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B Trend analysis (DESTEP)



demographic

Trend: International and cross- cultural travel

Passenger segmentation:

Leisure travellers

- Entertainment (adolescents, young adults)
- Socialize (adolescents, young adults)
- Greater comfort and convenience (older travellers)
- Authenticity and customization (first time travellers)

Business travellers

Business people still value their time above all else and are therefore willing to pay a premium price for the fastest available transport options.

(IATA, 2011)

Opportunity:

Many view the journey as part of the experience as opposed to just a means of getting to their final destination



economy

Strong acceleration of long-haul operations by low cost carriers over the last 5 years

Long-haul low-cost operations are fairly concentrated today, largely on routes within Asia Pacific and across the Atlantic, with about 70% of the seats offered by LCCs (on routes over 2,500nm) on these flows. This concentration and the relatively small share of overall seats offered suggests there is still opportunity to grow.

(OAG, Airbus GMF, Business models defined based on 2017 operations)

With the rapid adoption of even more connected mobile devices across multigenerations, consumer expectations on their path to purchase are evolving quickly into a complex, multifaceted process. For example, today, there are over 64 different paths to purchase versus just 1 in the past 10 years.¹ Social sharing has a large impact on decisions and peer-to-peer reviews carry a lot of weight.

(KPMG, 2019)

Opportunity:

A digital sales strategy to enable convenience for customers in order to sell and also empower fast growth and scaling up with digital technology



social

The Experience Movement:

Although millennials are getting older and entering what's been referred to as their prime spending years, they're not going out any less. Even as they mature into life stages that are traditionally coupled with buying more "things," experiences continue to be the most valuable currency for Millennials.

Often referred to as the "experiences generation"

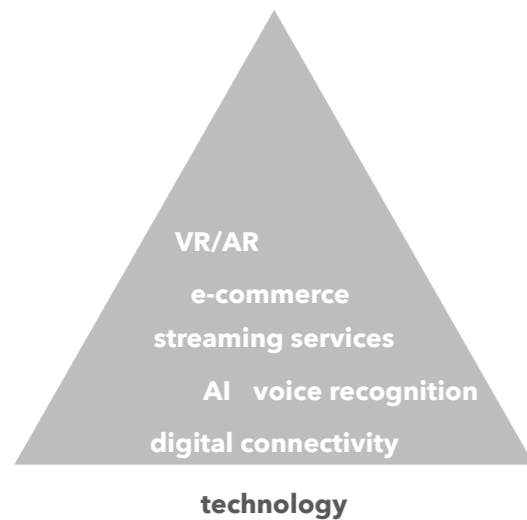
(Eventbrite, 2017)

Forbes: Increasing Consumer Demand For Transparency

The biggest trend driving change in the food and beverage industry right now is TRANSPARENCY. Consumers want to know and understand what ingredients are going into their products, which is why we are seeing so many innovative products with shorter ingredient lists that you can pronounce. Consumers are seeking simplicity in addition to better quality foods. Before now, it was rare to flip to the back of a product on shelf and read it before putting it in your cart. Consumers are reading the back of packages now more than ever (Abrams, 2019)

Opportunity:

Using technology to enable personalisation in order to create/sell a product that is foremost convenient



Four technology-driven megatrends: Autonomous driving, Connectivity, Electrification, Shared mobility

Finally, the four megatrends influence customers' mobility habits. Customers are beginning to demand innovative and individualized products, such as pay-per-use mobility packages or mobility as a service (MaaS), that integrate different modes of mobility according to individual needs. Furthermore, customer demand for sustainable mobility products is rapidly increasing.

(McKinsey, 2019)

Forbes:

1. The E-commerce Experience will Transcend The Screen.

In addition to delivering an experience through all screen types, future experiences will be delivered through new touchpoints such as voice, wearables and kiosks. For example, Staples now has AI-powered product search on touch-screen kiosks in their stores.

2. The E-commerce Experience will be More Personalized

While this has been a buzzword for decades, the next

wave of personalization will do a much better job of predicting needs. Each individual will get a different experience based on geography, searching history, past behavior, etc. When you walk into a store, a salesperson can intuit a lot about you. The future of e-commerce will use technology to do the same thing ... smarter technology that provides a better experience. For example, many search functions on retail sites are terrible. If you put in "shirt dress," the search function will read dress shirt the same as shirt dress. Yet a salesperson would know the difference. We have technology that can tell the difference and this will only continue to get better.

(Whitler, 2019)



Trend: Econvenience

A divergence of this behaviour is Econvenience, which is lifestyle that consists of consciously choosing environmentally friendly options, if accessing it does not require excessive/undue effort for the consumer (Trend One, 2017).

Local love is also a mindset which is consistent with this, where consumers would rather opt for locally sourced products for reasons both related to the local economy and the implied positive environmental impact (Radius, 2014).

Eco-conscious consumption, hyperlocal food, ethnic cuisines, nutritious snacking, fresh, organic and healthy

(KMPG, 2016)

Ethical consumerism continues to be a growing trend. Once upon a time, environmental concerns had an increasing influence over consumer choices. Whilst aviation's contribution to climate change has largely been addressed, this kind of ethical consumerism was the start of the trend that now focuses on such issues as the preservation of local cultures and livelihoods. In addition, with wide-spread economic development across the planet the definition of 'rights' has been expanded to include things like annual vacations and minimum lifestyle standards.

(IATA, 2011)

Opportunity:

A personalised experience to reduce excess such as unnecessary materials or products that are included



In mature markets like the US several analyses have identified a large backlog in airport investment, leading to increasing capacity constraints. In growing markets like the Middle East, aggressive public investments in airport capacity have been a major driver in attracting travel volumes.

(IATA, 2011)

In 2050, safety and security are still top priorities for passengers, but the increasingly rare nature of safety and security incidents means that these priorities are less frequently reinforced. Safety in particular is less of a concern, as automation and new technology have continued to revolutionize safety standards. The same technology has meant that reliability is also something that plays a decreasing role in consumer choice, given that flights are almost always on time and are almost never cancelled. There are still sporadic security threats regarding air transport, but these threats have gradually decreased over the past 40 years, again due in most part to technological advances that have improved the screening and tracking of passengers and cargo.

(IATA, 2011)

C Crew perspective on 2050 (co-creation session)

To gain insight into the main concerns of cabin crew regarding in-flight dining without laying the emphasis too much on past experiences and the current cabin environment, their perspective is captured by a co-creation session. This session is set up to gather input from various experts, to collect and cluster their perspectives into guidelines for the conceptual phase.

The creative session’s main topic ‘How do we feed an entire aircraft in 2050?’ was subdivided into two challenges.

- [sustainability] Food, food waste and waste deriving from service/packaging etc. is playing a crucial role in sustainability and in the airline industry. On average, a passenger produces 1.43 kilogram of waste per flight, which goes to landfill. 80% of a flight’s waste derives from the cabin, consisting of single-use plastics as cutlery and cups. How can we feed a plane full of passengers, wasting nothing, but ensuring an excellent service?
- [food experience] On a long-haul flight, people tend to experience a positive peak in their emotional curve when they go for a walk or are being served food and beverages. Convenience is the future, how can we feed all pax enabling a flexible way of in-flight meals, providing a customised experience?

Co-creation

The very literal meaning of co-creation is: together (co-) make or produce something (new) to exist (Koning, 2017). Now, in this session, participants contribute by offering their expertise and knowledge as a resource. These experts invited to co-create were representatives from Safran Cabin Design and KLM Inflight Services. They were given a sensitizing question prior to the creative session, to trigger them about the topic.

‘Give an example of a public environment wherein you feel good/ positive.’

At the beginning of the co-creation, these examples are discussed and its reasons for why they are an environment to feel good/positive are listed of each example. Then, similar why’s of different examples are clustered into a set of ‘Golden Rules’, to serve as inspirational guidelines for the design of the aircraft interior system.

- Food as a reward
- Freedom
- Diverse environment
- Reason to come back
- Pace: slowing down
- Out of routine
- Nature
- Disconnecting
- Solitude; being on your own (not alone)

For the ideation, the group was split in two groups of five, each group including at least one participant from Safran Cabin Design, KLM Inflight Services and a creative facilitator (from Delft University of Technology). Later on, the ideas are collected and presented. In total a number of 36 ideas were collected that represent the thoughts of eight experts about the future context of OS in the Flying-V.

The outcomes of this co-creation session are clustered in themes and several discussion points raised during the session are translated into the following learnings. The details of the created ideas are analysed more in-depth for the later design phase of the project.

- Cultural differences influence the needs of pax, making cultural customisation relevant to fulfill these different needs. For now, these needs are mostly demographically/ culturally different, but the differences are shifting because of globalisation. Future customer needs may no longer be demographically nor culturally bounded.
- Passengers like control and being able to choose, giving them control would expectedly increase customer satisfaction
- Diversity (in customers/job; no flight is the same) and interaction are the most enjoyed aspects of their [cabin crew] work
- Continuous conflict between business and consumer; galley space for better customer experience and service vs. more profitable seats

ANALYSIS OF CO-CREATION IDEAS

= requiring specific interior/
standalone food concept

Food consciousness

Process/airline
operation

Order your food from
your seat

Pre-distribute loaded meal
or snacks

Refreshments at the
entrance of the aircraft

Pre-flight food at gate

Customer
Experience

Serve unique flavours
which you can only taste
in the sky
(increase umami?)

Distribute food smell into
airconditioning

Shared dining portions
(for group seats?)

Sushi belt

Use lighting environment
to enhance food
experience (only during
eating)

Surprise menu for
everyone

Seasonal & cultural food
linked to destination

Live cooking

Flexibility

Serve food from a big
pot, give pax the portion
needed

Various food courts

Divide cabin by themes
instead of classes e.g.
restaurant styles: Asian,
Italian, etc.

Instant foods/frozen
meals which do not need
to be destroyed if not
consumed;

Sealed food that can be
returned or put at a self-
service point

Cabin with zones for
different activities:
working, relaxing, eating,
bar, ...

Dispensers for drinks, less
bottles & cans as waste

Buffet like Febo

Bento box at your seat

Customisation

Refill possibility

Customised meals by
labelling name of pax

Flight-long food
experience with small
bites from start to finish
#sushi #tapas

Fully customised food
(pre-boarding)

Pre-order meals with
booking

3D-printed customised
food

AI predicts food wishes of
pax

Capsule food

Data-driven offer (date
from hotels, food delivery,
previous flights, pax)

Doggy bags

Recycling stations/waste
separation

'Keep your cup'
No waste, take your
plates/cups

Limited catering stock

Edible packaging

% discount if not ordering
food (during booking)

Elaboration of ViP-method

Deconstruction phase: old product

Past product

Onboard Services is a composite of products.
For now, three key components are described.

Galley

The galley includes equipment with functions
such as heating meals, preparing trolleys
and storage of the large amount of food and
drinks. Each galley is tailored to the airline's
chosen standardisation and mostly has an
industrial, functional appearance, with little to
no distinctive branding in sight.



Figure #
Galley of an Airbus A340-300 of Air Canada (Wikipedia, 2007)

Trolley

Trolleys come in different sizes since there
are several standardisations. For different
airlines, aircraft and cabin equipment
manufacturers build different sizes according
to the standardisation chosen by the airline, but
needless to say, has to fit through the aisle of
the aircraft.

Tray

The tray is mostly fully branded since this
product is used by the passenger. It consists of
multiple smaller dishes, cups and items such as
cutlery, displayed at once, all to fit on the tray,
which in its turn must fit the folding table of the
aircraft seat.



Figure #
A common economy class meal tray of Singapore Airlines

past interaction

Past interaction

During a long-haul flight, the process of serving one or two hot meals on a tray in economy class has evolved in a completely pre-arranged and routine-based procedure, leaving little room for exceptions or variations. Depending on the airline and time of the day, the tray is usually filled with three or four courses. In the narrow but fully loaded galley, the cabin crew prepares for meal service by heating up the meals and make the trolley ready. Handling the equipment may sometimes be complex due to lack of space or numerous user steps. Doors come for instance with double latches to secure safely, making it difficult to use. The aisle of the conventional aircraft is equally narrow and a fully loaded trolley can weigh about a hundred kilograms. With a trolley and two cabin attendants blocking the narrow road and perhaps a twohundred more passengers to serve, interaction/use of the trolley may be somewhat hasty and difficult: the opposite of a desired smooth flow of serving. It can result in impediment to the customer service, while this service is one of the most valuable interactions for both passenger and cabin crew.

For the passenger, the combination of the folding table, meal tray and neighbours altogether in the same small space, can be overwhelming, causing negative emotions.

past context

Past context

The products inside the aircraft have underwent little developments in comparison to the developments the world outside the aircraft have seen. As long as aircrafts are built, the industry has been efficiency-focussed. This would explain the industrial process and way of working in an aircraft interior, which is rather engineered than human-centered designed. Whilst being subject to process and engineering, it has become fundamentally restricted by a system that has barely changed since the 1960's. The process of the meal service in economy class is a fixed schedule with little to no room to adapt to the different needs of passengers. Passengers do not consume the meal entirely or not at all, because they have had enough, dislike the quality or simply have no appetite (yet), while meal service plays a crucial role in the overall flight experience. Except for that, this results in a considerable amount of food waste too.

Designing phase: future context

Future context

With the key takeaways of the future analysis combined, a possible future context is described. This context is based on a few clusters of takeaways that derive from the conducted research.

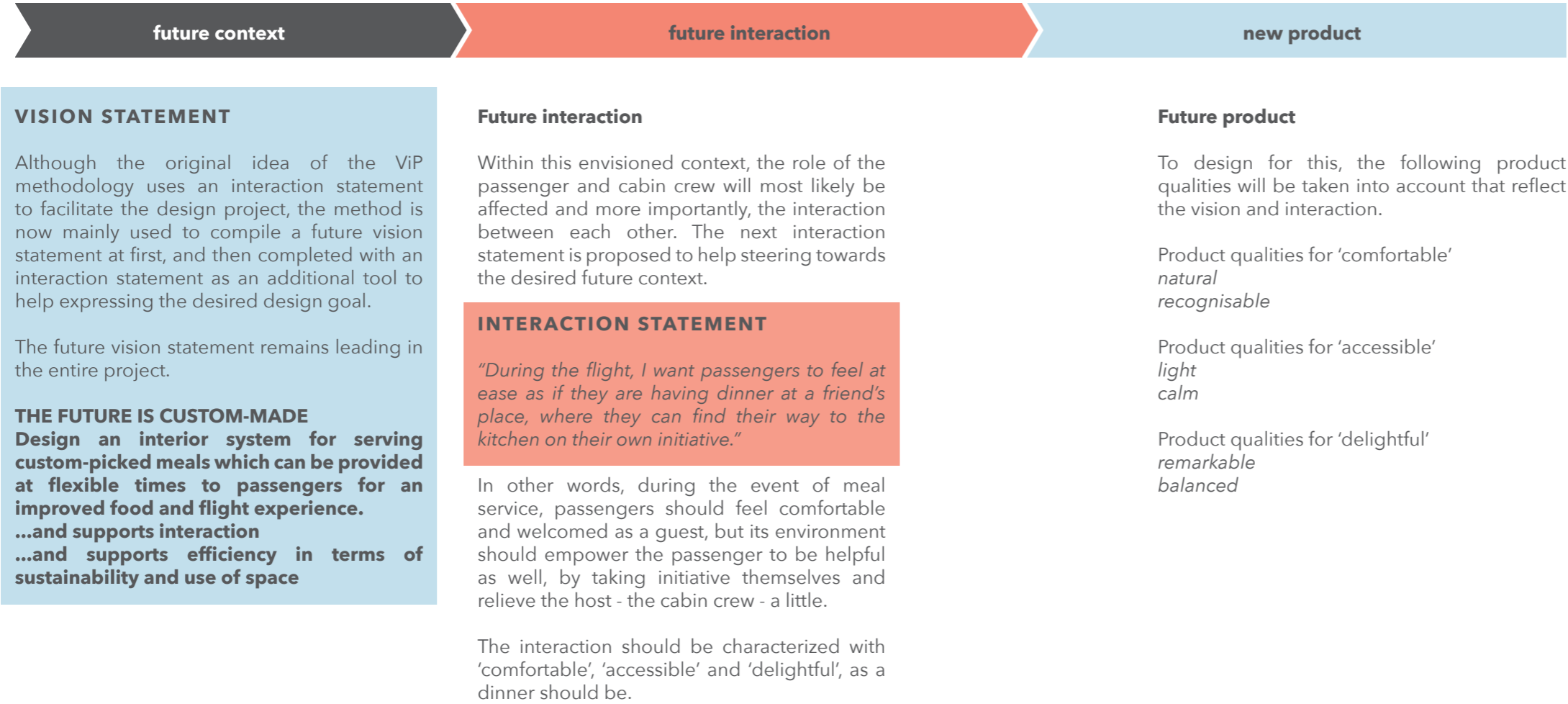
In 2050, the customer journey is smooth and seamless from check-in to boarding due to connectivity and real-time optimisation of the process and operation by the airport and airline.

In this world of digitalisation, it is most likely that we become fully empowered by the possibilities of digital. As stated before, the number of aircrafts with digital connectivity is skyrocketing and expected to be tripled from 7.284 aircrafts in 2017 to 23.100 in 2025 (Airbus, 2018). And as aircraft connectivity rises, not only the cabin environment becomes **connected and smarter**, data of the flight and meal service can be analysed and predictions can be made in order to improve the availability and variety in the assortment onboard.

From a consumer's perspective, one important digital empowerment is control, or at least feeling a sense of control. With digitalised tools and services, consumers have control and **flexibility** when to use, access, adjust, etc. the product. This flexibility is core in future consumerism. Having the ability to customise the product, consumers take a more active role by creating their own ideal user experience which fits their personal needs.

For many cabin crew, the satisfaction of their job lies within the diversity and **interaction** among passengers, especially for employees of customer-centered airlines. With passengers more in the active role, the approach of the customer service may change.

Adding flexibility to the future flight experience does not only benefit the passenger and airline review, the in-flight food service can also reduce its food waste since the passenger can now fulfill its nutritional needs corresponding to the appetite and takes away the event of rejecting a meal.



