:

Considering all the software and data which you use for flight simulation, what tends to be freeware versus payware?
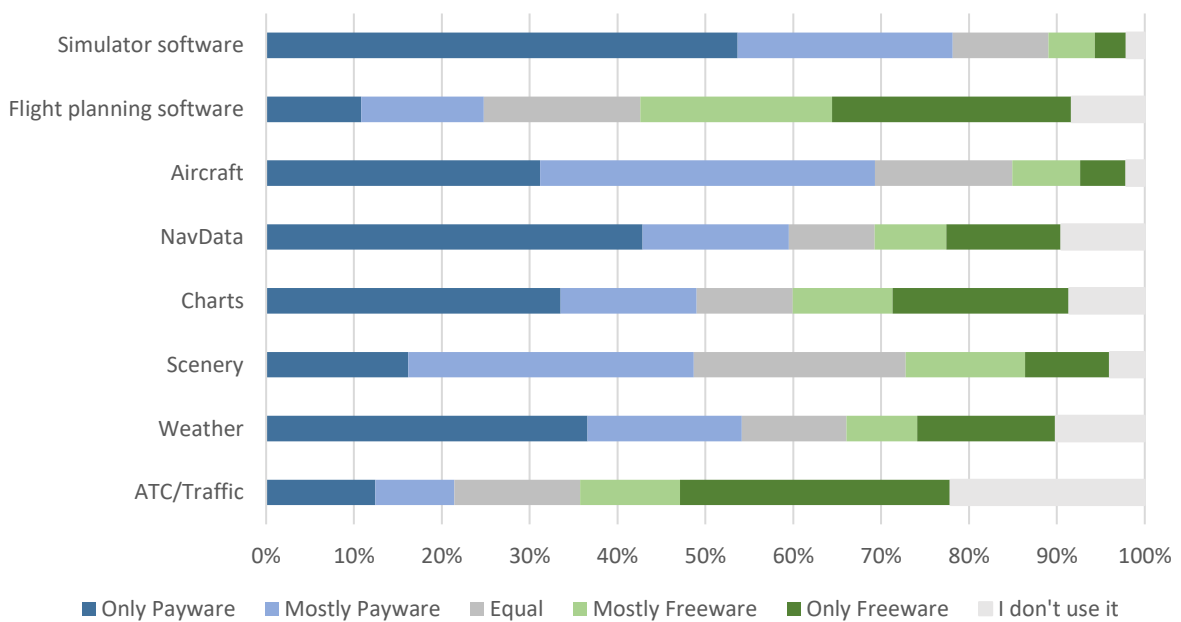
3.9. Community

3.9.1. Conferences

Usually, we ask questions about physical conference attendance. Considering the current global situation where many people are restricted, not many events have taken place this year. We can see that 3.7% of the respondents have attended a public flight simulation exhibition or conference in the last 12 months.

Have you attended a public flight simulation exhibition or conference in the last 12 months?

By asking this question, we wanted to know which flight simulation exhibitions or conferences respondents plan to attend during the next 12 months, provided that the conditions permit such an event to take place.

Which flight simulation exhibitions or conferences do you plan to attend during the next 12 months? (If they were available)

3.9.2. Contribution

Like the last year's results, every other flight simmer contributes or want to contribute in some way. Beta tester continues to be the most common form of contribution, although the percentage of beta testers has dropped from 17.5% last year to 13.5% this year.

Do you contribute to the flight simulation community?

Category	Percentage
Yes, as a Twitch/Youtube streamer	5.4%
Yes, as a blogger	1.2%
Yes, as a writer	1.6%
Yes, as a video producer	2.7%
Yes, as an admin of a flightsim...	4.1%
Yes, as an artist or 3D modeller	4.8%
Yes, as a software developer	4.6%
Yes, as a beta tester	13.5%
No, but I would like to	22.6%
No	50.1%
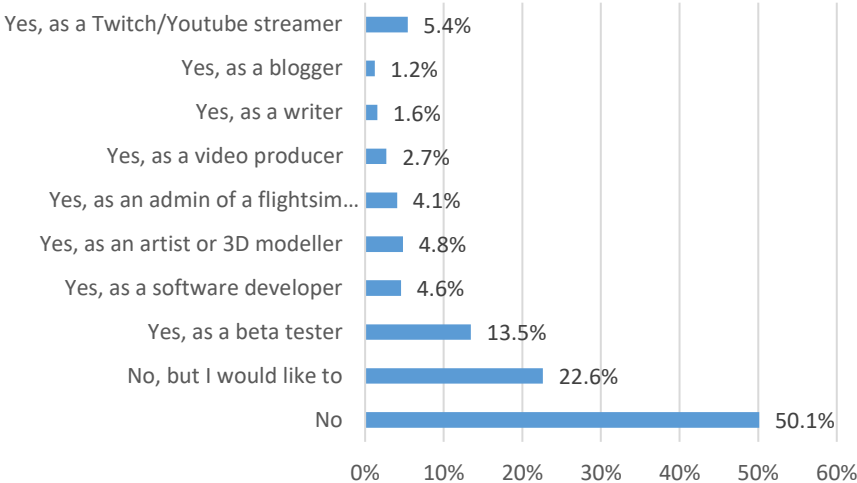
Last year's result:

Do you contribute to the flight simulation community?

Category	Percentage
Yes, as a Twitch/Youtube streamer	6.2%
Yes, as a blogger	1.7%
Yes, as a writer	2.2%
Yes, as a video producer	3.5%
Yes, as an admin of a flightsim organization	5.6%
Yes, as an artist or 3D modeller	5.1%
Yes, as a software developer	4.5%
Yes, as a beta tester	17.5%
No, but I would like to	23.6%
No	45.1%

51
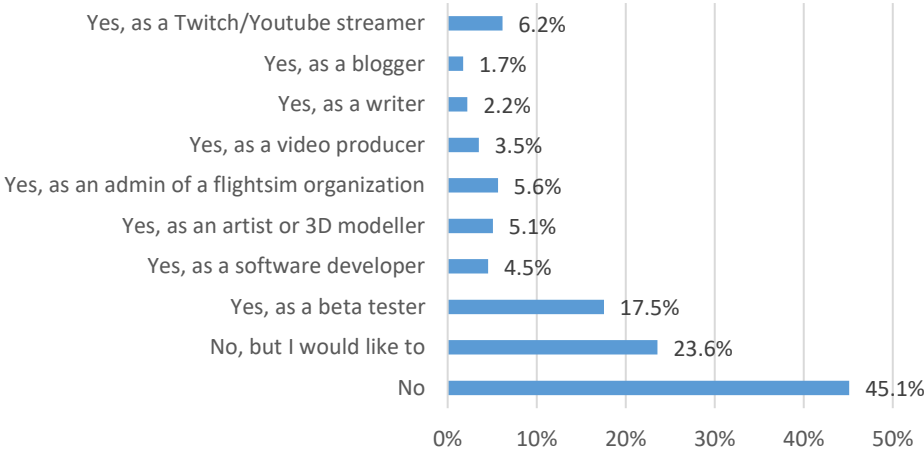
This question was conditional and only presented to the people who didn't contribute to the simulation community. We find that "Time constraints" is the largest factor that stops respondents from contributing to the flight simulation community. The results were the same last year.

What stops you from contributing to the flight simulation community?
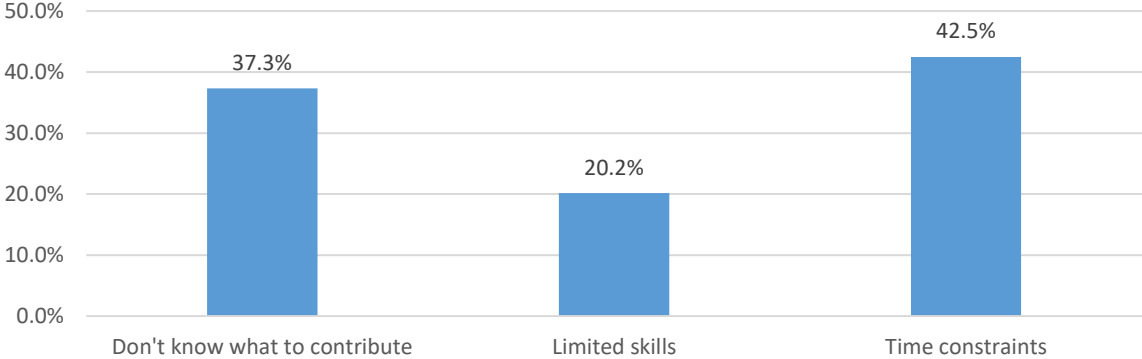
Last year's result:

What stops you from contributing to the flight simulation community?
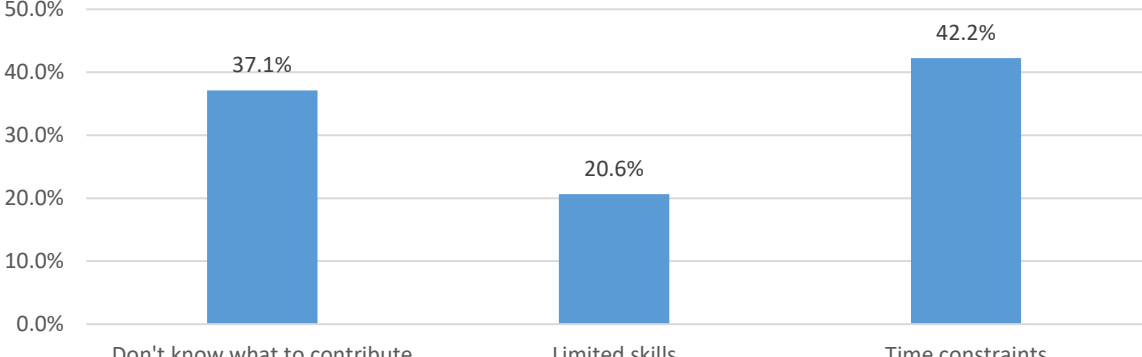
3.9.3. Communication Platforms

The most popular platforms to communicate with others are currently Discord, AVSIM Forum, Microsoft Flight Simulator Forum and Facebook, just like last year.

The percentage of respondents who always use Discord has bumped from 14% to 18% between 2020 and 2021. A total of 64% of the respondents use Discord to some extent, compared to last year's 54%.

How frequently do you use the following platforms for the purpose of communicating with others in the flight simulation community?
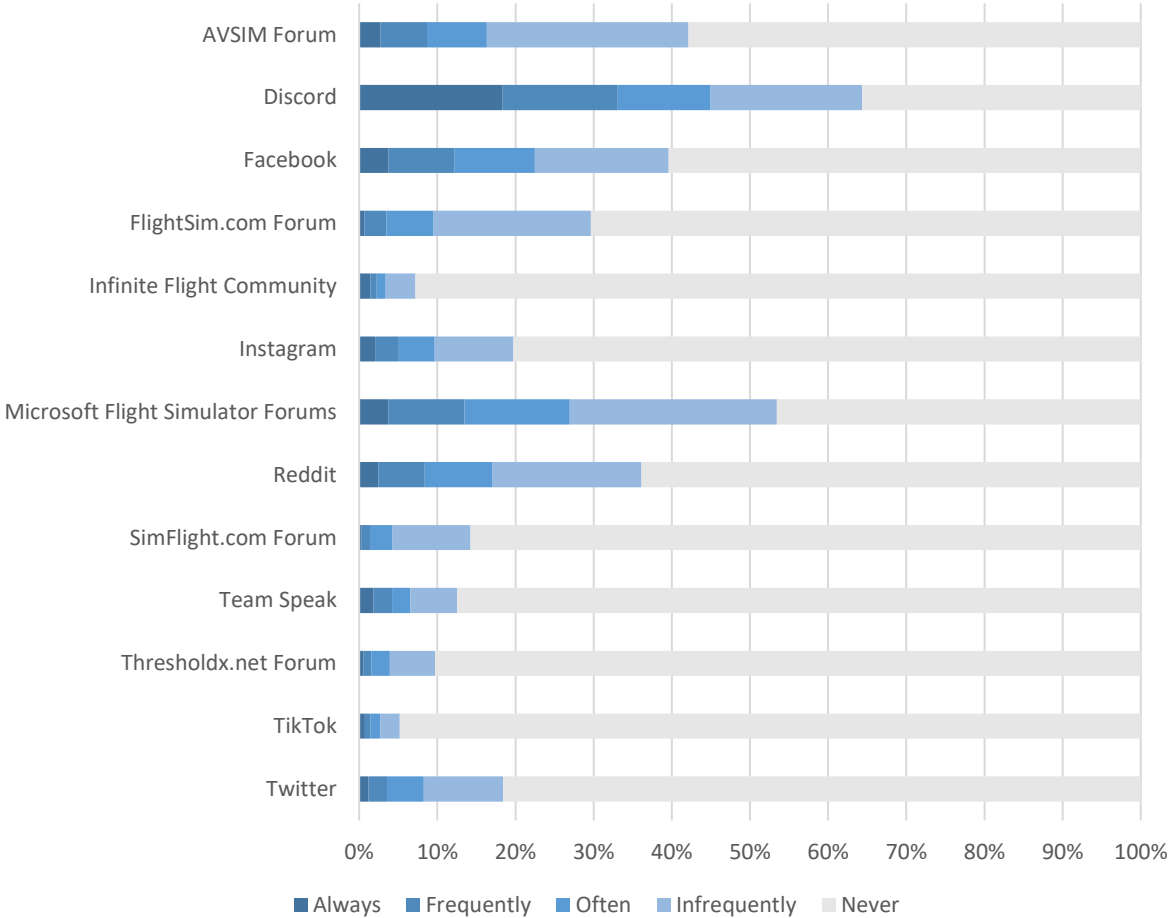
Last year's result:

How frequently do you use the following platforms for the purpose of communicating with others in the flight simulation community?

Legend: Always, Frequently, Often, Infrequently, Never
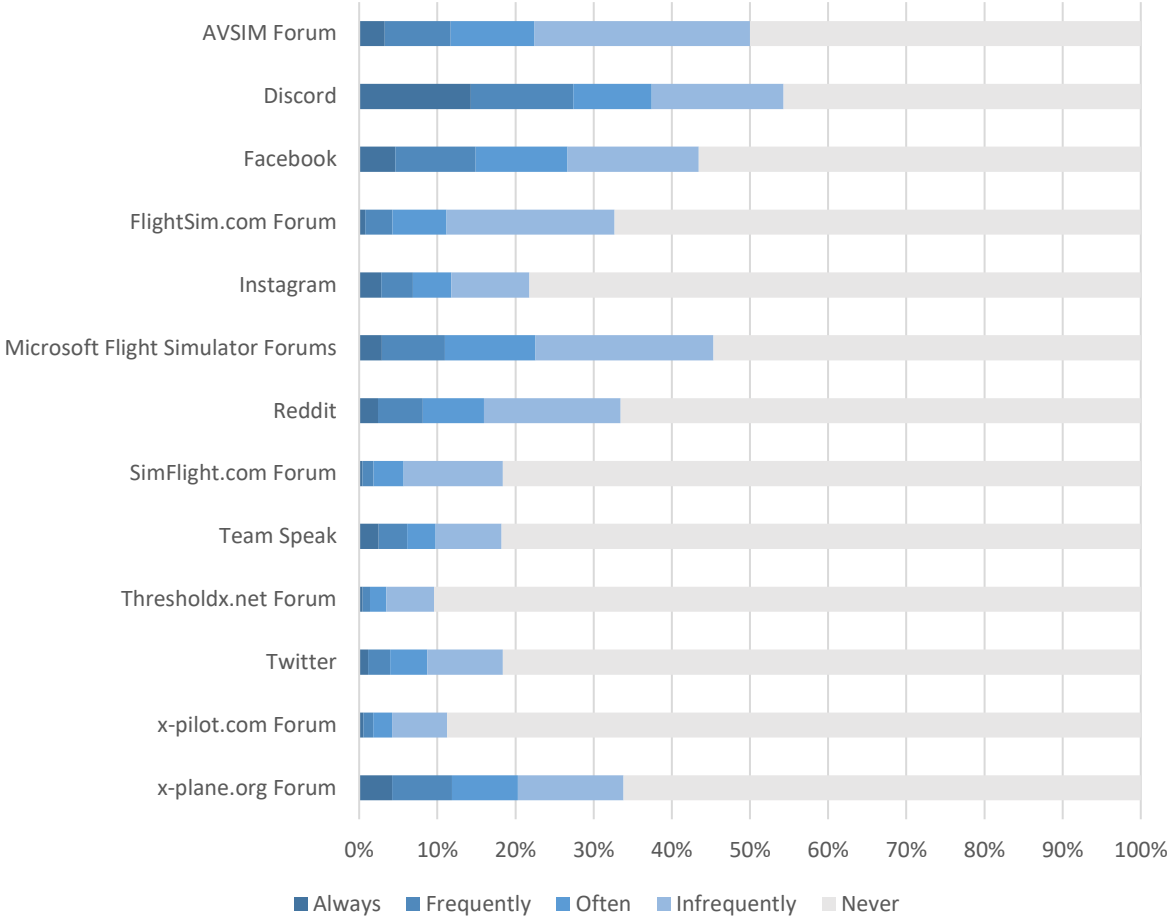
3.9.4. Virtual Airline Membership

This year, 25.7% of the respondents were a member of a virtual airline. Last year, 28.3% of the respondents were a member of a virtual airline.

Are you a member of a Virtual Airline

Last year's result:

Are you a member of a Virtual Airline
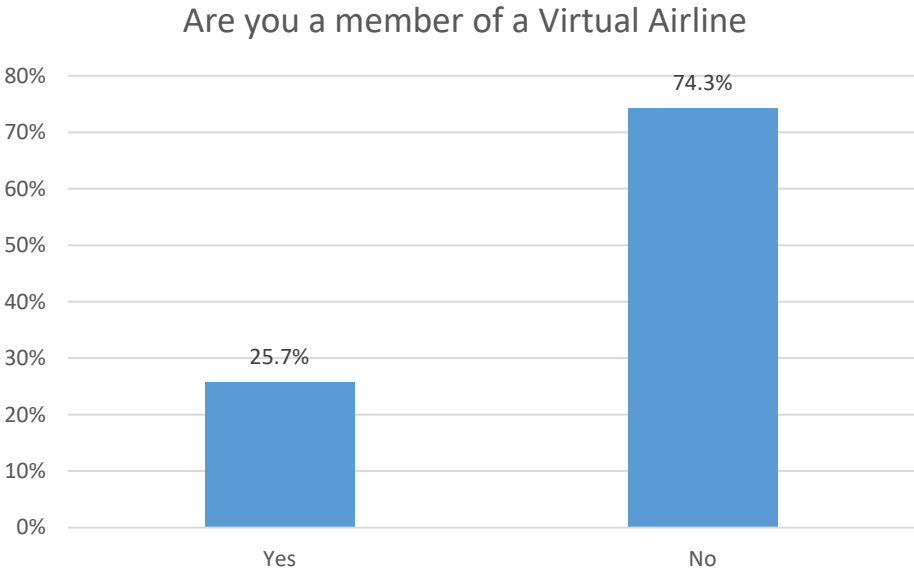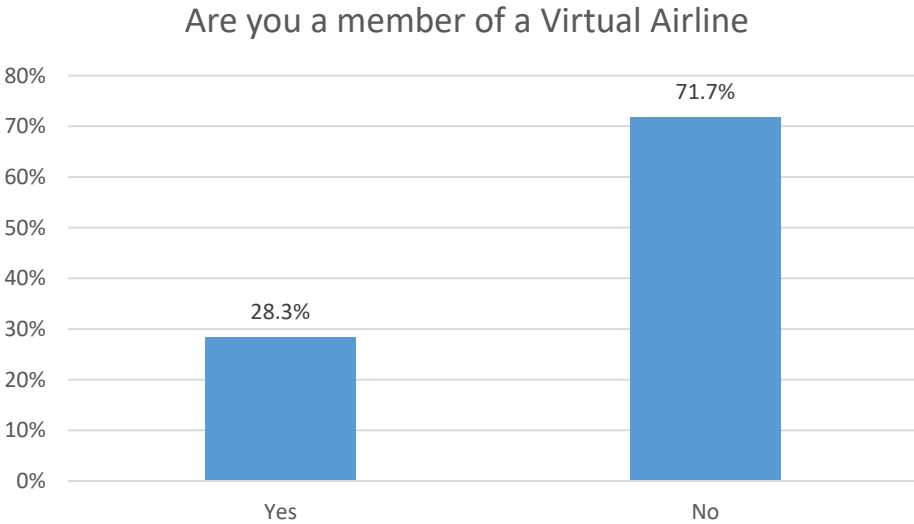
3.9.5. Online Flying

We wanted to know how many people fly online or not and compare the numbers to the previous year. The result is the same as last year.

Do you fly online?

Last year's result:

Do you fly online?
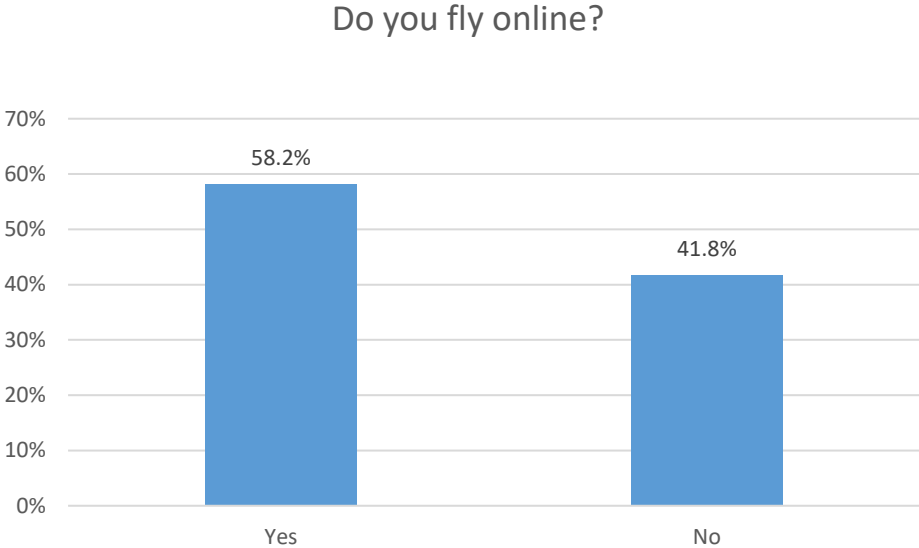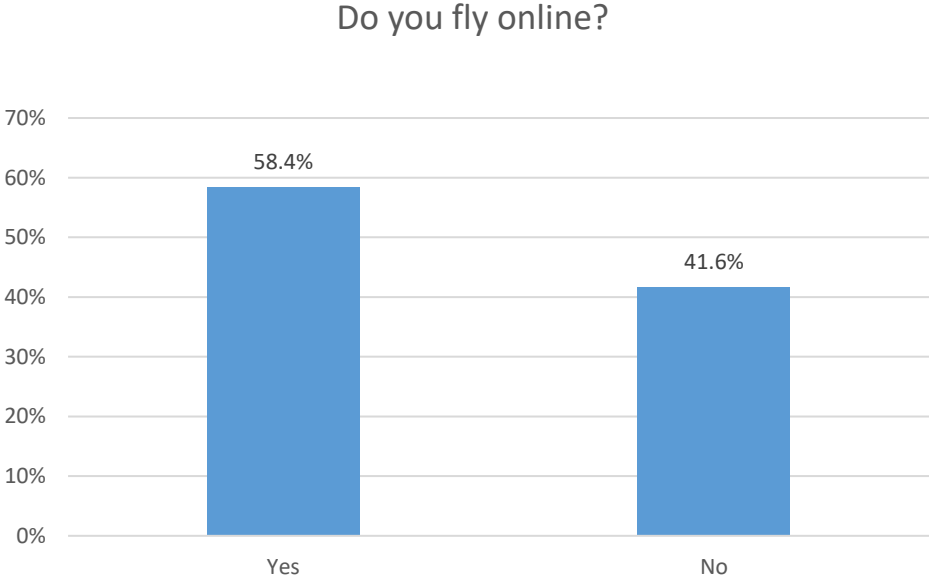
3.9.6. Online Network Preference

The following question regarding network preference was only asked to the respondents who stated that they fly online.

A newcomer for this year is Volanta, which has already become a popular online network among the respondents. As presented in previous year's survey, VATSIM is the most popular online network.

How often do you fly on any of the following online network?
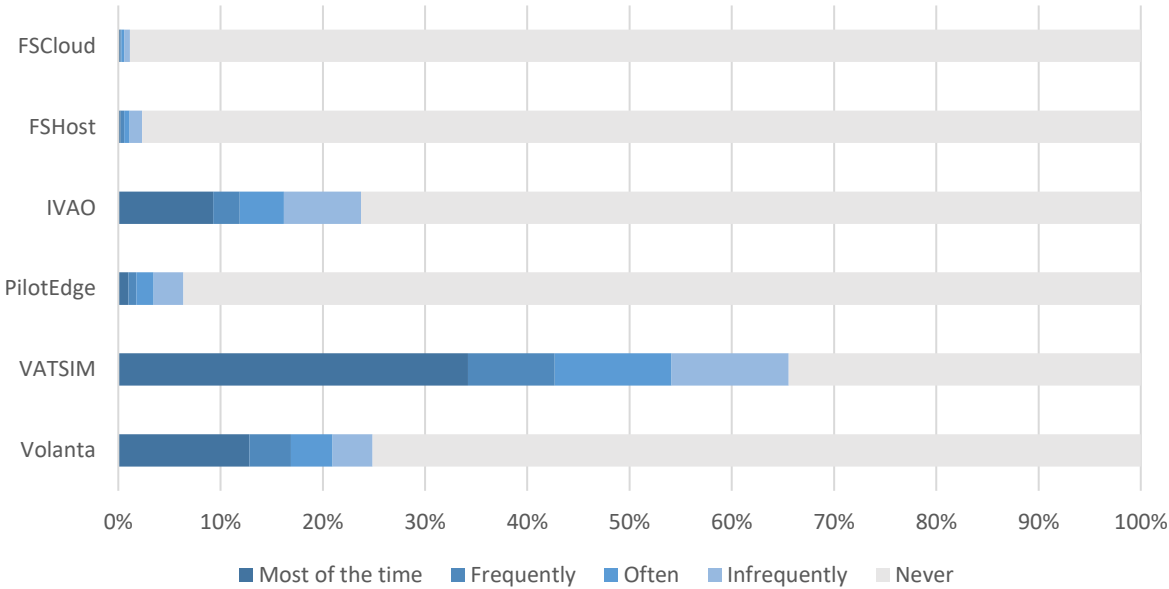
Last year's result:

How often do you fly on any of the following online network?
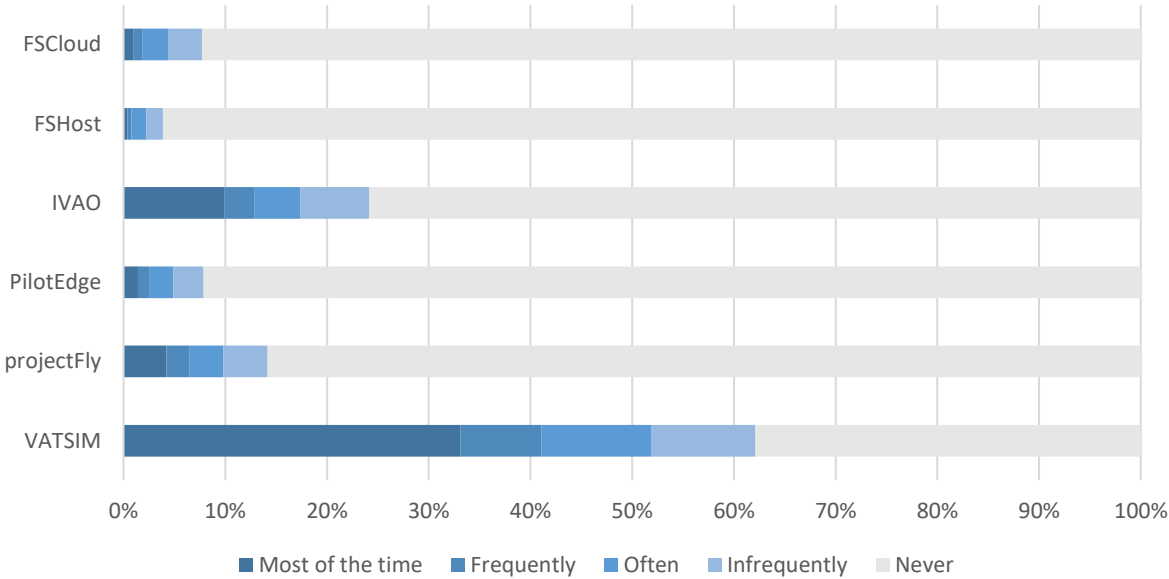
3.10. Simulator Platform

3.10.1. Simulator Software

Following the launch of Microsoft Flight Simulator in 2020, this simulator has grown to become the most popular flight simulator among the respondents. Almost three out of four currently use Microsoft Flight Simulator 2020 to some extent. Laminar Research X-Plane 11.50+, as well as Prepar3D v4 and v5 are also popular flight simulators.

How often do you fly any of the following flight simulator software?

Most of the time ◼ Frequently ◼ Sometimes ◼ Infrequently ◼ Never

How often do you fly any of the following flight simulator software?

Microsoft FS 2002
Microsoft FS 2004
Microsoft FSX
Microsoft FS 2020
Dovetail Microsoft FSX: Steam Edition
Laminar Research X-Plane 10
Laminar Research X-Plane 11.0 - 11.41
Laminar Research X-Plane 11.50 +
Laminar Research X-Plane Mobile
Lockheed Martin Prepar3d v1
Lockheed Martin Prepar3d v2
Lockheed Martin Prepar3d v3
Lockheed Martin Prepar3d v4
Lockheed Martin Prepar3d v5
Infinite Flight
Rortos
FlightGear
AeroFly FS 2
Aerowinx
Falcon 4.0. BMS
DCS World
GeoFS

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

■ Most of the time ■ Frequently ■ Sometimes ■ Infrequently ■ Never

3.10.2. Simulator Software Change

Last year almost 50% of the respondents switched their primary flight simulator. A total of one third of the respondents switched to Microsoft Flight Simulator 2020. This year about 40% switched their primary flight simulator, of which the majority switched to Microsoft Flight Simulator 2020.

Have you switched your primary flight simulation software this year?