Concept evaluation table

I. CUSTOMER EXPERIENCE

- [1] *Level of time convenience*
(0-1 flexibility; 1-2 flexibility; 2-3 flexibility; 3-4 flexibility; 4-5 flexibility)
The meal service gives the passenger sufficient flexibility and control to choose a preferred moment for having a meal onboard
- [2] *Level of food customisation*
(0-1 customisation; 1-2 customisation; 2-3 customisation; 3-4 customisation; 4-5 customisation)
The passenger could make various choices to adjust the food experience to personal preference and appetite
- [3] *User friendliness*
(0-1 friendliness; 1-2 friendliness; 2-3 friendliness; 3-4 friendliness; 4-5 friendliness)
The workload to obtain a meal should be performed with ease and with as less effort as possible for the passenger
- [4] *Ergonomic advantage*
(0-1 stimulation; 1-2 stimulation; 2-3 stimulation; 3-4 stimulation; 4-5 stimulation)
The meal system stimulates the passenger's perception of the food (by either comfort, distraction, entertainment,) giving the passenger a positive emotion
- [5] *Service*
(0-1 interaction; 1-2 interaction; 2-3 interaction; 3-4 interaction; 4-5 interaction)
The cabin crew is supported in their interaction with the passenger to provide an optimized service

II. SUSTAINABLE/CONSCIOUS

- [1] *Reduction of food waste*
(0-1 reduction; 1-2 reduction; 2-3 reduction; 3-4 reduction; 4-5 reduction)
Probability of food waste in the meal service is reduced to a minimum
- [2] *Disposables*
(0-1 reduction; 1-2 reduction; 2-3 reduction; 3-4 reduction; 4-5 reduction)
The use of disposables is minimized (~by reduction of these items or replacing them with reusable equipment~)
- [3] *Space footprint*
(0-1 space efficiency; 1-2 space efficiency; 2-3 space efficiency; 3-4 space efficiency; 4-5 space efficiency)
The required space that is designated for meal service is as small as possible in order to obtain high efficiency in use of space and smaller footprint

III. AIRLINE OPERATION

- [1] *Ecosystem fit*
(0-1 fit; 1-2 fit; 2-3 fit; 3-4 fit; 4-5 fit)
The system should fit within the operational environment of the meal preparations and turnaround: loading and linking, transport and cleaning.
- [2] *Cabin crew workload*
(0-1 workload friendliness; 1-2 friendliness; 2-3 friendliness; 3-4 friendliness; 4-5 workload friendliness)
The workload of the cabin crew is lower, if not, at least equal to the current situation and must fit within the routine of other processes to be performable in order to maintain an optimized customer service
- [3] *Efficiency*
(0-1 efficiency; 1-2 efficiency; 2-3 efficiency; 3-4 efficiency; 4-5 efficiency)
The way of working should be smooth, intuitive and minimizing work pressure and customer dissatisfaction with an effective and efficient meal system

F Concept directions

The six concept directions are discussed below.

1. Cabin crew service at your seat

Pre-ordered meals can be served to passengers while in their seat, which would mean that the level of interaction with the cabin crew will be equal to the conventional way of service. Pre-ordering prior to the flight, for instance during booking, could give passengers a larger variety to choose from and provide them freedom to customise their meals (direction 1-A). Instead of serving in seat order, pre-ordering meals could also allow passengers to choose a specific timeslot during the flight wherein they wish to be served (direction 1-B). This would require loading of meals in chronologic order of the timeslots instead of seat order. Passengers who have not pre-booked their meal service or only selected the timeslot but not the meal, can choose from the available offer on board (direction 1-C). This can be a data-based offer in order to predict the demand.

Drinks can be served separately at a self-service drink station, encouraging passengers to stretch their legs and walk as well. It would also compensate the added workload that is needed to serve passengers in multiple timeslots.

2. Anytime self-service galley

An anytime self-service point allows passengers the great flexibility to either collect their meal whenever they desire to, or, at the time they have opted for. This self-service point, in the

form of a vending machine or unmanned shop, could offer diverse meals simultaneously. Passengers can obtain one dish or even try multiple dishes (direction 2-C). Alternatively, passengers can pre-order their meal prior to the flight and collect this customised meal whenever they wish at the machine or shop (direction 2-B). However, this would mean that a system is required to keep meals either hot and/or cool for consumption. Also, if the meals are kept cool, this would require (plenty of) passenger-friendly ovens to allow them to reheat their meal themselves (direction 2-A). Furthermore, this system may require a refill operation to serve a second meal type, e.g. breakfast dishes.

Next, drinks can be available in another self-service galley.

3. Takeaway

This concept direction allows more interaction with the cabin crew, while still operating in a self-service environment. At a designated 'takeaway' galley, passengers can come and get a customised meal during the selected time frame, which is assembled and prepared by the cabin crew (direction 3-A). It would allow passengers the flexibility to order the dish they like and customise their meal experience on board according to their real-time needs. Again, passengers could also collect their pre-customised meal that they pre-ordered during booking (direction 3-B).

4. Canteen shops

A canteen gives passengers the opportunity to get their preferred food on the spot. Cabin crew can serve rows of passengers from behind a bar and put the right amount of food on a plate (direction 4-A). Obviously this requires a larger space for service and above all, an accurate prediction of demand, in order to prevent food waste. Passengers can visit the canteen per row or per selected timeframe. Alternatively, passengers indicate their meal choice prior to the flight and are served according to their pre-order (direction 4-B).

5. Buffet

A self-service buffet would give the most freedom in food choice. Passengers can customise their plate in a great variety of ingredients, dishes and portion size. For a smooth rotation and passenger flow, it is highly necessary to divide passengers in timeslots.

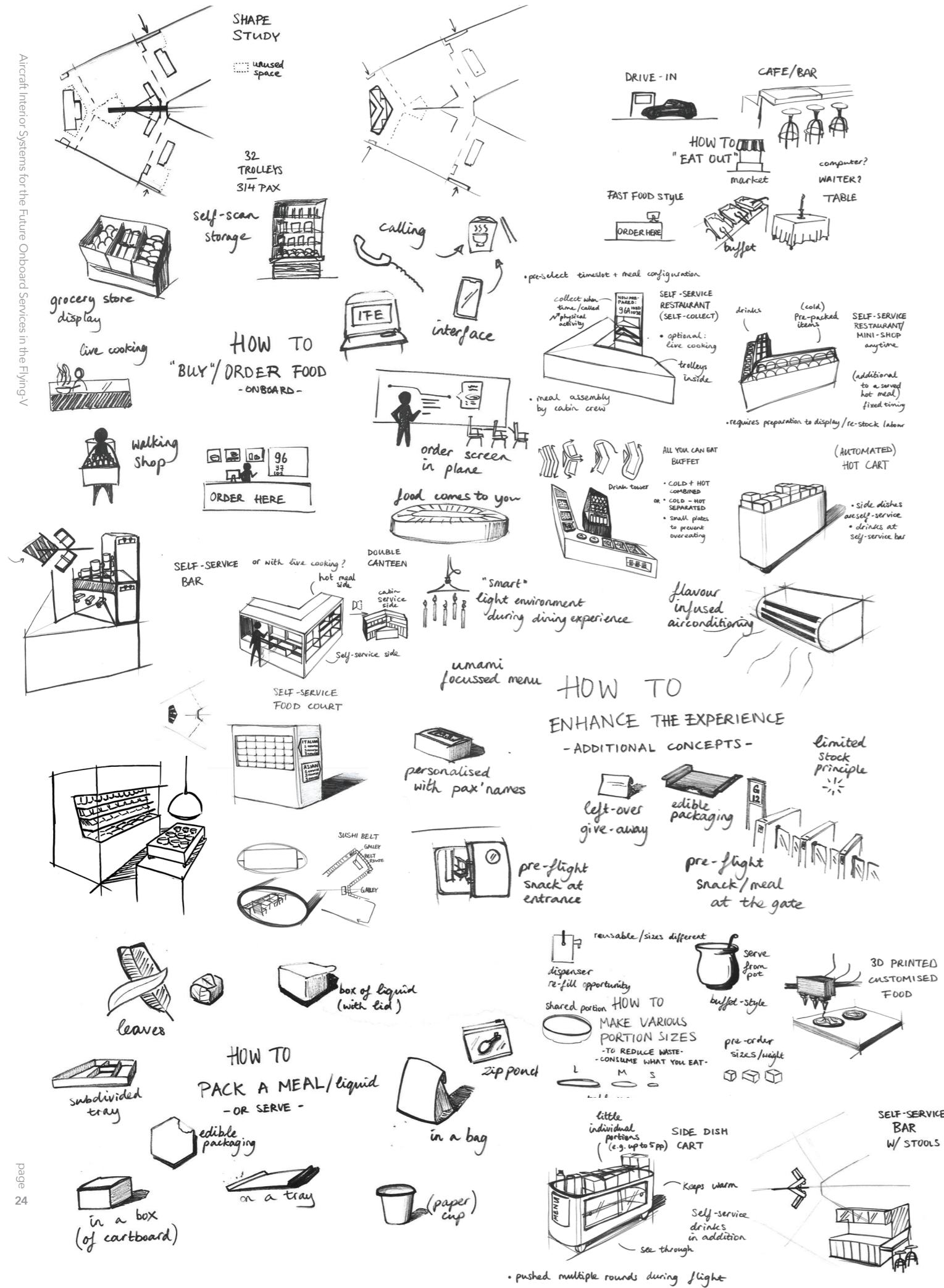
6. Vendor service

Similar to the conventional meal service trolley, this 'vendor style' cart will be going around during the flight to serve passengers. Contrary to the conventional concept, the aim is to continuously serve small dishes in frequent rounds during the flight, allowing passengers to choose their preferred moment to eat and vary in amount and choice of food.

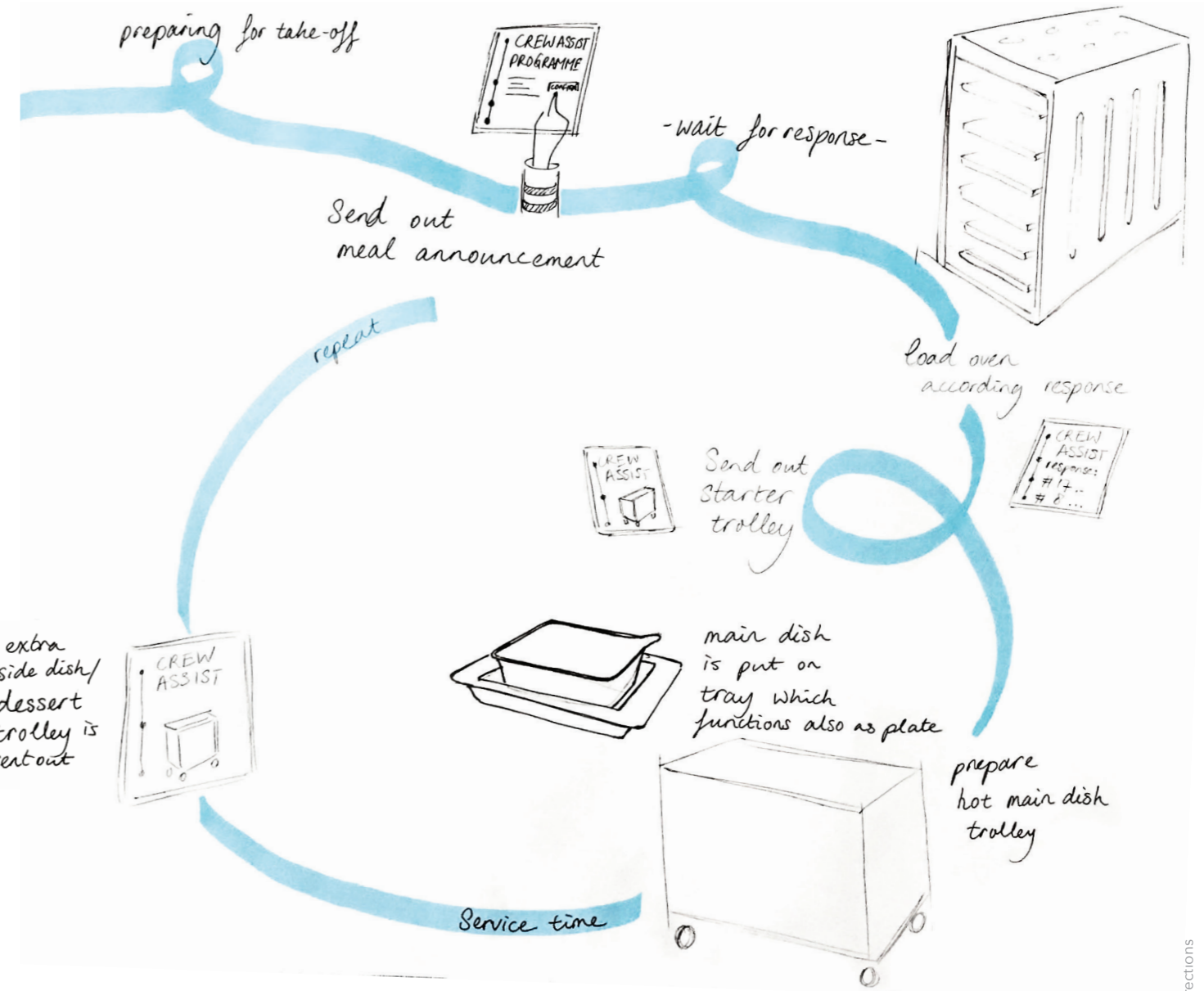
Yet, this concept direction may cause an unusual and unequal consumption among passengers

when, in fact, it is a buffet that comes to you and food is continuously served whilst being seated.

Again, drinks can be served separately at a self-service beverage station, in order to encourage physical exercise among passengers and simultaneously reduce the workload that has increased due to the multiple vendor rounds.



Left: ideation sketches that form the base of the clustering into six concept directions described earlier.



A preliminary sketch of a cabin attendant's journey for one of the concept directions (6).

G

Rubric tool

	THE FUTURE IS CUSTOM-MADE Design an interior system for serving custom-picked meals which can be provided at flexible times to passengers for an improved food and flight experience. ...and supports interaction ...and supports efficiency in terms of sustainability and use of space											
	I-A	I-B	I-C	II-A	II-B	II-C	III-A	III-B	IV-A	IV-B	V	VI
	Crew service / they come to you	Crew service / they come to you	Crew service / they come to you	Self-service	Self-service	Self-service	Self-service (You come to them)	Self-service (You come to them)	Self-service (You come to them)	Self-service (You come to them)	Self-service	COMBINED
	Pre-ordered complete meal served at your seat	Pre-ordered complete meal served at your seat during selected timeslot	Data-based meal offer at your seat during timeslot	Pre-ordered meal heated by yourself	Pre-ordered meal at self-collect machine	Data-based predicted complete food offer available (first come first serve)	Pre-ordered complete meal is prepared (heated) at manned 'take-away' station	On-demand ordering and preparation at manned 'take-away' station	Grab a pre-ordered meal during timeslot	Grab a meal in canteen during timeslot	Buffet where you can freely eat during assigned moment in combination with anytime drinks (also self-service)	Frequent rounds of (hot) side dishes trolley with self-service drinks
I. CUSTOMER EXPERIENCE												
1. Level of time convenience (0-1 flexibility; 1-2 flexibility; 2-3 flexibility; 3-4 flexibility; 4-5 flexibility) <i>The meal service gives the passenger sufficient flexibility and control to choose a preferred moment for having a meal onboard</i>	1	2	2	5	3	5	4	4	4	3	3	4
2. Level of food customisation (0-1 customisation; 1-2 customisation; 2-3 customisation; 3-4 customisation; 4-5 customisation) <i>The passenger could make various choices to adjust the food experience to personal preference and appetite</i>	3	3	3	3	4	3	3	4	4	4	5	5
3. User friendliness (0-1 friendliness; 1-2 friendliness; 2-3 friendliness; 3-4 friendliness; 4-5 friendliness) <i>The workload to obtain a meal should be performed with ease and with as less effort as possible for the passenger</i>	4	4	4	3	4	3	3	3	3	5	5	5
4. Ergonomic advantage (0-1 stimulation; 1-2 stimulation; 2-3 stimulation; 3-4 stimulation; 4-5 stimulation) <i>The meal system stimulates the passenger's perception of the food (by either comfort, distraction, entertainment,) giving the passenger a positive emotion</i>	1	1	1	3	2	3	3	3	4	4	4	2
5. Service (0-1 interaction; 1-2 interaction; 2-3 interaction; 3-4 interaction; 4-5 interaction) <i>The cabin crew is supported in their interaction with the passenger to provide an optimized service</i>	3	3	3	1	2	1	2	5	2	4	1	5
Subtotal of Customer Experience	2,714285714	2,857142857	2,857142857	2,714285714	3	2,714285714	2,857142857	3,857142857	3,142857143	4,142857143	3,428571429	4,428571429
II. SUSTAINABLE/CONSCIOUS												
1. Reduction of food waste (0-1 reduction; 1-2 reduction; 2-3 reduction; 3-4 reduction; 4-5 reduction) <i>Probability of food waste in the meal service is reduced to a minimum</i>	2	3	3	5	4	3	5	4	5	2	1	2
2. Disposables (0-1 reduction; 1-2 reduction; 2-3 reduction; 3-4 reduction; 4-5 reduction) <i>The use of disposables is minimized (~by reduction of these items or replacing them with reusable equipment~)</i>	1	1	1	1	2	1	1	2	2	5	5	1
3. Space footprint (0-1 space efficiency; 1-2 space efficiency; 2-3 space efficiency; 3-4 space efficiency; 4-5 space efficiency) <i>The required space that is designated for meal service is as small as possible in order to obtain high efficiency in use of space and smaller footprint</i>	3	3	3	4	3	5	2	1	2	3	3	4
Subtotal of Sustainable/Conscious	2	2,333333333	2,333333333	3,333333333	3	3	2,666666667	2,333333333	3	3,333333333	3	2,333333333
III. AIRLINE OPERATION												
1. Ecosystem fit <i>The system should give the passenger sufficient flexibility and control to choose a preferred moment for having a meal onboard</i>	1	2	2	5	2	4	5	4	4	5	5	3
2. Cabin crew friendliness (0-1 friendliness; 1-2 friendliness; 2-3 friendliness; 3-4 friendliness; 4-5 friendliness) <i>The workload of the cabin crew must fit within the routine of other processes and should be performable with ease in order to maintain an optimized customer service</i>	3	2	2	3	4	4	3	1	4	2	3	2
3. Efficiency (0-1 efficiency; 1-2 efficiency; 2-3 efficiency; 3-4 efficiency; 4-5 efficiency) <i>The way of working should be smooth, intuitive and minimizing work pressure and customer dissatisfaction with an effective and efficient meal system</i>	2	3	2	4	5	4	3	1	4	1	1	4
Subtotal of Airline Operation	2	2,333333333	2	4	3,666666667	4	3,666666667	2	4	2,666666667	3	3
TOTAL SCORE	2,571428571	2,785714286	2,642857143	3,428571429	3,571428571	3,428571429	3,214285714	3	3,642857143	3,571428571	3,285714286	3,785714286

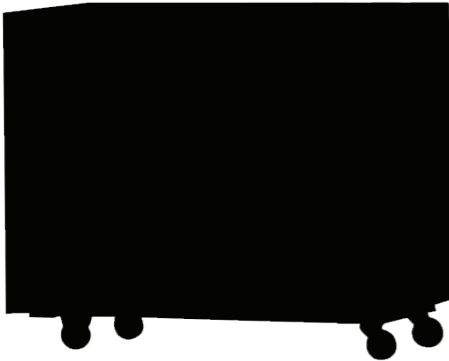
IV-A	IV-B	V	VI
'Self-service' (You come to them)	'Self-service' (You come to them)	Self-service	COMBINED
Grab a pre-ordered meal during timeslot	Grab a meal in canteen during timeslot	Buffet where you can freely eat during assigned moment in combination with anytime drinks (also self-service)	Frequent rounds of (hot) side dishes trolley with self-service drinks
3,642857143	3,571428571	3,285714286	3,785714286

H NIOSH-formula

The NIOSH-formula is an international method that is used to calculate the recommended maximum weight to lift in certain labour circumstances.

The outcome of this calculation is based on an estimation of the position and work situation. Since it is an estimation, the simplified formula is used. Note: the formula is written in Dutch.

The following posture is assumed in the NIOSH-formula:



The boxes are assumed to be transported from caterer to the aircraft with a movable cart/robot for an easy and fast loading process.

3. De rekentool

Stap 1: Invoeren van de taakeigenschappen

	Gemiddeld te tillen gewicht	15 kilo	Each meal content is estimated to be approximately 300 grams. A box with 24 courses weighs 7,2 kilograms. The calculation weight is multiplied by a rough safety factor of two.
	Optillen (begin van de tilactiviteit): de afstand van lichaam tot tillast (horizontaal)	0 cm	There is minimal distance in the galley possible when lifting a box.
	Optillen (begin van de tilactiviteit): de afstand van vloer tot tillast (vertikaal)	80 cm	The last boxes at the bottom are lower to reach.
	Optillen (begin van de tilactiviteit): de hoek tussen lichaam en te tillen last (last recht voor het lichaam = 0 graden)	90 graden	The boxes that need to be loaded are next to the person. Behind the person is no space available.
	Neerzetten (einde van de tilactiviteit): de afstand van lichaam tot tillast (horizontaal)	25 cm	The boxes are shoved into the fridge, which is a short distance from where the person is standing (right in front of the fridge).
	Neerzetten (einde van de tilactiviteit): de afstand van vloer tot tillast (vertikaal)	80 cm	
	Neerzetten (einde van de tilactiviteit):De hoek tussen lichaam en te tillen last (last recht voor het lichaam = 0 graden)	90 graden	
	De tilfrequentie: hoe vaak tilt u gemiddeld per minuut	0.2 keer per minuut	It is estimated that a fridge can be loaded in approximately 5 minutes.
	De tijdsduur: hoeveel uur tilt u per dag?	5 uur per dag	5 out of 8 working hours is estimated to be intensive labour, deducting transport time and other tasks.
	De hanteerbaarheid van de tillast (Zie beslisschema)	<div><input checked="" type="radio"/> goed</div> <div><input type="radio"/> gewoon</div> <div><input type="radio"/> slecht</div>	

Stap 2: Maximaal tilgewicht berekenen:
Onder optimale omstandigheden is het maximum tilgewicht circa 23 kilo. Als de omstandigheden niet optimaal zijn, levert de berekening een lager maximum tilgewicht op. Het laagste van de maximumgewichten in de twee blauwe vakken is maatgevend!

<div>Beveilig</div> <div>Reset</div>	
Maximum tilgewicht beginsituatie (23kilo gecorrigeerd voor tilsituatie)	Maximum tilgewicht eindsituatie (23kilo gecorrigeerd voor tilsituatie)
13.0 kg	13.0 kg

Stap 3: De NIOSH Til-index voor uw tilsituatie

Bij een Til-index kleiner dan of gelijk aan 1 is de tilsituatie in orde. Het hoogste van de twee getallen is daarbij maatgevend.
Is de tilindex hoger dan 1, dan is er sprake van een ongunstige tilsituatie, met op den duur het risico van gezondheidsschade. Is de tilindex hoger dan 2, dan is onmiddellijke actie vereist.

Tilindex begin	Tilindex eind
1.14805	1.14805



3. De rekentool

Stap 1: Invoeren van de taakeigenschappen

	Gemiddeld te tillen gewicht	15 kilo
	Optillen (begin van de tilactiviteit): de afstand van lichaam tot tillast (horizontaal)	0 cm
	Optillen (begin van de tilactiviteit): de afstand van vloer tot tillast (vertikaal)	90 cm
	Optillen (begin van de tilactiviteit): de hoek tussen lichaam en te tillen last (last recht voor het lichaam = 0 graden)	90 graden
	Neerzetten (einde van de tilactiviteit): de afstand van lichaam tot tillast (horizontaal)	25 cm
	Neerzetten (einde van de tilactiviteit): de afstand van vloer tot tillast (vertikaal)	120 cm
	Neerzetten (einde van de tilactiviteit): De hoek tussen lichaam en te tillen last (last recht voor het lichaam = 0 graden)	0 graden
	De tilfrequentie: hoe vaak tilt u gemiddeld per minuut	0.25 keer per minuut
	De tijdsduur: hoeveel uur tilt u per dag?	5 uur per dag
	De hanteerbaarheid van de tillast (Zie beslisschema)	<div><input checked="" type="radio"/> goed</div> <div><input type="radio"/> gewoon</div> <div><input type="radio"/> slecht</div>

Stap 2: Maximaal tilgewicht berekenen:
Onder optimale omstandigheden is het maximum tilgewicht circa 23 kilo. Als de omstandigheden niet optimaal zijn, levert de berekening een lager maximum tilgewicht op. Het laagste van de maximumgewichten in de twee blauwe vakken is maatgevend!

<div>Bereken</div> <div>Result</div>	
Maximum tilgewicht beginsituatie (23kilo gecorrigeerd voor tilsituatie)	Maximum tilgewicht eindsituatie (23kilo gecorrigeerd voor tilsituatie)
12.2 kg	15.6 kg

Stap 3: De NIOSH Til-index voor uw tilsituatie

Bij een Til-index kleiner dan of gelijk aan 1 is de tilsituatie in orde. Het hoogste van de twee getallen is daarbij maatgevend.
Is de tilindex hoger dan 1, dan is er sprake van een ongunstige tilsituatie, met op den duur het risico van gezondheidsschade. Is de tilindex hoger dan 2, dan is onmiddellijke actie vereist.

Tilindex begin	Tilindex eind
1.22074	0.95966

Appearance test

A different appearance enables a clear distinction between the galleys, so it becomes obvious to passengers that they have different purposes: self-service or crew usage. It is important that the self-service usage is understandable for passengers and therefore reflect the stated interaction vision of this project: *During the flight, passengers can feel at ease, as if they are having dinner at a friend's place, where they can find their way to the kitchen on their own initiative.*

The following product qualities are described and used as a benchmark for the product interaction.

Product qualities for 'comfortable'
natural
recognisable

Product qualities for 'accessible'
light
calm

Product qualities for 'delightful'
remarkable
balanced

To meet the corresponding product qualities of this vision, a wooden cabinet style is chosen.

Goal

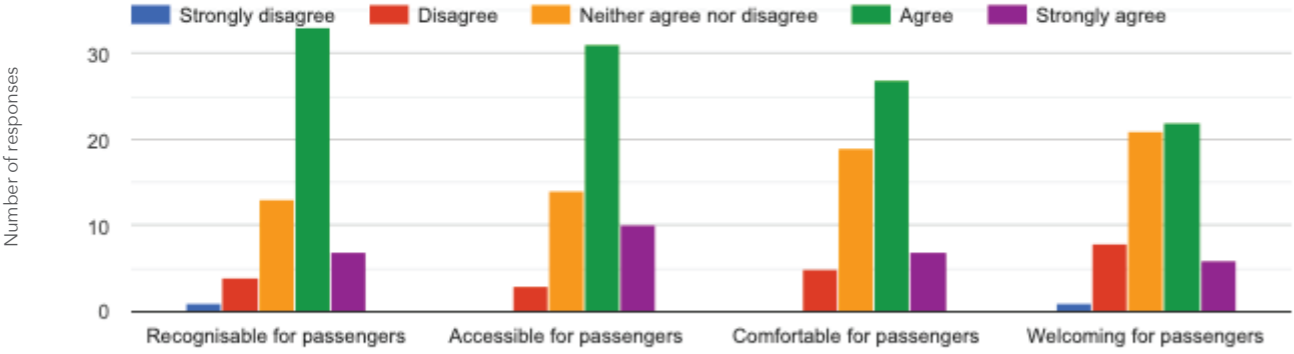
The design is evaluated among participants to see if this sparks a more accessible feeling for its users.

Method

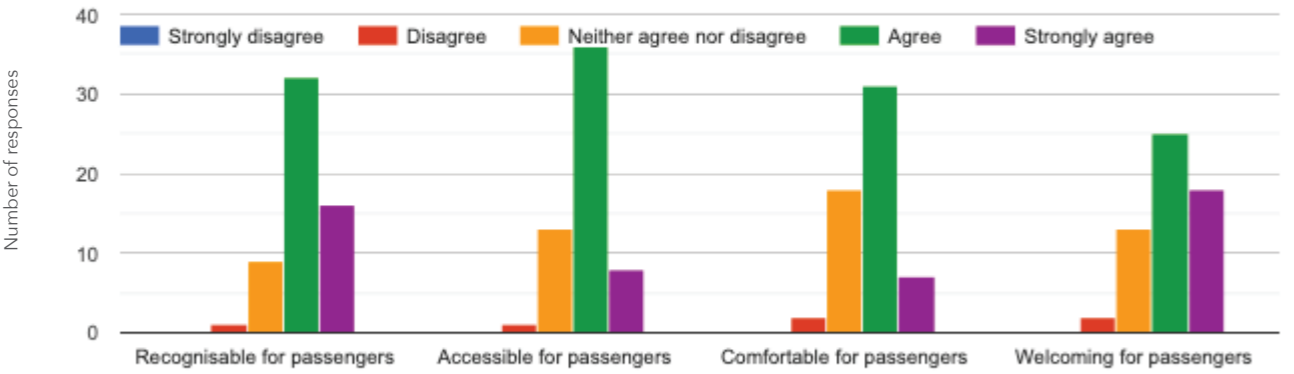
Three designs with a variation in its wood appearance is tested by means of a questionnaire. The respondents had to rate each design variation on its recognisability, accessibility, comfortability and welcoming appearance, using a 5-point Likert scale.



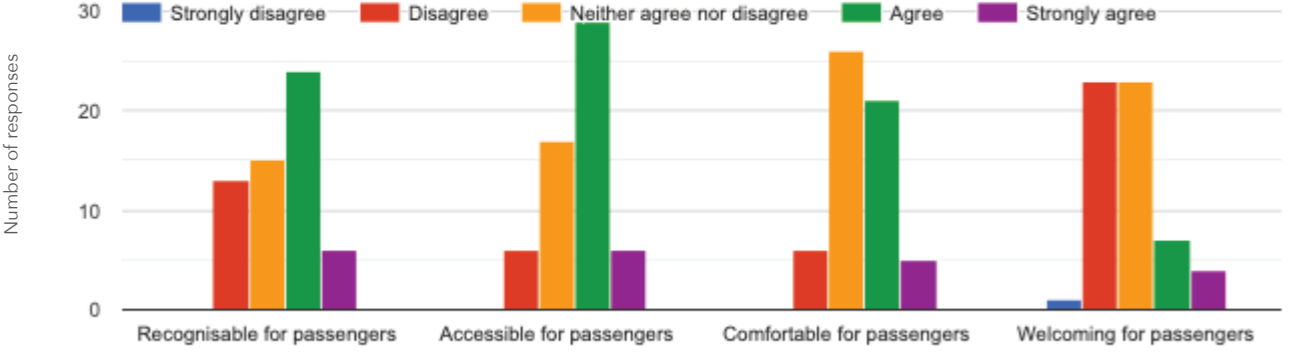
Please rate the appearance of unit I



Please rate the appearance of unit II



Please rate the appearance of unit III



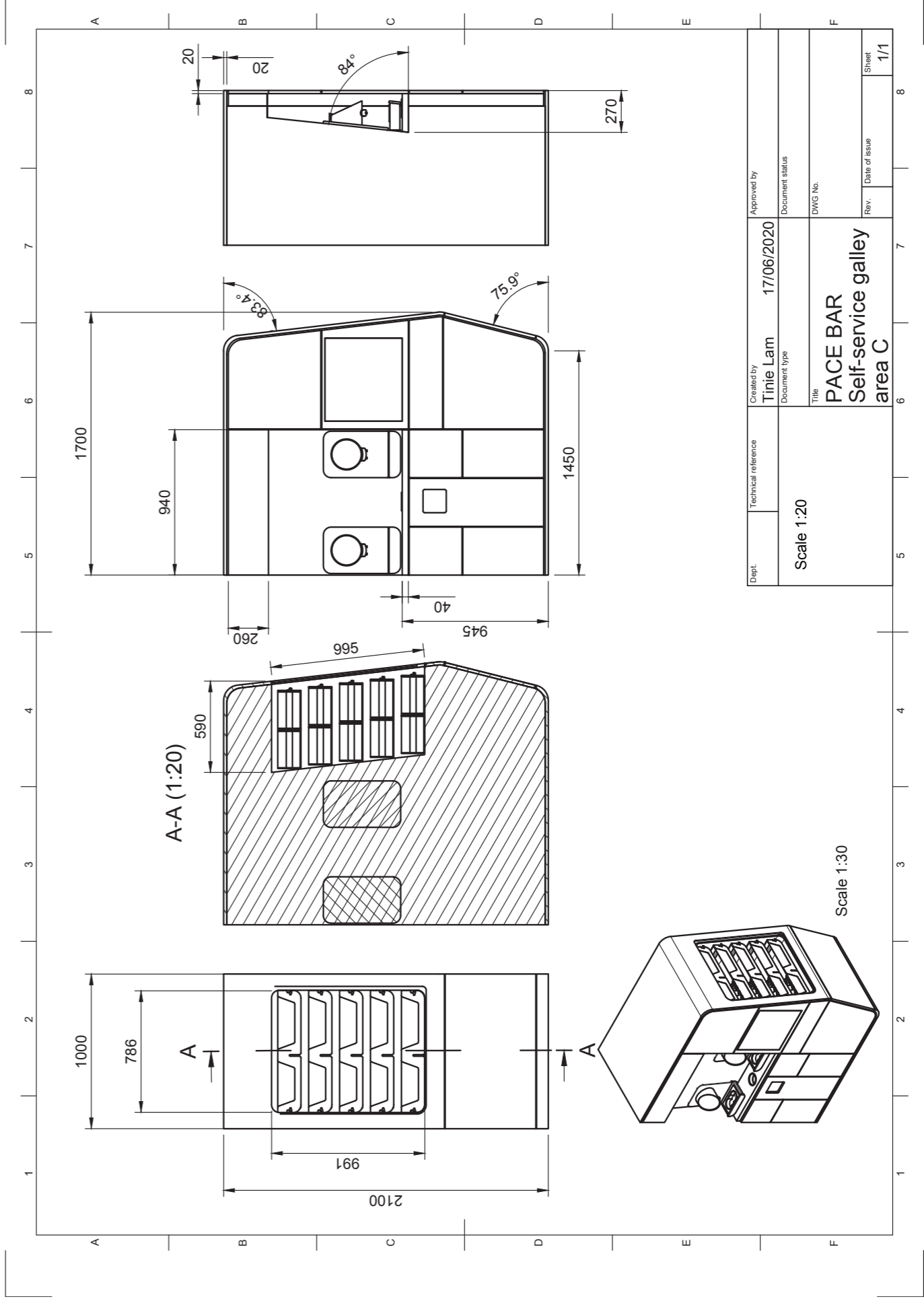
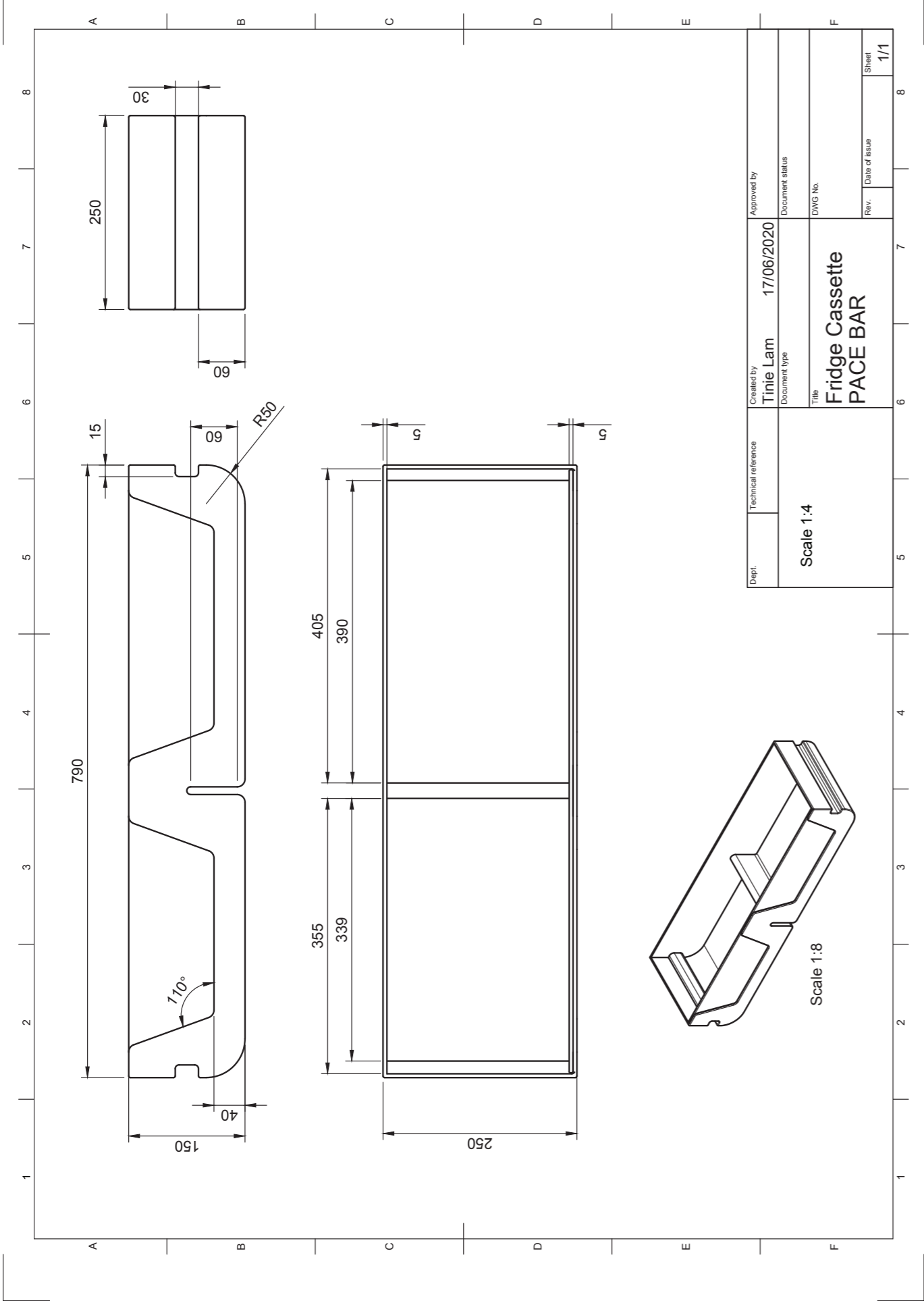
Results

The questionnaire is filled in by 58 participants, varying in their age between 20 and 72 years old.