- Yes, to X-Plane 11 — 4.4%
- Yes, to Prepar3d v5 — 3.5%
- Yes, to other (please specify) — 1.7%
- Yes, to Microsoft Flight Simulator (2020) — 31.0%
- No — 59.4%
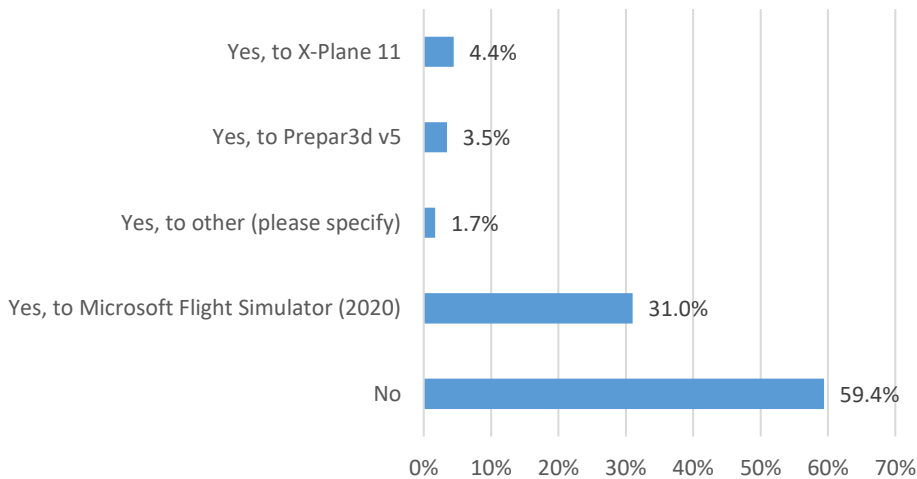
Last year's result:

Have you switched your primary flight simulation software this year?
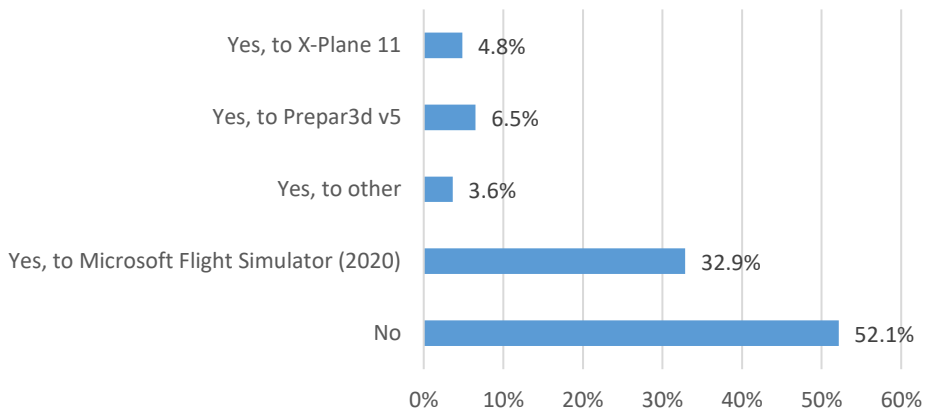
- Yes, to X-Plane 11 — 4.8%
- Yes, to Prepar3d v5 — 6.5%
- Yes, to other — 3.6%
- Yes, to Microsoft Flight Simulator (2020) — 32.9%
- No — 52.1%

The following question was conditional and only presented to the respondents who stated that they switched to X-Plane 11 this year. We can establish that the most flight simulator that respondents left for X-Plane 11 was Microsoft Flight Simulator 2020.

From which flight simulator software did you switch to X-Plane 11?
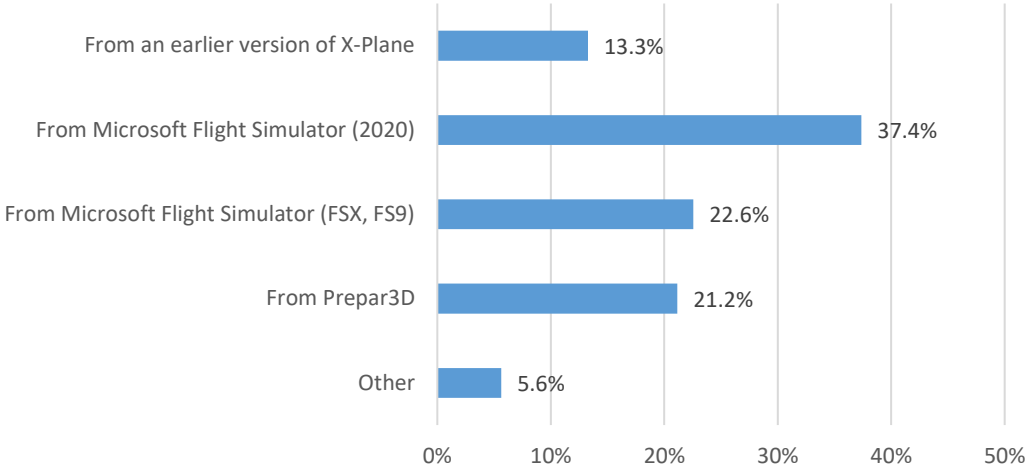
Category	Percentage
From an earlier version of X-Plane	13.3%
From Microsoft Flight Simulator (2020)	37.4%
From Microsoft Flight Simulator (FSX, FS9)	22.6%
From Prepar3D	21.2%
Other	5.6%

Last year's result:

From which flight simulator software did you switch to X-Plane 11?

Category	Percentage
From an earlier version of X-Plane	15.9%
From Microsoft Flight Simulator (2020)	11.1%
From Microsoft Flight Simulator (FSX, FS9)	41.6%
From Prepar3D	24.5%
Other	6.8%
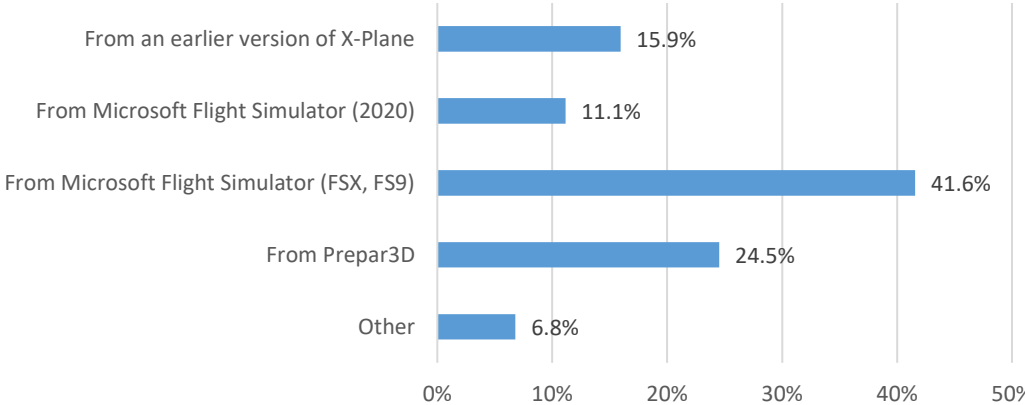
The following question was conditional and only presented to the respondents who stated that they switched to Prepar3d v5 this year. By far most of the respondents switched from an earlier version of Prepar3D, just like last year.

From which flight simulator software did you switch to Prepar3d v5?
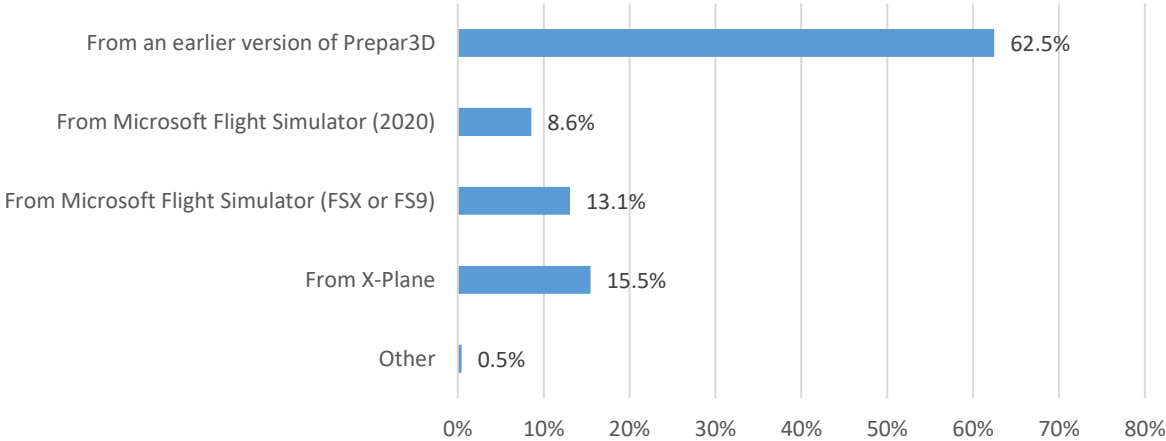
From an earlier version of Prepar3D	62.5%
From Microsoft Flight Simulator (2020)	8.6%
From Microsoft Flight Simulator (FSX or FS9)	13.1%
From X-Plane	15.5%
Other	0.5%

Last year's result:

From which flight simulator software did you switch to Prepar3d v5?

From an earlier version of Prepar3D	77.3%
From Microsoft Flight Simulator (2020)	3.7%
From Microsoft Flight Simulator (FSX or FS9)	12.4%
From X-Plane	5.6%
Other	1.0%
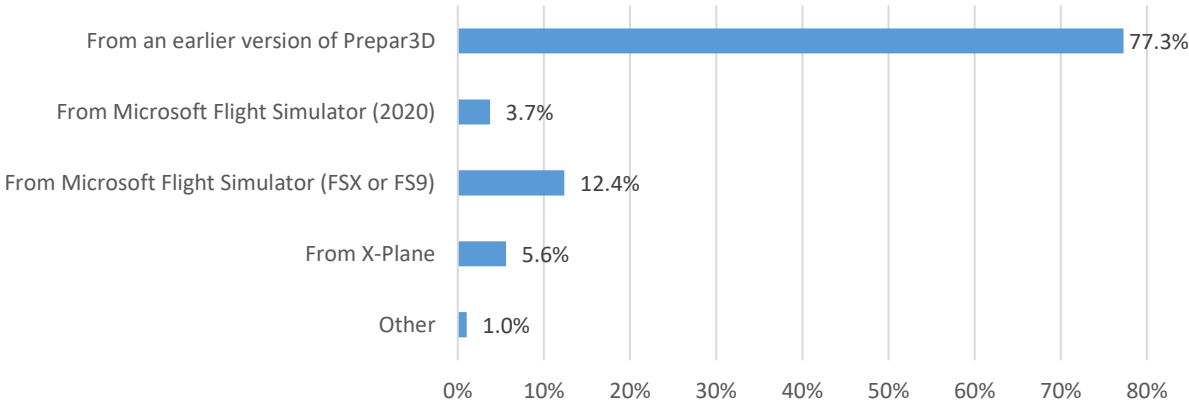
The following question was conditional and only presented to the respondents who stated that they switched to Microsoft Flight Simulator this year. The results suggest a spread between X-Plane, Prepar3D, and earlier versions of Microsoft Flight Simulator.

From which flight simulator software did you switch to Microsoft Flight Simulator?
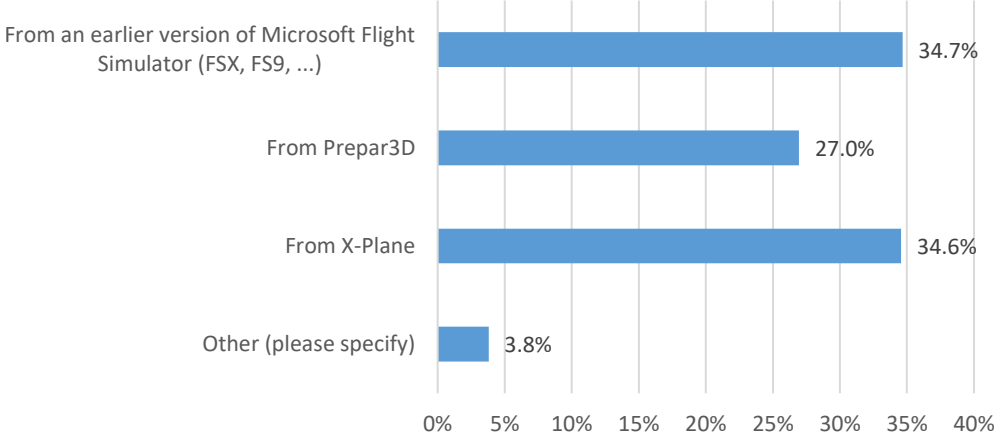
Category	Percentage
From an earlier version of Microsoft Flight Simulator (FSX, FS9, ...)	34.7%
From Prepar3D	27.0%
From X-Plane	34.6%
Other (please specify)	3.8%

Last year's result:

From which flight simulator software did you switch to Microsoft Flight Simulator?

Category	Percentage
From an earlier version of Microsoft Flight Simulator (FSX, FS9, ...)	28.8%
From Prepar3D	33.1%
From X-Plane	32.2%
Other	5.8%
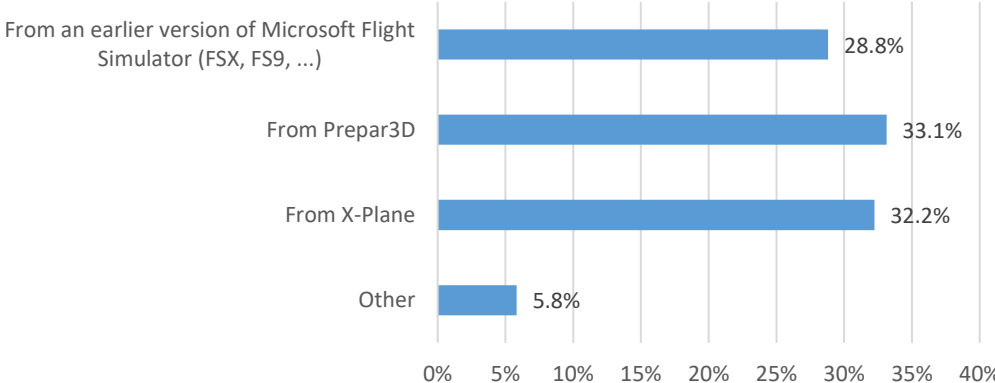
3.10.3. X-Plane 12 Purchase Likelihood

Earlier this year, Laminar Research announced that X-Plane 12 is coming. By asking this question, we wanted to know how likely it is that our respondents will buy X-Plane 12 when it comes out.

How likely is it that you will buy X-Plane 12 when it becomes available?

Very likely	Likely	Possibly	Unlikely	Very unlikely
22.9%	8.5%	19.0%	15.4%	34.1%
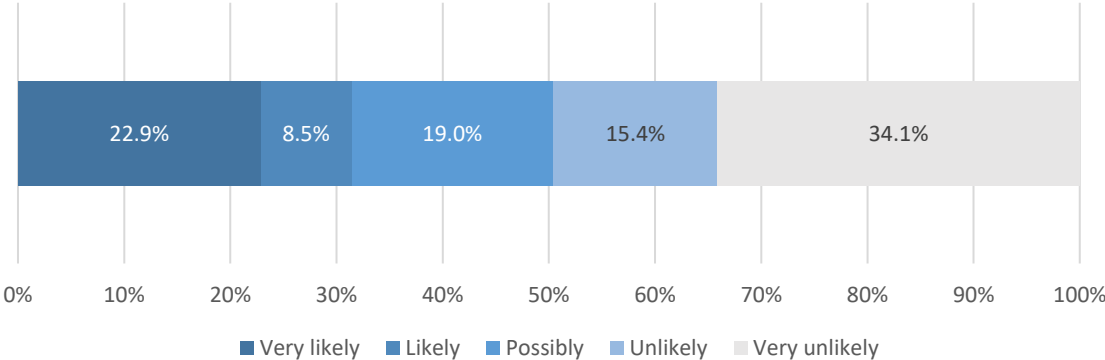
3.10.4. Computer

This question was used to filter out laptop and desktop users for upcoming questions. Over 96% of the respondents fly simulators on desktop or laptop computers.

Do you fly simulators on desktop or laptop computers?
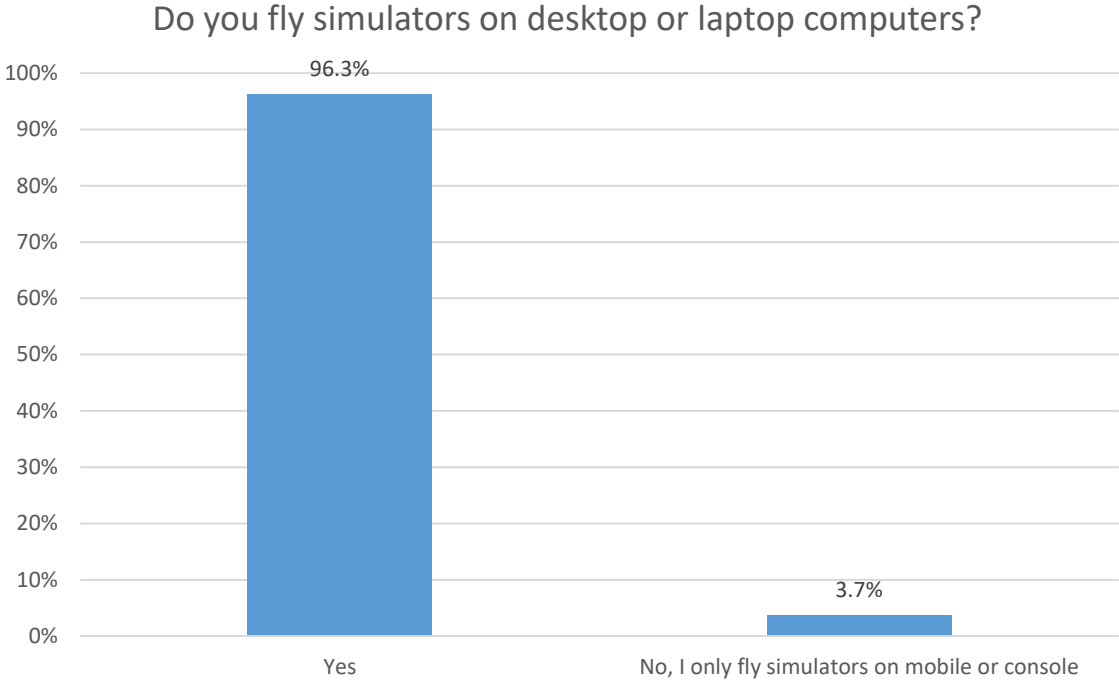
3.10.5. Operating System

Windows 10 continues to be the most popular operating system among the respondents. Since the last survey, Windows 11 has however been released. We find that over 20% are already using Windows 11, while the Windows 10 users have dropped from 92.5% to 74.5%.

Which operating system are you running on your primary flight simulator computer?

Operating System	Percentage
Windows Vista or earlier - previous versions	0.3%
Windows 8.1	0.1%
Windows 8	0.1%
Windows 7	1.1%
Windows 11	20.4%
Windows 10	74.5%
Other (please specify)	0.5%
Mac "Monterey"	0.3%
Mac "Mojave" 10.14 or earlier - previous versions	0.2%
Mac "Catalina" 10.15	0.3%
Mac "Big Sur" 11.6	1.1%
Linux - any distro or version	1.0%
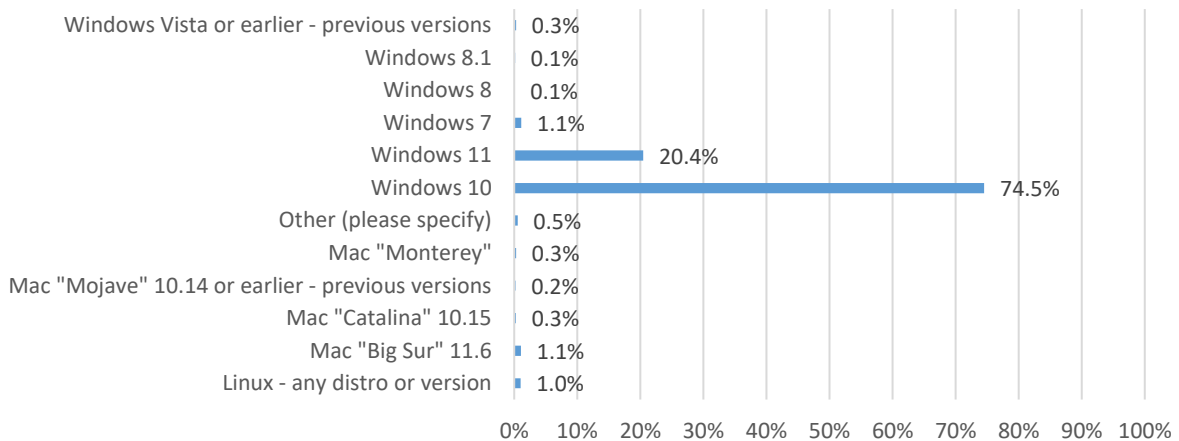
Last year's result:

Which operating system are you running on your primary flight simulator computer?

Operating System	Percentage
Windows Vista or earlier - previous versions	0.1%
Windows 8.1	0.4%
Windows 8	0.1%
Windows 7	2.7%
Windows 10 - the current version	92.5%
Other	0.7%
Mac "Mojave" 10.14 or earlier - previous versions	0.5%
Mac "Catalina" 10.15	1.0%
Mac "Big Sur" 11.00 - the current version	0.7%
Linux - any distro or version	1.3%

66
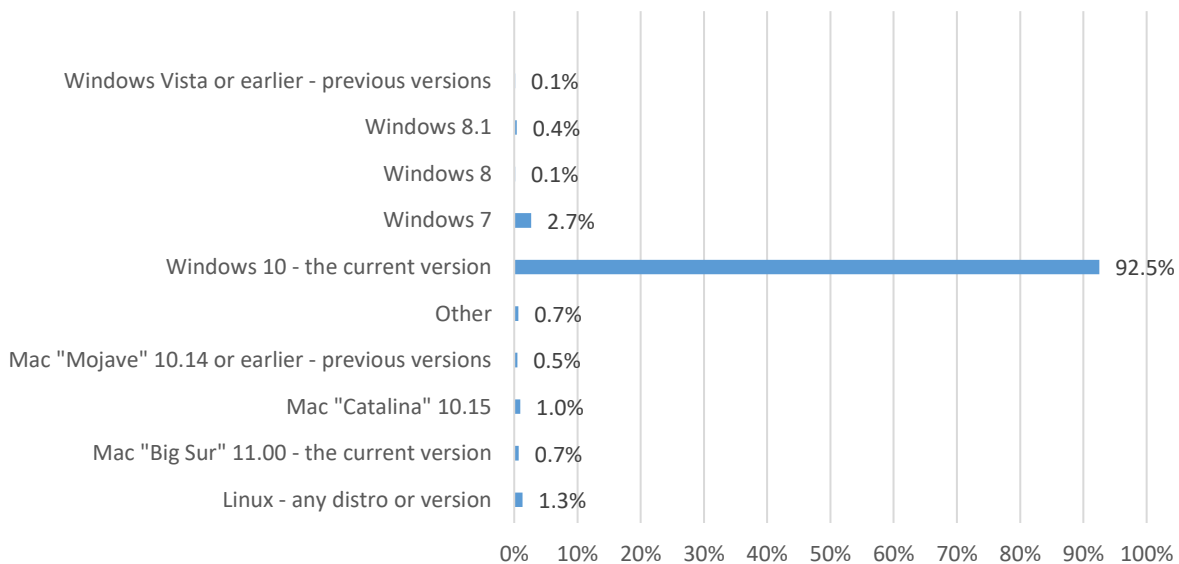
3.10.6. Graphics Card Usage

In 2018 we included a question about graphics cards, but not in 2019. In 2020 we decided to revisit this question again and include some follow-up questions to get more information about the performance range of our respondents' computers. The question was asked to all respondents who use laptop or desktops.

Just like last year, Nvidia appears to be dominating as the most popular graphic card among the respondents.

Which graphics card do you use in your primary flight simulation computer?

Card	Percentage
Nvidia	84.8%
Intel	3.7%
I don't know	2.2%
AMD	9.3%
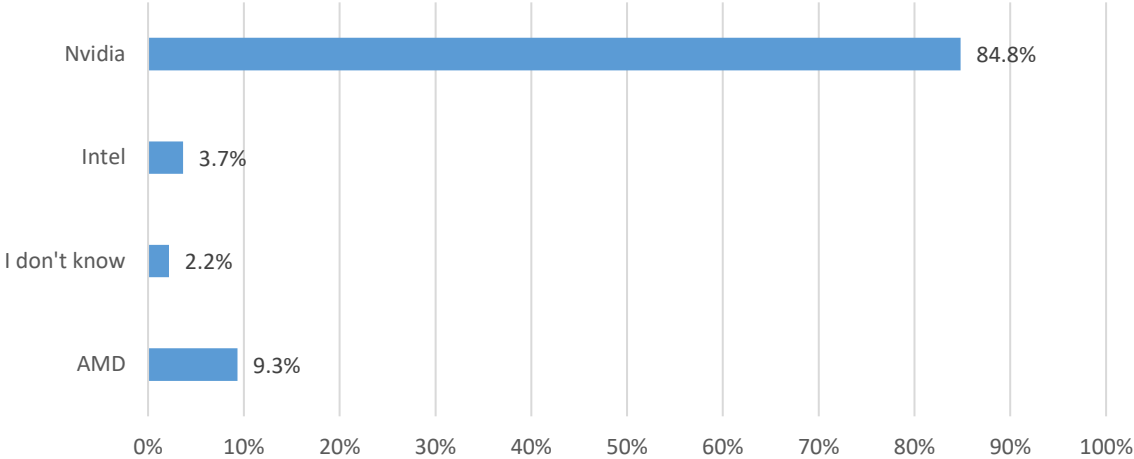
Last year's result:

Which graphics card do you use in your primary flight simulation computer?

Card	Percentage
Nvidia	85.8%
Intel	4.0%
I don't know	2.5%
AMD	7.6%
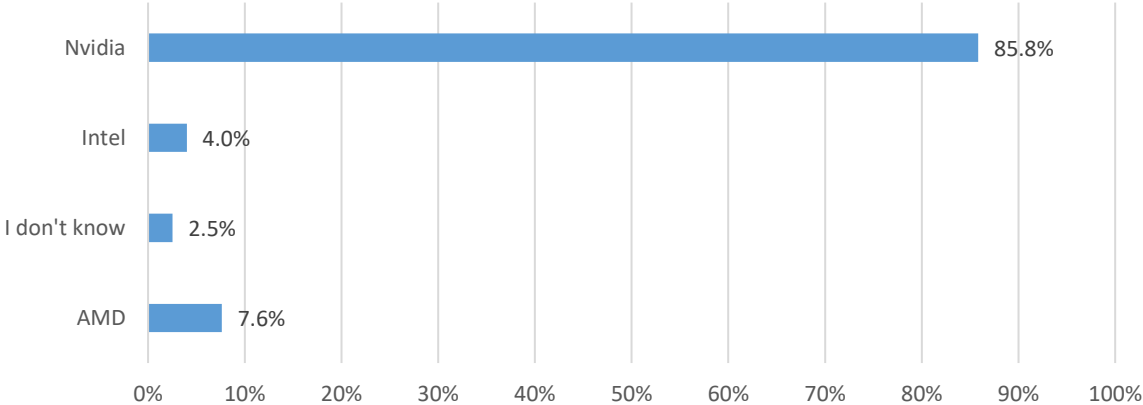
The following question was conditional and only answered by those who had an Nvidia graphics card. Last year, the GeForce GTX 1080 was the most used graphics card used by 18.1% of the respondents, followed by the RTX 2080 used by 16.2% of the respondents. This year, those cards have dropped in popularity, while the RTX 3070, 3080 and 3090 have all increased by a few percentage points.

Which Nvidia graphics card do you have?

Card	Percentage
GeForce GTX 1050	2.8%
GeForce GTX 1060	5.7%
GeForce GTX 1070	7.4%
GeForce GTX 1080	11.5%
GeForce GTX 1650	2.1%
GeForce GTX 1660	5.1%
GeForce RTX 2060	6.6%
GeForce RTX 2070	9.4%
GeForce RTX 2080	12.6%
GeForce RTX 3070	6.6%
GeForce RTX 3080	9.4%
GeForce RTX 3090	5.4%
I don't know	3.2%
Other	12.2%
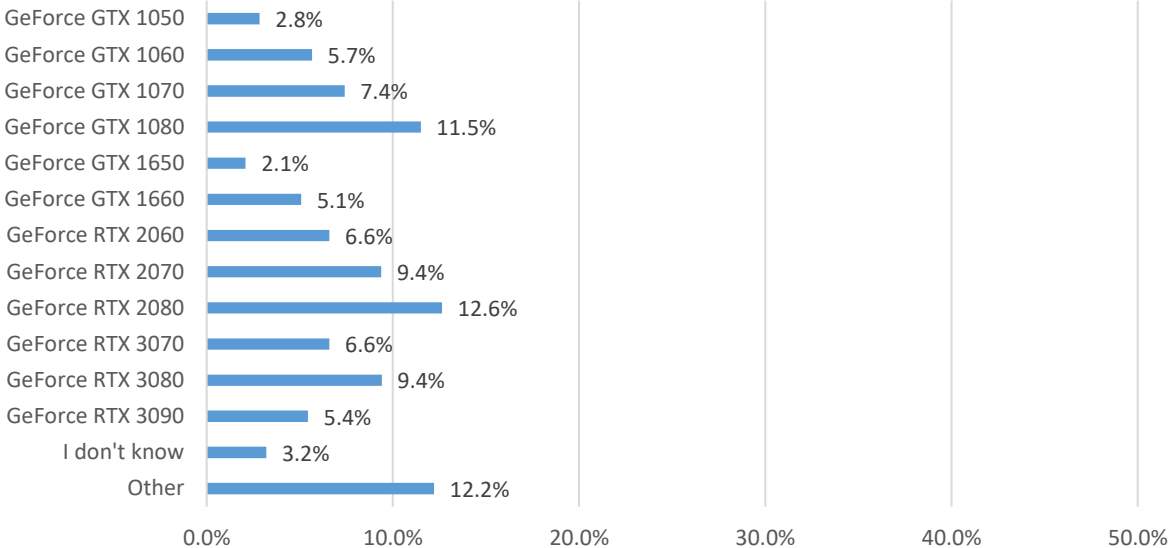
Last year's result:

Which Nvidia graphics card do you have?

Card	Percentage
GeForce GTX 1050	3.7%
GeForce GTX 1060	7.7%
GeForce GTX 1070	10.8%
GeForce GTX 1080	18.1%
GeForce GTX 1650	1.2%
GeForce GTX 1660	4.4%
GeForce RTX 2060	5.4%
GeForce RTX 2070	11.4%
GeForce RTX 2080	16.2%
GeForce RTX 3070	1.0%
GeForce RTX 3080	2.4%
GeForce RTX 3090	1.5%
I don't know	3.6%
Other	12.7%
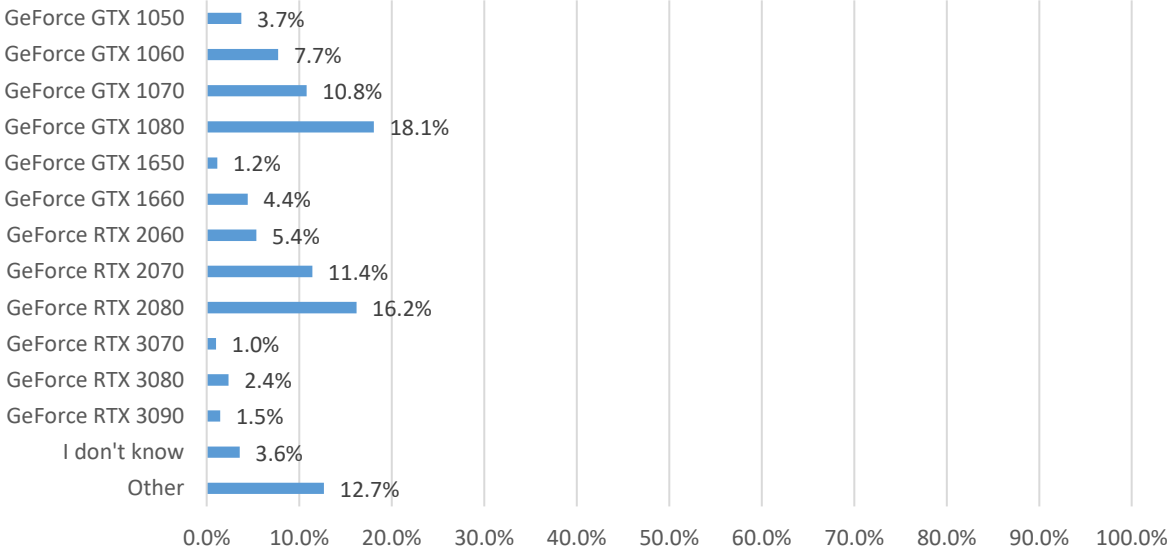
The following question was only answered by those who have an AMD graphics card. We can establish that the Radeon RX 5700 and RX 580 are the most used AMD graphics cards among the respondents.