The third appearance in grey scored the lowest in every aspect, so wood can be considered as a contributing factor to the product quality. The second design was rated higher than the first appearance and therefore selected to proceed with.

Discussion

The design was shown in isolation and not placed in the aircraft interior. Therefore, additional contextual testing should be conducted to re-evaluate the first and second design variations as a first impression when boarding the airplane.



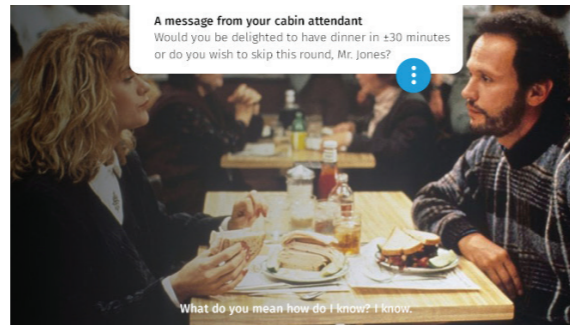
K Validation of the passenger journey

Method

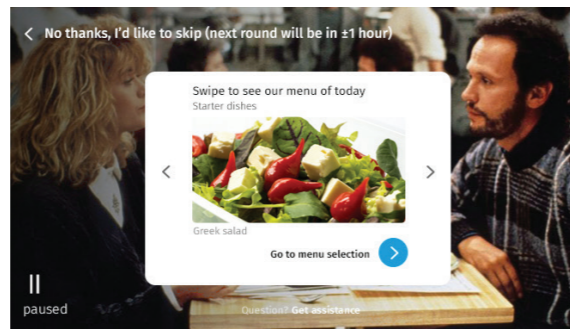
The onboard scenario of the passenger's inflight meal service is simulated step by step in a digital questionnaire. Each step of the service procedure is shown in images and descriptions. The progress of the questionnaire depends on the participant's choice, similar to reality when choosing a meal (or not).



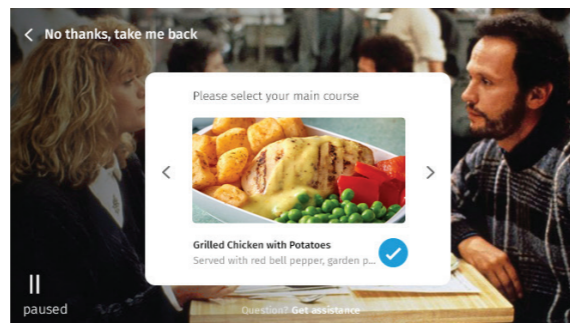
First, participants are explained that the screens they see are displayed in front of them while they are imagining themselves onboard of a flight.



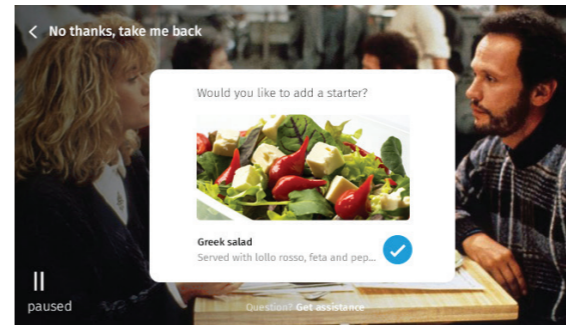
The participant/passenger receives a notification whilst watching a film.



The participant/passenger can choose to have a meal or to skip this round in the questionnaire.



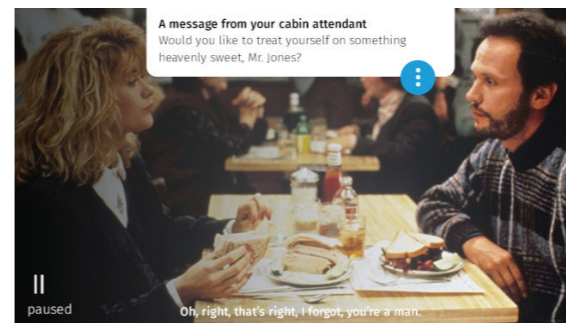
The participant/passenger is shown the meal selection menu if they chose for having a meal.



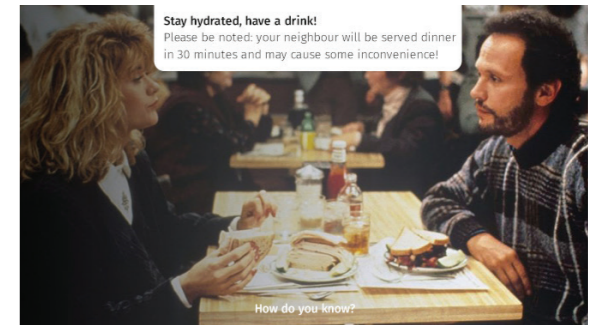
The participant/passenger can opt for an additional starter.



In a while, the starter and main course are served successively.



The participant/passenger receives a notification for the dessert and can once again choose to have it or not.

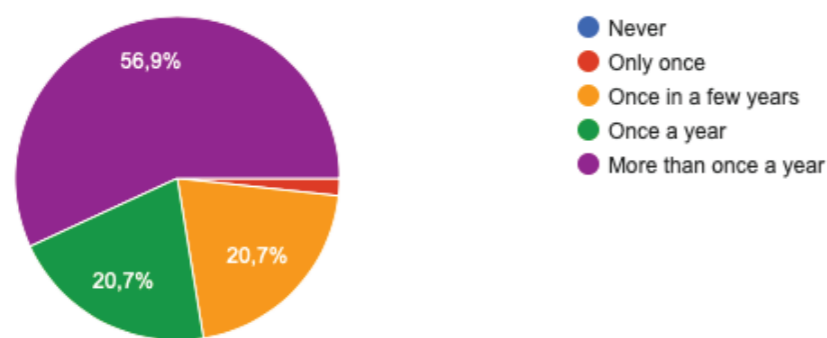


The participant who supposedly dismissed the first meal round, will receive this notification and then be redirected to another notification to have a meal during a later, second round.

Results & analysis

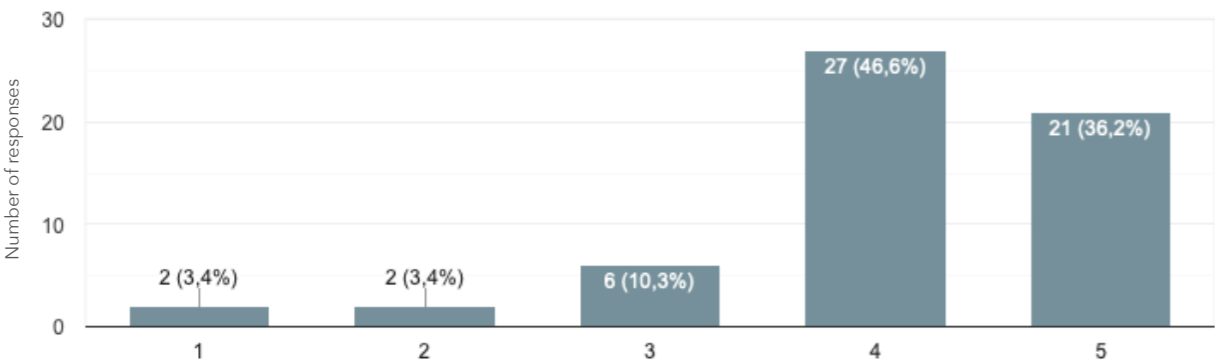
How often do you fly? Please select what is applicable to you:

58 antwoorden



This (digital) meal selection gives me sufficient flexibility and control to choose a preferred moment for having a meal onboard.

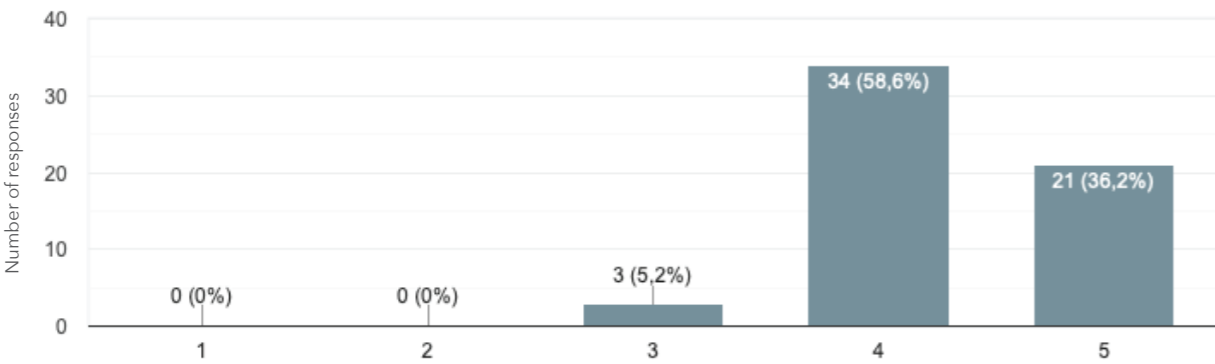
58 antwoorden



Score given on 5-point Likert scale where 1 means 'Strongly disagree' and 5 means 'Strongly agree')

A 3-course menu allows me to sufficiently personalise my dinner according to my taste.

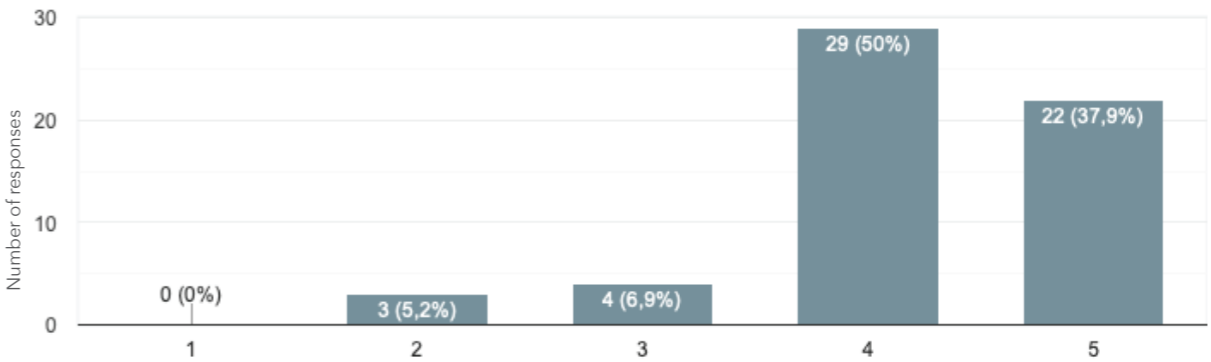
58 antwoorden



Score given on 5-point Likert scale where 1 means 'Strongly disagree' and 5 means 'Strongly agree')

The announcements and steps through the interface are understandable and user-friendly.

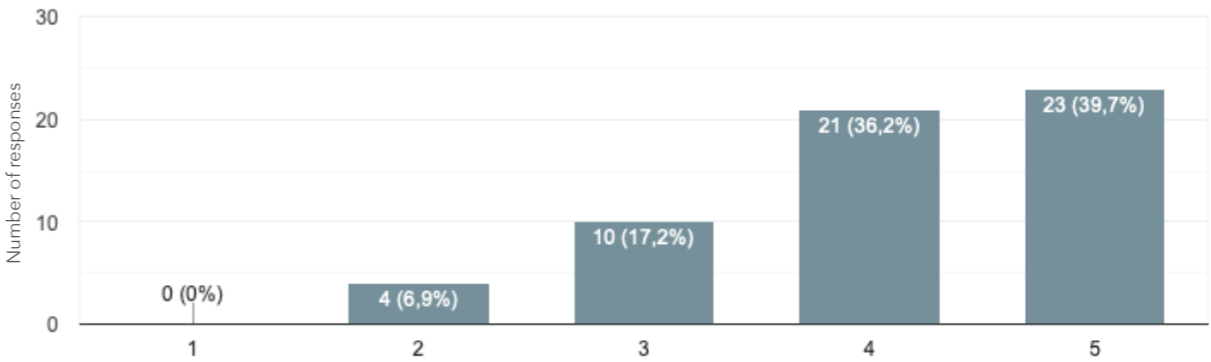
58 antwoorden



Score given on 5-point Likert scale where 1 means 'Strongly disagree' and 5 means 'Strongly agree')

Each course is now served separately; this contributes positively to my dinner experience.

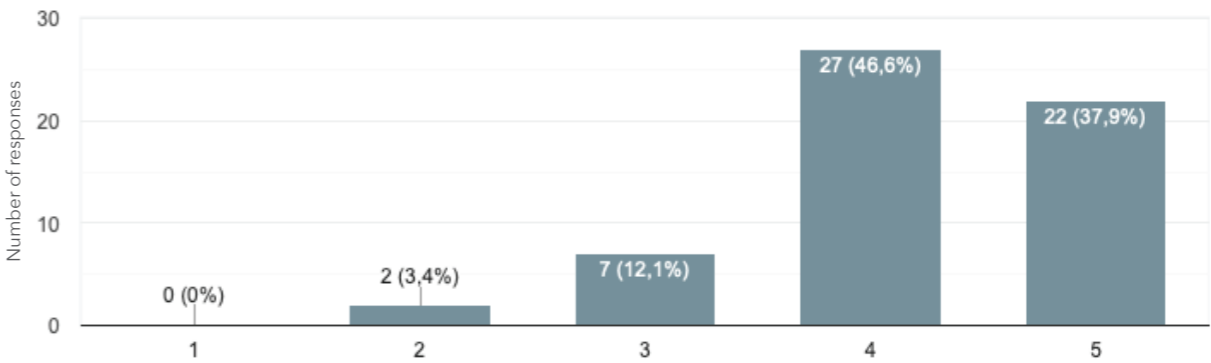
58 antwoorden



Score given on 5-point Likert scale where 1 means 'Strongly disagree' and 5 means 'Strongly agree')

The human interaction with a cabin attendant, who served your main course, is a positive contribution to my flight experience.

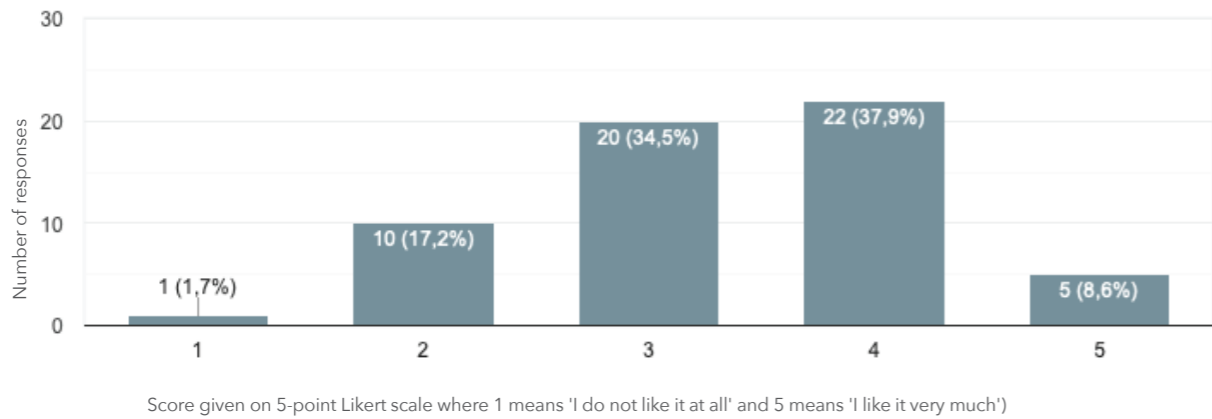
58 antwoorden



Score given on 5-point Likert scale where 1 means 'Strongly disagree' and 5 means 'Strongly agree')

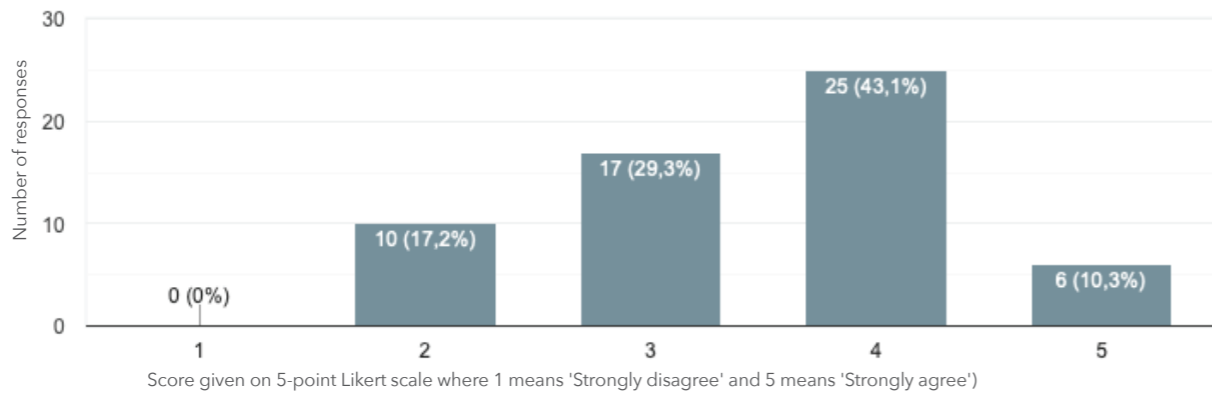
How would you appreciate it if an autonomous food cart would bring you the food?

58 antwoorden



The (self-service) interaction with an autonomous food cart would be a positive contribution to my flight experience.