Which AMD graphics card do you have?

Graphics Card	Percentage
I don't know	7.6%
Other	17.9%
Radeon 520	0.4%
Radeon 530	0.3%
Radeon 535	0.1%
Radeon 550X	1.1%
Radeon 610	0.1%
Radeon 620	0.1%
Radeon 630	0.1%
Radeon 640	0.1%
Radeon RX 5300	0.7%
Radeon RX 540	0.7%
Radeon RX 5500	3.0%
Radeon RX 560	1.6%
Radeon RX 5600	2.8%
Radeon RX 570	6.2%
Radeon RX 5700	19.7%
Radeon RX 580	15.3%
Radeon RX 6600	1.1%
Radeon RX 6700	4.3%
Radeon RX 6800	9.9%
Radeon RX 6900	6.8%
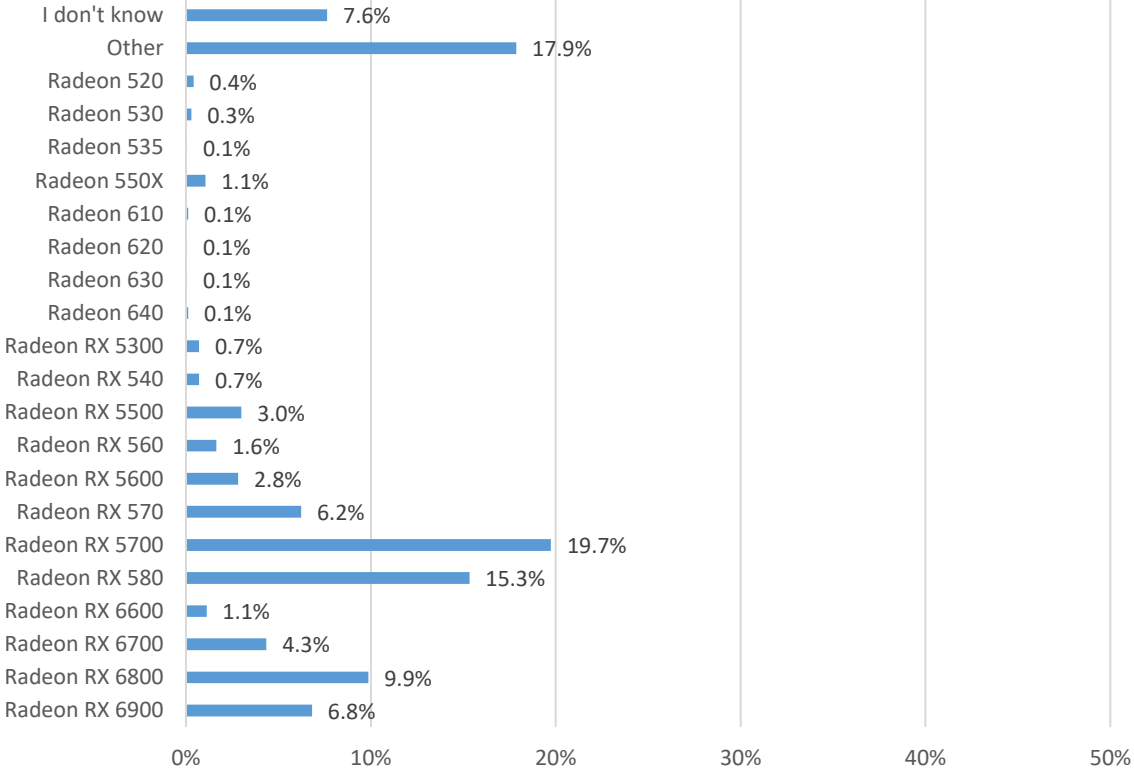
3.10.7. Graphics Card Satisfaction

Flight simulators can be very demanding in terms of graphics card performance. By adding this question, we wanted to investigate how happy flight simmers are with their graphics card performance. It turned out that over 21% are not happy with their graphics card and potentially in the market for a new one. As presented in section "3.8.3. Inability to Purchase Hardware", 17% of the respondents haven't purchased a new graphics card since it's out of stock, and 33% haven't purchased a graphics card the last year since it's currently too expensive.

Are you happy with the performance of your current graphics card?

	Yes	No
Percentage	78.4%	21.6%
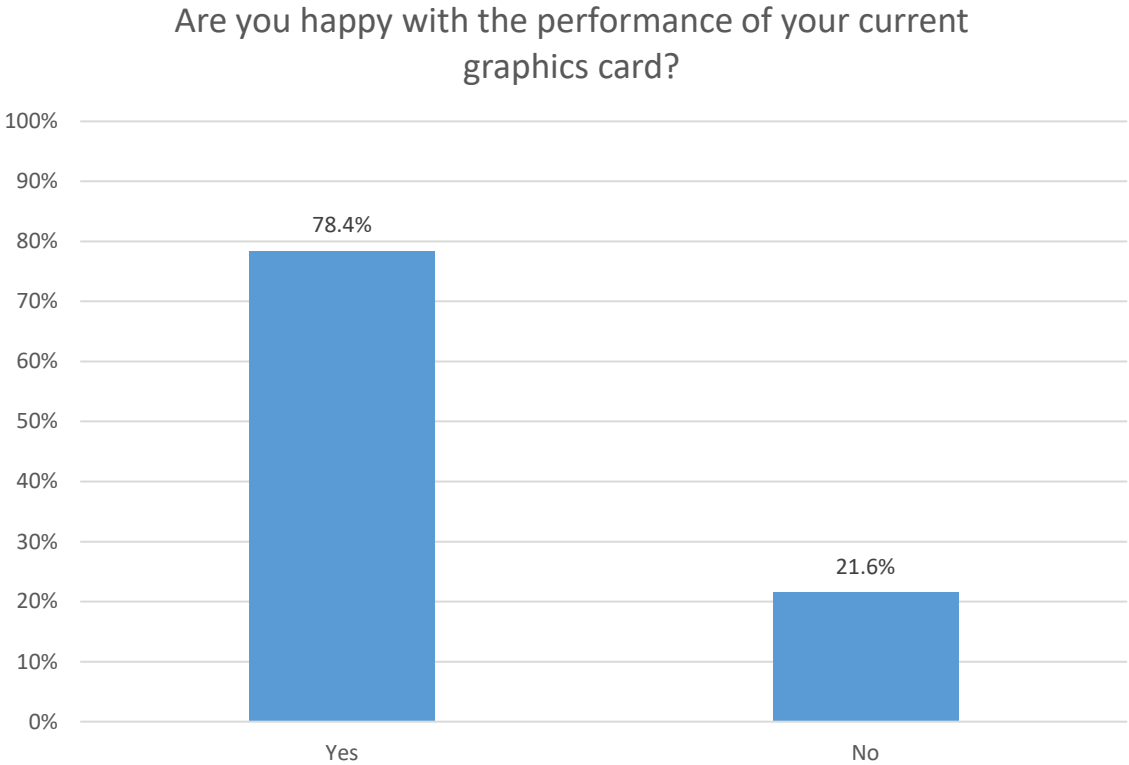
3.10.8. VRAM Storage

The following question was used to filter out respondents for the upcoming question.

Do you know how much VRAM you have?

Last year's result:

Do you know how much VRAM you have?
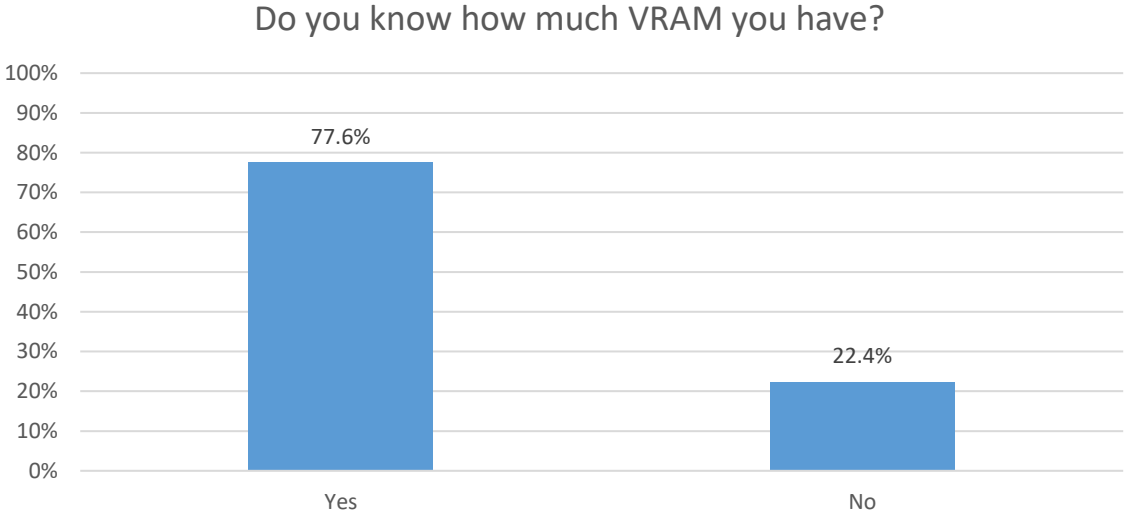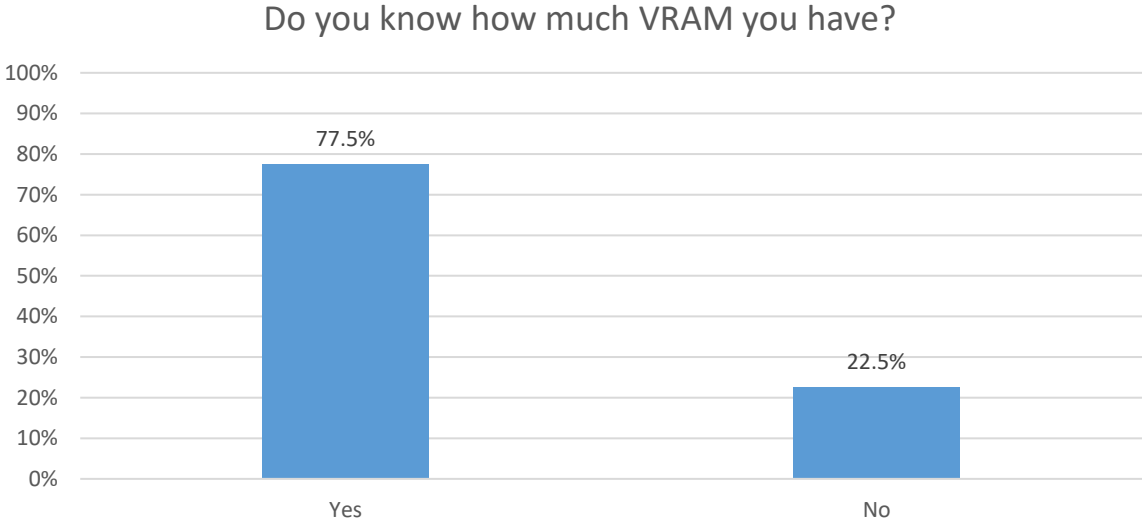
By introducing the following question in the 2020 survey, we wanted to find out how many gigabytes of VRAM the respondents have. The diagram below presents all answers that had a popularity of 1% or more among the respondents. In general, 8 gigabytes and below have decreased in percentage points and the number of gigabytes above 8 have increased compared to last year.

How many gigabytes of VRAM do you have?

Gigabytes	Percentage
64	2.1%
32	9.8%
24	4.5%
16	10.3%
12	7.0%
11	7.4%
10	4.5%
8	33.4%
6	11.4%
4	6.4%
2	1.4%
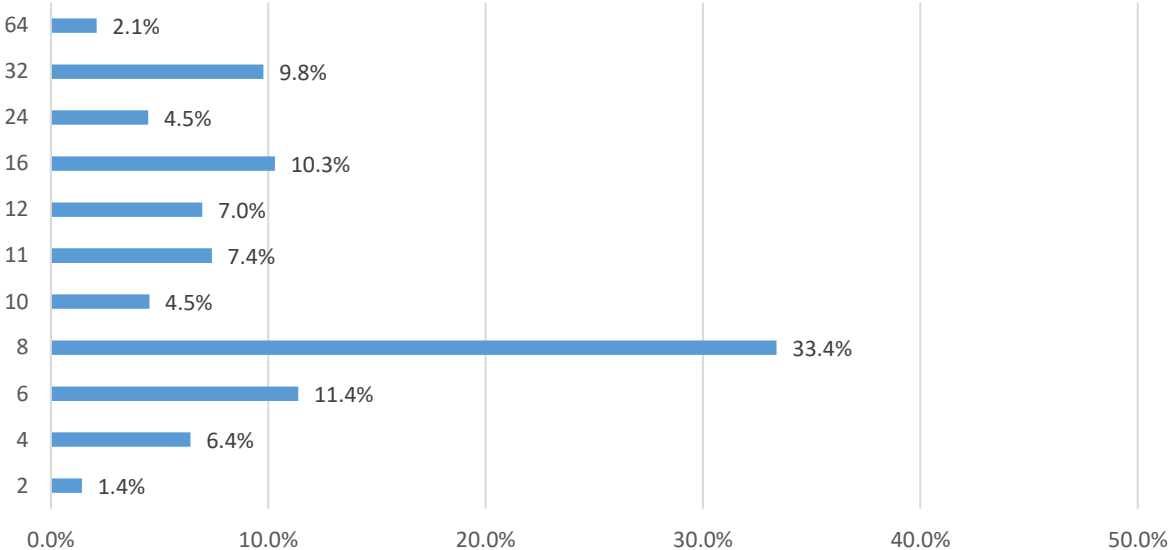
Last year's result:

How many gigabytes of VRAM do you have?

Gigabytes	Percentage
64	1.3%
32	8.0%
24	1.6%
16	9.0%
12	2.2%
11	12.1%
10	2.1%
8	38.7%
6	12.8%
4	7.5%
2	2.4%
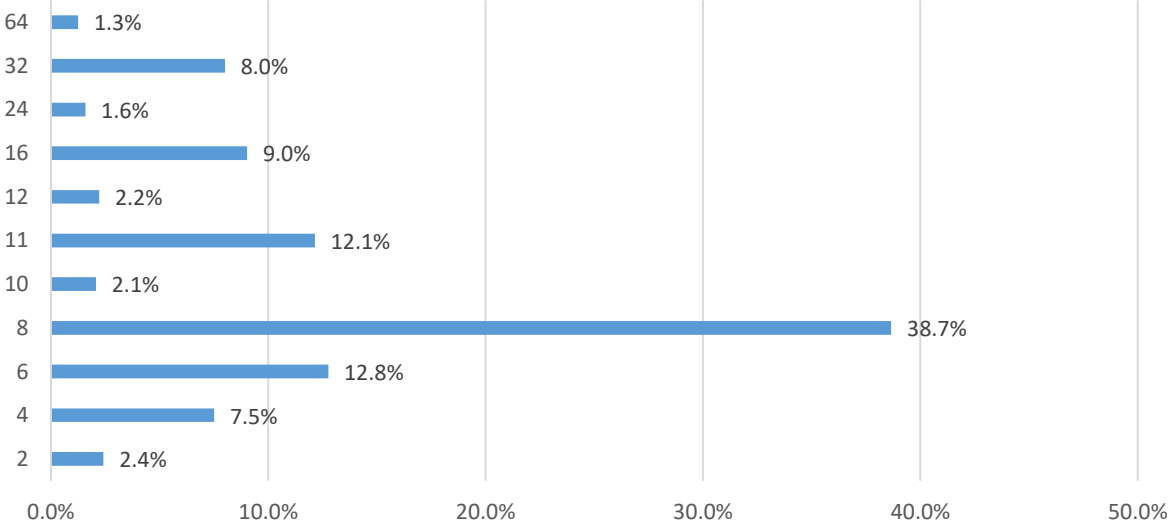
3.10.9. Xbox Consoles

In last year's survey we added the new Xbox Series X and Xbox Series S as answer alternatives. The percentage of Xbox Series X users increased from 1.3% to 3.7%, and from 0.2% to 1.3% for Xbox Series S users during this year.

Do you own an Xbox console?
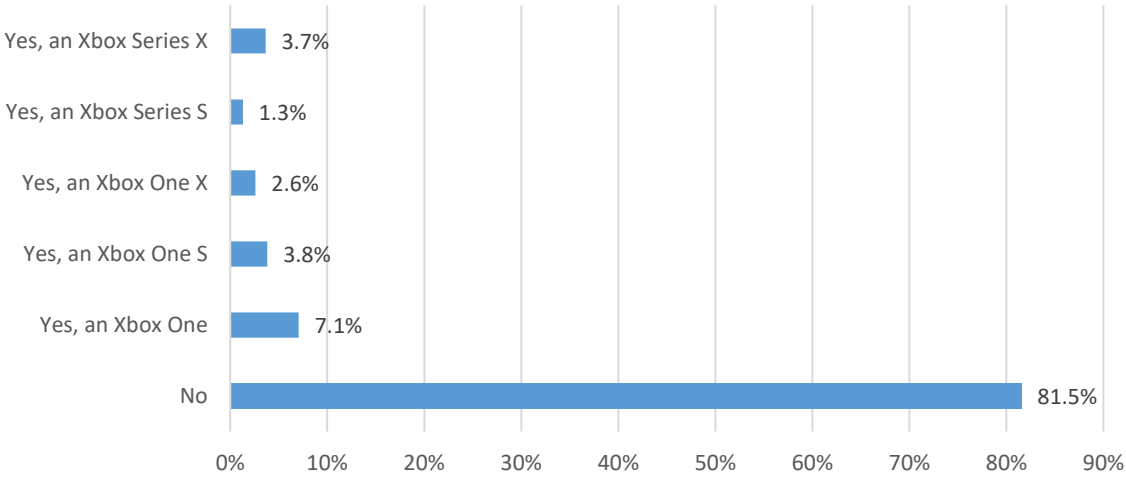
Last year's result:

Do you own an Xbox console?

73
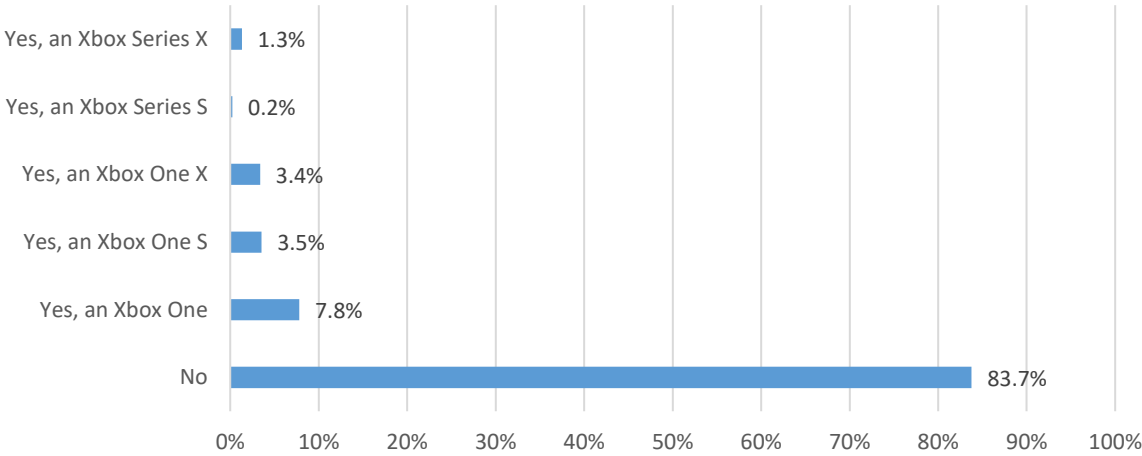
3.10.10. Console Activity

The previous question was used to filter out Xbox users for the following questions. All respondents who claimed to have an Xbox Series S or X were presented with the following in-depth console questions.

Do you fly simulators on Xbox?

Category	Percentage
No	45.4%
Yes	54.6%
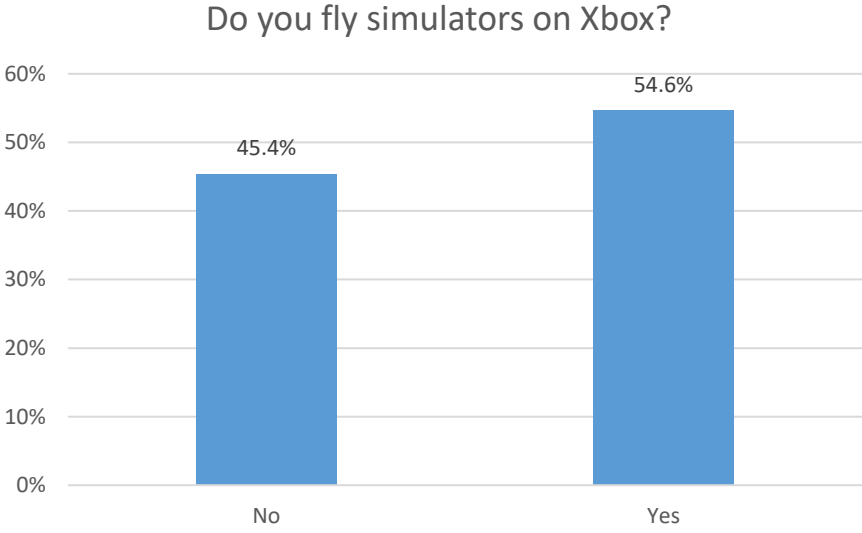
3.10.11. Console Controller

Continuing on the topic of consoles, we would like to know if respondents connect any other peripherals aside from gamepad controllers to fly. In 2020, we asked if the question "If you were able to run a flight simulator on a console, would you prefer to play with something else than the gamepad controller?". It turned out that three out of four would prefer to play with something else then gamepad controller, and just over two-thirds would prefer to fly with yoke and pedals.

Since Microsoft Flight Simulator 2020 was released for Xbox earlier this year, we could now ask the question "Do you fly simulators on your console with something else than the gamepad controller?". It turned out that less than half of the respondents currently flies with something else than the gamepad controller, remembering that 22 % of the respondents haven't purchased flight controls since it's out of stock as presented in section "3.8.3. Inability to Purchase Hardware".

Do you fly simulators on your console with something else than the gamepad controller?

Answer	Percentage
No	46.0%
Yes, with flight controls such as yoke/joystick and pedals	39.5%
Yes, with mouse and keyboard	14.5%

Last year's result:

If you were able to run a flight simulator on a console, would you prefer to play with something else than the gamepad controller?

Answer	Percentage
Probably not	25.1%
Yes, other	4.0%
Yes, with mouse and keyboard	3.1%
Yes, with yoke and pedals	67.8%
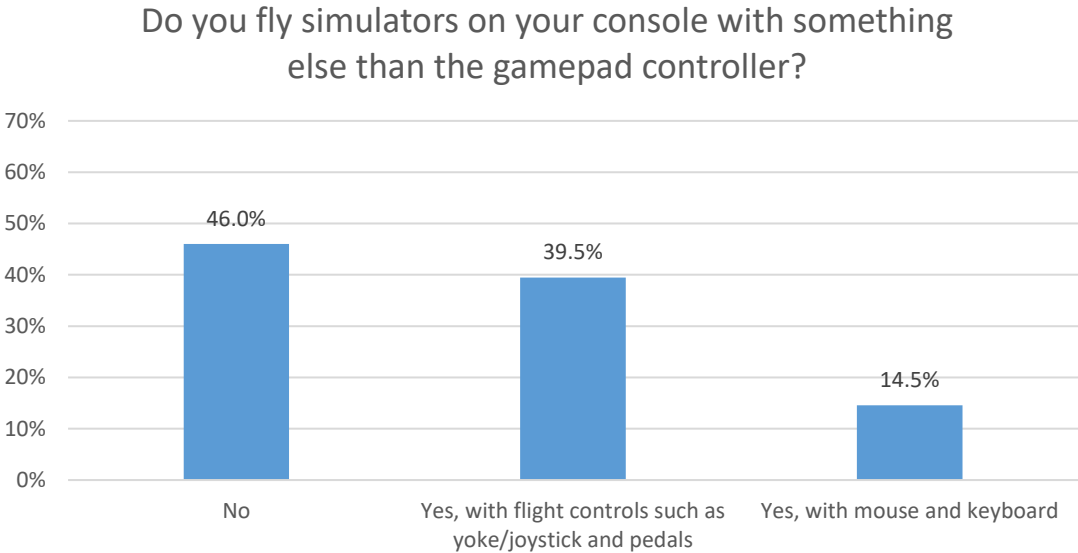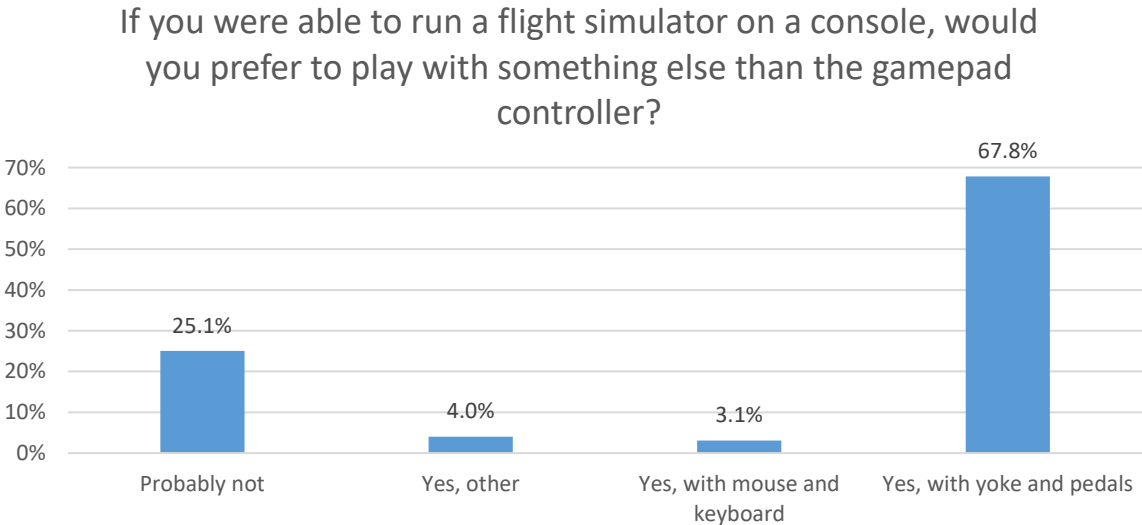
By asking the following question we wanted to learn why respondents prefer not flying on console. This can help the community in understanding what can be improved to make flight simulation on consoles more attractive in the future.

Why don't you fly simulators on your console?
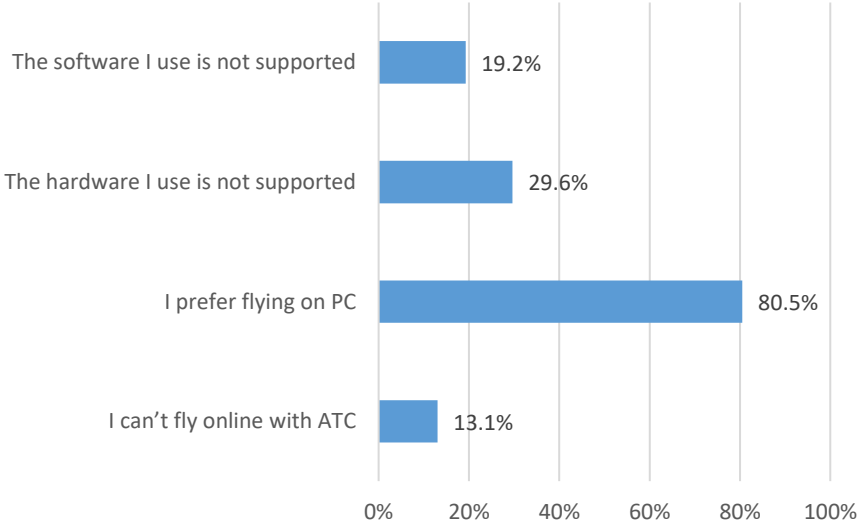
3.10.12. Internet Connection Speed

This year respondents typically have speeds of 10 to 499 Mbit/s. The results are comparable to last year's survey, however the percentage of respondents on 500-999 Mbit/s have increased from 13.6% to 16.1%.

How fast is your internet connection?

Speed	Percentage
0-9 Mbit/s	2.1%
10-99 Mbit/s	27.5%
100-499Mbit/s	36.6%
500-999 Mbit/s	16.1%
1-9 Gbit/s	12.4%
10+ Gbit/s	5.2%
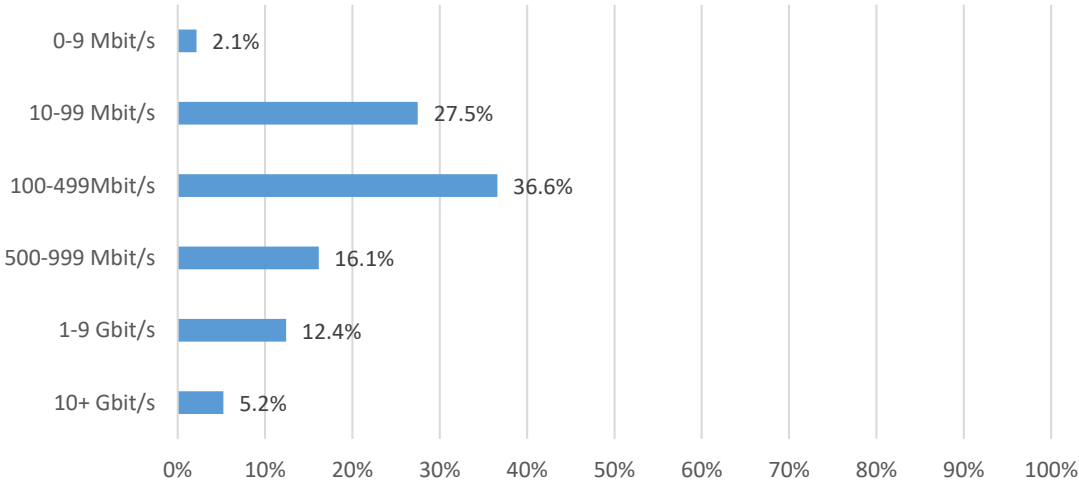
Last year's result:

How fast is your internet connection?

Speed	Percentage
0-9 Mbit/s	3.5%
10-99 Mbit/s	31.9%
100-499Mbit/s	34.6%
500-999 Mbit/s	13.6%
1-9 Gbit/s	10.0%
10+ Gbit/s	6.4%
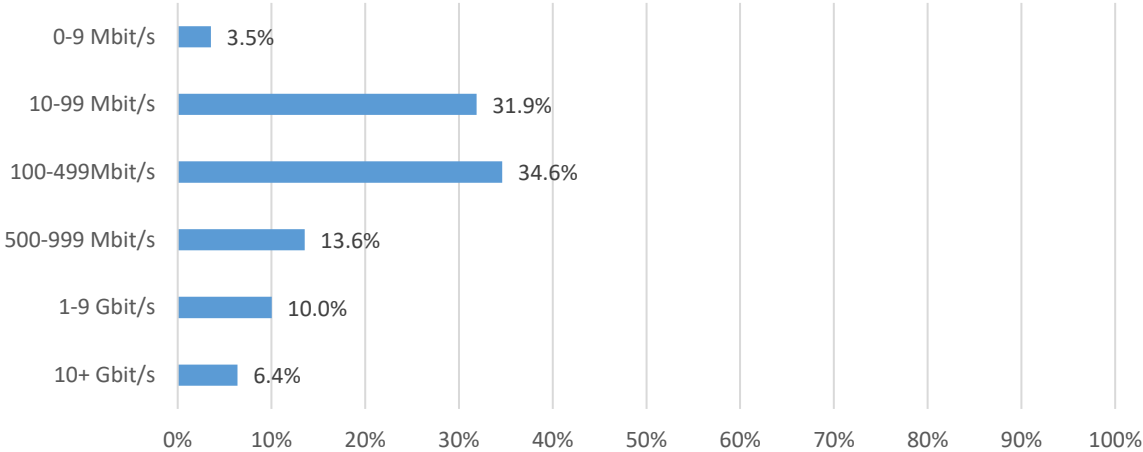
3.10.13. Auxiliary Systems

Pedal, throttle, joystick and yoke are popular, but also tablets and multiple display setups.

What does your simulator setup look like?

Setup	Percentage
Throttle quadrant	62.7%
Pedals	57.7%
Joystick with z-axis and hat switch control	51.5%
Yoke	46.7%
Several displays, however only one used for the cockpit view	39.7%
Tablet, such as iPad or Android	39.7%
HOTAS	32.6%
Headtracker such as TrackIR, Tobii, freetrack/opentrack, or similar	21.9%
VR	15.5%
Avionics hardware	14.7%
Additional computer(s), other than the simulator computer	14.5%
Several displays, some of which connected to created a panoramic cockpit view	8.4%
Cockpit build, home project	6.9%
Kneeboard	6.4%
No gear - just a computer and a screen	5.5%
Hot towels	2.8%
Helicopter controls	2.1%
Cockpit, purchased from professional	1.5%
PA system	1.3%
Under-seat life jacket	1.1%
Projector(s)	1.1%
FAA/EASA approved FTD (Redbird, Gleim, Flight1, Flightdeck Solutions etc.)	0.5%

Last year's result:

What does your simulator setup look like?

Option	Percentage
Pedals	56.5%
Throttle quadrant	54.0%
Joystick with z-axis and hat switch control	52.4%
Yoke	45.7%
Several displays, however only one used for the…	34.1%
Tablet, such as iPad or Android	33.5%
HOTAS	32.3%
Headtracker such as TrackIR, freetrack/opentrack,…	23.2%
Hardware panels	17.1%
Additional computer(s), other than the simulator…	15.2%
Several displays, some of which connected to…	8.3%
Cockpit build, home project	6.3%
No gear - just a computer and a screen	5.7%
Kneeboard	5.5%
Helicopter controls	1.7%
Polarized sunglasses	1.6%
Cockpit, purchased from professional	1.5%
Projector(s)	1.3%
Leather flying helmet	0.9%
Moving platform	0.5%
Extracted cockpit from a retired airliner	0.3%
Full motion level D cockpit	0.2%
FNPT II Simulator	0.2%

3.10.14. Qualified Training Device

About one-fifth of the respondents think it is important to be able to use the simulator for training towards a pilot license. This is comparable to the results from last year.

Is it important for you that you can use the flight simulator platform to log hours towards a pilot license?

	Yes	No
	19.2%	80.8%

Last year's result:

Is it important for you that you can use the flight simulator platform to log hours towards a pilot license?

	Yes	No
	20.4%	79.6%
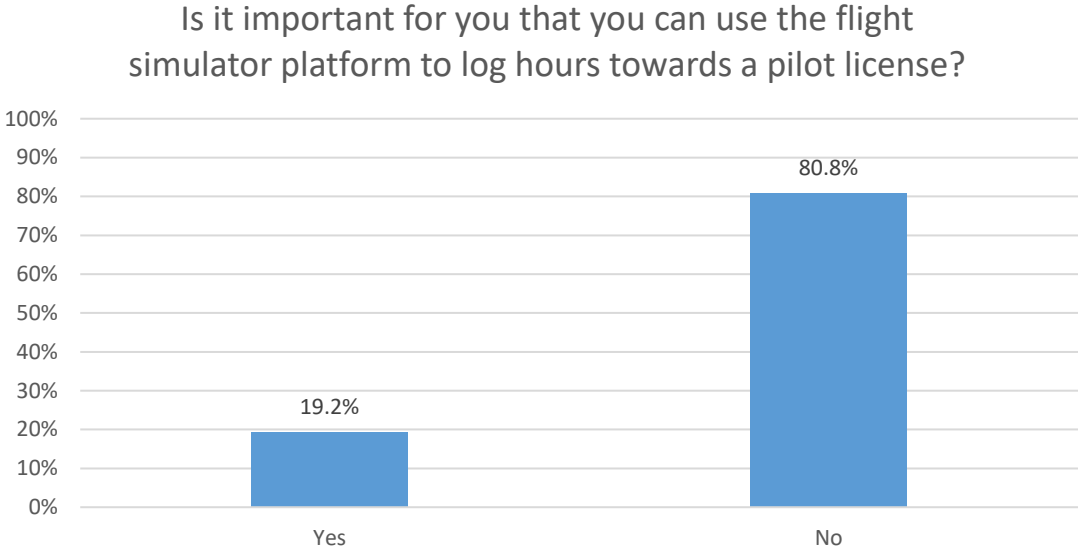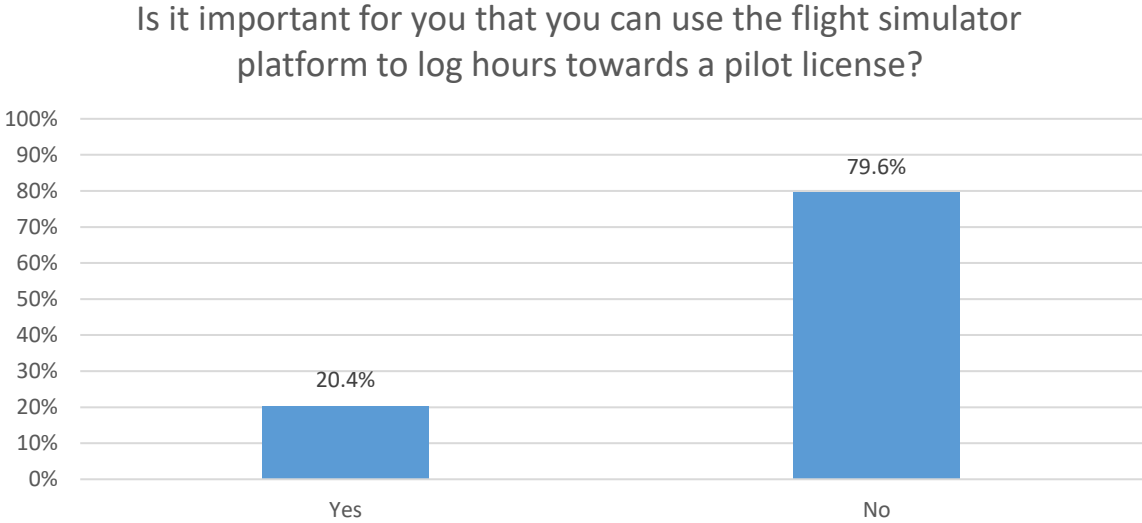
3.11. Virtual Reality

3.11.1. Ownership

The following question has also been asked in 2019 and 2020, where the results have been consistent with a total of under 20% owning a VR headset. This year however, a total of 24.4% of the respondents own a VR headset, of which most of them use it for flight simulation.

Do you own a VR headset?

Response	Percentage
Yes, but I don't use it for flight simulation	9.2%
Yes, and I use it for flight simulation	15.2%
No	75.6%
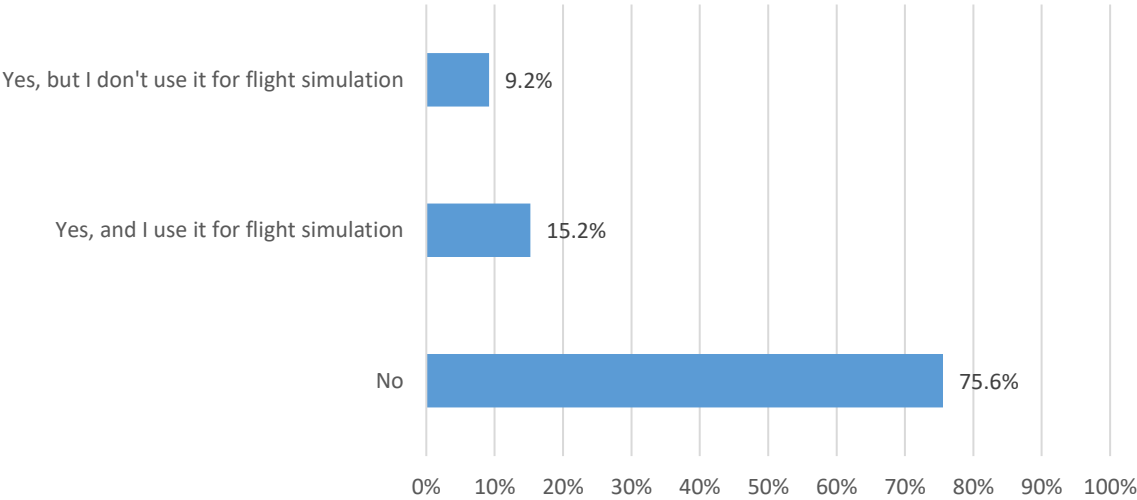
Last year's result:

Do you own a VR headset?

Response	Percentage
Yes, but I don't use it for flight simulation	6.8%
Yes, and I use it for flight simulation	11.5%
No	81.7%
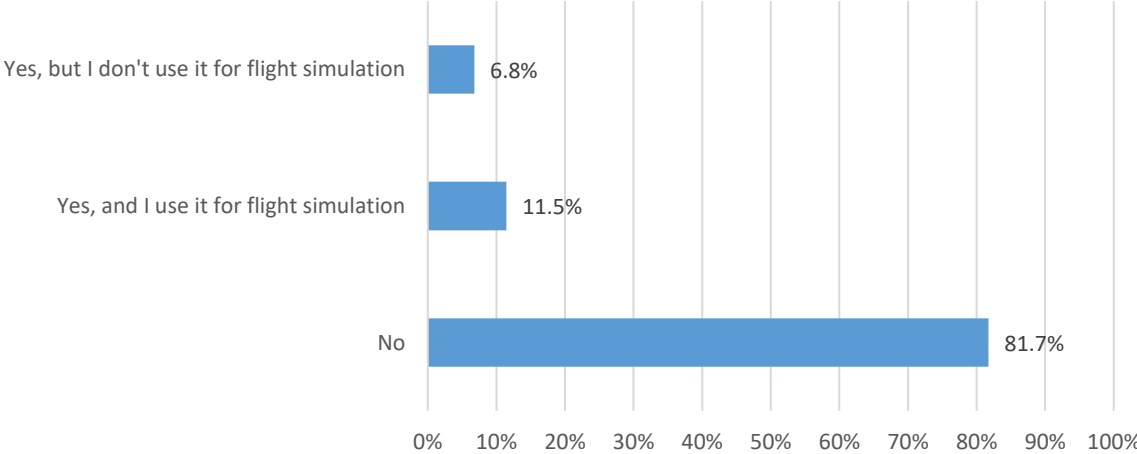
3.11.2. Brand

The following questions regarding VR were only asked to respondents who stated they owned a VR headset.

This question was also featured in the 2019 survey. In 2020, we added answer options such as HP Reverb G1 and G2 as well as Oculus Quest and Oculus Quest 2 to reflect the current VR market.

In 2020 Oculus Rift was the most used VR headset among the respondents, followed by the Oculus Rift S. This year however, the HP Reverb G2 is mostly used, followed by Oculus Quest 2 and Oculus Rift S.

Which VR headset do you primarily use?

Headset	Percentage
HP Reverb G1	3.3%
HP Reverb G2	32.8%
HTC Vive	2.4%
HTC Vive Cosmos	0.7%
HTC Vive Cosmos Elite	0.2%
HTC Vive Pro	1.2%
HTC Vive Pro 2	0.7%
Lenovo Explorer	0.9%
Oculus GO	0.1%
Oculus Quest	2.1%
Oculus Quest 2	21.5%
Oculus Rift	7.7%
Oculus Rift S	15.2%
Other (please specify)	2.5%
Pimax 5k series	0.4%
Pimax 8k series	1.1%
Samsung Odyssey series	2.3%
Valve Index	5.0%

Last year's result:

Which VR headset do you primarily use?

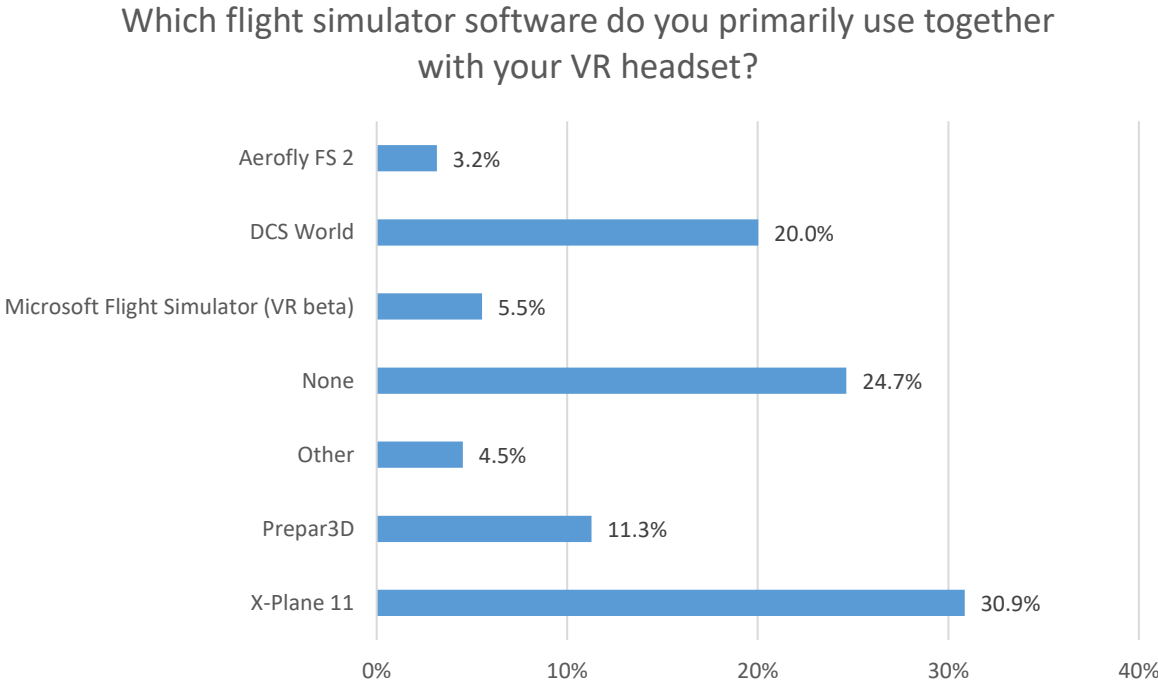| Headset	Percentage
HP Reverb G1	4.9%
HP Reverb G2	6.1%
HTC Vive	6.9%
HTC Vive Cosmos	1.0%
HTC Vive Pro	3.3%
Lenovo Explorer	1.3%
Oculus GO	0.9%
Oculus Quest	4.9%
Oculus Quest 2	3.5%
Oculus Rift	25.0%
Oculus Rift S	22.6%
Other	8.7%
Pimax 5k series	0.9%
Pimax 8k series	0.9%
Samsung Odyssey series	4.3%
Valve Index	4.8%
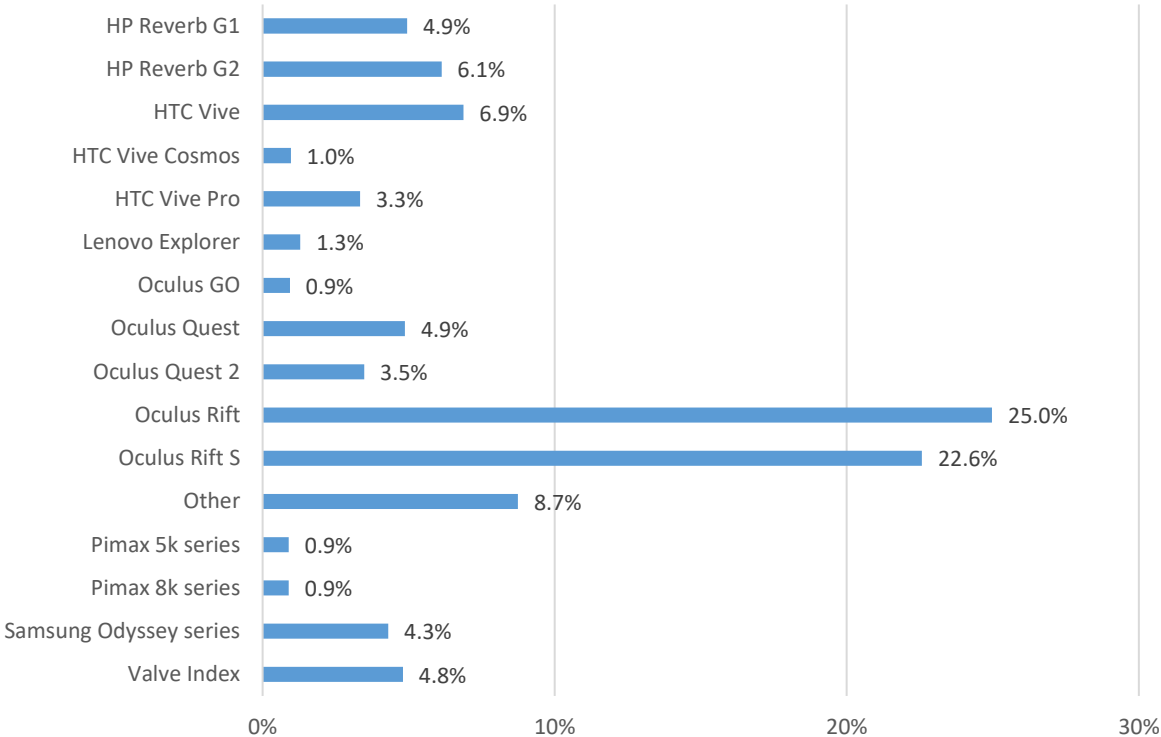
3.11.3. VR Simulator Software

When this question was asked in the 2020 survey, 5.5% was using the Microsoft Flight Simulator VR Beta. Microsoft Flight Simulator is now out of Beta state and is used by most (60.3%) of the respondents who fly simulators on their VR headset. X-Plane and DCS continues to be popular flight simulator software for VR.

Which flight simulator software do you primarily use together with your VR headset?

Software	Percentage
Aerofly FS 2	0.9%
DCS World	18.2%
Microsoft Flight Simulator	60.3%
None	0.5%
Other	3.2%
Prepar3D	3.2%
X-Plane 11	13.6%

Last year's result:

Which flight simulator software do you primarily use together with your VR headset?

Software	Percentage
Aerofly FS 2	3.2%
DCS World	20.0%
Microsoft Flight Simulator (VR beta)	5.5%
None	24.7%
Other	4.5%
Prepar3D	11.3%
X-Plane 11	30.9%

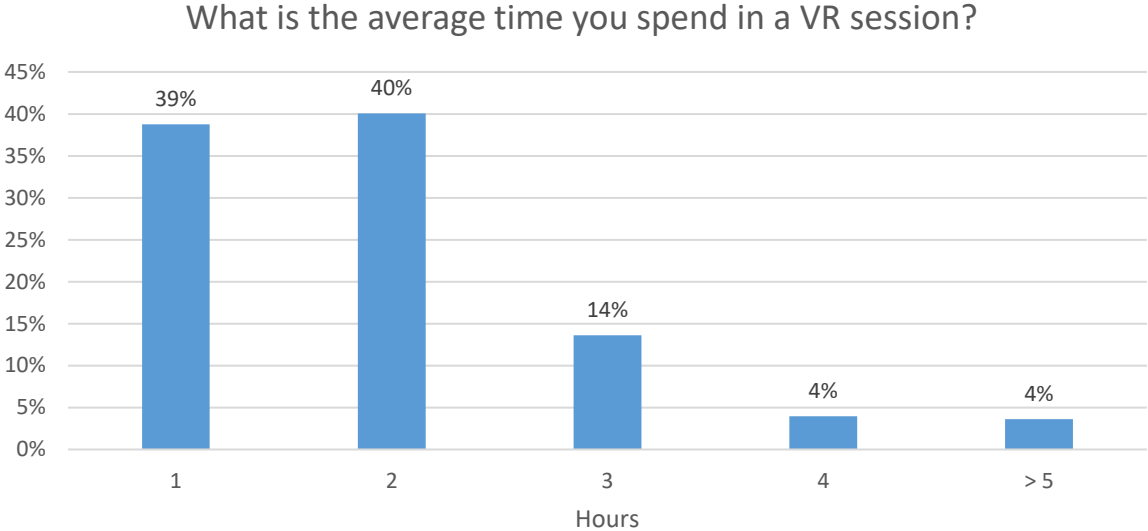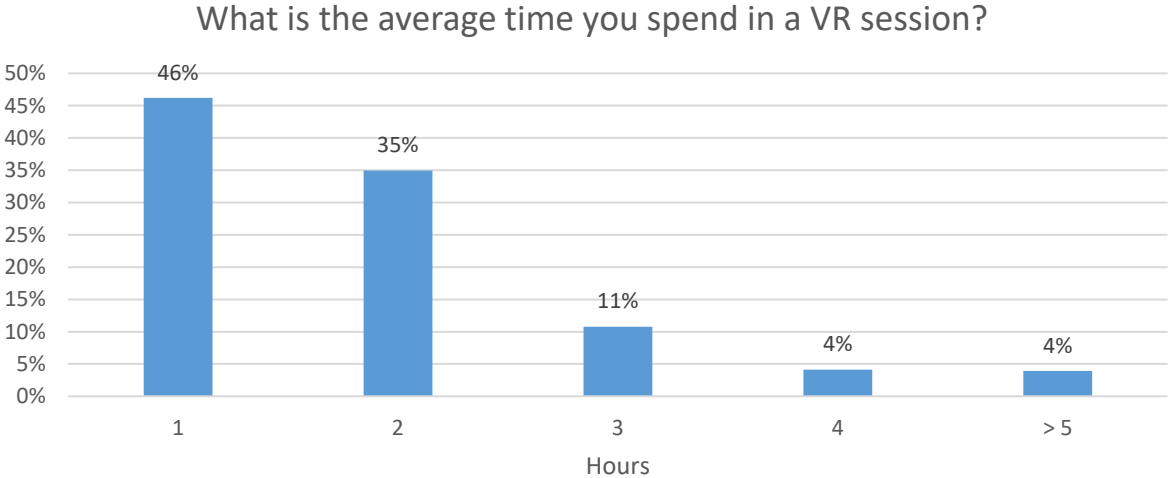## 3.11.4. VR Session Duration

This question was introduced in year's survey. Last year, 1 hour on an average session was most popular at 46%, while 35% of the respondents spent 2 hours. This year, 2 hours are more popular than 1 hour, at 40% and 39% respectively.

What is the average time you spend in a VR session?

Last year's result:

What is the average time you spend in a VR session?

3.11.5. VR Flight Types

The most common type of flying is VFR, which is same as last year but with an increase by 6.2%. Second place this year we find IFR which increased by 3.7% compared to the previous year. This puts last year's number two "Casual flying without rules", which decreased by 1.3%, on a third place of the most popular types of flying in VR.

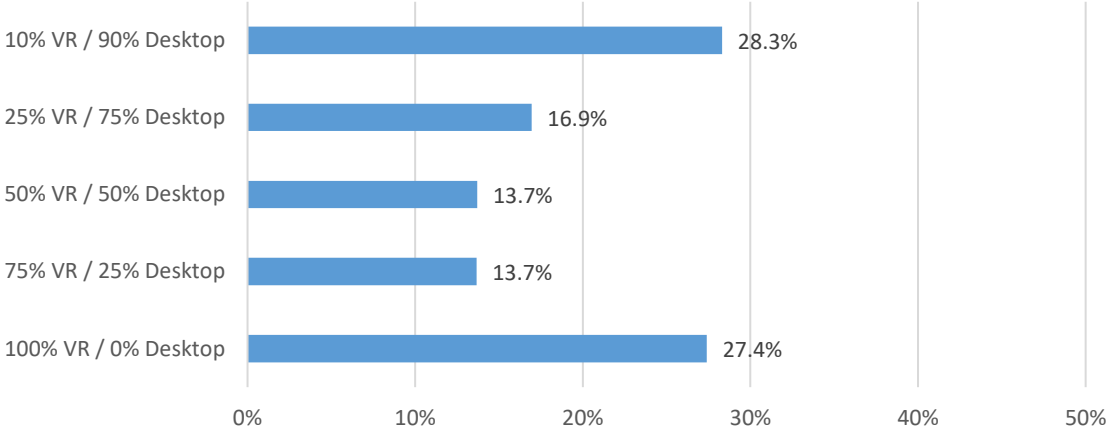**What type of flying do you use VR for?**
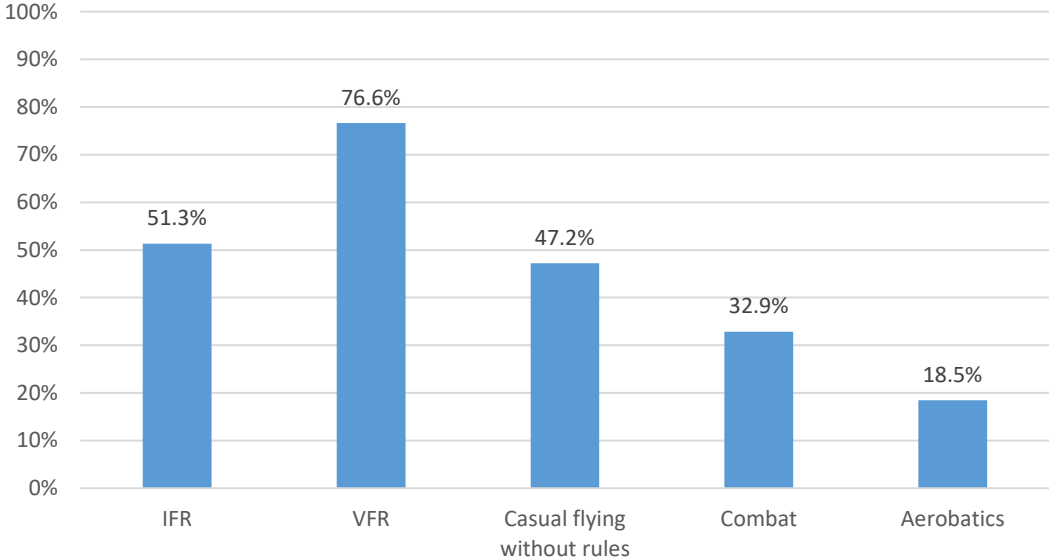
Last year's result:

What type of flying do you use VR for?
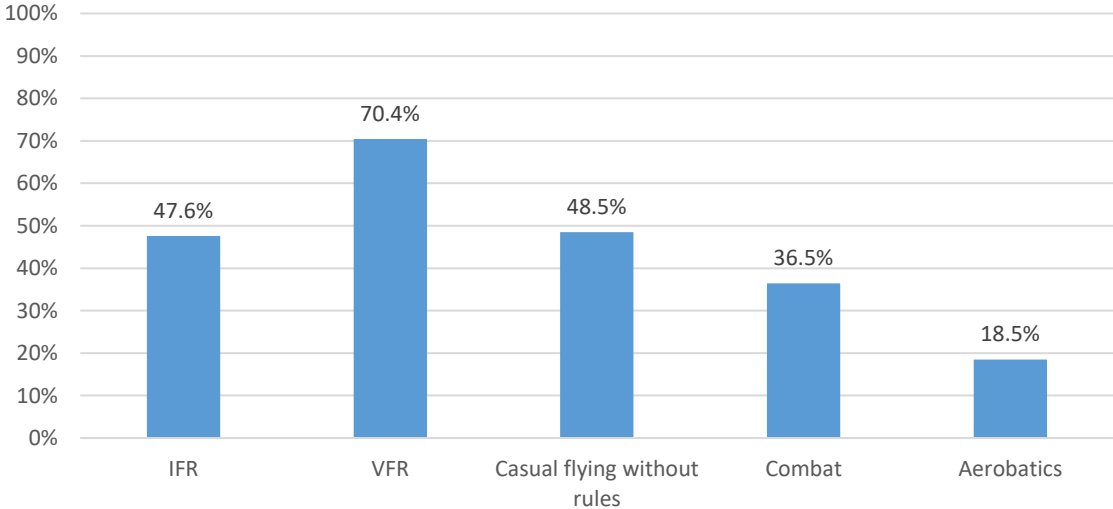
3.11.6. VR vs Desktop Flying

Last year, over 40% of the respondents used VR for about 10% of the time when flying, while just over 16% used it 100% of the time. This year, the percentage of respondents who use VR 10% of the time has dropped to 28.3%, while over 27% use VR 100% of the time.

How often do you use VR vs regular desktop flying?

Category	Percentage
10% VR / 90% Desktop	28.3%
25% VR / 75% Desktop	16.9%
50% VR / 50% Desktop	13.7%
75% VR / 25% Desktop	13.7%
100% VR / 0% Desktop	27.4%

Last year's result:

How often do you use VR vs regular desktop flying?

Category	Percentage
10% VR / 90% Desktop	43.1%
25% VR / 75% Desktop	15.0%
50% VR / 50% Desktop	13.2%
75% VR / 25% Desktop	12.3%
100% VR / 0% Desktop	16.4%

3.11.7. VR Desktop Switch

By introducing this question in 2020, we wanted to know if the respondents switch between VR and desktop during their session. More than half of the respondents switch between VR and desktop to some degree.

In the same session, do you switch between VR and Desktop?