58 antwoorden



What do you think of this 'warning'?	
I would be slightly confused. I guess I cannot go to the restroom when my neighbour is having a meal, which I understand. But, it seems a bit weird that I get a message about someone else's meal. I would get the feeling that suddenly something is "expected" from me, for something I'm not really involved in. It would also seem a bit awkward to be notified by something my neighbour does while he sits next to me. I can imagine the moment that I get a notification, he sees that I'm reading it, and now the awkward moment of "will he do something or not" arises.	*
Pleasant, as I now know that I can't get out of my chair the next 30 minutes because the neighbour is eating	*
Unnecessary, I can wait until my neighbour is finished. This is already the second notification during my film	*
Te opdringend, ik zei net dat ik mijn film wilde kijken	*
I like it. Good way to remind the passenger that it could be complicated to move while the neighbour is getting food. Without, one one could be annoyed later.	*
In order to avoid distributions	*
intimidating	*
It is good to be warned about this	*
Toch een beetje storend	*
Just as with my previous answer I would probably ignore it - if I am arriving in 8 hours, at 8 in the morning, I will try to sleep now!	*

Age	Rating	What do you think of interacting with an autonomous food cart that brings you a meal or collects waste?
27	3	I don't have a strong opinion on this. It would be slightly more awkward with a cabin attendant bringing food (as you stare straight ahead while he/she sets down your food etc) but I don't really mind either I would think.
25	2	Sitting in the middle seat might make this difficult. Is someone going to take my food? I think bringing food will be ok, but prefer human interaction,. Autonomous waste collection sounds great. It always felt weird for a person to take the waste from me. More of a robot job
31	3	I would miss a personal touch and the chance to ask further questions, furthermore it means you are probably dependent on the passenger closest to the aisle. Personally I would not like to be that person having to handle others random food times and plates, but that might be solved or it will only be applied In higher classes.
25	3	It is not very personal, like when the cabin crew gives you a plate en wishes you to enjoy your meal. But I think it is very efficient and you don't have to wait for a long time
25	4	Futuristic, would be nice. But I would also prefer the option that a cabin attendant comes by and asks if everything is ok.
31	4	Is it (more) convenient to grab the food (drinks?) myself? Will I not to be consumed by the movie to miss the cart or cause delay? Having a button to summon the cart to collect waste would be a nice feature. To replace and improve the current system needs a lot of testing. It probably won't work with too many people and long flights.
24	3	I'm afraid of losing the human interaction. The sevice appears to become less personal.
36	5	Bring me a meal
24	1	There is no interaction anymore. I like to have some contact with the flight personnel.
25	2	Just fine, but a real person would feel more luxurious, more possibilities to ask about the the food (is it vegan, is it but free etc.) or simply a napkin.
25	2	I always feel like getting my food brought to me by a human is fancy. Like sitting in a restaurant. I feel like this is lost with a serving robot. Additionally, if I have to reach over people to grab my meal from the autonomous cart, or needed to let the people next to me grab it for me, I would be quite unhappy.
24	3	Efficiënt but also takes away some of the luxury feeling you have when a steward or stewardess gives the service with human interaction
24	4	I have no clear idea of what this interaction would look like. I think it might be nice if the cart speaks your language. This would be nice to hear after being abroad and could positively contribute to the experience.
25	3	It would really depend on how responsive the cart is. It would be really annoying if the cart is not aware enough of what is happening and drives away before you are done. Also it is diminishing the feeling that as a passenger you are really special. (though that feeling is gone since the 80s I guess.
24	2	I think I prefer personal interaction with a human flight attendant. In case of any question and it would feel more friendly
34	2	Inflight experience will be less than with a stewardess. Also, if you're not next to the aisle, you would have to ask your neighbour to handover your food.
24	2	Ik zou de steward missen want ik mijn eigen zorgen die voor een betere sfeer
61	4	seems convenient. would like to have influence on the tme between the courses
59	4	Nice innovation
28	4	I think it definitely has benefits and it's practical. However, I do think that especially for longer flights sometimes it's nice when the flight attendant comes, even sometimes makes small talk. If not done properly it could end up being a "cold" experience.
24	4	I think for people who like human interaction would find it disappointing, but at the same time I think everyone would think that it is really cool and futuristic (especially in the beginning)
24	3	Interesting from a technological perspective, though might make the experience feel more like an assembly line than a restaurant.
45	2	make me feel experiences in fast food ticket machines
26	3	lijkt me lastig om dit te doen, aangezien je eigenlijk altijd zo snel mogelijk van je afval af wilt. En vaak als je in een film zit valt zo een wagentje niet echt op, en op dit moment is er dan nog een stewardess die je aantikt en je spullen dan alsnog meeneemt
44	4	very high tech
40	4	Good ideas
27	5	Great
25	4	I would support this idea. Sometimes it can be a bit noisy in the cabin and it might be harder to get the flight attendant's attention. I believe that a cart would improve the experience, as long as my neighbours (if I'm in the middle seat) would be willing to hand me my dinner :)
58	4	This is great but very much depend on the time required for the interaction.
23	4	An autonomous food car seems fine, but I wonder if I would still have the possiblity to ask for anything else/something specific to the car as well or if there will still be a steward who knows what to do directly
26	4	Could make it less complicated, if every passenger has access to the hallway. If you have additional special wishes though it gets complicated again.
54	5	Satisfy consumer s expectation
24	3	How can it reach across the 3 seats. How does noone steal my meal. I don't hate it I think it's a bit more complicated than having a stewardess do it.
26	3	I wouldn't have any problems with that
25	2	In case of collecting waste I would not mind interacting with an autonomous cart. Though, in case of serving meals, it would feel a bit impersonal.
48	4	This is flexible choose the moment to having a meal
55	4	It's good if the cart works in reasonable time .
30	2	Loss my appetite
30	3	I think it's very efficient
28	4	If I don't need to ask help from my neighbor is good. But if I need to ask for help/pas other people, it would not be nice.
49	3	It depends on the space it needs in the aisle. If people can still pass to go to the toilets it would be an improvement. Also it must be very clear to whom it delivers. You don't want people grabbing each other's meals or getting confused.
68	4	good idea
71	3	Not really different from a purser
24	5	Fun and innovative.
34	4	That would be nice
69	3	Ok
72	3	I agree, because it is more efficient
59	4	If it can talk or communicate for whom the meal is so there is no misunderstanding, it should be fine!
25	3	It would be nice and perhaps less intrusive than cabin crew. On the other hand, it increases the barrier for asking cabin crew for specific service like an extra tissue.
25	4	Seems like a fine solution :)
24	3	Seems like an interesting idea but I can imagine it might pose several operational problems; do you have multiple meals in each cart or do you let them drive back and forth? If so, people would have to collect the right meal which can and will go wrong and letting carts drive back and forth can result in crowded alleys. What problem is the autonomous cart solving?
26	3	For waste it is definitely better, I would usually feel bad when somebody has to touch and collect my waste. For food I would like the personal touch of an attendant a bit more.
37	4	I suppose it is more convenience, than interacting with a cabin attendant, who has a limited time per passanger. As long it is clear where or how to take your food and to leave your waste from the autonomous food cart.
25	3	I do really like having the comforting interaction with a flight attendant, as a flight is ultimately quite boring. However, if you could summon the cart to get rid of your waste that would be really nice, now often you have to keep your waste for a long time.
25	2	I'm not convinced yet. I think I would prefer a person
23	4	I think this would be user-friendly, but I also doubt the reliability a little.
20	3	Strange and impersonal but could be much more practical than a human interaction
34	5	Good

What do you think of self-service beverages? What features are necessary to enjoy a refreshing drink?		Concerns	Direct action points
Nice that you don't have to wait for or ask a cabin attendant. I would like some options (cold water, maybe some soda, tea, coffee).		*	
Being able to drink coffee at the spot would be great. You don't want to spill something while walking back to your seat. Also small volumes available so you don't need to go to the toilet that often. Also options for bottles with caps so you can keep it for later			Drinking area; small volumes and big volumes (bottles with caps)
I prefer them being brought to me, mostly because I don't want to spill while walking and encounter turbulence or something.		Spilling	
You can drink whenever you want, that's nice. But the path towards the machine has to be clear and easy. The machine itself has to be easy to understand. The drinks has to look fresh, like the oranges are just pressed and the coffee is made by a barista.		Clear way	
Nice to stretch your legs and walk. Cups, different options to for drinks. Good coffee is important, no instant shit.		*	
To pay a lot of money for a flight and not to have service does not look like an improvement. Important features are enough space to walk (and stand/sit) to enjoy drink. And time efficiency can I quickly grab a drink and go back to my seat?		Value for money	Drinking area
Is fine, nice to be in control yourself. There should be space to stand around, maybe even a social chill area to stand for a while		*	Drinking area
Is quite good			
That is nice! Coffee and a canned soda is a must. Some local drinks from the country that I am flying to would be cool!			Local selection
Nice idea! I hope there will not be a long waiting line.		Waiting time	
They need to be quick, I would not like to stand in a line while on an airplane. They also need to be easily accessible, though that might be more of a seating design element (not having to climb over people to get a drink). I'd also like there to be some sort of option for spill proofing (like a cap for the cup, or some other solution) so I don't spill anything while walking back in a moving vehicle.		Waiting time; window seat; spilling	
I like the easy and speed with which you can order and receive your beverage. Especially for simple drinks like coca cola or a coffee		*	
I think it would be nice to choose when you get a drink, but during mealtimes it might get busy and waiting in your seat for an attendant would be more comfortable than waiting in the aisle I think. To enjoy a nice drink there should be cups, possibly ice, a trash area and napkins		Busy during mealtimes	Napkins
It is a good way to get moving, I also like the idea of being able to do somethings yourself during the flight.		*	
Sounds nice, it feels like you have more control over the way you spend your flight. Sufficient space would be preferred in Rotherham to not make in uncomfortable			
Good idea, plenty of choices and user friendliness.			
Handig, een kleine ruimte waar meerdere mensen even kunnen staan aan de machine om zo met elkaar te kunnen praten			Drinking area
sitting at the window, it might be difficult to leave your seat, especially when your neighbour is sleeping		Window seat	
Nice innovatie although it might cause a lot of walking in the		Traffic	
Clean glasses, ice, perhaps some customizable options like special flavors unique to the airline			Local selection
Wide variety of beverages			
Fast service, short queues			
good and casual to enjoy, but may always have a line of queue if not enough counter or wait for refill		Waiting time	
fast and easy ordering			
the self service beverage machine should be fast and easy to use. there should be enough selections for the people.			
Convenience, save times; coffee or tea or chocolate, these basic drinks must be required,			
Good. User friendly			
I personally enjoy the self-service bars in long-haul flights. Especially during the "dark" hours where most of the passengers are asleep, this gives me the opportunity to stretch my legs and get some drinks/snacks without waking other passengers by interacting with the flight attendants. However, I am not sure whether this would be a great idea if this is the only way to get drinks throughout the flight. Especially at the start I believe that most passengers like to have a drink and prefer to have it served at their seat, at least I do. But for the remainder of the flight it's definitely a great idea. I would just prefer to sit far away from this compartment, to avoid queues next to my chair. (like you sometimes have when people are waiting for the bathrooms, quite annoying)		Noise close to buffet; not being served anymore	
I prefer being served !			
Good temperature, quality, affordable price			
Personally, I like it because it triggers me to move on the plane which I consider important. For older people or disabled people it could be a problem though. Also I like to have free choice without being put on the spot. Features: You expect it to be cold and fully carbonized.		Elderly	
Good and easy-to-use			
UNLIMITED DRINKS! Also clean taps and cups are very important			
I don't think self-service beverages are the way to go. Especially when everyone wants to get their beverages during meal-time. This would create inconveniences for the person next to you and/or lines at the machines.		Waiting time; traffic during mealtimes	
I would prefer self-services beverages. Especially during long flights. Maybe a nice feature would be to have something to read in case the passenger finishes the drink at the self-service unit. Some flight information presented on a monitor perhaps.			Something to read or watch at the buffet
This is more convenient for passengers			
I concern there is not too much choices of beverages		Limited selection	
Good idea. Unlimited drinks with different choice of alcoholic beverages			
It's a good idea.I think you need a good drink and a system user friendly			
Lids and trays to avoid spills. Honestly the red/blue things looks as if they might fall during turbulence		Spilling	Lids and trays
Easy choice menu and easy user interface. Press button with image of the drink of your choice or pick it up.			
a clean environment and good instructions			
Depends on the cabin layout. If anyone can easily leave the chair, this is a great idea. But in a row of 3 chairs with only one galley, it is terrible.		Window seat	
Easy of use and diversity in choice			
Hygiene.if people cannot make a mess then that would be best.		Cleaniness	
You must not disturb your neighbour too much		Window seat	
I like self service beverages because I can drink on the moment I like to drink		*	
An area to have a drink while standing is relaxing during a long flight.			Drinking area
Very good idea! Gives you an excuse to move a little and provides autonomy. Lots of people moving will not form a problem for the salad-bringin-'robots'?		Traffic in combination with carts	
It is nice that you can pick your own time for a drink.		*	
From a passenger perspective, this would be nice but again operational this could pose problems like line forming and crowded alleys. Can imagine this becomes especially crowded if you add autonomous carts to the formula. Will only work if the alleys in flying-V aircraft are significantly larger than current aircraft in my opinion. Otherwise you want as many passengers keeping in their seat as possible from operational perspective. Crowded alleys is already one of the main things frustrating me in a flight.		Waiting time; traffic in combination with carts	
Nice! It's nice that you can take a little walk, but it would be nice to not have people spilling hot drinks all over each other during the flight.		Spilling	
Simple interface and safety. It must be easy to get your choice and it should be safe (spill proof) to bring your drink back to your sit.			
I love the idea of getting beverages whenever I want. Would it be free? (This also goes for the extra options with the meal, I mean, nice but hidden costs are not nice!) The most important thing for me would be that I can leave my seat without bothering others.		Social	
Can be nice. Adds a sense of control. Do you have to stand in line to get a coffee in the morning?		Waiting time	
Convenient. Nice taste, short waiting time, enough choices.			
A reusable cup for example, for the whole flight. And an ice tray			Reusable cup for the whole flight
Freedom, you have enough time to choose your drink		*	

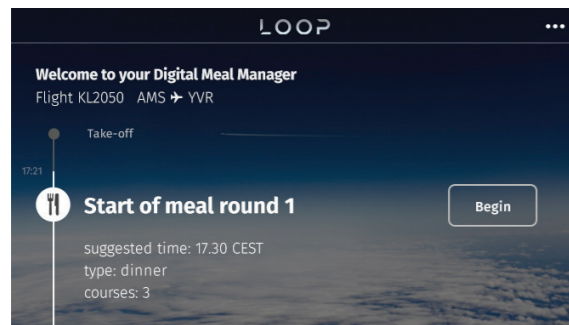
Are there other things you would like to mention about your flight experience? Tops, tips, questions, criticism, suggestions, let it all out!	Concerns	Direct action points
I can see the appeal of having the option to choose when to eat. But I don't like to be bothered many times during a flight. So, the message about my neighbour being served food might be something to think about. Also, perhaps I can see an overview of all the options after the first time I get asked if I would like to eat this round. Then I know how many times I can still skip a round or just pick a round if I already know when I want to eat.	Be bothered too many times	Overview of rounds
Ik denk dat het goed is om de tijd te kunnen selecteren terwijl je al aan het vliegen bent. Hier wil je van te voren niet te veel over nadenken. Een nadeel lijkt me wel dat iedereen op een ander tijdstip aan het eten is waardoor het langer onrustig blijft en continue andere geuren. Interface zag er goed uit, maar kan waarschijnlijk makkelijk in gebruik. Bij de terug knoppen was het niet helemaal duidelijk of het gelijk definitief is. Op zo'n groot scherm kan je ook meer informatie naast elkaar zetten. Dus bijvoorbeeld dat je makkelijker door de gerechten kan scrollen. Kan meer overzicht geven	Continuous rousing environment	More overview in the interface; clarity when to select
Automation of other requests: e.g. extra pillow, headphones, newspaper entered via the screen at your seat.		Request function
If you go to the toilet, you always have to wait until the cabin crew has gone by with the trolley. It would be nice if this stage is passed!	*	
I did not totally understand the ranking of the self beverage thing. How is the comfortability different for three different pictures. They looked different, which was nice, but the questions were confusing. How can I rate them on the given aspect?		
I like the ideas, but a lot need to change for it to be an improvement. There are too many people in economy class, in higher classes you most likely want more (personalized) service.		
The dinner can be something to look forward to, yet annoying when you want to sleep. It would be nice if you could set a time. I'd preferre to receivd meal from a person over from a robot.		Set time for meal round when sleeping
It would be even better if I can place an order on the screen if I want to, so that it feels like a restaurant. ;)		
I would love to not just get a notification, 30 min before a meal possibility, but a schedule at the start of the flight where I can see when I can get my food (first possible option). Since I'm always hungry it will be better for me to know that I can only order for example 2 hours after take off rather than just wait until finally the announcement is there that says I still have to wait for another 30 minutes.	Expectation of timing	Overview of rounds
You could consider if having people eat meals at different times in a (relatively) cramped environment might be somewhat uncomfortable. I am a bit self-conscious around other people, and I would be worried I was bothering them if I were, for example, the only one in my row eating dinner while they are trying to work/sleep/watch something.	Social	
I always like to have my first meal quite soon. It might get busy in the beginning. Also when you smell the food, sometimes you get hungry because of that. It is always nice if you get your food at the same time as the person next to you.	Social	
I really liked the food, +1 for the menu.		
I like the idea that you can choose the meal times, however I also experience meal being served as a joyful moment. Now the fun and surprising element would be less.		
Nice option for passengers sitting at the walking lanes. But what about me, sitting at the window?	Window seat	
With the self-service bar, perhaps it should be at specific times. For example when boarding you do it by groups, and you want to avoid "traffic" because everyone wants to have a coffee/ drink break at once.	Traffic at self-service	Schedule for the bar
wanneer de drink dispenser in het grijs is doet het afstand voor de passagiers. Daarnaast ben ik benieuwd hoe een autonomous trolley zich door het gangpad beweegt aangezien daar vaak obstakels zijn van mensen (voeten armen etc) nu kun je aangeikt worden door een flight attendant waardoor je je noise cancelling headphones af kan zetten en ruimte kan maken. En moet de trolley zich wel door het gangpad bewegen? Kan het niet ook via het plafond?	Cart movement	Grey color is distancing for the beverage dispenser,
I like the idea! Is this meant for all compartments, or only economy or business? I believe that this would work best for economy. During my flights in business class I felt that the personal attention given by the flight attendants is also part of the experience, so I would still try to maintain some of that.		
Reaction time required is very important !		
Will there be enough options for allergies (as you only mentioned three options)? To what extent will a human steward still be visible? What about medicine, would the food car also bring a asperine? Will the food car have enough space to move or might it easily bump into a passenger because it can't move that flexible as humans do?	Special meals; special (medicin) requests; cart movement	
Is every passenger sitting at an aisle? If not, I cannot imagine the robot to work well. What if the person at the aisle is sleeping?	Cart movement; window seat	
A good responsive tablet would already be a plus. Normally these things control like they're running on a potato.		
The layout of the meal selection application looks very intuitive!		
Might need a scenario where the is an infant on your lap.	Infant on your lap	
The unit is now shown without context. If my seat is nearby the unit will it disturb my experience? Also, will people restrict themselves or will they drink too much, causing extra traffic to the toilets. How dangerous will it be to have people walk around with hot beverages? Maybe it would be wise to start the flight with bottles of water at every chair, so people can quench their thirst and will not all get up at the same time the moment the seat belt sign switches off.	Noise close to bar; traffic to toilets; pax walking with hot beverages	Bottles of water at every chair at take-off
choose your own time for meals etc.		
I see minor differences in the design of I, II, III. The basic design is the same.		
The meals still don't look nice.		
I think it is not pleasant when your neighbour eats and drink at different times	Social	
Je kan alleen moment 1 of 2 kiezen voor je maaltijd. Laat alle momenten kiesbaar zijn, behalve als er geslapen moet worden.		
May be more toilets needed if there is a self-service bar. The bar would be nice to have a standing area. A steward(ess) should be available all the time though if anything goes wrong. And the separate service of dishes would be even better if also presented as a course, not a cheap 'boxy' takeaway	Toilets	Meal presentation
TOP: the beverage buffet looks amazing! TIP: Have you thought about the increased barrier for people to ask special services if they see the cabin crew less? And have you thought about whether the increased walking activity during the flight (due to the bev buffet) is possible in combination with the crew and meal-serving -robots?	Traffic for beverage buffet, toilets, crew and autonomous carts; barrier for special service request	
Overall I think this could contribute to the in flight experience for passengers but only if you can make sure it doesn't result in crowded alleys. This could be nightmare for crew from operational and safety perspective. If enough room is available/lanes for crew/bots and passengers defined separately or something like that it could result in a luxurious flight experience.	Traffic	Separate lanes for crew/carts and pax
What about people sitting at a window or middle seat? How will they get self service? Also for them I imagine it is more of a hurdle to access the drink-machine.	Window seat	
Features which give you information about the situation at the bar (whether it is busy or out of business), would be a welcome addition.		Traffic meter for the self-service buffet
I like that you can adjust your meal time, because sometimes you are just not hungry yet because flying messes up your internal clock. However, I would prefer to have control over it and not have to wait for this notification. For example, in the very first example, I would try to sleep at this moment. I would not care about food, and I would not see the notification. But maybe I can already set my preferred time for a small breakfast meal. (if this is included)		Overview of rounds; set time for meal round when sleeping
Going for a drink can be a relaxing experience as it allows to stretch your legs and walk a bit around the cabin, however, if all the passengers decide to go at the same time it would be a big mess. Also, kids would be constantly going there to refill their drinks.	Traffic; kids	
Reduce so much Waste as possible during the flight		

L Validation of the system (cabin experts test)

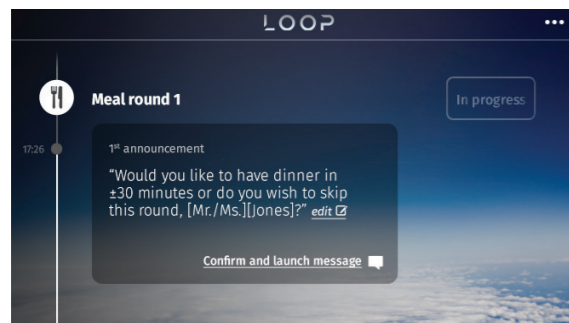
Method

The test simulates a journey through the operational steps of one meal cycle. The journey starts after take-off in the kitchen galley, from the perspective of a cabin attendant. The steps in the service are supported with digital interface illustrations that manage the meal service rounds.