Most of the time	Frequently	Sometimes	Infrequently	Never
	9.7%	26.7%	28.3%	31.9%
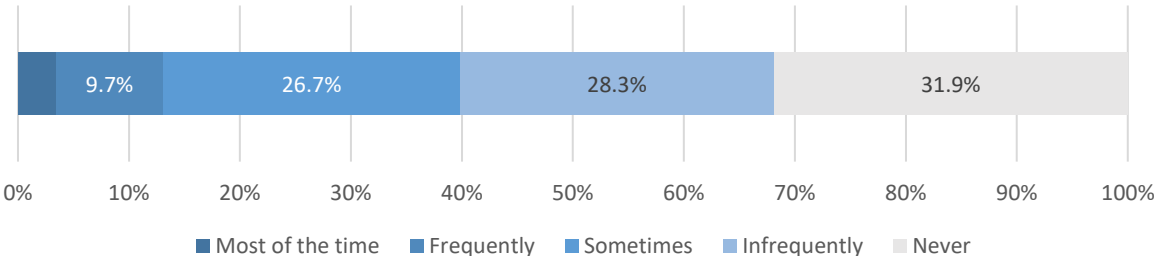
Last year's result:

In the same session, do you switch between VR and Desktop?

Most of the time	Frequently	Sometimes	Infrequently	Never
	7.8%	20.6%	27.5%	41.1%
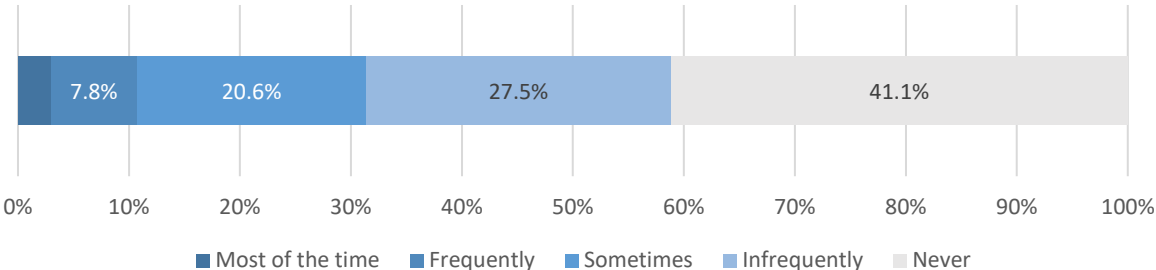
3.11.8. VR Plugins/Mods

The following question was also featured in last year's survey. This year however, the Navigraph Charts In-Game Panel was released and therefore added to the list. The Navigraph Charts In-Game Panel has become a popular VR plugin/mod, together with Oculus Home and AviTab EFB that were the most popular plugins/mods in 2019 and 2020.

Which plugins/mods do you use to improve your VR experience in the simulator?
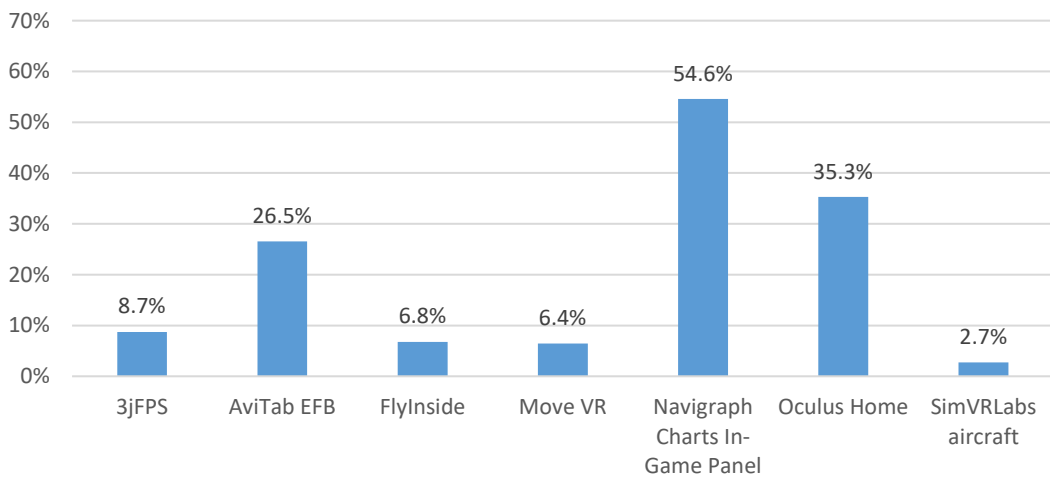
Last year's result:

Which plugins/mods do you use to improve your VR experience in the simulator?
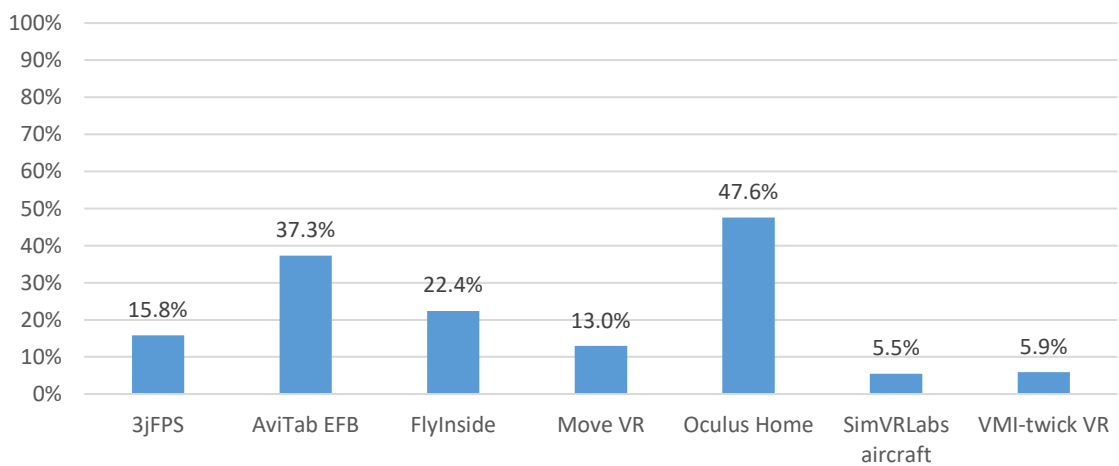
3.12. Addons in General

3.12.1. Addon Purchase Influences

This question was generalized in 2020 to cover all types of addon software. Similar to last year respondents tend to trust video reviews and tutorials, as well as recommendations from friends, when deciding which addon software to purchase. The answer option "Watching streams and live video shows" is also quite popular.

Like last year's survey "Ads or reviews in printed magazines" and "Newsletters from developers" have the least influence in the purchase decision according to respondents.

What influences you the most when deciding to purchase addon software?
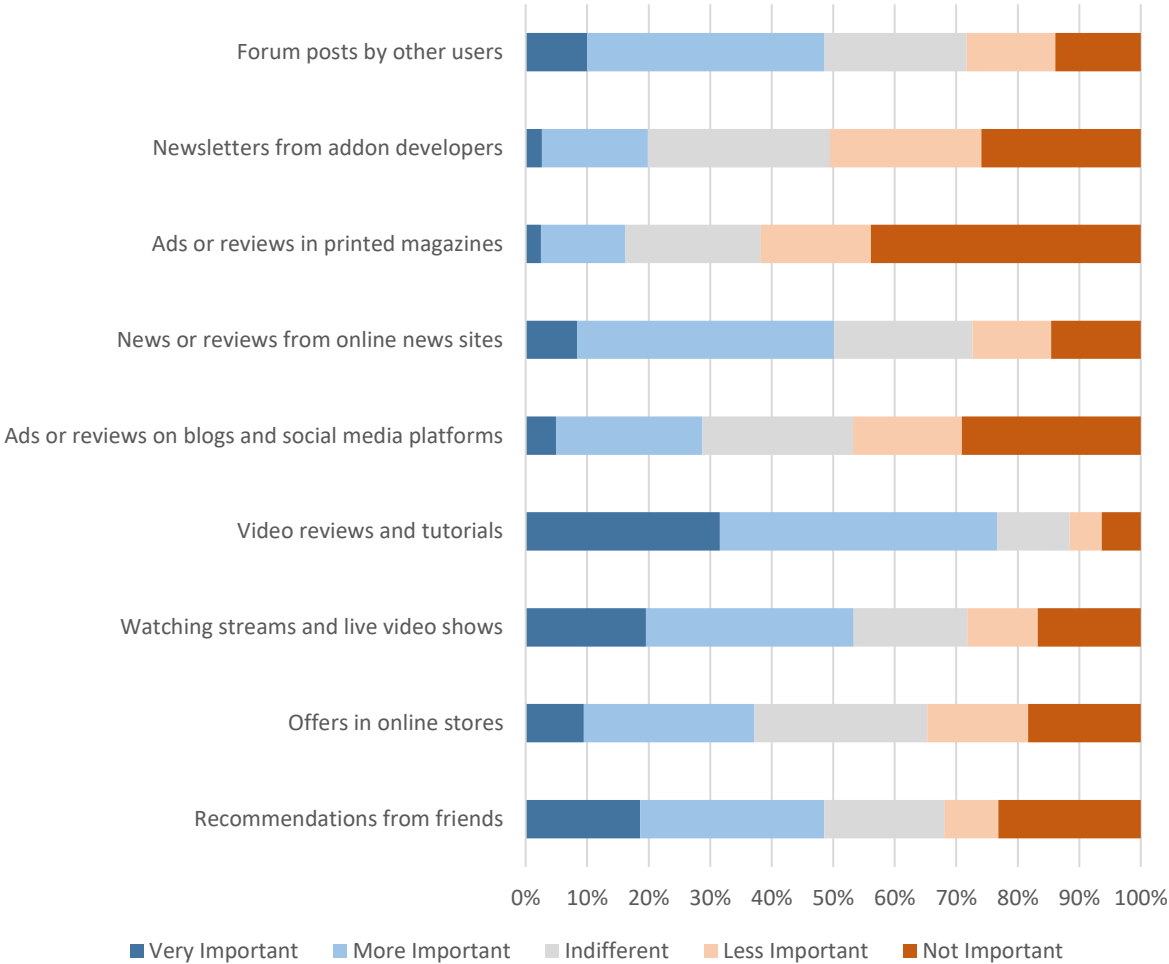
Last year's result:

What influences you the most when deciding to purchase addon software?

Categories (top to bottom):
- Forum posts by other users
- Newsletters from addon developer
- Ads or reviews in printed magazines
- News or reviews from online news sites
- Ads or reviews on blogs and social media
- Video reviews and tutorials
- Watching streams and live video shows
- Offers in online stores
- Recommendations from friends

Legend: Very Important, More Important, Indifferent, Less Important, Not Important
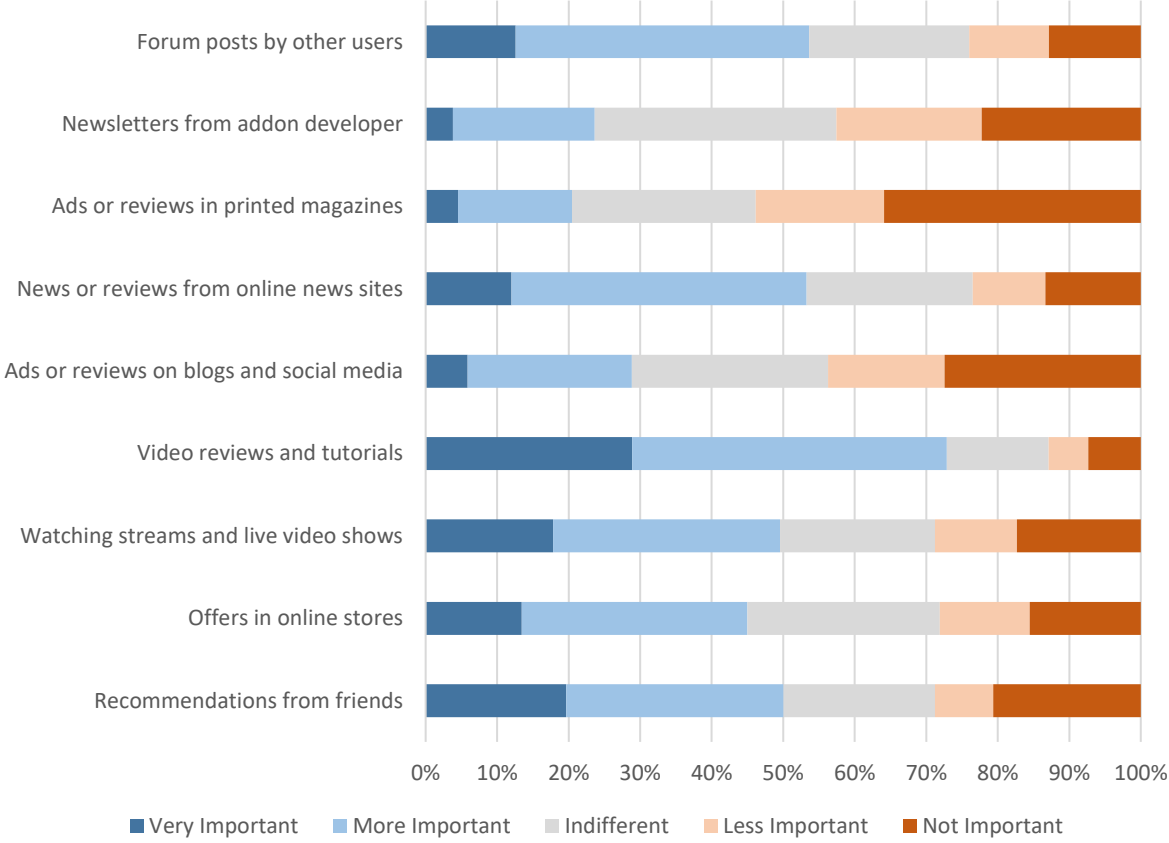
3.13. Aircraft Addons

3.13.1. Aircraft Feature Importance

Compared to the last three years, it seems like the same set of features are important to the respondents when it comes to purchasing an aircraft addon. Although every listed feature has shown to be important to some degree, we find that "Virtual cockpit visual realism", "Set of instruments/avionics modeled" and "Flight dynamics realism" as well as "Engine and systems realism" are considered very important to most respondents.

What are the most important features for you, when deciding which addon aircraft to purchase?
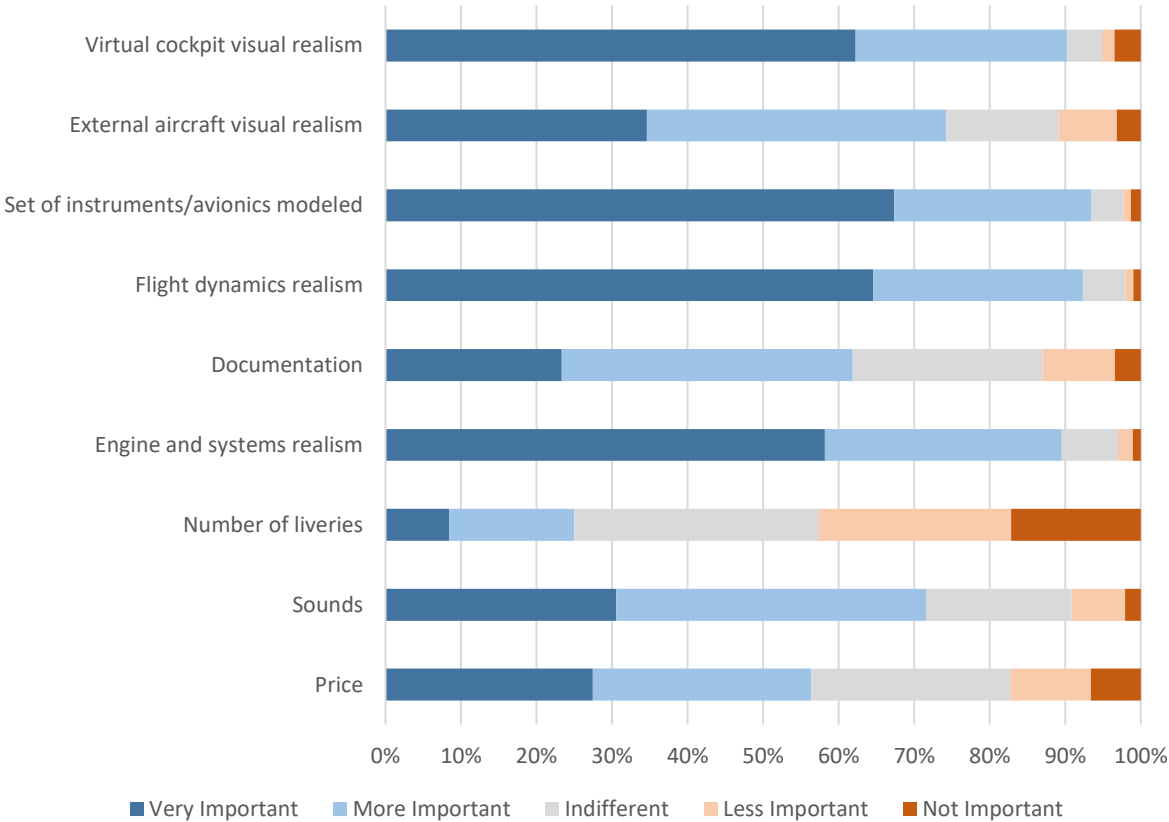
Last year's result:

What are the most important features for you, when deciding which addon aircraft to purchase?

Legend: Very Important, More Important, Indifferent, Less Important, Not Important

Categories (top to bottom):
- Virtual cockpit visual realism
- External aircraft visual realism
- Set of instruments/avionics modeled
- Flight dynamics realism
- Documentation
- Engine and systems realism
- Number of liveries
- Sounds
- Price
- Purchase process
- Customer Service/Support
- Addon developer reputation
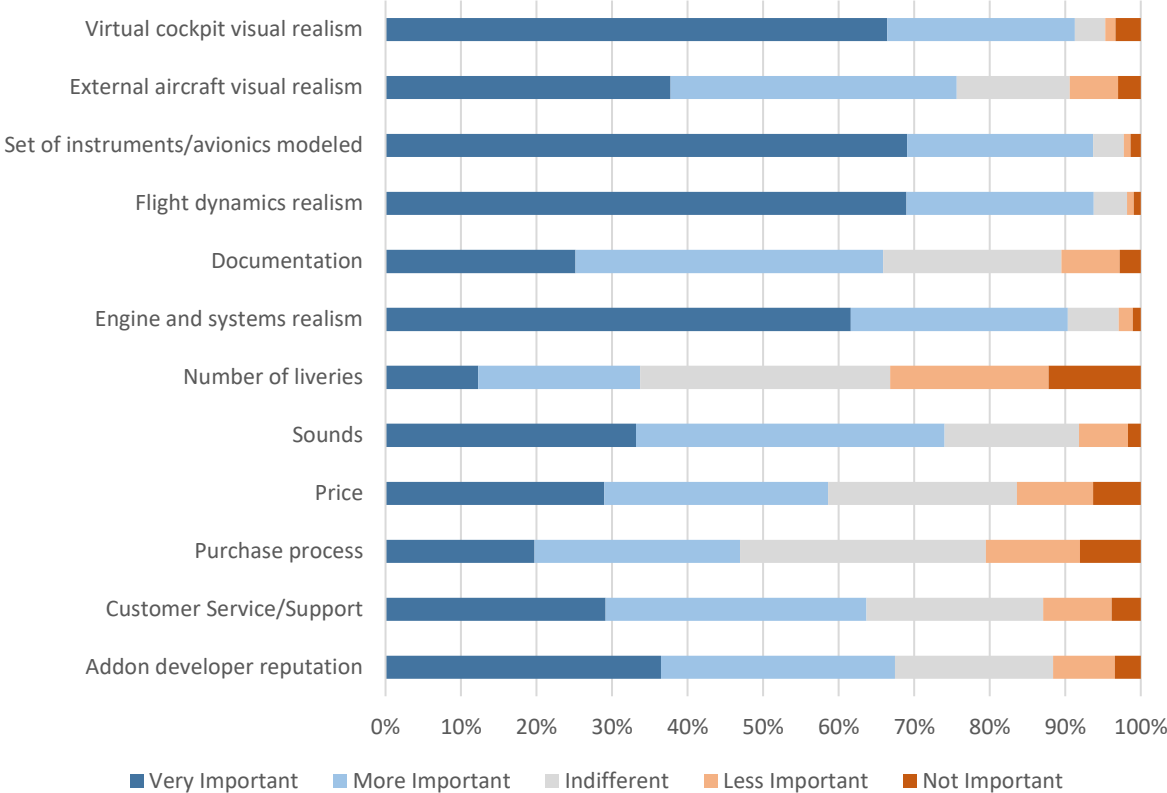
3.14. Scenery and Weather

3.14.1. Scenery Importance

Just like the three previous surveys presented, detailed airports remain the most important aspect of scenery addons. Presence of famous landmarks continues to be the least important aspect of a scenery addon.

Based on the type of flying you do, which aspects of a scenery addon is important to you?

Last year's result:

Based on the type of flying you do, which aspects of a scenery addon is important to you?
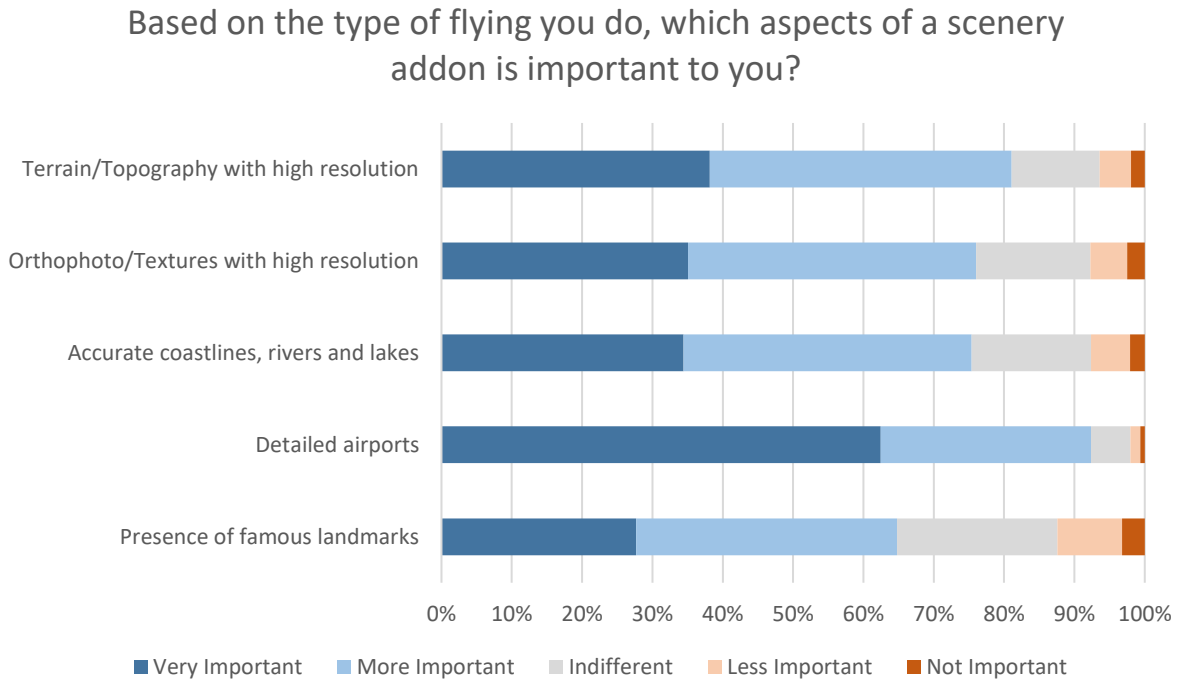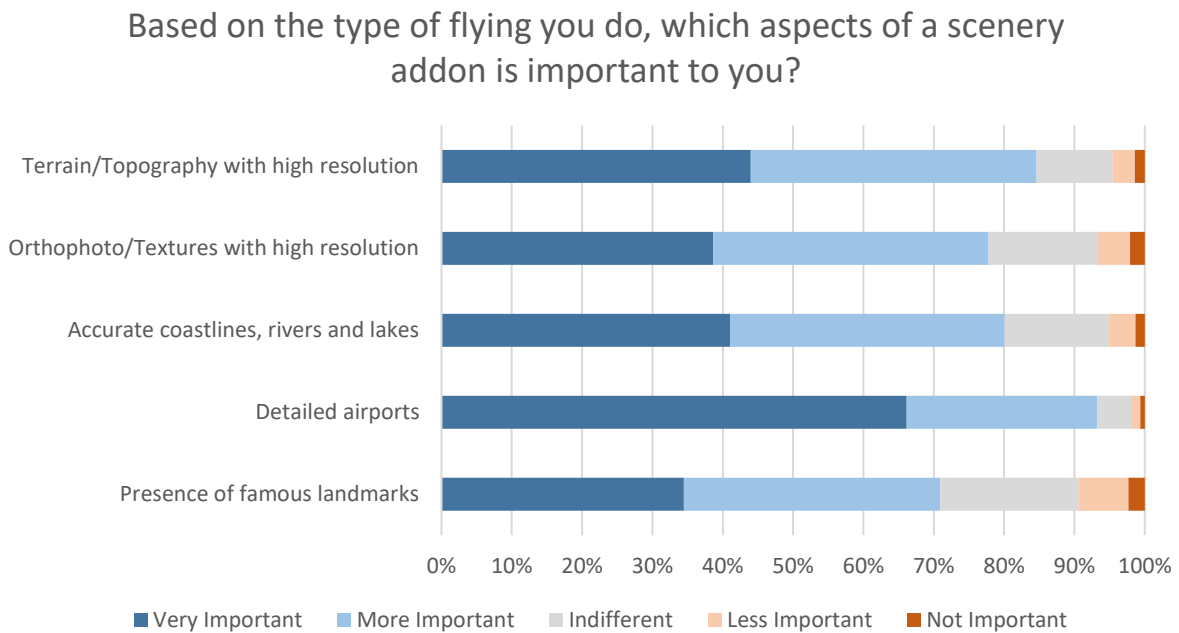
3.14.2. Airport Importance

This question shows us what characteristics you think are important in an airport add-on. The results are identical to last year, where accuracy is the most important aspect of an airport add-on.

Which characteristics of an airport add-on do you consider to be important?
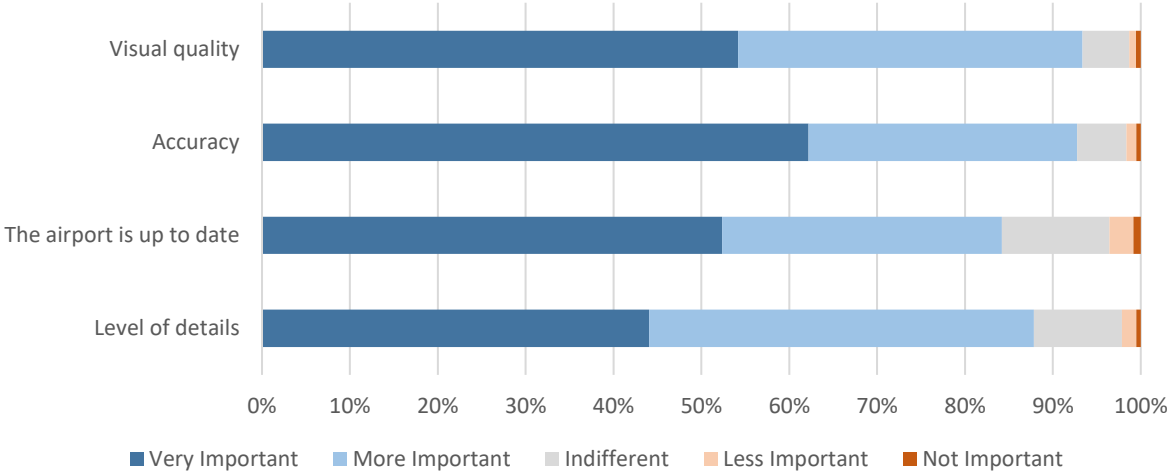
Last year's result:

Which characteristics of an airport add-on do you consider to be important?
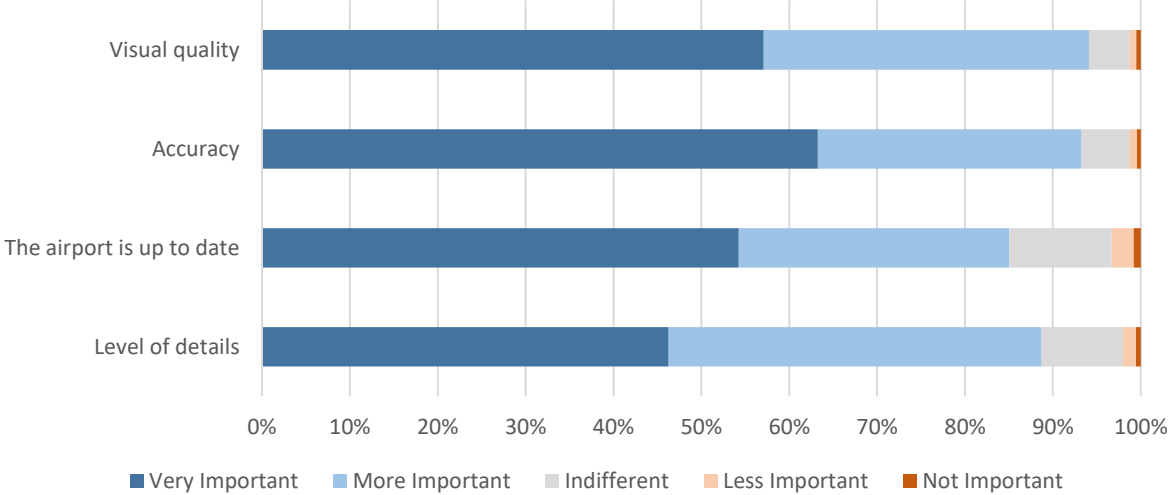
3.14.3. Weather Sources

This question was asked because we wanted to know which type of software is used to control the weather in a simulator. We can see a change from last year's result. "Weather generated by my simulator" increased by 13.5% and "Weather generated by payware software" dropped by 14.7%.

Which of the following types of weather services do you use?