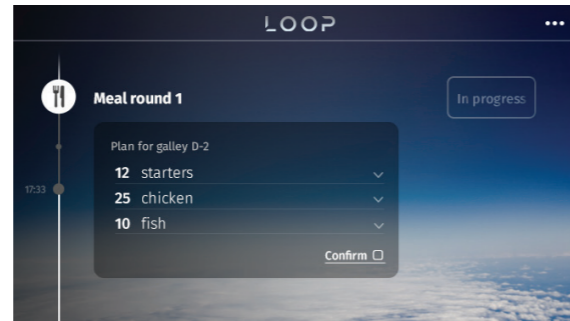
The test is conducted with 28 various cabin experts from different companies.



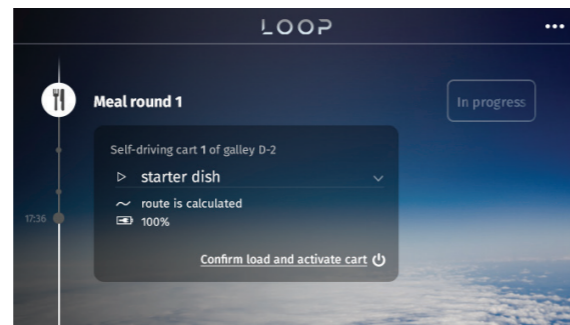
First, participants are explained that the screens they see are part of a digital system that manages the meal service.



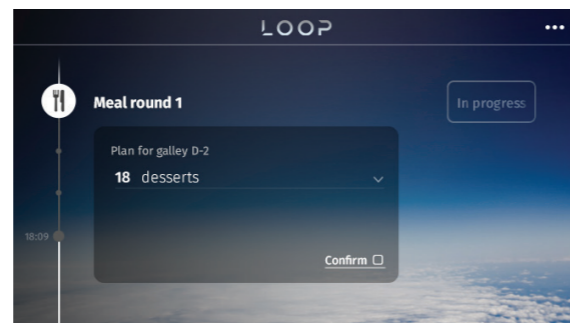
The participant begins the first meal round and will see this screen in order to send the notification to passengers.



The response is displayed as following. This is what the cabin crew has to prepare in galley D-2.



Once the meals are ready, they have to be loaded in the self-driving cart. The cart is activated and drives away.



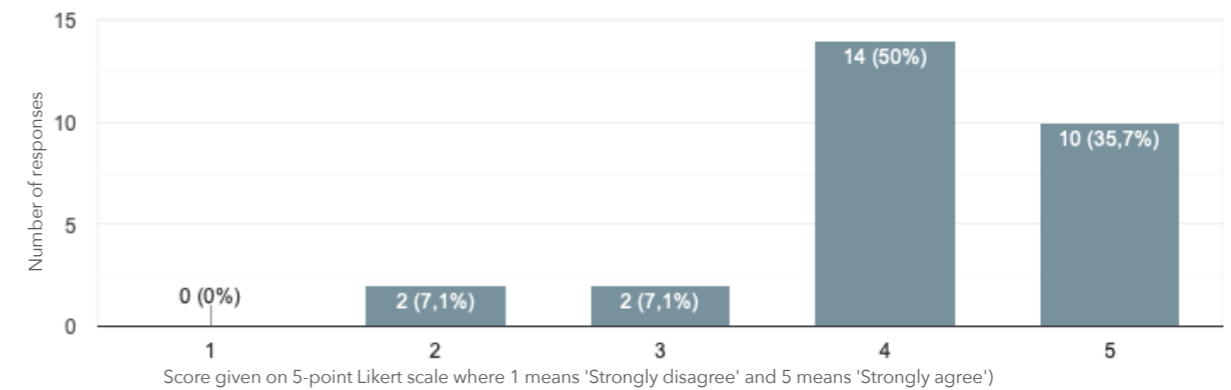
Then, the participant/crew member sends a second notification to those who are having their meal now. According to the response, the crew loads the self-driving cart again with desserts.

Illustration of the cart and supporting image of the kitchen galley for the question: What do you think of the position of the fridge, oven and workspace in the galley? The carts are stored underneath the workspace. How can it contribute (better) to your workflow?

Results & analysis

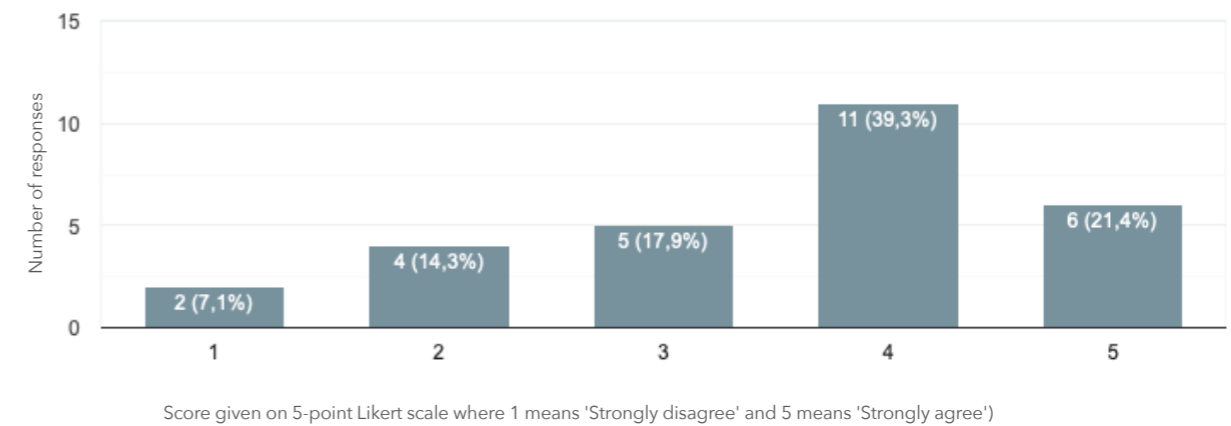
Serving the main courses myself instead of the self-driving cart, is a positive contribution to my work experience.

28 antwoorden



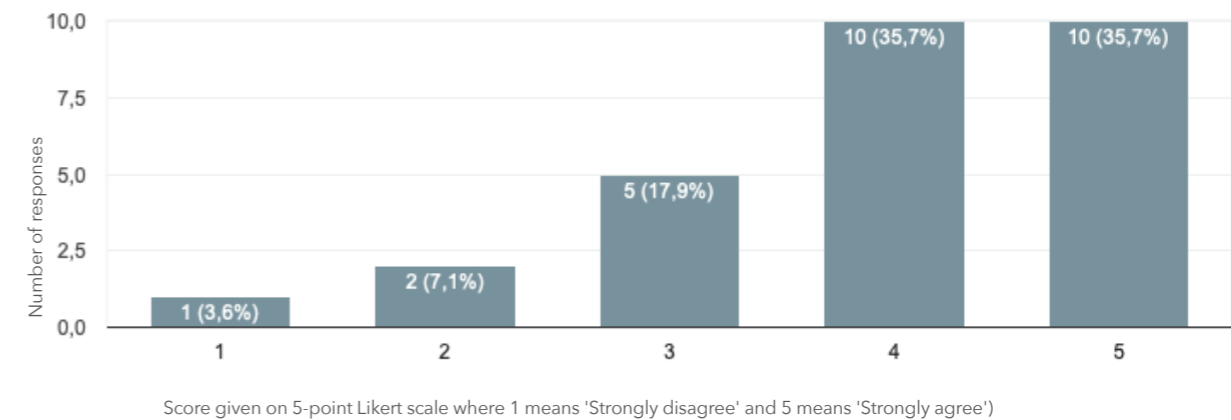
The use of a self-driving cart would be a positive contribution to my work experience.

28 antwoorden



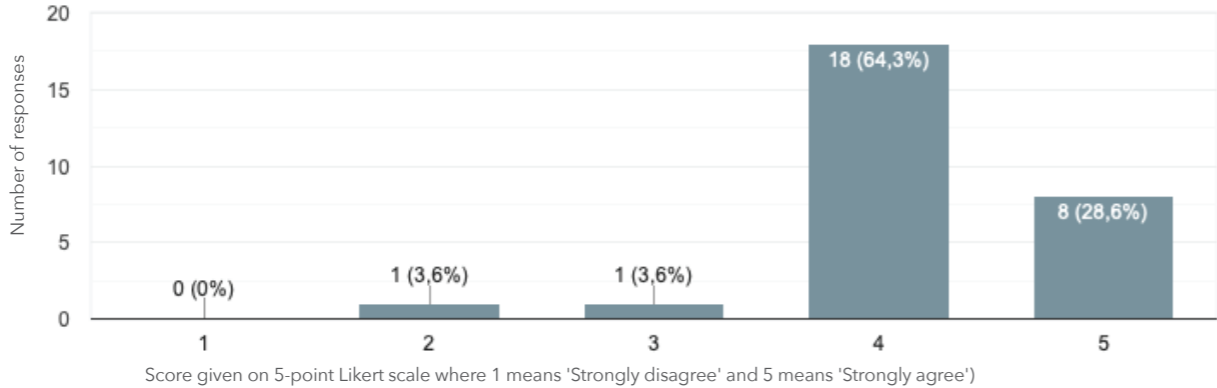
The steps of preparing each course separate are easy to perform.

28 antwoorden



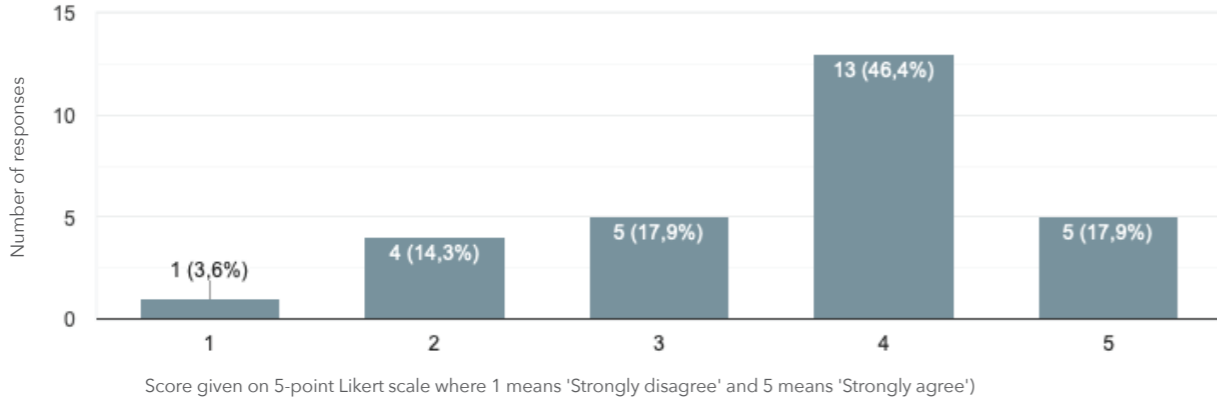
The steps through the interface are understandable and user-friendly.

28 antwoorden



I feel supported in my work with this (digital) system to provide an optimised service to the passenger.

28 antwoorden



Which company do you work for?	What is your role/job?	Passengers receive a reminder to stay hydrated. To coordinate these visits to the self-service bar, they receive a notification per row. What do you think of such a digital reminder?
Klm	steward	Very dutch! Not at all necessary to tell people what and when to drink.
KLM	éénbander	Too much. When some people walk, they will motivate others to do so as well.
KLM	Cabin Attendant	I don't think the self-service bar is a good idea.
Klm	Cabin Attendant	Niet ok. Mensen zoveel laten lopen aan boord is niet veilig en onrustig.
KLM	Stewardess	A bit too computerised
KLM	Cabin Attendant	Unnecessary.
KLM	Cabin attendant	very nice!
KLM	Purser	Sounds hospitable but probably unnecessary
FCMedia/FlightChic	Aviation Industry Reporter	Scheduling access to a self-service bar may solve my concern above. The same would be the case for scheduling trips to the lavatory.
KLM	Businessclass cabin attendant	What if they miss itches message because they slept or didn't see it?
Transavia	Cabin Crew	Super Nice! But good service is to give someone something before they realize they want it. No possible anymore.
Transavia	Purser	I think it's better to give them water instead of reminding them. Again they will be walking through the cabin and that's something we don't want. Again turbulence and blocking our way for medical other passenger or fire fighting etc. Safety first
KLM	Product Specialist Europe	Would probably be appreciated by passengers.
Safran	Director of Safran Cabin Innovation	Nice, but is it enough to motivate passengers to actually go?
Safran	Designer	I like the idea of a reminder if this is not too intrusive. I might have a smartwatch already with personalized advises or maybe I already got a drinks 10 minutes ago: in these 2 cases, I don't want to see a new reminder. The rest of the time, it could be useful! According to the time, you could be advised a coffee/tea (morning) or water (afternoon)?
Klm	Cabin Crew Economy	I think one reminder to point out the possibility would be enough. I were watching a movie I wouldn't want to be bothered by pop-up all the time.
Safran Cabin	Interaction designer	it can be a little bit annoying for the passengers watching a movie. I would not like to get such a notification. I can fill up my water bottle if I care a lot to be hydrated.
		If you want to be really futuristic about it I think that every other row should have a fresh water tap / fountain. Another complete no-brainer that doesn't exist yet today.
		I think you should only entertain this idea if you find empirical evidence that such things actually work in industrial applications - like a study on cognitive ergonomics. Attention and frustration exist in a delicate balance with one another and nobody likes being told what to do. It is not the job of the airline to keep passengers hydrated, its their job to provide them with hydration options. Reminders and notifications always need to be extremely subtle and in my opinion they are not a star feature. Think - a light on a console turning from grey to blue, avoid "banner across the IFE screen during a movie" style solutions.
Safran Cabin Innovation	Research and Technology	Another solution could be to cut your monument into two and place one elsewhere in the cabin. Similar to the fresh water tap idea, you don't need to orchestrate passengers movements if they are already within range of water.
Safran aerospace	R&D Engineer catering equipment	I already have a mom, don't listen to here advice either
Embraer NL	Research and Technology	Sounds great!
Klm	Twee banden en wagen	Goed, maar enigszins "belerend"
Safran	Industrial Designer	This would be good to spread the passenger movements as i mentioned in the previous answer. Personally, I would be even more stimulated if the reminder would be backed up with some data, for example the amount of liquid I have lost since takeoff, or the benefits of staying hydrated.
KLM	CA1	Goed! Heeft ook weer invloed op hoe de passagier van boord gaat en zich na de vlucht voelt. Dit heeft uiteraard dan ook z'n invloed op de gehele ervaring met KLM!
Klm	Cabin attendant	That's good otherwise waitingtime too long
KLM	Purser	That it is going to be really Busy at that station.
Klm	Cabin attendant	If it's per row, it's good
KLM	flight attendant	Alle pop ups op een scherm die een film onderbreken ervaren mensen als storend. Op een nachtvlucht slapen veel mensen om wakker te worden zodra de verlichting aangaat omdat de maaltijd geserveerd gaat worden. Je blijft dus blokken houden die of rustig of druk zijn.
KLM	Cabin Attendant	Not to much digital reminders please!