Last year's result:

Which of the following types of weather services do you use?
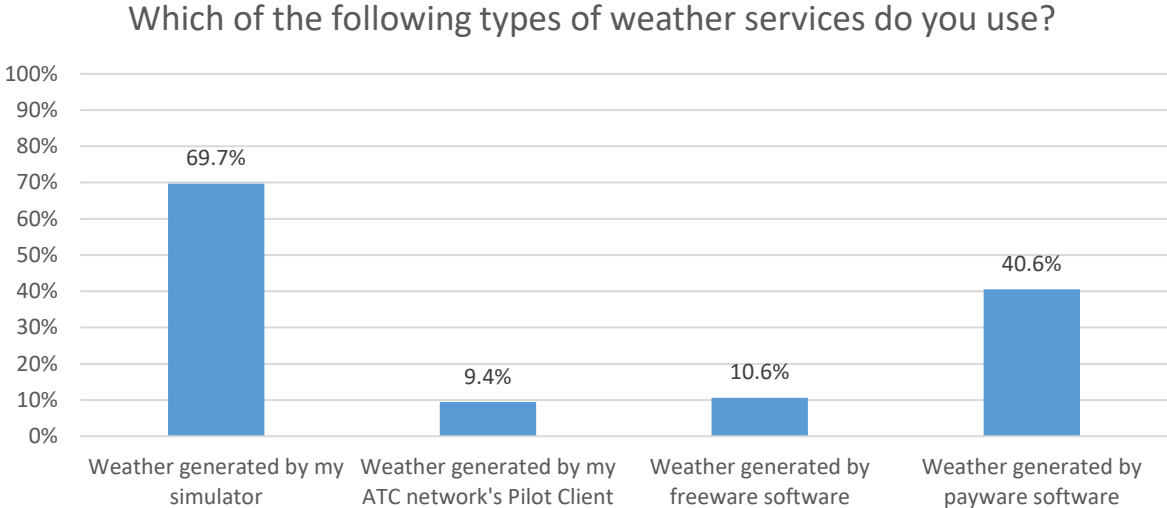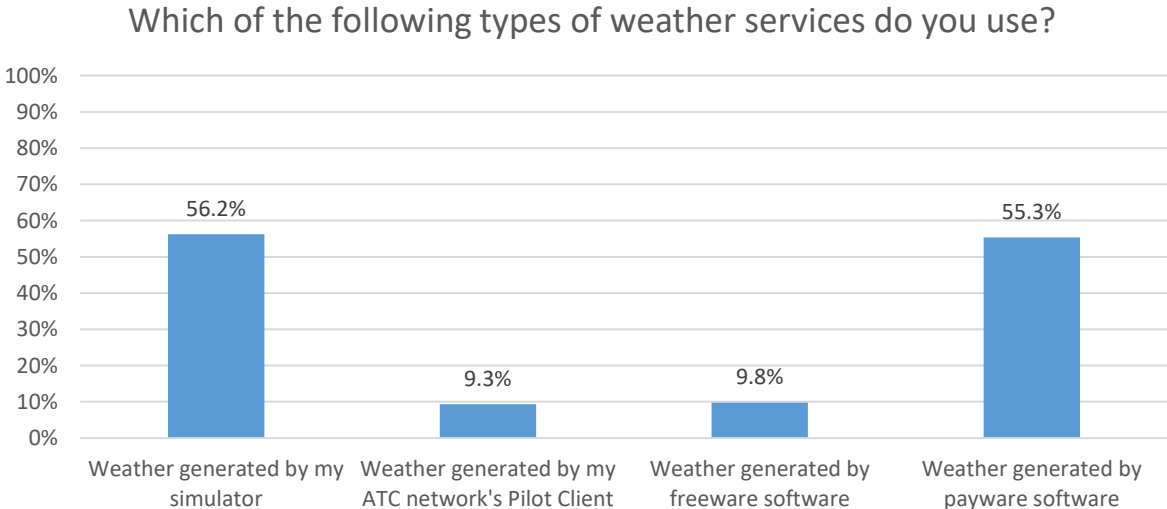
3.14.4. Weather Importance

The results are comparable to last year's survey. Access to live/real-time and a realistic weather experience seems to remain the most important feature for weather addons. Being able to worsen the weather conditions such that you must rely on instrument navigation turns out to have the least importance among the weather statements.

Considering the weather inside the simulator, please rate how important the following aspects are to you.
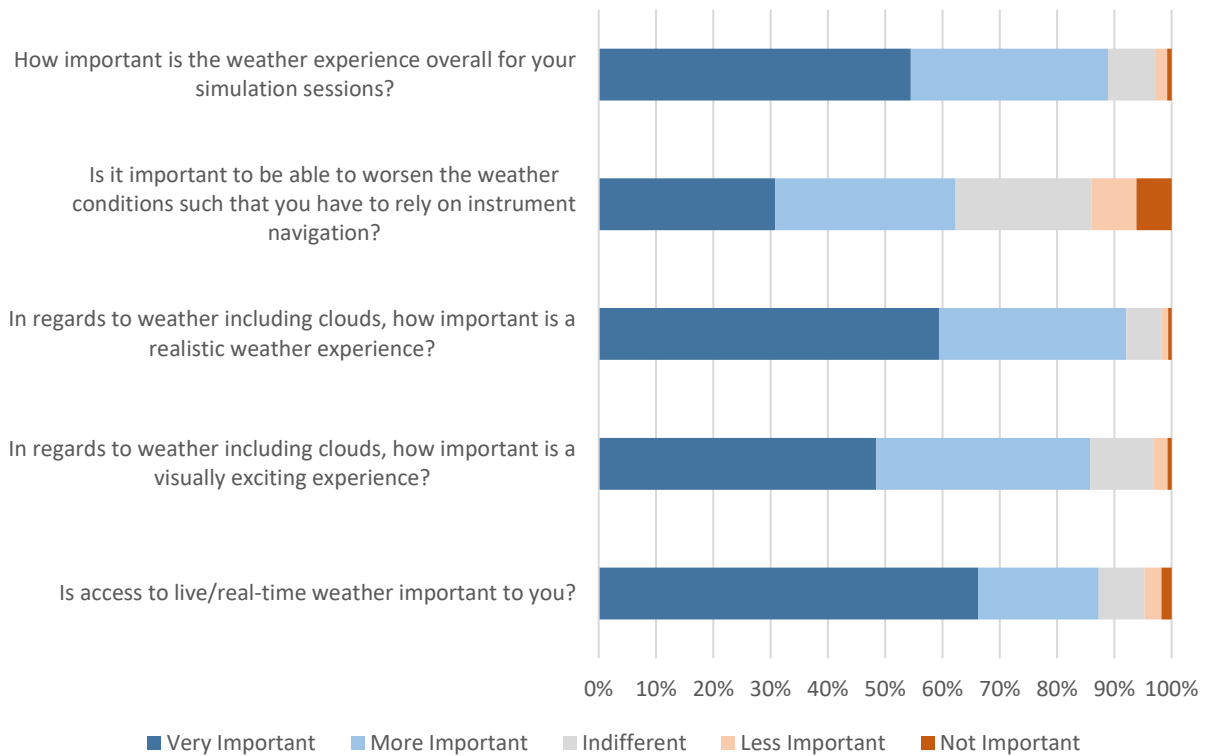
Last year's result:

Considering the weather inside the simulator, please rate how important the following aspects are to you.
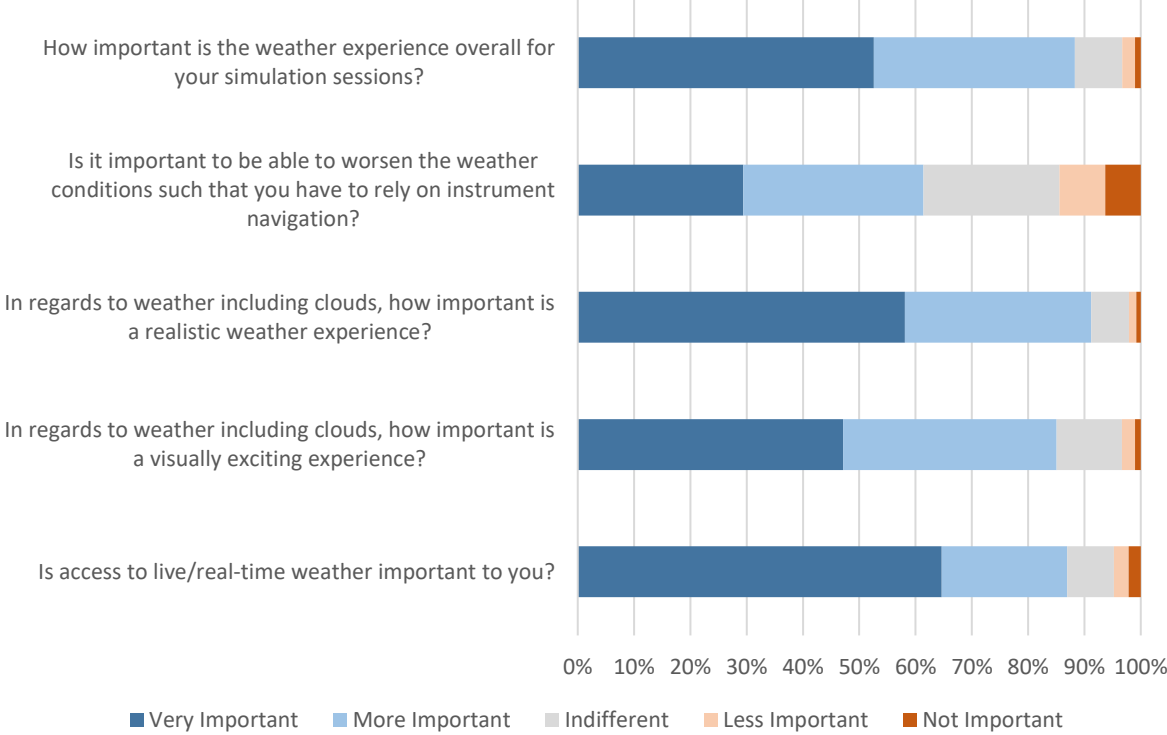
3.15. Charts Products and Addons

3.15.1. Charts Products Popularity

Navigraph Charts, SkyVector and FlightAware are the most commonly used charts products. This result is consistent with results from the last two years.

Which charts products do you use?

Product	Percentage
Sky Vector	27.2%
SkyDemon	2.6%
Navigraph Charts	63.3%
Navblue (formerly Navtech/EAG) Charts+	0.6%
Lufthansa Systems Lido/mPilot	1.1%
Lufthansa Systems Lido/eRouteManual	1.3%
Jeppesen VFR Manual	2.3%
Jeppesen Mobile FliteDeck	1.3%
Jeppesen FliteDeck Pro	3.3%
ForeFlight Mobile EFB	5.4%
FltPlan Go	3.0%
Flightaware	9.6%
FAA d-TTP	2.0%
Eurocontrol EAD	3.5%
Dauntless Aviation SimPlates Ultra	0.6%
ChartFox	9.9%
Air Navigation	1.8%
Aerosoft NavDataPro	3.6%
AeroNavMap	1.1%
None	13.8%

Last year's result:

Which charts products do you use?

Product	Percentage
Sky Vector	35.2%
Navigraph Charts	59.5%
Navblue (formerly Navtech/EAG) Charts+	1.9%
Lufthansa Systems Lido/mPilot	1.2%
Lufthansa Systems Lido/eRouteManual	1.2%
Jeppesen VFR Manual	3.2%
Jeppesen Mobile FliteDeck	2.1%
Jeppesen FliteDeck Pro	3.9%
ForeFlight Mobile EFB	7.8%
FltPlan Go	4.3%
Flightaware	11.3%
FAA d-TTP	2.7%
Eurocontrol EAD	2.9%
Dauntless Aviation SimPlates	1.0%
Aerosoft NavDataPro	3.6%
AeroNavMap	1.7%
None	16.8%

3.15.2. Charts Products Awareness

During the last four years respondents are well aware of Jeppesen charts. Respondents also know that charts are available from ANSPs. The awareness of Navblue charts has decreased from 8.9% to 5.5% during this year.

Which chart formats have you encountered?

Category	Percentage
Jeppesen	78.7%
Lufthansa Systems Lido/RouteManual	14.6%
Navblue	5.5%
Air Navigation Service Provider (ANSP) such as FAA,...	29.8%
None	14.7%

Last year's result:

Which chart formats have you encountered?

Category	Percentage
Jeppesen	78.7%
Lufthansa Systems Lido/RouteManual	14.9%
Navblue	8.9%
Air Navigation Service Provider (ANSP) such as FAA, NATS, DFS, DSNA,DECEA,LFV	30.3%
None	13.9%
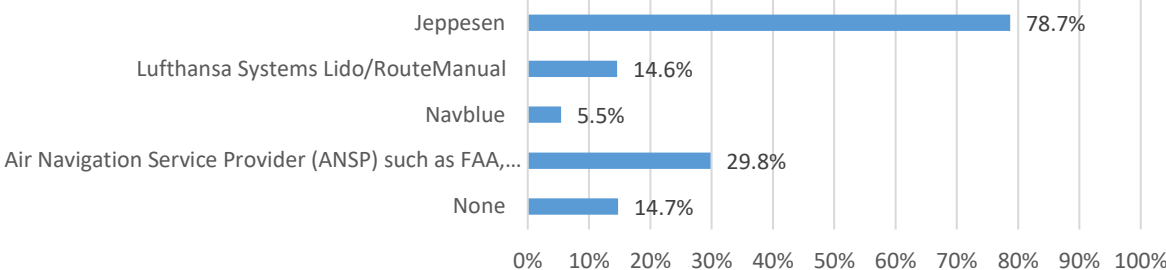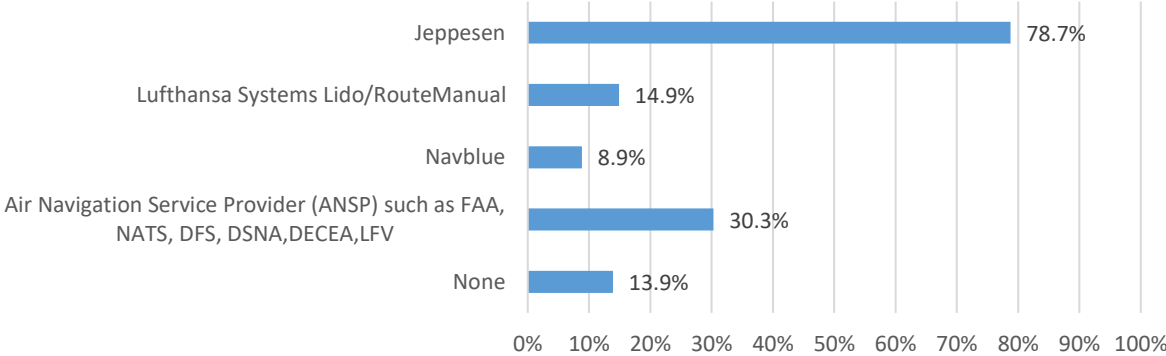
3.15.3. Charts Preference

Respondents continue to prefer Jeppesen charts with remarkable consistency. Just like the previous three years, 60% of the respondents said they prefer Jeppesen charts. This year, 9.7% of the respondents prefer charts from ANSPs, which is a slight drop compared to last year's 10.7%. Similar to last year's result, 6.8% prefer Lufthansa Systems. Navblue charts is preferred by 1% of the respondents, which is a drop compared to last year's 1.9%.

Which chart format do you prefer?

Category	Percentage
Air Navigation Service Provider (ANSP) such as FAA,…	9.7%
Jeppesen	62.9%
Lufthansa Systems Lido/RouteManual	6.8%
Navblue	1.0%
None	18.3%
Other	1.3%

Last year's result:

Which chart format do you prefer?

Category	Percentage
Air Navigation Service Provider (ANSP) such as…	10.7%
Jeppesen	60.2%
Lufthansa Systems Lido/RouteManual	6.6%
Navblue	1.9%
None	19.0%
Other	1.6%
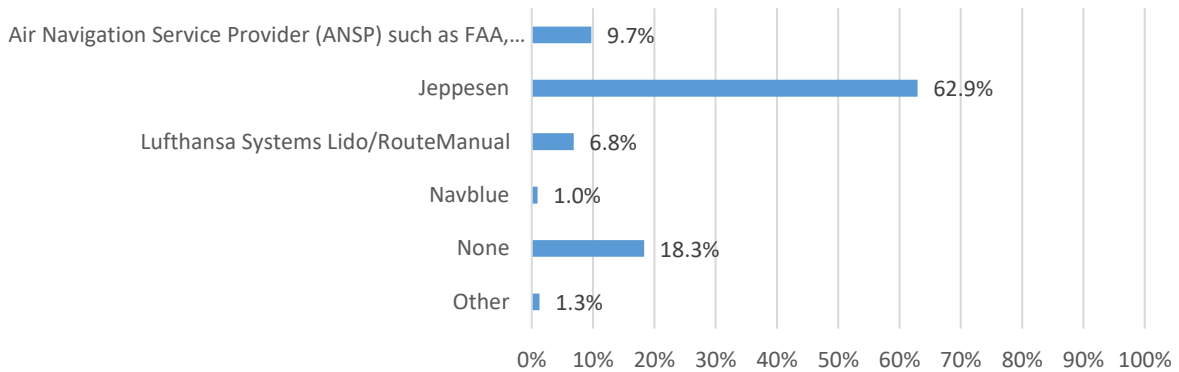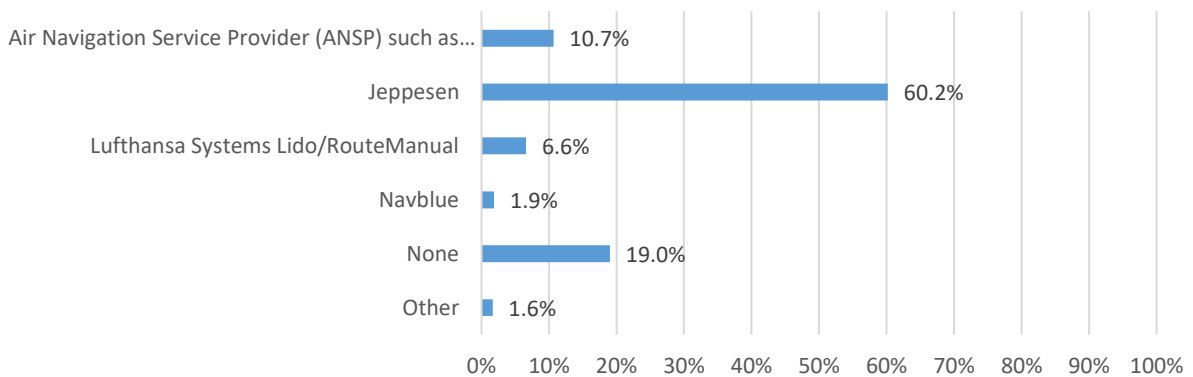
3.15.4. Flight Tracking Products

The following question is new for this year. By asking this question, we wanted to know which products our respondents use for tracking their flights, if any. It turned out that 60% of the respondents use a flight tracker. The top three flight trackers are Simlink/Moving Maps by Navigraph, Volanta by Orbx, and SimToolKitPro.

Which visual flight tracking products do you use?

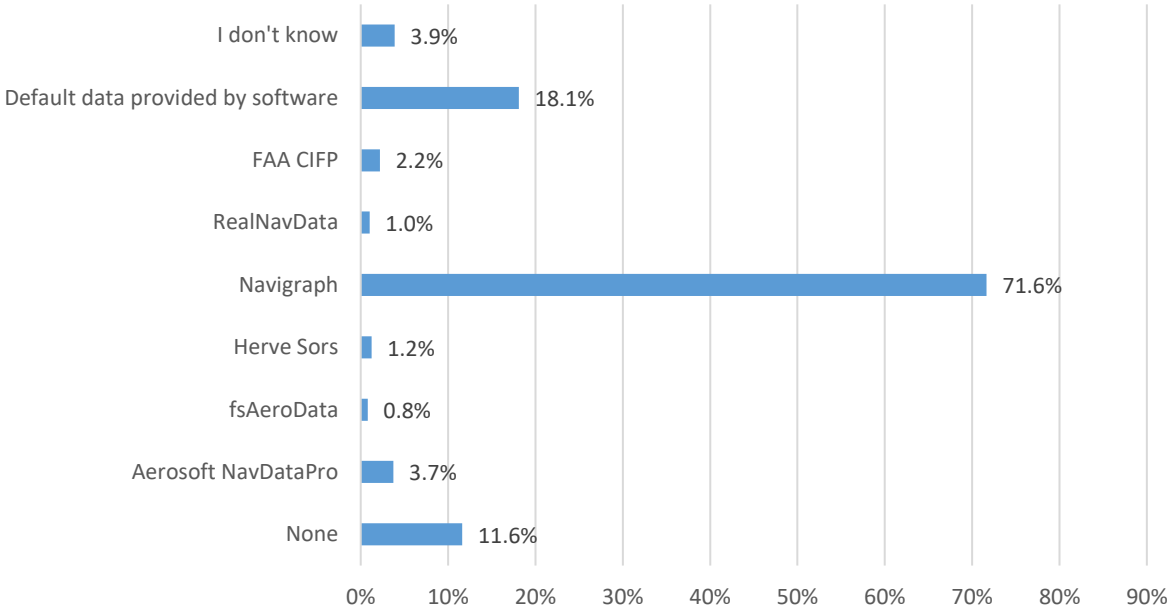| Product	Percentage
Other	4.0%
yoFlight Skypark by Parallell 42	1.5%
Volanta by Orbx	19.7%
SkyDemon	2.0%
SimToolkitPro	14.4%
Simlink/Moving Maps by Navigraph	28.3%
FSX Flight Tracker	1.2%
FSHub	0.7%
Foreflight	5.6%
Flight Tracker StreamDeck	1.0%
Find My Plane	0.7%
Airtrack by Haversine	0.4%
None	40.0%
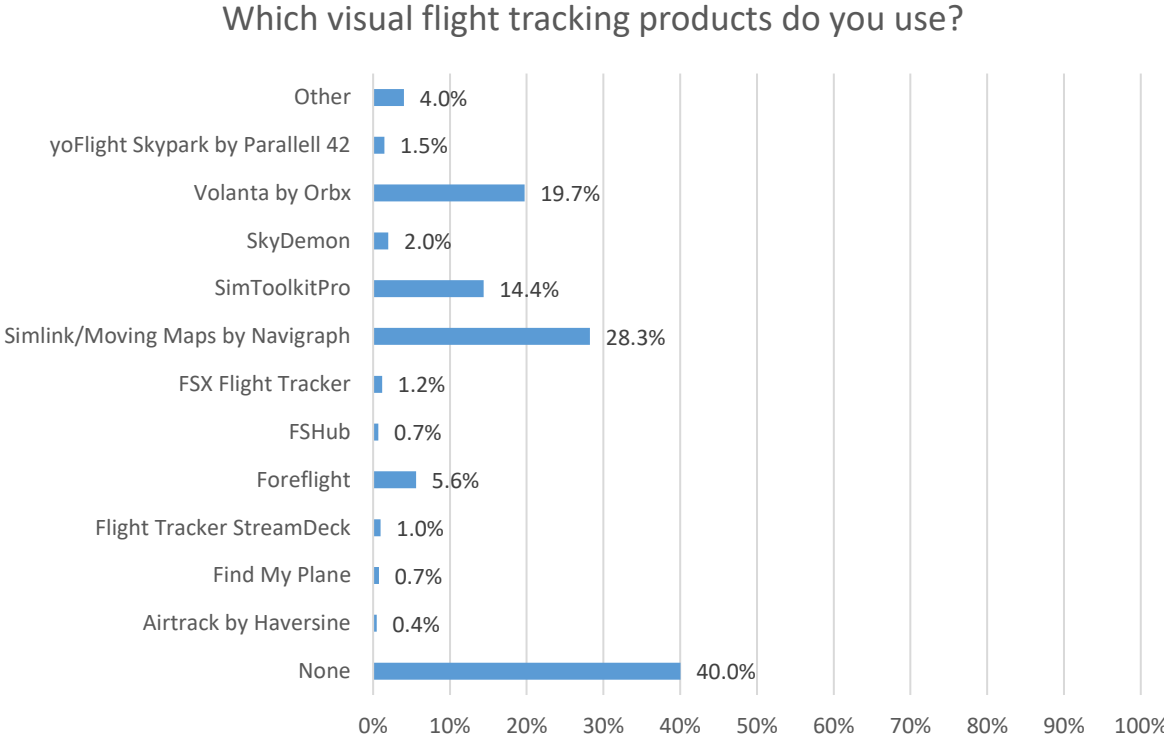
3.16. NavData/FMS Data
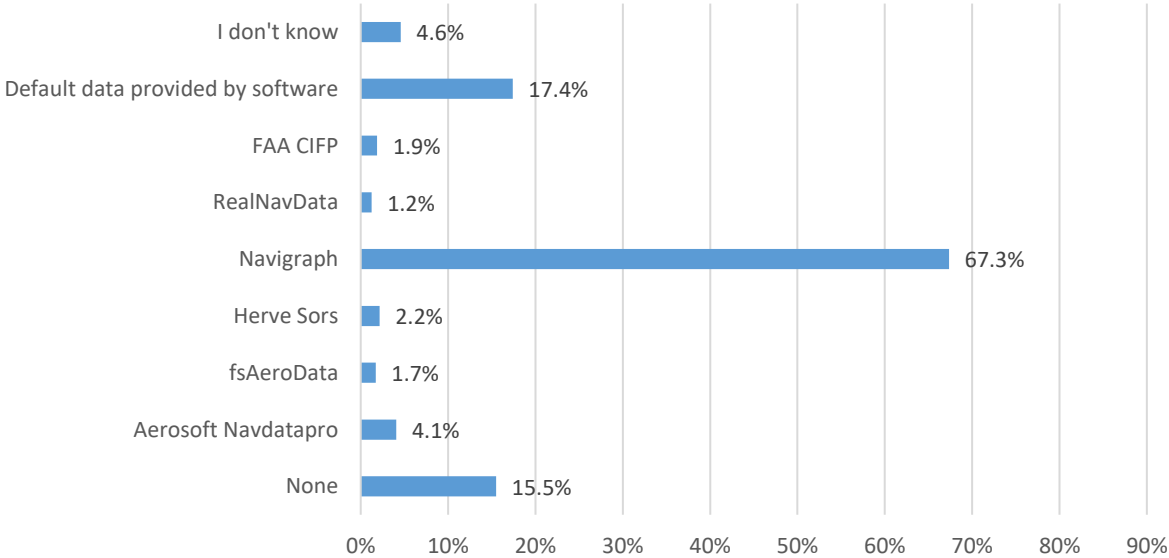
3.16.1. NavData/FMS Data Products Popularity

Last year, Navigraph was the most popular source of navdata at 67.3%, followed by default data provided by software at 17.4%. This year, Navigraph remains the most popular option at 71.6%, followed by default data provided by software at 18.1%.

Which NavData/FMS Data products do you use?

Category	Percentage
I don't know	3.9%
Default data provided by software	18.1%
FAA CIFP	2.2%
RealNavData	1.0%
Navigraph	71.6%
Herve Sors	1.2%
fsAeroData	0.8%
Aerosoft NavDataPro	3.7%
None	11.6%

Last year's result:

Which NavData/FMS Data products do you use?

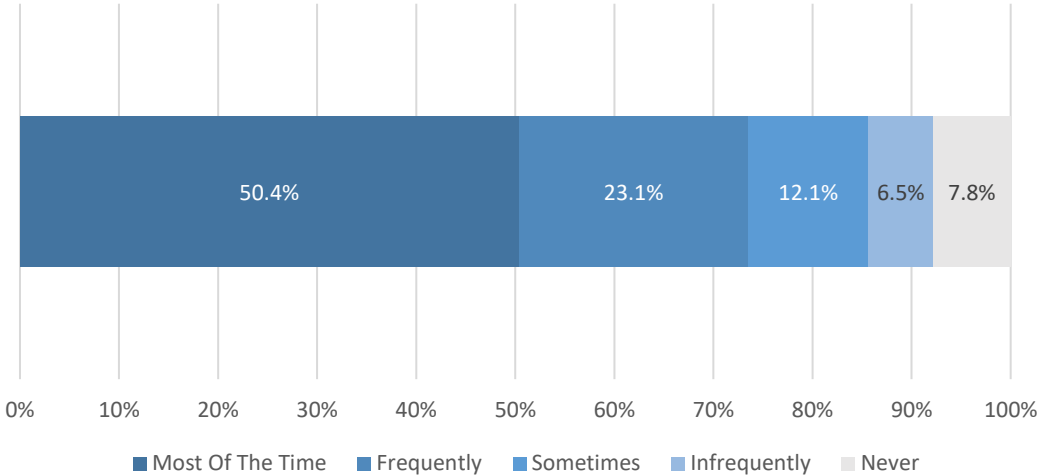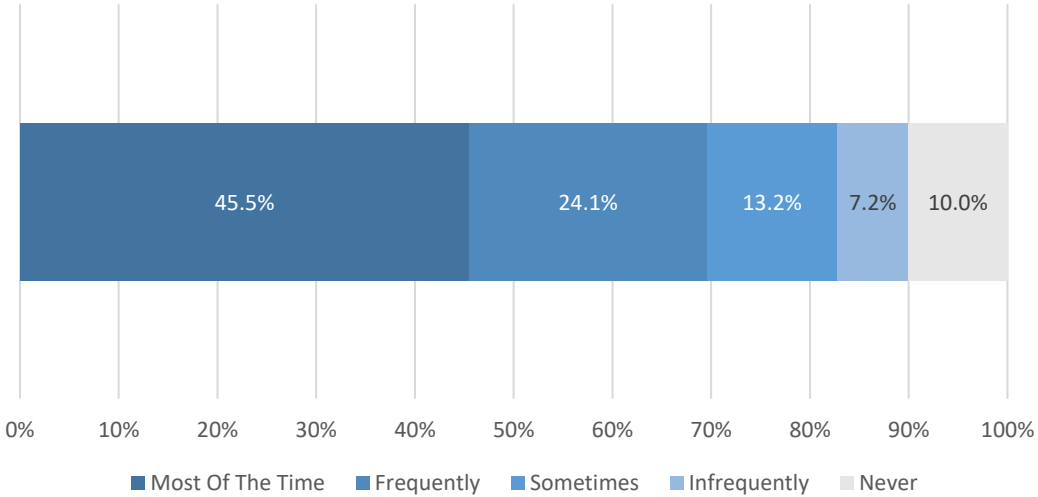| Category	Percentage
I don't know	4.6%
Default data provided by software	17.4%
FAA CIFP	1.9%
RealNavData	1.2%
Navigraph	67.3%
Herve Sors	2.2%
fsAeroData	1.7%
Aerosoft Navdatapro	4.1%
None	15.5%

3.17. Flight Planning

3.17.1. Usage

Just over one out of two respondents use flight planning services most of the time. The results are comparable to last year's survey.

How often do you use flight planning services?

Most Of The Time	Frequently	Sometimes	Infrequently	Never
50.4%	23.1%	12.1%	6.5%	7.8%

■ Most Of The Time ■ Frequently ■ Sometimes ■ Infrequently ■ Never

Last year's result:

How often do you use flight planning services?

Most Of The Time	Frequently	Sometimes	Infrequently	Never
45.5%	24.1%	13.2%	7.2%	10.0%

■ Most Of The Time ■ Frequently ■ Sometimes ■ Infrequently ■ Never

We ask respondents why they use flight planning services to learn what the most important purposes for their flight planning are. The results are comparable to previous year's survey.
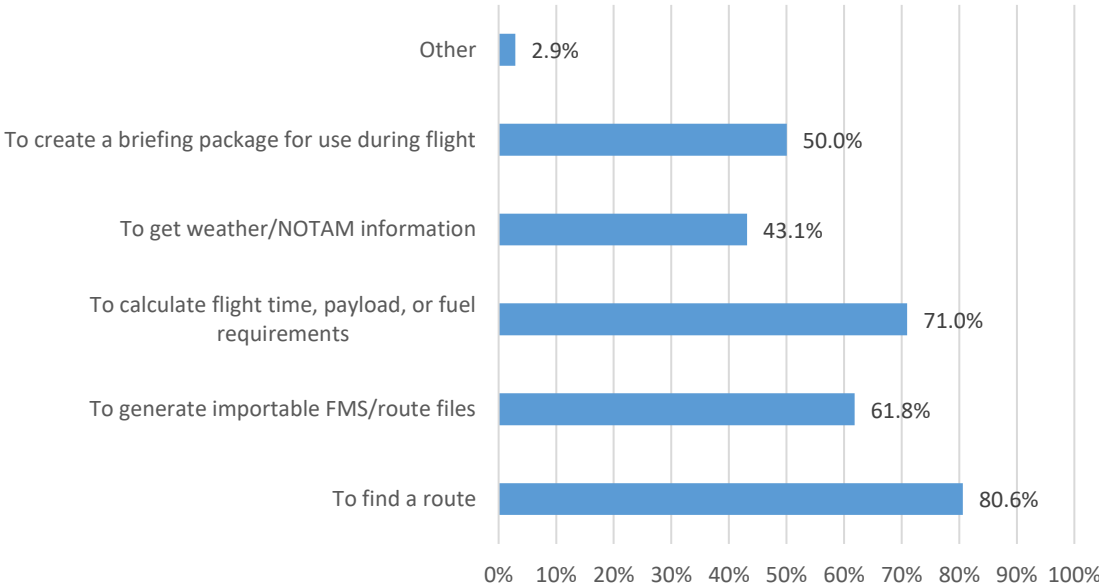
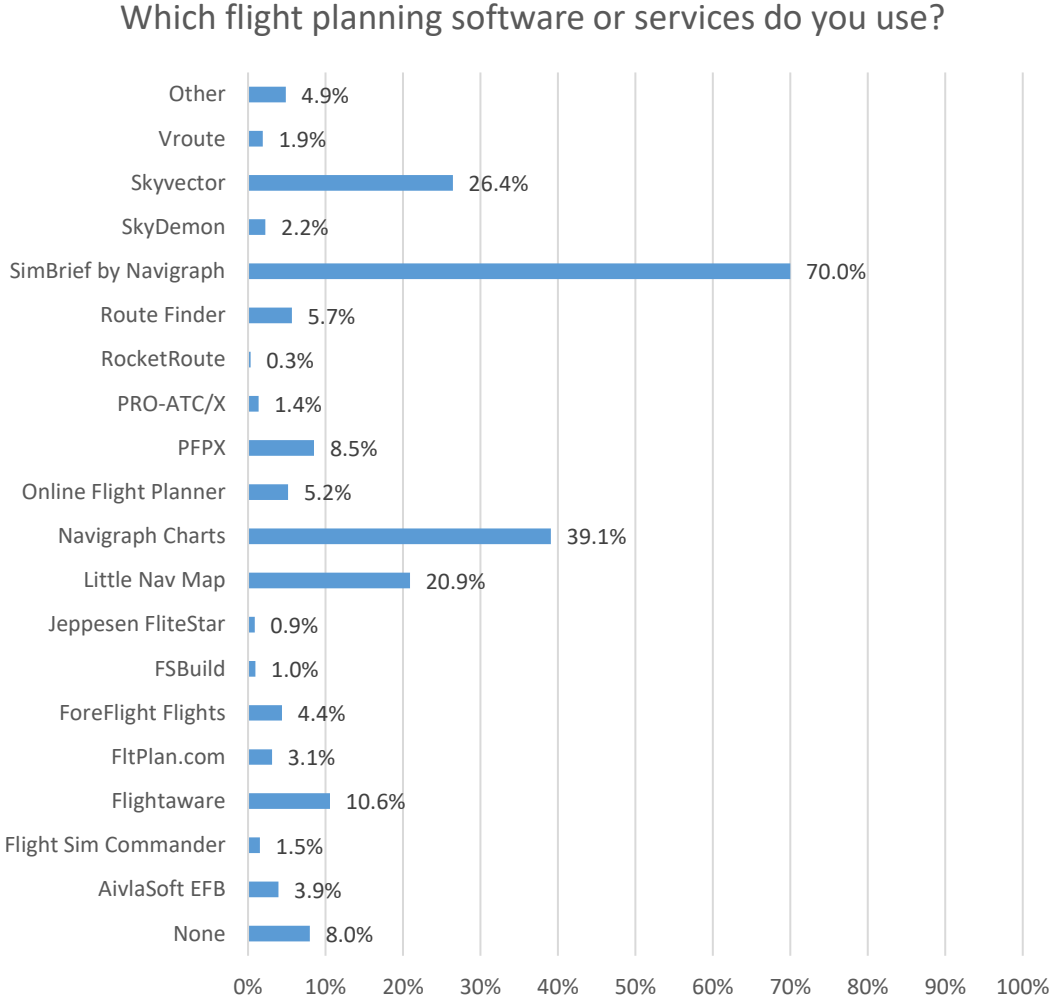## Why do you use flight planning services (select any that apply)?

Category	Percentage
Other	2.7%
To create a briefing package for use during flight	55.3%
To get weather/NOTAM information	44.4%
To calculate flight time, payload, or fuel requirements	73.8%
To generate importable FMS/route files	65.2%
To find a route	79.6%
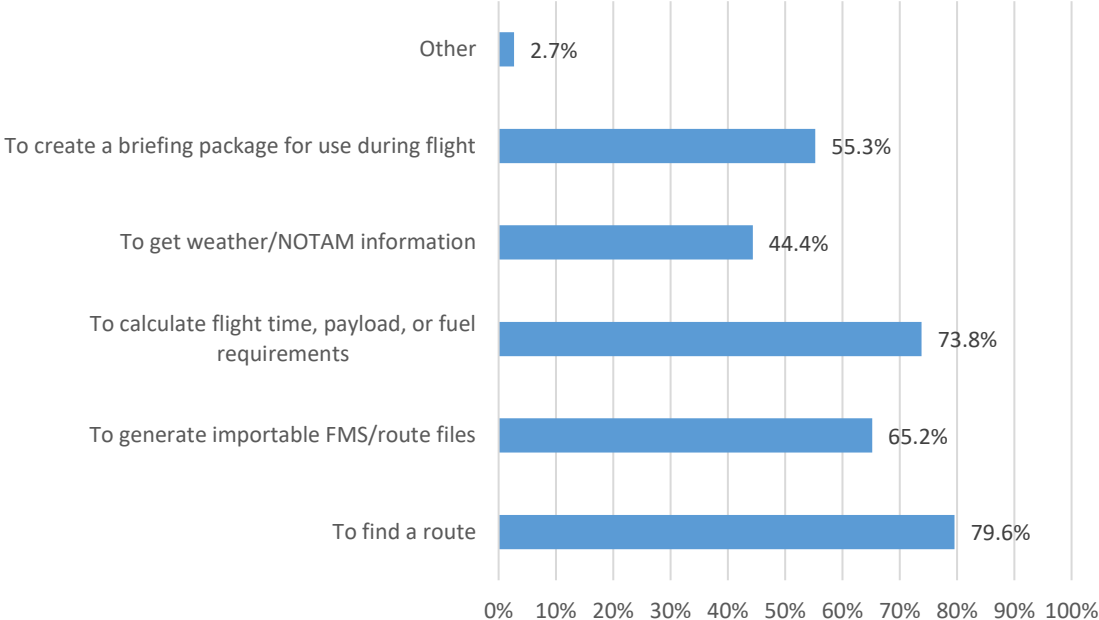
Last year's result:

Why do you use flight planning services (select any that apply)?

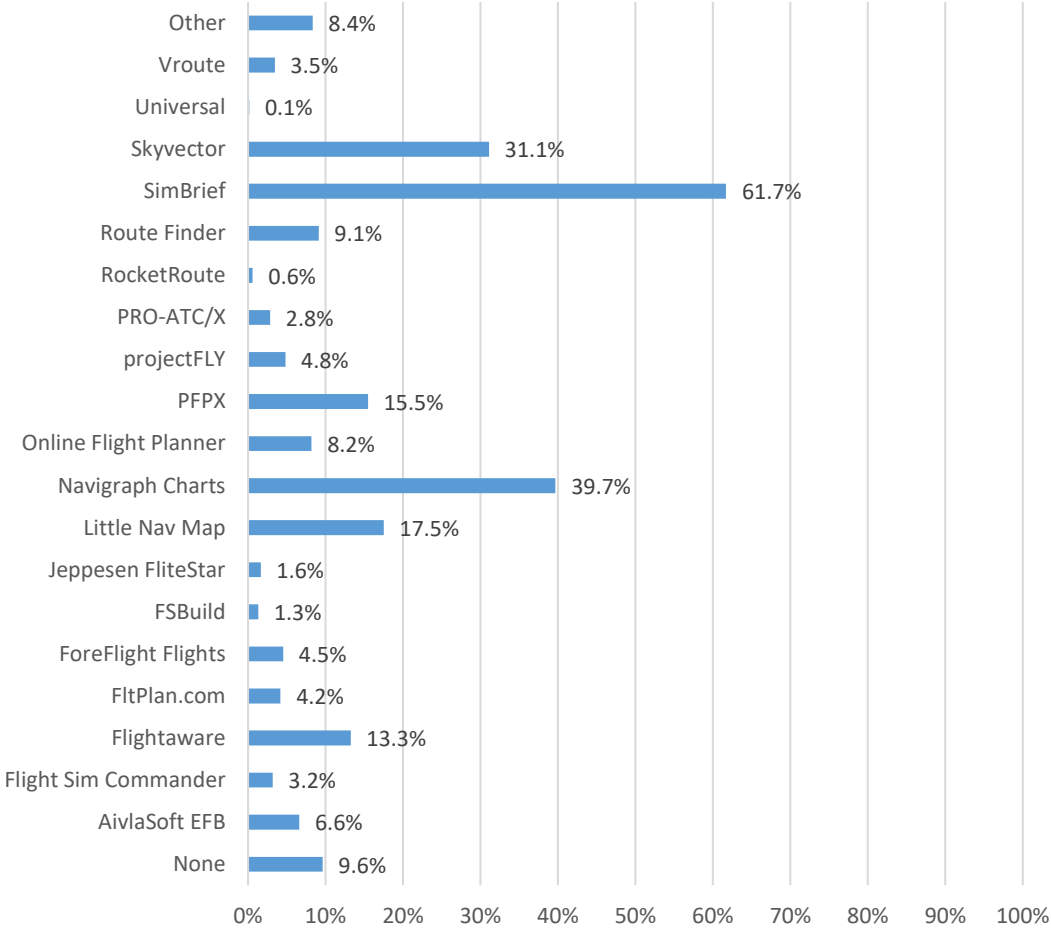| Category	Percentage
Other	2.9%
To create a briefing package for use during flight	50.0%
To get weather/NOTAM information	43.1%
To calculate flight time, payload, or fuel requirements	71.0%
To generate importable FMS/route files	61.8%
To find a route	80.6%

3.17.2. Services

SimBrief by Navigraph continues to be the most preferred flight planning software just like the last three years, having increased from 61.7% to 70% this year. Navigraph Charts and SkyVector continues to be number two and three respectively. Little Nav Map has increased by 3.4% since last year, staying at fourth place in popularity.

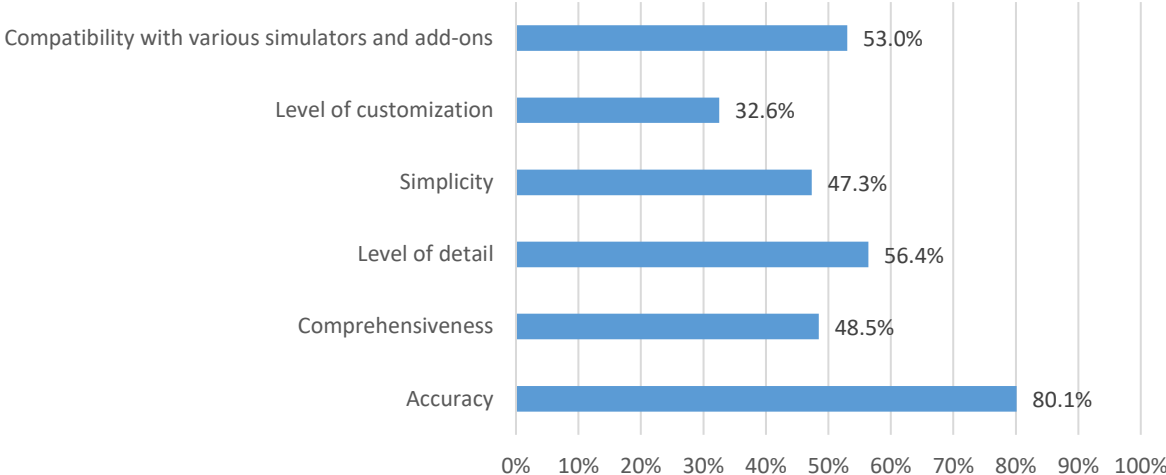### Which flight planning software or services do you use?

Service	Percentage
Other	4.9%
Vroute	1.9%
Skyvector	26.4%
SkyDemon	2.2%
SimBrief by Navigraph	70.0%
Route Finder	5.7%
RocketRoute	0.3%
PRO-ATC/X	1.4%
PFPX	8.5%
Online Flight Planner	5.2%
Navigraph Charts	39.1%
Little Nav Map	20.9%
Jeppesen FliteStar	0.9%
FSBuild	1.0%
ForeFlight Flights	4.4%
FltPlan.com	3.1%
Flightaware	10.6%
Flight Sim Commander	1.5%
AivlaSoft EFB	3.9%
None	8.0%

Last year's result:

Which flight planning software or services do you use?

Service	Percentage
Other	8.4%
Vroute	3.5%
Universal	0.1%
Skyvector	31.1%
SimBrief	61.7%
Route Finder	9.1%
RocketRoute	0.6%
PRO-ATC/X	2.8%
projectFLY	4.8%
PFPX	15.5%
Online Flight Planner	8.2%
Navigraph Charts	39.7%
Little Nav Map	17.5%
Jeppesen FliteStar	1.6%
FSBuild	1.3%
ForeFlight Flights	4.5%
FltPlan.com	4.2%
Flightaware	13.3%
Flight Sim Commander	3.2%
AivlaSoft EFB	6.6%
None	9.6%

3.17.3. Important Features

This question was new for last year's survey. We can see that all aspects are important to some degree. Accuracy continues to be the most important feature, followed by level of detail and compatibility with various simulator add-ons.

**When selecting a flight planning service, what characteristics are most important to you?**

Characteristic	Percentage
Compatibility with various simulators and add-ons	53.0%
Level of customization	32.6%
Simplicity	47.3%
Level of detail	56.4%
Comprehensiveness	48.5%
Accuracy	80.1%

Last year's result:

When selecting a flight planning service, what characteristics are most important to you?

| Characteristic	Percentage
Compatibility with various simulators and add-ons	55.1%
Level of customization	30.2%
Simplicity	45.8%
Level of detail	57.0%
Comprehensiveness	47.7%
Accuracy	80.4%
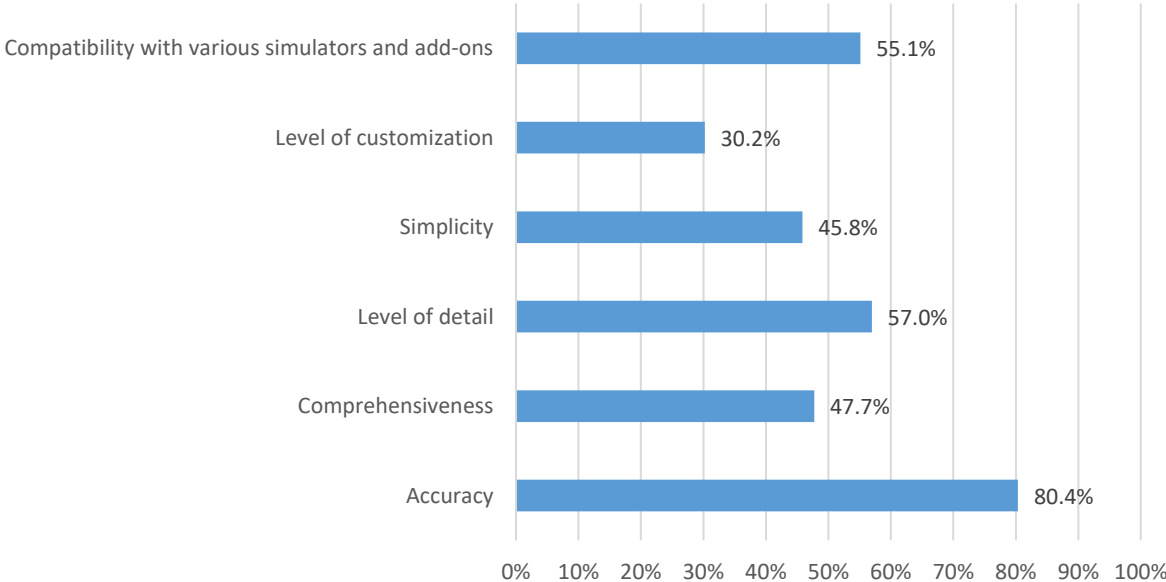
3.18. Training

3.18.1. Learning

By asking all respondents if they started learning to pilot a new aircraft type in the last 12 months, we could establish that this was the case for over 70% of our respondents. This is an increase by over 15% compared to last year, when just over 55% started learning to pilot a new aircraft type.
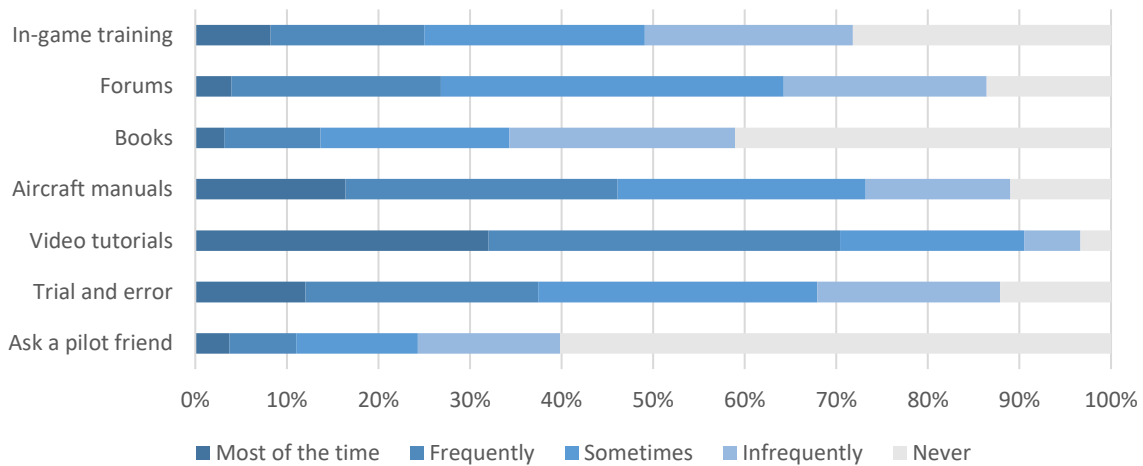
Did you start learning to pilot a new aircraft type in the last 12 months?

Last year's result:

Did you start learning to pilot a new aircraft type in the last 12 months?
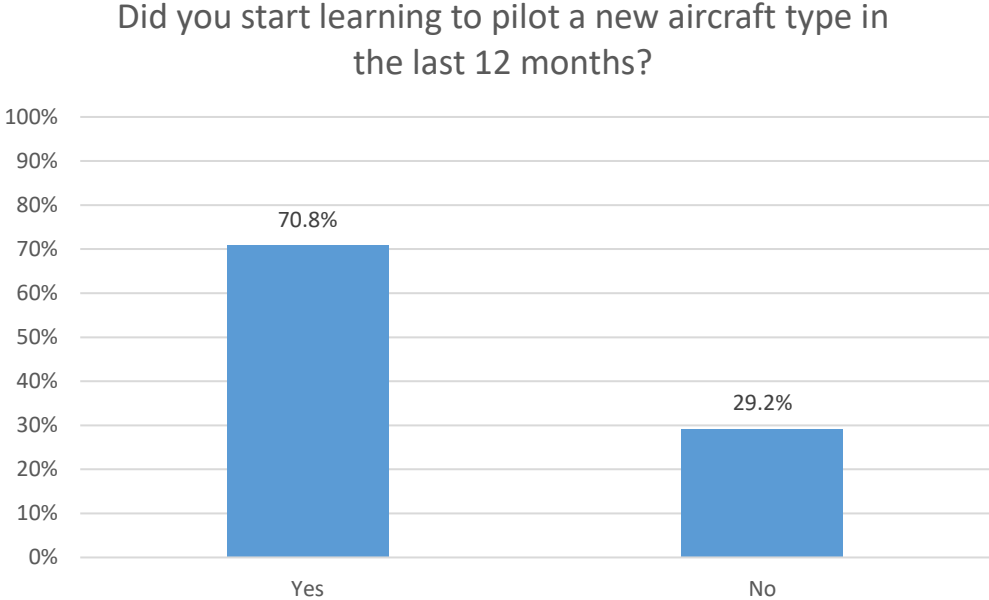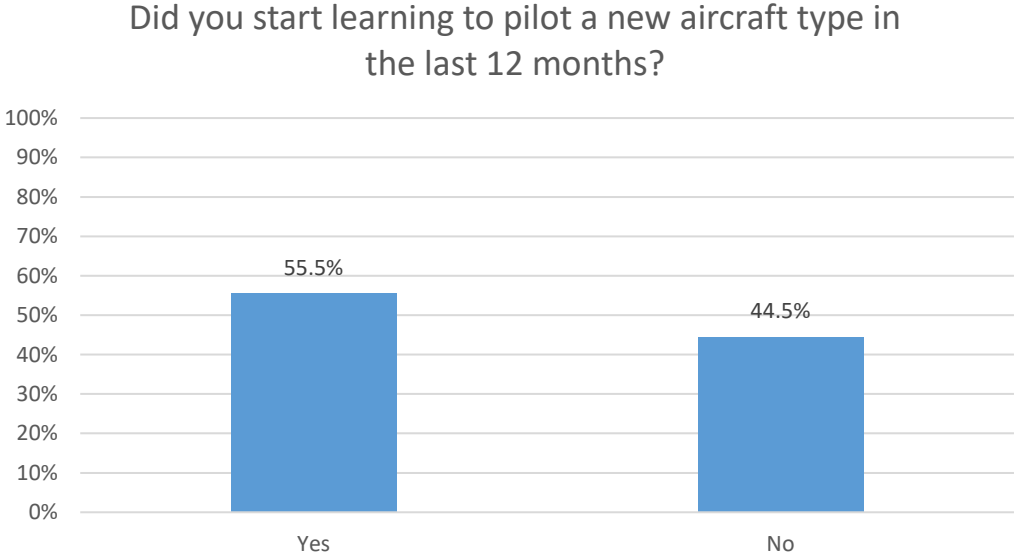
3.18.2. Learning Method

This question was conditional and only presented to the respondents who stated that they started to learn a new aircraft the last twelve months.

Among the different resources available when learning to pilot a new aircraft we found that video tutorials, trial and error, aircraft manuals and forums were most popular answer options. The results are consistent with last year's survey results.

Which resources do you use when learning to pilot a new aircraft?

Last year's result:

Which resources do you use when learning to pilot a new aircraft?
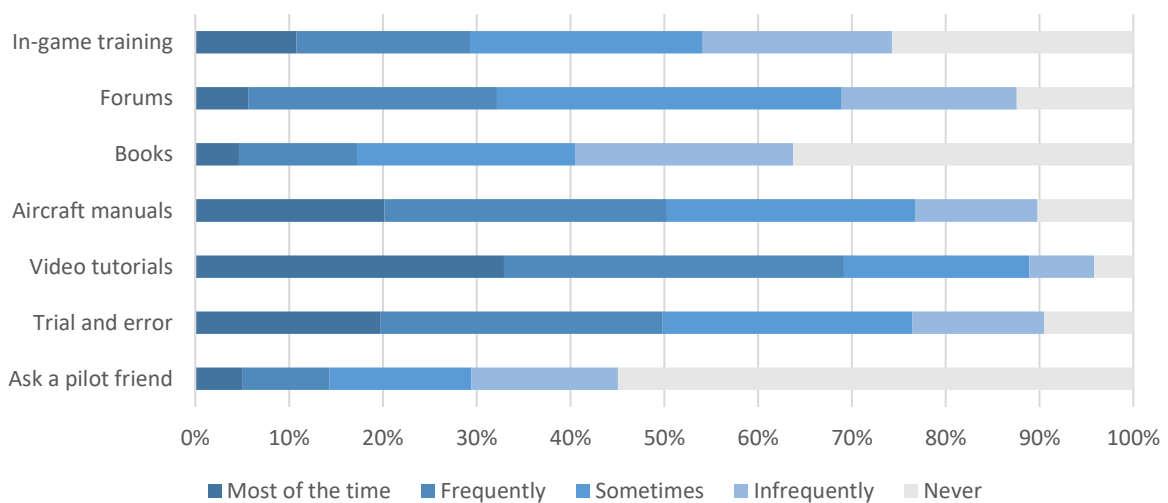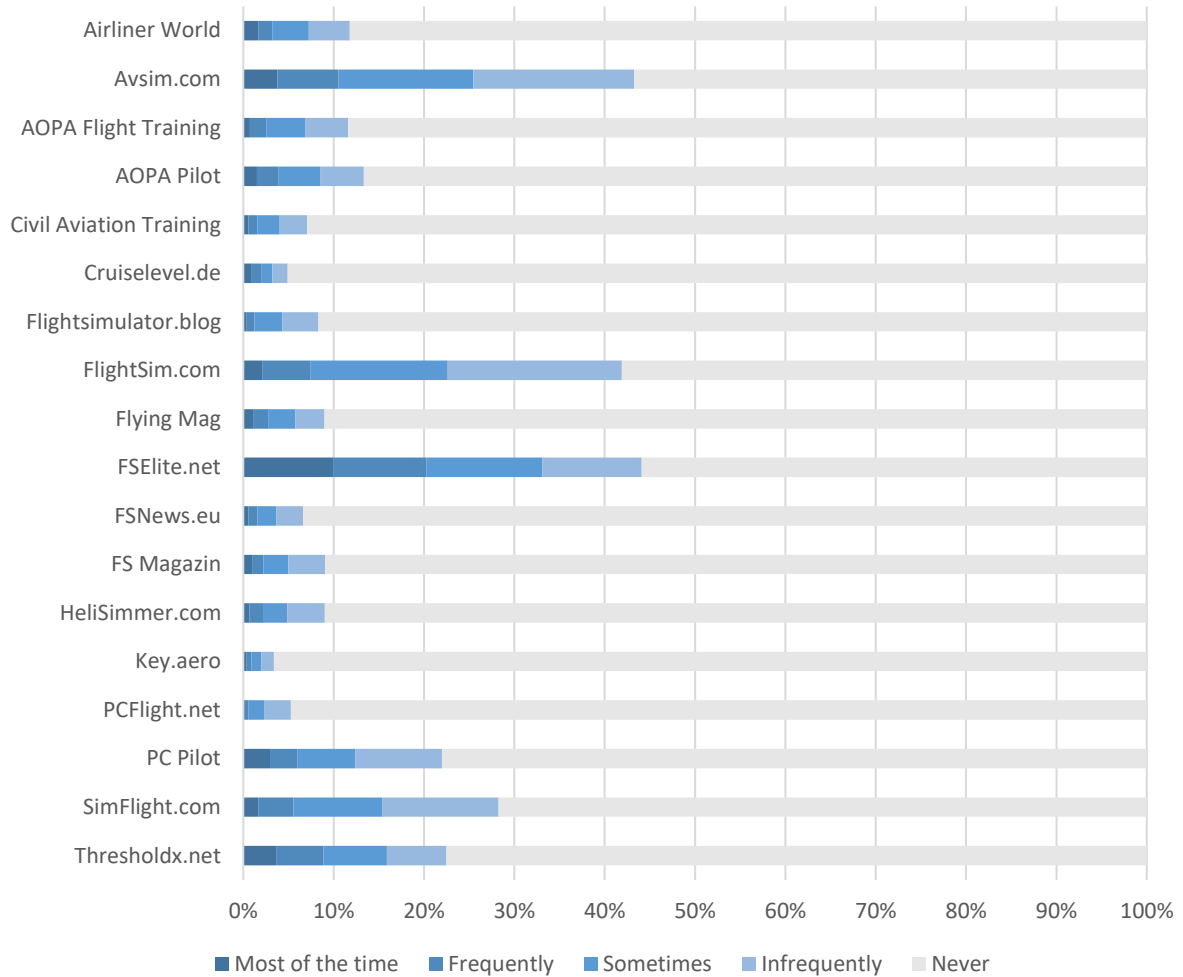
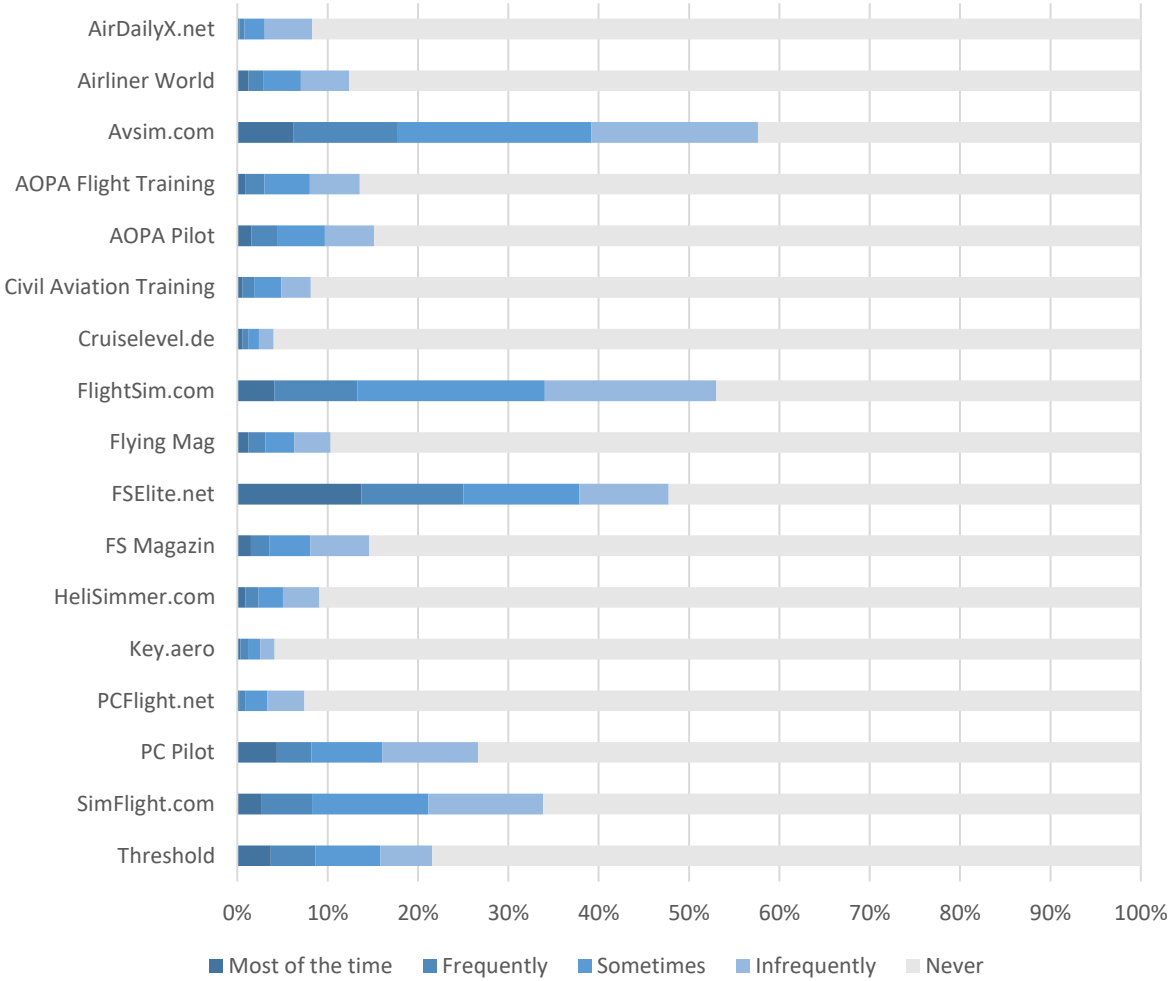## 3.19. Media

3.19.1. Media Consumption

Avsim.com continues to be the most popular flightsim or aviation related media. FlightSim.com and FSElite.net are also popular.