Which company do you work for?	What is your role/job?	What do you think of a self-service bar? What do you like about self-service and what do you dislike? And what about the design?	Concerns
klm	steward	People are free to get a drink whenever they like. As long as they do not make a mess of the selfservice	Mess
KLM	éénbander	It looks very nice, but what will be our USP? Every airline becomes totally the same.	Lack of service
KLM	Cabin Attendant	DISLIKE. We like to have passengers in their seats. Not standing in line to have a drink. Also, we do serve alcohol, but we like to keep an eye on how many drinks a passenger has. This will cause an increase in unruly passengers	Safety
		Design is good.	
Kim	Cabin Attendant	Selfservice moet wel non alcoholic zijn en makkelijk te vullen/ schoonmaken.	Safety
KLM	Stewardess	Er gaat dmv self service veel meer gelopen worden in de cabine. Dit komt de veiligheid niet ten goede	Traffic
KLM	Cabin Attendant	Drinks should be served together with a meal. During mealservice passengers could otherwise be lining up for the machines.	
KLM	Cabin attendant	Safety: tapping hot drinks. Could lead to dangerous situations. E.g. misuse by disturbed passenger. Pax walking around with hot drinks. turbulence etc.	Traffic, safety
KLM	Cabin attendant	Creates a lot of walking around by pax. Positive: pax could feel a sense of being in control when to have something to drink.	Lack of service
KLM	Purser	I dislike the interaction with the passengers. It will be more hygiene and probably safer in case of unexpected turbulence.	Lack of service
FCMedia/FlightChic		Excellent idea! However for non alcoholic beverages only. Like: pax will never have to wait for a drink. Dislike: less contact with pax, they will probably drink much more. Love the design.	
KLM	Aviation Industry Reporter	I worry that a self-service bar may not be suitable for social distancing requirements in future.	
KLM	Businessclass cabin attendant	If there is enough space for passengers to walk around the mail trolley when in service then it is a good idea otherwise not	Traffic
Transavia	Cabin Crew	It's super cool! But please keep in mind that the personal service and the fa smile can make a difference sometimes (or that's what I am telling myself ;-)).	
Transavia	Purser	Pax will be standing too much and makes our work harder. It's better that they stay seated, because of turbulence or if crew needs to get to a sick passenger (they will block the way) also they can bother other pax by hanging around. It's not a bar or a hanging out.	
KLM	Product Specialist Europe	No control on alcohol.	Safety, traffic
Safran	Director of Safran Cabin	Self service would be fine, if it's additional to the current service. We prefer to serve a drink & meal at the same moment.	Meal and drink together
Safran	Designer	I guess passengers something to do and get out of their seats for. It can also cause some traffic jams of passengers waiting for their turn. Passengers would most likely welcome the freedom to get their own stuff when they feel like it. How to keep the unit stocked, clean and tidy is something to think about.	Traffic
Kim	Cabin Crew Economy	I like the choice and the fact that I can have a drink whenever I want. Yet, To drink my favorite drink with my meal is important to me (as part of the meal service). I would mostly use the self-service unit between 2 services or if I get bored.	
Safran Cabin	Interaction designer	I still think that people at the windowseats will not benefit as much. Unless there all seats are free to enter without having to bother other passengers. What if you want a drink with your meal. Passengers will be in the cabin when the selfserving cart is trying to do service. The passengers that placed an order might not be in their seat. Also it promotes considering it as a bar where you "hang out". Not a safe situation during unexpected turbulence or a decompression.	Meal and drink together
		And are there alcoholic drinks in 2050? It might need monitoring.	
		To reduce waste will people bring their own cups? The soft drink could then also come from a tap.	Window seat, safety
		I like it from cabin crew perspective because it is pretty tiring for cabin crew to take all beverage orders, keep them in mind, prepare and serve them. In this solution, passengers can help themselves and have enough time choose their drink.	*
		I think its a great idea - see my previous answer about beverages not fitting in trolleys. However, all meals should at least come with fresh water. A totally self service drink system would cause congestion around peak meal times and again block the service caterbots. It shouldn't be too difficult to include bottled water (or the sustainable future alternative) in the galley fridge. Passengers will be split on like having to get up if they want a drink and will still likely look for the option to request specific drinks to come with their order.	*
Safran Cabin Innovation	Research and Technology	I think it could be a nice additional service, but I think drink service is the first contact moment with passengers and very valuable because of that. Also, it will cause a lot of movements and disturbance if people have to get all their drinks themselves. Walking in a moving plane, passengers walking up and down cause a lot of movements and disturbance to pass each other with hot coffee in their hands, hovering over occupied seats. not gonna happen.	Meal and drink together
Safran aerospace	R&D Engineer catering et		Lack of service, traffic
Embraer NL	Research and Technology	I like it; it gives freedom to passengers. Well placed I like it a lot!	*
Kim	Twee banden en wbc pp	De machines.... dat ze wel werken aan boord! Sorry ik vind het eruit zien als Goedkope take away.. En ik merk nu dat de pax weinig tot heel weinig iets komen halen of pakken in de hallen, terwijl ik echt alles aantrekkelijk uitstal in de galley, en in de cabine (vind ik zelf)	
Safran	Industrial Designer	The unit looks very nice! As a passenger it is probably also very nice to have a reason to stand up and walk through the aircraft (but what about disabled passengers?) A downside could be a large number of passenger movements, possibly conflicting with the self-driving carts. Self-driving vehicles (today's versions) might have trouble with too many disruptions of their program.	Traffic
KLM	CA1	Interessant voor tussen de service door andere wel erg weinig persoonlijk contact. iets wat KLM juist maakt tot wat zij nu is.	Lack of service
Kim	Cabin attendant	No hospitably design is nice	Lack of service
KLM	Purser	I dont THINK during food serving this is easy for pax. During The flight its sounds More like a plan	Traffic
Kim	Cabin attendant	Will miss contact with pax. Dangerous when all pax move around With drinks, especially hot drinks. Love the design!	Lack of service, safety
KLM	flight attendant	Werkt niet. Ivm met wachttijden/rij voor de machine.	
		Krijg je een decompression hangen daar dan genoeg o2 maskers? Met lichte/milde turbulente werken/serveeren wij door maar moeten passagiers zitten met stoelriem om. Dat kan lange tijd aanhouden. Eten en drinken moet naar mijn idee samen geserveerd worden. En hoe hou je op deze manier in de gaten hoeveel alcohol iemand drinkt?	
KLM	Cabin Attendant	Dislike: a lot of xtra movements of pax - spolling drinks	Safety
		Like: pax can create own time schedule for drinks	

Which company do you work for?	What is your role/job?	What do you like about letting the self-driving cart serve the starter dish and dessert? And what do you dislike?	Concerns	Tops
klm	steward	What with Corona and keeping distance, this is a nice solution. But how am I sure a passenger does not take more than he may have? And how can it reach the passenger farthest seated from the trolley (=window seat) without disturbing the other passengers?	Window seat, passengers take wrong food	hygienic
KLM	éénbander	less personal experience for passenger	Lack of interaction	
KLM	Cabin Attendant	I don't like it because these are our only contact moments. as well, who serves the drinks?	Lack of interaction	
Kim	Cabin Attendant	You loose the personal contact with the passengers. That is one of the reasons passengers choose a specific airline. Because of the personal contact with cabincrew instead of a robot.	Lack of interaction	Time for other activities
KLM	Stewardess	Like the fact that it gives me more time to serve passengers drinks. Hygienic as well, so great!		
KLM	Cabin Attendant	During times like these in a pandemic, less passenger contact moments are preferred. However, passengers can be quite demanding and fickle and will be interested in the items on the cart. Would they let the carts do their job or interfere in the process? Probably not every passenger would only grab the items they have ordered. What about sleeping passengers, passengers who changed their mind etc. I think passengers would like to see crew as well (post pandemic). Be aware that a decrease in amount of cabin crew could cause safety issues.	Passenger take wrong food	hygienic
KLM	Cabin attendant	I don't really like the interaction with the passenger with this service. its less than with the current service. However, it is more hygiene (less contact), less work, & better to distribute the meals to the right passengers (better calculation) = happier passengers	Lack of interaction	hygienic, lower workload
KLM	Purser	Like: very easy, low work load. Dislike: impersonal and what about the drinks?	Passenger take wrong food	lower workload
FCMedia/FlightChic	Aviation Industry Reporter	I like the efficiency and that it would support social distancing requirements in food service. I worry about customers being confused about their orders, or changing their minds and blaming the trolley.	Lack of interaction	hygienic
KLM	Businessclass cabin attendant	When do you collect it again?only one time collecting waste is not enough I think		
Transavia	Cabin Crew	I would to hand it out myself. More personal	Lack of interaction	
		Apart from a safety issue (for instance turbulence or medical needed) it's not really services minded. Pax can't ask any questions or what if another passenger sees the starter/ dessert and change their mind?	Lack of interaction, passenger take wrong food, safety	
Transavia	Purser		Working area	
KLM	Product Specialist Europe	+ Multiple contact moments with passengers. - Will each CA still have their own working area?	Passenger take wrong food, traffic	Add alternative main course for mind changers
Safran	Director of Safran Cabin	You have to rely on the passengers taking what's meant or them. If you don't, you may have to resolve a situation with unhappy passengers. Also, the self-driving cart may still get blocked in the aisle by passengers moving around?	Passenger take wrong food, traffic	
Safran	Designer	If all the starters are the same, I find it convenient to automate this service. However, for the main dish with choices, I can imagine that some passengers might change their mind sometimes. To propose an alternative at the last moment could therefore be convenient, with the help of a Flight Attendant.	Passenger take wrong food, traffic	
Kim	Cabin Crew Economy	Just wondering about the practicalities: what if your seat isn't next to the aisle? What about the drinks served with the meal?What about the human contact?	window seat, lack of interaction	*
Safran Cabin	Interaction designer	Service of the starter and dessert can be done without crew-passenger interaction, because it is not required to ask the passengers' preference on them (no multiple choice for starter and desert mainly). Also, it is good that passenger can choose not to get starter or desert and prevent the waste. In the current system, the crew has to throw everything on the passenger's tray if it doesn't matter if it is eaten or not.		
		If you manage to get self driving cart-bots on the airplane then crew will never want to touch a piece of catering equipment. and rightly so. The toughest part for them is the repetition - delivering the same meals over and over again to a hundred+ people who may or may not even appreciate it. Service is seen as much less of a chore in business and first because its more personal delivering to a few people, which crew and passengers respond well to. So this is the part that should be handled by bots (large scale repetition that is) and its definitely worth developing. I mainly like this because it reduces crew work load which opens up opportunities for airlines, equipment designers (us folk) and makes the job far more appealing.		
		Passengers who do not wish to be disturbed will love it since you can't hurt a bots feelings (please don't give it facial expressions). Crew can handle the special cases - individual passenger requests and order corrections. Everybody wins. Passengers will always make special requests to crew and this is what generally pushes their workload over the top. By taking out the most labour intensive part (delivery) crew can put more effort into the 'touches' which crew always tell us is one of the best parts of their job - helping people. A system built up this way may also lead passengers feel like they can ask for assistance without feeling like a burden to crew (which they are).		
Safran Cabin Innovation	Research and Technology	The only other negative aspect I can think of is cabin traffic - caterbots need to be carefully programmed to make way for standing passengers and crew. "Rogue bot runs over lady on transatlantic flight" is one hell of a headline but not something airlines would ever want to risk.	Traffic	Deleting the large scale repetition in the workload
Safran aerospace	R&D Engineer catering et	In principle, I think it can be helpful but I see some difficulties. The window or middle seat will not have direct access, so they are depending on their neighbor who might be watching a movie or is asleep. having 3 separate serving rounds would also mean 3 waste collection rounds, otherwise you would still end up with the waste of your starter, meal and desert on your tiny table. A self driving cart sounds very high tech, but I doubt if it will really add value if it replaces personal interactions. And I think it will be expensive and unreliable.	Window seat, traffic, lack of interaction	
Embraer NL	Research and Technology	I particularly enjoy the idea but I suppose it has to be validated through other passenger's feedback..let's say you need to wake up someone to leave your seat, for example..	Window seat	
Kim	Twee banden en wbc pp	Onpersoonlijk en warming tegen slaat zijn al die vragen via het scherm.... men vind de aankondigingen al vervelend laat staan steeds een onpersoonlijke vraag via het systeem	Lack of interaction	
Safran	Industrial Designer	If these are snacks/meals without options to choose from, this could be an option. Especially serving the first small snack can be done by an autonomous cart, freeing the flight attendants to work in the galley. However, would they all be needed in the galley if meal service is spread out in shifts?		Lower workload
KLM	CA1	Positief is dat we desert en voorgerecht separaat van hoofdgerecht kunnen serveren, minder positief is afname subtiel contactmoment klant. Of juist meer tijd voor contact met passagiers en meer tijd voor commerciële activiteiten aan boord. Ligt eraan hoe je het bekijkt.	Lack of interaction	Time for other activities
Kim	Cabin attendant	Efficient, quicker. I dislike the lack of interaction with passenger	Lack of interaction	Lower workload
KLM	Purser	I THINK passengers will miss the most important manner, The Cabin crew. Some people travel & like contact. And others dont. If They dont See You, Will be different	Lack of interaction	Lower workload
Kim	Cabin attendant	It seems to be easy and faster, but I will miss the contact with pax	Lack of interaction	
		Kan ik geen pasklaar antwoord op geven. Er komt zoveel meer bij kijken dan alleen het uitserveren. Dank aan: kussens/dekens/lassen en passagiers die gangpad blokkeren, ploetsing turbulence, een passagier die toch iets anders wil, speciale maaltijden zoals gluten/lactosevrij enz. alles op 1 tray uitserveren en daarna ophalen is handig want sneller uit het gangpad zodat passagiers naar het toilet kunnen, passagier wil iets vragen over ingredient.... kortom ik denk dat een flight attendant onmisbaar is.		
KLM	flight attendant	Dislike: impersonally, failures can be made quickly when there is no check at receiving meals	Lack of interaction	
		Like: quick and efficient		
KLM	Cabin Attendant		Lack of interaction, passenger take wrong food	Lower workload

Which company do you work for?	What is your role/job?	What do you think of the position of the fridge, oven and workspace in the galley? The carts are stored underneath the workspace. How can it contribute (better) to your workflow?	Concerns
KLM	steward	Looks Ok.	
KLM	éénbander	little work space.	Small
KLM	Cabin Attendant	The working area seems really small to work with multiple cabin attendants	Small
Klm	Cabin Attendant	Op het plaatje ziet er vrij smal uit. Te smal.	Small
KLM	Stewardess	Yes!	
KLM	Cabin Attendant	Hard to see in this picture. Would need more visuals to comment about this.	
KLM	Cabin attendant	I can't really imagine this in the galley for now..	
KLM	Purser	There is not enough workspace to my opinion. The lower container positions are not very easy to reach.	Small
FCMedia/FlightChic	Aviation Industry Reporter	I'm not informed enough to answer this, but it looks fine to me.	
KLM	Businessclass cabin attendant	Not much workspace	Small
Transavia	Cabin Crew	Way better!! Easier , less time consuming	
Transavia	Purser	Not sure. Need a better picture	
KLM	Product Specialist Europe	Minimum CA height is 1.58 m. are all storage areas easy reachable for everyone?	
Safran	Director of Safran Cabin	It appears to be easily accessible and organized well for the crew to have a quick look and find what they need. The whole looks cleaner and everything is at sight. The fridge looks really big which is nice to display all the elements inside, but I would provide more workspace for the attendants so they can easily arrange the galley to prepare the meals the way they want. I like the clear separation of elements in the galley instead of the patchwork of products/devices we have now.	
Safran	Designer	If there is just one person working it could function but with more colleagues I think it will still disturb the workflow.	Small
Klm	Cabin Crew Economy	It could have been better if you placed the cart on the eye sight. It seems like the flight attendant will have to kneel down a lot to load/unload something to the cart.	Small
Safran Cabin	Interaction designer	The galley is already lacking enough usable countertop spaces - it is very valuable to have one running the full width of the aircraft if possible. Some items are heavy and you need to prevent whole trays hitting the floor so maybe put a surface or lip in front of the ovens. Consider looking at this space when multiple food items + equipment are removed from the fridges / ovens and multiple people are trying to move around one another. Be realistic about it because on every aircraft the space is incredibly tight. Flying V will surely be no different. To me the fridge looks very big (how deep does it go?) and monolithic, so try build in some usable elements there like a shelf or more buffer zones like the one you've indicated, again to rest objects. a lot of airlines do it in different ways, but for me, the heated part of the meal is something most struggle with. Most of the time, it is stored in a trolley on separate trays, taken out and put into the oven, and then , the hot (very hot) meals have to be put back into the trolley. If this can be made better than that would be an improvement	
Safran aerospace	R&D Engineer catering equipment	As in the previous question it has to be experienced and tested with crew and galley inserts so you can make sure it would work out better this way or another.	
Embraer NL	Research and Technology	another...	
Klm	Twee banden en wbc pp	Ziet er goed uit, maar over hoeveel ruimte per galien spreken wij? Is het even breed als een gangpad?eerlijk gezegd hoop ik van niet	Small
Safran	Industrial Designer	More overview of meals. Also, the carts are not in the way of the meal preparation process. A downside is that this configuration will require a large (double) galley space	
KLM	CA1	Sneller handelen tijdens voorbereiden en vullen Vd trolleys	
Klm	Cabin attendant	Good, fridge opposite the ovens	
KLM	Purser	The cards are not that important. You reach them When You need them. The ovens and fridge are together. thats better.	Oven and fridge together
Klm	Cabin attendant	Seems good like this, easy overview	
		Kan ik zo niet beoordelen. Op longhaul gaat de crew af om te rusten. De ene helft rust de andere helft zit "op" Dit doen we nu in de galley. Daar moet ruimte voor zijn. Ook voor passagiers die toch de benen willen strekken. Voor iedere deur het je 1 crewild nodig. Op blijv een 787 sta je al met 3 crewleden in één galley. Dit moet om een deur te bennannen met start en landing maar ook om af te kunnen tijdens een vlucht en om calamiteiten op te vangen.	
KLM	flight attendant		
KLM	Cabin Attendant	Ovens and fridges next to each other (same side) to make it easier to put all meals in the oven.	Oven and fridge together