Which flightsim or aviation related media do you consume?

Legend: Most of the time, Frequently, Sometimes, Infrequently, Never

Categories: Airliner World, Avsim.com, AOPA Flight Training, AOPA Pilot, Civil Aviation Training, Cruiselevel.de, Flightsimulator.blog, FlightSim.com, Flying Mag, FSElite.net, FSNews.eu, FS Magazin, HeliSimmer.com, Key.aero, PCFlight.net, PC Pilot, SimFlight.com, Thresholdx.net

Last year's result:

## Which flightsim or aviation related media do you consume?

## 3.20. Video

3.20.1. Platform Preference

Not unlike the results of previous three surveys, YouTube remains the most popular video platform. Facebook and Twitch also continues to be strong platforms for the consumption of flight simulation related video content. This year we also added TikTok to the list of video platforms for consuming flight simulation related content.

Which video platforms do you use for consuming flight simulation related content?
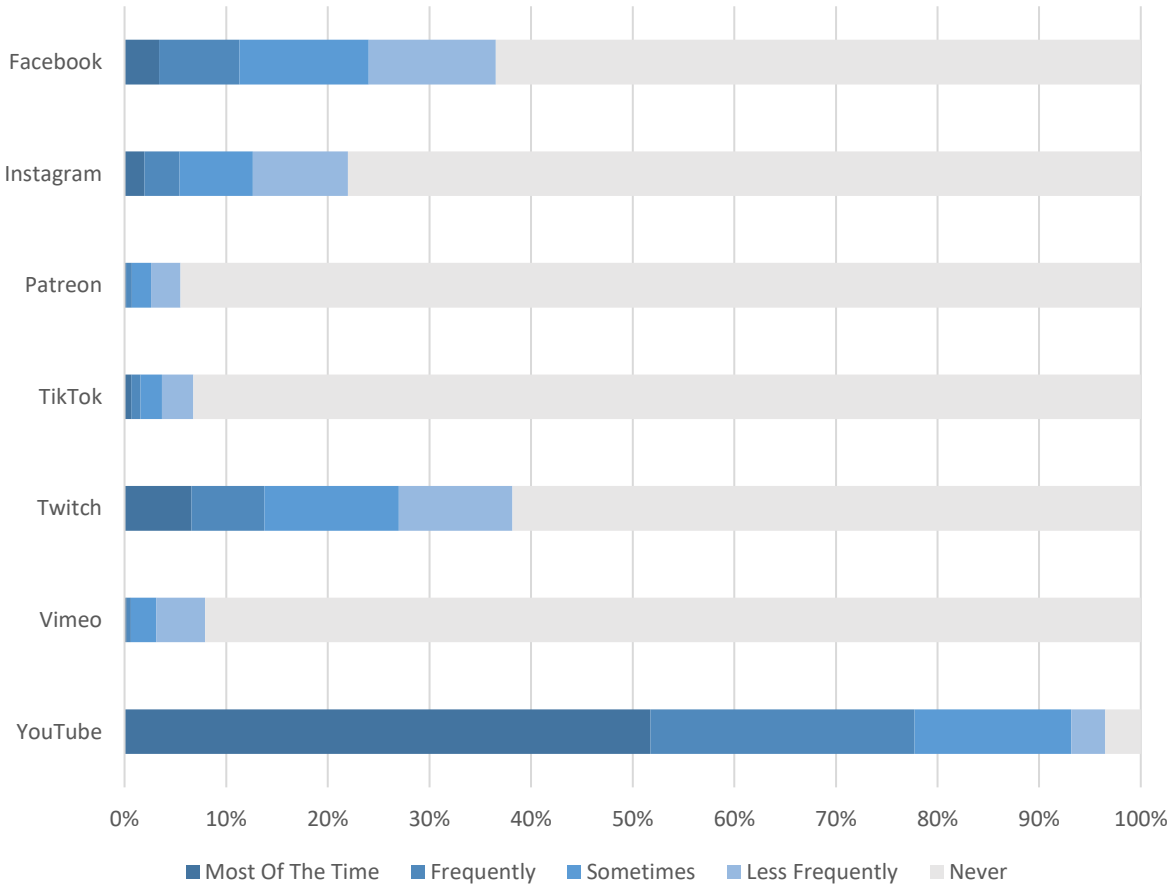
Most Of The Time ■ Frequently ■ Sometimes ■ Less Frequently ■ Never

Which video platforms do you use for consuming flight simulation related content?
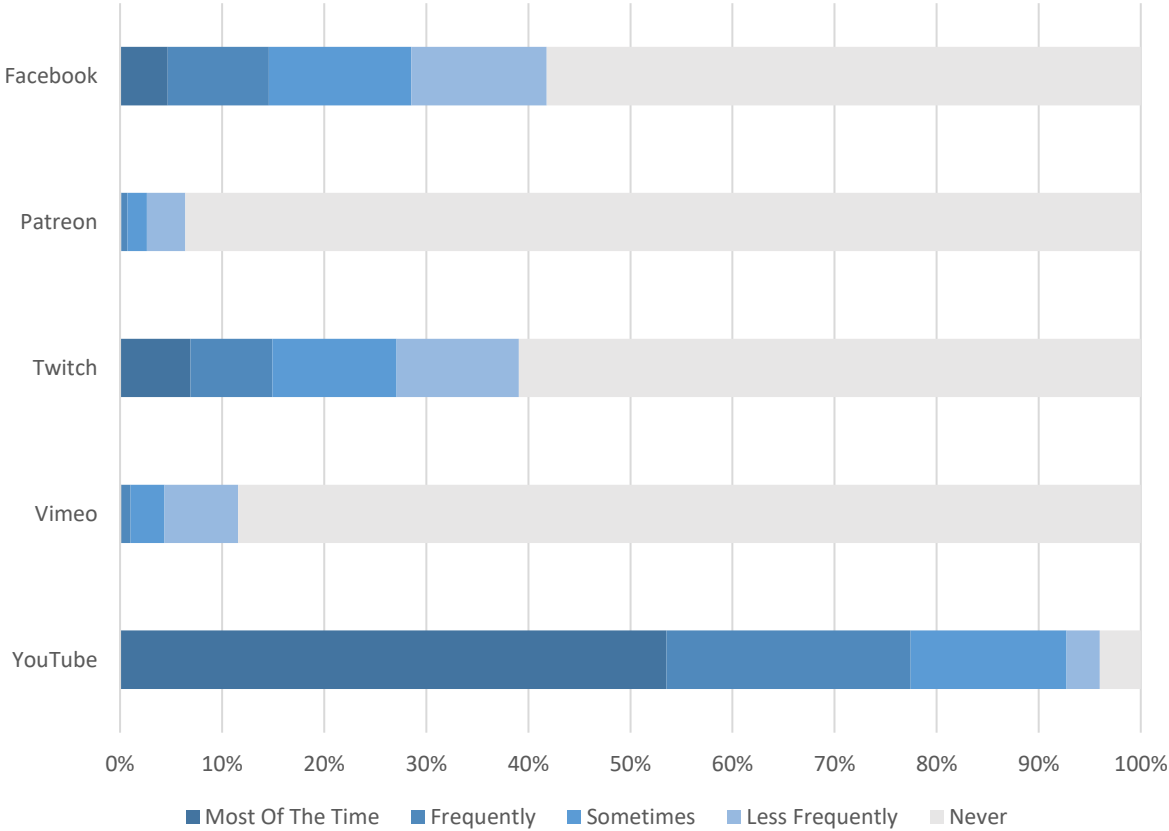
3.21. Survey Meta Analysis

3.21.1. Participation

In the last year's survey, 40.1% of the respondents had participated in the 2019 FlightSim Community Survey and 59.9% had not. This is comparable to this year where 44.6% had participated in the 2020 FlightSim Community Survey, and 55.4% had not.
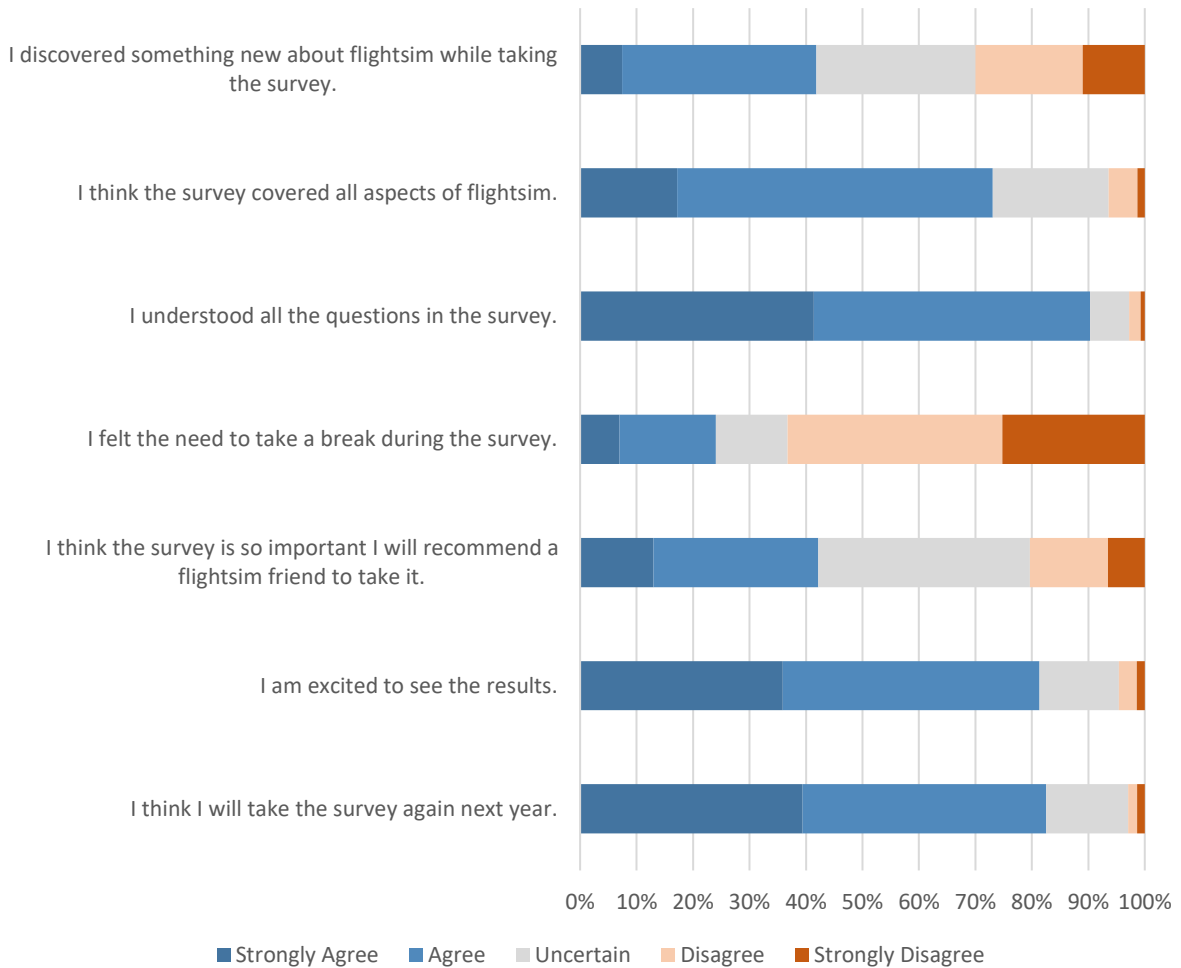
Did you participate in the 2020 FlightSim Community Survey?

Last year's result:

Did you participate in the 2019 FlightSim Community Survey?
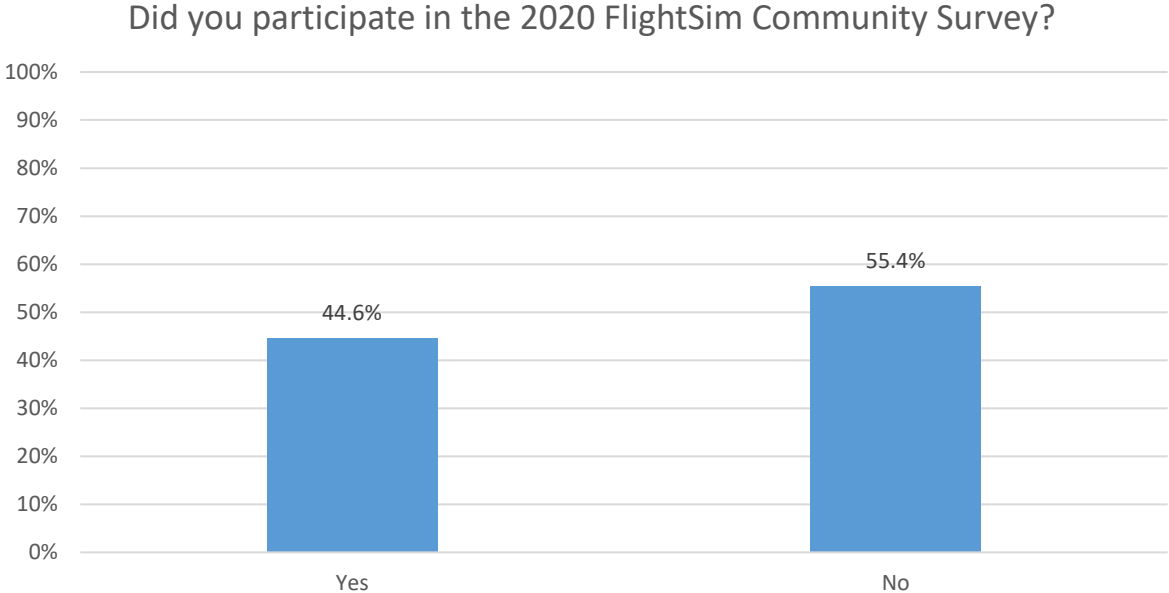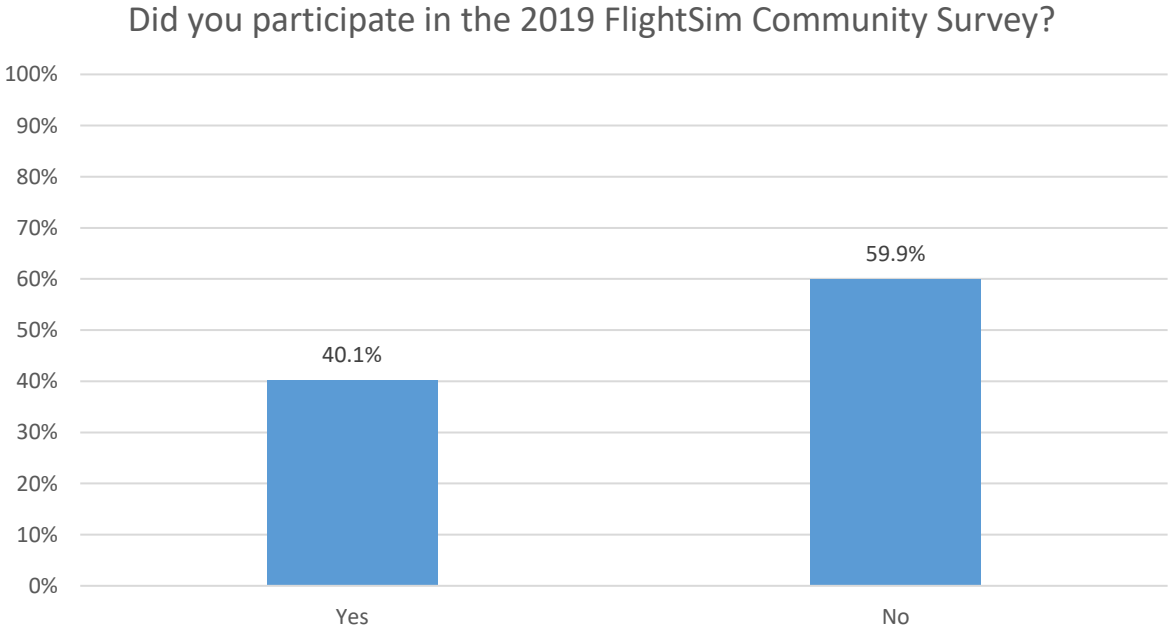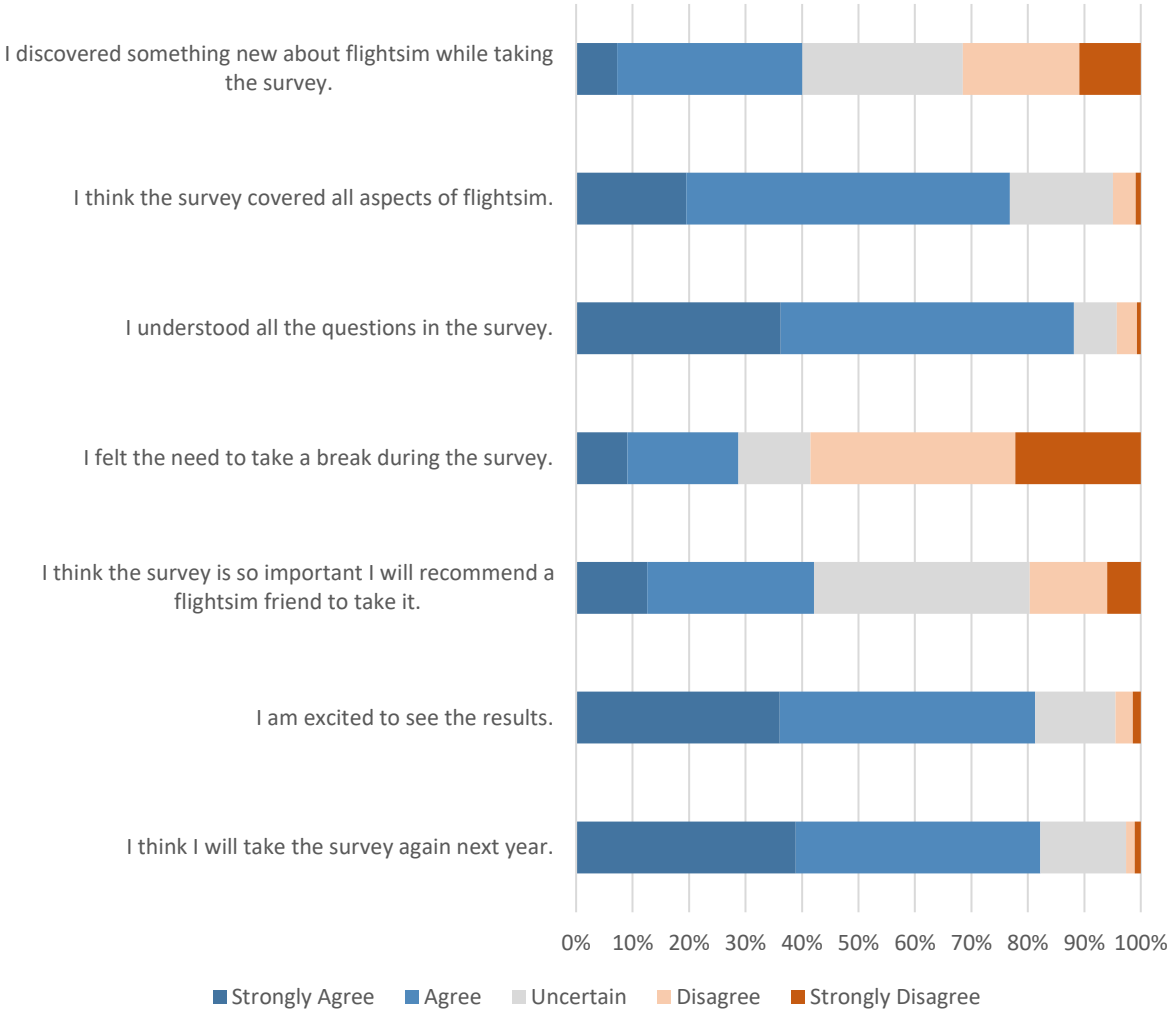
3.21.2. Survey Experience

This question was introduced in the 2019 FlightSim Community Survey to investigate how the respondents experienced the survey.

Please rate the following statements about the current survey.

Last year's result:

Please rate the following statements about the current survey.

4. Results

4.1. First a Word on Sampling Bias and Validity

Since respondents were not selected according to a random sampling technique, but instead voluntarily chose to participate themselves, there may be a bias in the data collected. This is true for any survey where respondents are invited to participate without randomizing the respondent selection according to the topics the survey set out to investigate.

We want to highlight the fact that this chapter is merely summarizing the collected survey data - not drawing any conclusions. Since we cannot check whether the dataset is a representative sample of the flight simulation population, we do not conclude anything with absolute certainty. For this reason, we have chosen not to calculate confidence intervals or margin of errors.

So, what can be said about this dataset? First of all, with 24,200 respondents, this dataset must be considered to be large compared to other surveys of its kind. The bigger the sample, the more likely that it is resembling the population. A high number of respondents can mitigate the effect of any selection bias which may be present. Secondly, while the dataset may not be generally conclusive for the entire population, we can still claim that the 24,200 respondents that decided to participate in the survey did indeed reply this way.

Thirdly, we can track trends and make relative comparisons between years. 55.4% of this year's participants were new to the survey and did not take the survey last year. Many of the survey questions have same, or very similar, distributions when comparing two consecutive years. If a sampling bias were present one might anticipate some variance between years – especially when each year has approximately 50% new respondents. If the variance between samples is low one might reason that the result is representative of the population – or that the same type of bias is present in both samples. Low variance in samples over consecutive years may increase the confidence of a representative result, but we will still not be able to be absolutely certain. With these words of caution let's consider the data that was collected.

4.2 Brief Summary

Despite the fact that 55.4% of the respondents were new to the survey this year, most of the results are very similar to those of last year. Where we can, we have provided data from previous years next to the diagrams.

Here is a brief non-exhaustive summary of the results:

- Almost all respondents are male.
- Age ranges from 15-85 years, with a notable peak around 20.
- Most of the respondents come from the US, the UK and Germany.
- The majority have a high-school or Bachelor's degree.
- The majority earn $40,000-80,000 per year, before tax.
- 17.0% work within aviation. 4.4% are airplane pilots.
- 25.1% have some sort of pilot license.
  - 8.7% have a PPL.
- 8.3% are currently enrolled in flight school.
  - 25.6% of those who are not consider taking lessons in the coming year.

- 19.7% fly combat simulators.
  - DCS World is the most common one.
- 12.6% fly simulators on mobile or tablet devices.
- The most popular aircraft type is Single Engine Piston and Narrow-body Commercial Airliner.
- Pilots tend to fly 2-5 times a week, 2-3 hours per session, sometimes longer.
- IFR as a little more popular than VFR, but pilots like to fly casually without rules too.
- The median software spending per year is $223 which is the same as last year.
- The median hardware spending per year is $245 which is a bit less than last year.
- 58.2% fly online, which is about the same as last year.
  - VATSIM is the most popular online network.
- 25.7% are members of a Virtual Airline, which is less than last year.
- Microsoft FS2020 is the most popular simulation platform.
- A majority of respondents did not change simulator platforms this year.
  - The majority of those who did change platform, changed to Microsoft FS2020.
  - Among those who changed to X-Plane 11.50, the majority comes from FS2020.
  - Among those who changed to Prepar3D v5, the majority comes from a previous version of Prepar3D.
  - Those who changed to Microsoft FS2020 come from X-Plane and an earlier version of Microsoft Flight Simulator, and to a smaller extent from Prepar3D.
- 22.9%, 8.5% and 19.0% are "Very likely", "Likely" or can "Possibly" imagine themselves purchase the upcoming X-Plane 12.
- 18.5% own an Xbox console.
- 24.4% own a VR headset.
  - 15.2% use it for flight simulation.
  - HP Reverb G2 is the most popular VR headset.
- Video reviews and tutorials are the most influential factors when deciding to purchase an addon.
- Jeppesen are the most well-known and preferred charts format.
- Simbrief is the most preferred flight planning software/service.
- Simlink/Moving Maps by Navigraph is the most popular visual flight tracking product, followed by Volanta by Orbx.
- Avsim.com, FlightSim.com and FSElite.net are popular media outlets.
- YouTube is the most popular video platform.
- 44.6% of the respondents took the survey last year.
- A majority of the respondents understood all of the questions in the survey; are excited to see the results; and will take the survey again next year.
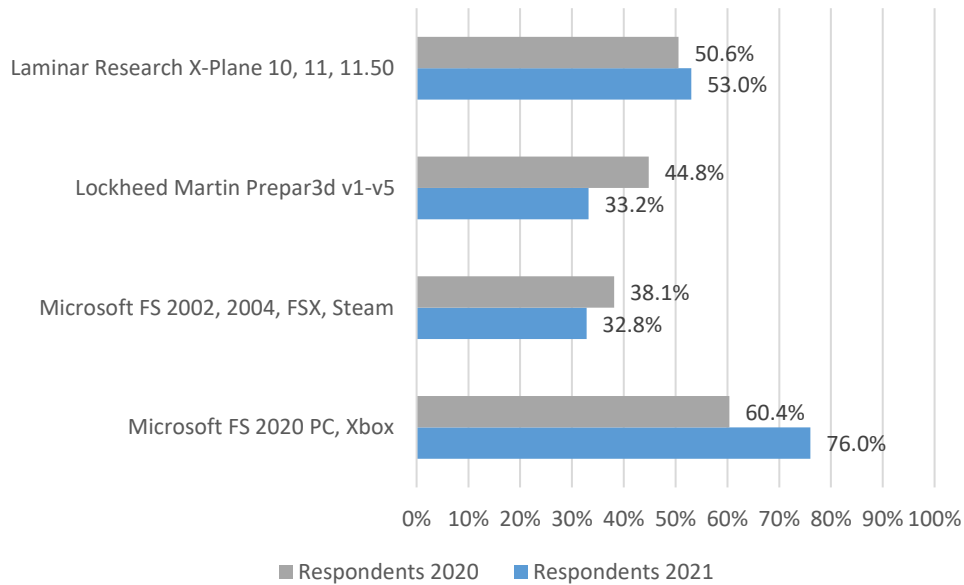
4.3 Discussion

4.3.1. Simulation Platform Popularity

Microsoft Flight Simulator 2020 continues to be the most popular flight simulator among the survey respondents followed by Laminar Research X-Plane and Lockheed Martin Prepar3D. Both FS2020 and X-Plane have grown in popularity compared to last year. However, it appears that Prepar3D has diminished in popularity. To clarify the results, we grouped the positive use responses by various flight simulator versions by manufacturer. In the graph below we see indeed that Lockheed Martin Prepar3D is less popular compared to last year. In this context it could be worth noting that Prepar3D

version 5.3 was released during this survey, namely on December 1 and version 5.2 was released in June 2021.

How often do you fly any of the following flight simulator software?

Laminar Research X-Plane 10, 11, 11.50
- 50.6%
- 53.0%

Lockheed Martin Prepar3d v1-v5
- 44.8%
- 33.2%

Microsoft FS 2002, 2004, FSX, Steam
- 38.1%
- 32.8%

Microsoft FS 2020 PC, Xbox
- 60.4%
- 76.0%

■ Respondents 2020   ■ Respondents 2021

It shall be interesting to revisit this question next year, especially since the next major version of Laminar Research X-Plane is expected in the year to come.

How likely is it that you will buy X-Plane 12 when it becomes available?

| 22.9% | 8.5% | 19.0% | 15.4% | 34.1% |

■ Very likely   ■ Likely   ■ Possibly   ■ Unlikely   ■ Very unlikely
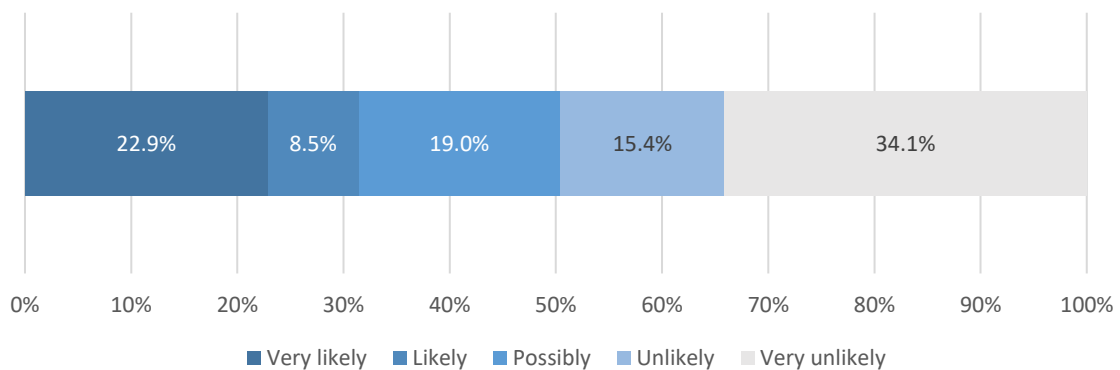
4.3.2. Xbox Console

With the release of Microsoft Flight Simulator 2020 on Xbox in July this year our level of anticipation was high going into this survey. However, we found that Xbox ownership was only up 2,2% to 18.5%

this year from 16.3% last year. We had expected to see a more noticeable increase. We think the absence of a larger increase is due to the fact that this survey, in its current design and partner network, mainly reaches flight simulator enthusiasts flying on desktop computers and mobile devices.

4.4. Survey Meta Analysis

This year we shortened the survey from 119 back to 93 questions. It resulted in slightly higher completion rate and a minute shorter average completion time. Even though this is a long and comprehensive survey, the questions on survey experience tells us that our respondents are doing well, are happy to participate, and are looking forward to the results. The majority will also take the survey again next year.

5. Future Work

Just like last year, we are publishing the raw survey data for anyone who wishes to do continued analysis of the responses. The data is anonymous and we have removed all free text as we currently have no way of ensuring that this data does not contain personally identifiable information.

Our ideas for continued analysis are mainly within correlation studies. Can something be said about the results with respect to certain flight simulator preference or demographics?

If you decide to download the data and want to share any of your analyses, please post them on social media using #flightsimsurveyanalysis and we will be happy to repost them.