Which company do you work for?	What is your role/job?	The meals are now stored in boxes, each course separate instead of already being placed together on a tray. This reduces the number of trolleys in the aircraft. What do you like about having the meals stored this way in the fridge? And what do you dislike?	Concerns	Tops
klm	steward	experience is that everyone wants to eat at about the same time. so more trolleys will be needed. And economy passengers basically like to have everything in one shot, I believe.	Everybody likes to eat at about the same time?	
KLM	éénbander	more functional	Difficult to see content?	easier
KLM	Cabin Attendant	Its more difficult to see the content.		
Klm	Cabin Attendant	Het opbergen/stuwen van maaltijden moet efficiënt zijn. Dat is het belangrijkste		
KLM	Stewardess	Hygienic that you only take out of the fridge what you need. Layer on passengers can get extra's. Could be a bit of a hassle when a passenger changes his mind during the mealservice.	Passenger changing minds	hygienic
KLM	Cabin Attendant	This probably causes more waste, increase the need for extra cutlery.	Increased waste because of cutlery	
KLM	Cabin attendant	Very nice, is this also a way of reducing the waste of not-eaten meals?		reduce food waste
KLM	Purser	Like; less waste, more combinations possible and easy to find. Dislike; more assembly on board.		
FCMedia/FlightChic	Aviation Industry Reporter	I like the idea of keeping the aisles clear more often, so that passengers can move freely. I'm not sure whether that would be achieved by this approach.	Traffic	
KLM	Businessclass cabin attendant	Then again, it is probably best not to have passengers moving around too much.		
Transavia	Cabin Crew	Easier		easier
Transavia	Purser	Again if pax change their mind of wanting a meal you don't have it and have to do more work. However wasting food is a shame.	Passenger changing minds	reduce food waste
KLM	Product Specialist Europe	- Feels like more 'handelingen' on board, but this is an assumption.	Higher workload	
Safran	Director of Safran Cabin	Separating starter/main/dessert will need more serving rounds, but if the new system can manage this while reducing the crew workload it would work. It seems to foster flexibility and maintain a better food quality while reducing the waste! I like that the service looks more high end, but doesn't create extra steps for the Attendants? I assume the boxes are reusable?		
Safran	Designer	Wouldn't it produce more waste? Is there new cutlery with every round? We already place the hot meals by hand on the tray. I don't see how serving more rounds would give a better experience unless you're in business class. Will the starters and desserts be more substantial? It would be a plus if there was a choice in starters or desserts otherwise it's just a waste of time and energy and waste if you don't serve them together.		
Klm	Cabin Crew Economy	I don't see any added value of it to be honest. The space occupied is still the same. It doesn't matter if the meals are in the trolleys or the boxes, they still occupy the same volume of space. You can use chilled trolleys if you want to keep the content cool. Also, trolleys has also a lot of benefits, like being mobile, in the catering facility, if you consider the whole supply chain.	Increase waste	
Safran Cabin	Interaction designer	Personally I like the idea of fewer trolleys (unpopular opinion in Safran who makes trolleys), however trolleys are indeed a great all-in-one-vehicle for stocking / unloading at a ground facility then using throughout the flight. They're very effective in that way. Consider how these fridges are stocked, how is the handover performed from ground staff to flight crew? I would imagine that stocking the fridges will take significantly longer between flights than simply loading trolleys.	No spatial benefit	
Safran Cabin Innovation	Research and Technology	Also don't forget about beverages, they account for a third of the stock on most flights and are difficult to store given the range of items: plastic, carton, cans, glass... The current approach of chucking items into trolleys wherever they fit needs to go, it's a mess. I really like the large fridge concept but this looks extremely energy intensive. Consider chilled air circulation instead of a traditional fridge.	Energy consumption	
Safran aerospace	R&D Engineer catering equipment	I think boxes are a good way, I have seen some very nice concepts that also take the waste collection into account. In essence the trolleys are already used as fridges, if you have to take the boxes out of a transport 'trolley' into the fridge, and then into a trolley again for serving does not sound like the most efficient way.	Higher workload	
Embraer NL	Research and Technology	Sounds interesting...would reduce weight, right? have you checked with crew how viable this is?		Less trolleys, less weight
Klm	Twee banden en wbc pp	Minder trolleys is goed, en scheelt een hoop gewicht. Ik denk dat je moet gaat testen of het werkt.		
Safran	Industrial Designer	A positive thing is that there are less trolleys in the galley, and less moving around of the trolleys in the small galley space, in order to get to the trolley needed (which might be behind some others)		
KLM	CA1	A negative thing could be that the meal now needs to be assembled in the galley, which still provides little space for this.		
Klm	Cabin attendant	Top! Veel moeier om voor, hoofd en na los van elkaar te serveren! Wellicht iets meer handelingen vooraf maar tijdens weer minder.		*
KLM	Purser	It may reduce the amount of waste, passenger who doesn't want an item, you don't spill it		reduce food waste
Klm	Cabin attendant	I THINK it great, for The environment & for the quality of The food		Quality of the food
		Less trolleys in aisle is good, dislike the less contact part		Less trolleys
KLM	flight attendant	Passagier zal toch vanaf een tray moeten eten. Er wordt vaak gemorst wat dan op de tafel zal zijn. Wie maakt dat schoon? Hoe komt de passagier aan bestek? Om te werken maakt de ruimte van de koelkasten niet uit. Galley neemt daardoor wel meer ruimte in waar anders stoelen hadden kunnen staan = inkomsten.	Dirty tables, increase cutlery, no spatial benefit	
KLM	Cabin Attendant	Like: efficiency of space and lack of waste Dislike: -		reduce food waste, less trolleys

Which company do you work for?	What is your role/job?	Would you prefer to have the application on a fixed screen in the galley or on a handheld device? Or perhaps a wearable, e.g. smartwatch? Please explain shortly why.
KLM	steward	fixed screen in galley, that is where I am working. Smartwatch is too small and our eyes are old & tired at looking at small screens.
KLM	éénbander	handheld device, for the ease of use.
KLM	Cabin Attendant	both a fixed screen and a handheld. So that you can work with multiple people. Not wearable since a smartwatch does not look good with the uniform
Klm	Cabin Attendant	Handheld device zodat je het device ook mee kan nemen naar de passagier toe
KLM	Stewardess	Both if possible, most workable
KLM	Cabin Attendant	No wearable, fixed screen both with handheld device
KLM	Cabin attendant	I like a big fixed screen in the galley. Especially when you are tired, easy to read, and you don't have to take it everywhere you go..
KLM	Purser	Both fixed and handheld. Or there could be a way to fix the handheld in the galley. But while doing the service it is necessary to have all pax info handy in the cabin. When doing the preparation in de galley you want the device in a fixed, logical place, where it cannot hinder the activities.
FCMedia/FlightChic	Aviation Industry Reporter	I think a handheld would likely be more convenient for flight attendants.
KLM	Businessclass cabin attendant	Fixed screen plus smart watch. Because you always have the fixed screen if the other options do not work properly but also the smartwatch is easy to walk around and get noticed if something is ready or there is a message
Transavia	Cabin Crew	Fixed screen, easier to look for an overview. Handheld can be lost.
Transavia	Purser	On my iPad. Each galley has their crew, so when everyone knows where they stand they can get their info for their rows.
KLM	Product Specialist Europa	Handheld device, because you can also use it in the cabin/aisles or in other galley areas.
Safran	Director of Safran Cabin	I'd go for a combination of a fixed display in the galley zone, and have personal devices for each crew member (e.g. a tablet or wearable).
Safran	Designer	I would prefer to have it on a fixed screen in front of me since the display would be wider and easy to interact with. The meal is one part of my flight so I wouldn't like to have an extra device in a small space only for that. Once I have chosen my meal, I would be impatient to experience it in real while watching a movie for instance.
Klm	Cabin Crew Economy	A fixed position would be nice because you'll never lose it. But a handheld would be helpful when you're in the cabin.
Safran Cabin	Interaction designer	A personal device with a docking station on the galley wall would be nice.
		We all know the pain of trying to cook or repair something while holding up a phone or tablet. There are many solutions but only some that REALLY work. The exact same problem is experienced by cabin crew.
		Push to get a large multi-user visual display on some available nearby flat wall. Galley displays are notoriously difficult to develop because they get in the way of everything else and usually need to be folded away for safety when not in use - folding displays generally go under-used compared to large always-on displays than you can see / interact with at a glance even with your hands full. There are also heating and static electricity issues for electronic galley tech.
		Virtually all cabin crew already have a PED (personal electronic device), usually a phablet or tablet. Nothing fancy just an android tab with some airline specific apps. This should continue as the standard for a very long time. Integrating the same universal tablet mounting module in as many places as you can will be very helpful for crew. Especially if it also charges their device. They literally don't have this and its such a no-brainer.
		Wearables aren't there yet, won't be for another 10 years (perhaps suitable for Flying V?). My opinion on wearables is that they're support tools, not driving productivity machines. What I don't like about them is that it places the responsibility of maintenance on crew, which an airline cannot control. Nice for
Safran Cabin Innovation	Research and Technology	emergency notifications maybe.
Safran aerospace	R&D Engineer catering equipment	I think a tablet size handheld device with content adjusted to your position in the plane would be the best. portable enough, and always showing the most relevant info
Embraer NL	Research and Technology	In a handheld device as it would decrease the time spend in the galley.
Klm	Twee banden en wbc pp	Een handheld defice, gekoppeld aan een fixed screen in de galley, wel op een goede plek,dicht bij de koelkast en ovens.
Safran	Industrial Designer	Fixed in the galley. If I understand correctly, most of the 'human' work will take place in the galley. If FAs are not in the galley, they are also not able to prepare any meals. A wearable for alerting for incoming orders might still be a nice addition.
KLM	CA1	Smartwatch, zodat je waar je ook bent kunt kijken. Handheld device raakt sneller kwijt
Klm	Cabin attendant	Not fixed, you can check it everywhere, in the cabin as well
KLM	Purser	I think, that a smartwatch or little ipad is most effective
Klm	Cabin attendant	Fixed screen, because it's bigger and more visible and it can't get lost while working, no one can move it
KLM	flight attendant	Handig is het om één iemand die taak te geven. Passagiers stellen soms dezelfde vraag aan wel drie flight attendants. Kan rommelig worden als iedereen iets zelf invoerd. Er moet overzicht zijn. Een device is wel handig voor in het gangpad
KLM	Cabin Attendant	Handheld device. Must be usable while in the aisles

Which company do you work for?	What is your role/job?	Are there other things you would like to mention about this flight? Tops, tips, questions, criticism, suggestions, let it all out!	Concerns
KLM	Cabin Attendant	Although automatic systems seem like a good idea, our service items are also the time we check our passengers. Who looks sick, who might be scared. By adding to much self service we let go of a lot of control.	Service
Klm	Cabin Attendant	Vliegveiligheid moet zeker niet vergeten worden in bovengenoemde voorbeelden.	Safety
KLM	Stewardess	Think again about the drinks, the mealservice is great!	Reconsider drinks
KLM	Cabin Attendant	Nice idea during pandemic. However not that fond of the idea of tapping hot drinks by passengers. Also be aware that less contact moments with crew will probably lead to having less crew on board and this could cause safety issues. (unruly pax and only a small amount of crew on duty)	Safety, service
FCMedia/FlightChic	Aviation Industry Reporter	Interesting ideas all-around. I'd be very happy to learn the results of this survey.	
KLM	Businessclass cabin attendant	All stands also with the space for passengers to walk around and to get easy in and out of their seat, all aisle seats?	Traffic
Transavia	Purser	Think about flight safety	Safety
KLM	Product Specialist Europa	Cabin Attendant	
		I like the approach of taking work out of the crew's hands and using technology to take care of repetitive tasks that don't add value to the inflight experience of passengers.	
Safran	Director of Safran Cabin	Keep in mind that for some of this to work well, such as the autonomous trolley and responding to messages on the screen, you're relying on passengers doing what's expected of them. Large groups of very diverse people may not understand everything or do as expected.	Rely on passengers
Safran	Designer	I was curious to see the interactions between the Flight Attendants, the passengers and the trolleys in the aisles... More contextual pictures about it? Very intrigued by this new approach and the atmosphere it could create inside Flying-V. Congrats and good luck!	
		I think there probably will be a lot more automatic in the processes on board but I still think people love to get served in the comfort of their seats. I can imagine that it will be possible to place your drink order on the screen and that it will be brought to you by a selfdriving cart.	
Kim	Cabin Crew Economy	I foresee that service might be more personalized. But I think that your choice (chicken or veg or any kind of special meal) will already be made pre-flight so the loading of food items can be done more efficiently. So then it's more about the timing of the serving. According to your preferred time-zone for instance.)	Service
Safran Cabin	Interaction designer	Good luck with your graduation!)	
		I really like your project and I think you've done an excellent job of capturing a future vision of how things should be. A lot of these things are just out of reach today and you would be amazed at how lacking aircraft cabin technology already is in 2020.	
Safran Cabin Innovation	Research and Technology	To be honest I pray that by 2050 we have better access to clean water in aircraft cabins. Right now with the virus this topic is receiving attention and I definitely believe that it will be a given in the years to come. For sure hygiene standards will go to the next tier by 2025. I would hope that by 2050 the technology is somewhere we can't imagine today.	
		I like the flexibility with multiple meal services. But I think flying is already quite complicated for a lot of people, and this will not bring them joy. Also, moving to a different time zone is difficult, and a well timed meal service will help in adapting. I think it sounds good in theory, more choice is always better, but I don't think it is an improvement in real life.	
Safran aerospace	R&D Engineer catering equipment	Love the Flying V project, good to see that catering is also part of it. I think a good opportunity is to combine optimizing the flightattendant workflow with the design of equipment, packaging and waste separation.	Workflow
Embraer NL	Research and Technology	Maybe passengers could choose also not having meals on board maybe with a discount on ticket price and be advised to make health choices as well:)	
		Ik denk dat je ook de mogelijkheid moet bieden om later te eten.	
		ook denk ik aan die elektrische trolleys/warmte afgifte hiervan/ brandprocedures ed. We zien wat er nu al voor nodig is om een lap top te "blussen" laat staan een trolley...	
Kim	Twee banden en wbc pp	Wel vind ik het super om te zien deze mogelijkheden eraan gaan komen. En dat juich ik van harte toe. Maar voor mij blijft een pre.... persoonlijk contact en aandacht. En dat mis ik toch sterk tijdens deze vlucht. Het contact creëer je al bij binnenkomst en bouw je op tijdens de vlucht, ik heb nu het gevoel dat ik een of andere "stewardessen pop" ben..	Safety, service
		Really nice system! I think for both users this offers great benefits. I see three main elements: course rounds to spread FA workload, automated carts to reduce FA workload, and self-service for passengers also reducing FA workload. Each of these could also very well be followed up individually I think. For passengers the self-service drinks offer a great reason to get out of your seat.	
		Without wanting to be negative, these are a couple of considerations that came to mind: - What if the majority of passengers want to eat in a single time slot (convenient dinner time)? - How should passengers not seated at the aisle access the cleaning cart? - With multiple meal rounds, would the carts not be constantly moving through the aisle? Would they block each other? What if a passenger needs to go to the toilet? - What if there is bad turbulence and some of the meal rounds have to be suspended? Would this system still allow all passengers to be served during only one round if necessary?	Window seat, traffic
Safran	Industrial Designer	Super ideeën maar lijkt me belangrijk om niet dat persoonlijk contact te verliezen. Dat is wat KLM als organisatie kenmerkt en uitdraagt. Het persoonlijk contact is vaak het grootste onderdeel van een positieve ervaring vanuit de passagier.	Service
KLM	CA1	Efficiency in galley is nice but less personal attention	Service
Kim	Cabin attendant	To little contact with pax. New way of working looks good. Seems faster by knowing on forehand what pax wish to eat. Easy they can get the drinks from machine but pax at window seat to get up and down will not be easy.	Window seat
Kim	Cabin attendant	Contact between crew and pax should be more, to oversee the Cabin and feel what's going on	
		Hoewel deuren heeft het nieuwe toestel? Voor iedere deur heb je 1 CA nodig. Zijn de hoeveelheid deuren hetzelfde als nu bijv op een 777? Hoeveel ca's zijn er wettelijk nodig? Als ze toch aan boord zijn kunnen ze ook werken.	
KLM	flight attendant	Deze manier van werken bespaart natuurlijk wel gewicht. Hoeveelheid afval is ongeveer hetzelfde dat zou ik graag anders zien.	
KLM	Cabin Attendant	Er zijn zoveel variabelen aan boord dat kun je alleen ondervangen door mensen (zie mijn andere antwoorden)	
		Being in the cabin regularly, is for cabin attendants also a flight safety issue! To check if everything is ok and rules are followed.	Safety

M Validation in Virtual Reality (test)

Method

During the test, the participants were asked to walk around in the virtual cabin environment and help themselves by grabbing a drink from the self-service buffet. Cabin crew members are specifically requested to go to the kitchen galley.

All participants were asked a set of questions afterwards and rated the following product qualities, which derive from the design vision in chapter 4: *recognisable, comfortable, accessible and welcoming*.

[1] What do you think is good about the lay-out of the aircraft? What do you dislike? How about dimensions?

[2] Can you name what you find accessible to use and what not?

[3] What do you think of the appearance of the galleys, what do you like and dislike?

[4] What do you think of the self-service offer and what about the variety?

[5] Please rate the following (on a 5-point Likert scale where 1 means 'Strongly disagree' and 5 means 'Strongly agree').

- The self-service galley distincts from the kitchen galley.
- The products in the galleys are accessible for me to use/reach.
- I would be comfortable with using the self-service bar as a passenger.

- The appearance of the galleys feels welcoming.

Results

Participant 1 – cabin crew member (44 years old, height 1,82m)

- [1] It looks realistic, bright, spacious and clean
- [2] LOOP screen looks great
- [3] Nice, it is a bit small, on the other hand the fridge is cool like this
- [4] Excellent.

Participant 2 – cabin crew member (45 years old, height 1,77m)

- [1] I think it is different with what we are used to. However I think it would be very innovative. The dimensions are big that could be a disadvantage.
- [2] The galley seems accessible. The aisles are a bit small.
- [3] It looks futuristic. Hopefully the passengers can handle it. I think there will be queues in front of the buffet. So you have a place for them to wait?
- [4] I think it is a good idea however I think that you need a big or larger storage. If passengers have self-service they will take more drinks, if it is all for free.

Participant 3 – cabin crew member (52 years old, height 1,83m)

- [1] It seems OK. Some aisles are deadheading.
- [2] Everything is accessible.
- [3] Sleek and functional design.

- [4] Both options are helpful. Thing is where to stow waste and keep it safe in case of turbulence.

Participant 4 – cabin crew member (61 years old, height 1,83m)

- [1] The lay-out is fine, not to big and gives a clear overview of the whole plane.
- [2] The large doors of the fridge are accessible, the ovens likewise.
- [3] The colors are beautiful of the galley. I like the transparent doors of the fridge, very nice.
- [4] Super idea resulting in more time for interaction with the passenger.

Participant 5 – cabin crew member (44 years old, height 1,75m)

- [1] The aircraft looks very spacious and modern. I cannot think of something I really dislike actually.
- [2] The self-service machines are really accessible.
- [3] I think it is very nice.
- [4] If there is both hot and cold drinks it is fine.

Participant 6 – cabin crew member (31 years old, height 1,79m)

- [1] It is spacious and gives a good overview. The galley spaces for the crew could be slightly bigger.
- [2] Self-service galley is super. It is open and nice to allow passengers to get the drinks themselves.
- [3] Neat appearance, very good design. I am

curious how I can work with more colleagues in the galley, because the space looks small.
[4] Top idea, it can decrease our workload and pressure a lot.

Participant 7 – cabin crew member (39 years old, height 1,63m)

- [1] It is a really nice overview of the plane when standing in the front, which I really like.
- [2] The kitchen galley is narrow and small. And I do not think there is sufficient space on the countertop to work.
- [3] The self-service station is great.
- [4] Top idea! Passengers can stretch their legs for a while and get a drink in the meantime.

Participant 8 – cabin crew member (30 years old, height 1,64m)

- [1] Clear lay-out, good to have the self-service in the middle. It looks very modern. Well done!
- [2] The galleys and partition is easy and feels modern, but also familiar. It would be very easy for me to find my way as flight attendant. I like the fact that you have a choice in starters, main courses and desserts.
- [3] Nice, modern easy.
- [4] A very nice option. I am only afraid that it causes some queues during the flight. This must stay safe because of oxygen masks etc.

Participant 9 – cabin crew member (21 years old, height 1,78m)

- [1] It feels so spacious and I think it is much more social now you can see each other better

in this configuration. Nice idea to have separate bar stands onboard/spread throughout the cabin.

[2] I like the lighting a lot, nice color details on the floor. All the screens/panels offer plenty of projection possibilities for the airline.

[3] Perfect, fun concept. I expect that a lot of workload is taken away for the cabin crew.

[4] I like it that you can decide for yourself as a passenger when you want to have a consumption at any moment of the flight.

Participant 10 – cabin crew member
(48 years old, height 1,64m)

[1] Layout is clear, spacious and open. The galleys are very small, I think there is barely enough space for cabin attendants to work.

[2] Passenger seats look easily accessible to me.

[3] It looks modern and clean. I cannot see the content on the box.

[4] I am in doubt about self-service. I am afraid that passengers will hoard, so there will be a run or passengers take more than one. This would cause conflicts. Nowadays I can already see that snack boxes are being looted onboard.

Participant 11 – passenger
(25 years old, height 1,94m)

[1] It looks welcoming but little intimidating if there is also a cabin crew standing there in the opening whilst boarding. The lighting is calming, better than the area in the front where it is very bright and white.

[2] Everything looks rather right for my height.

How do I grab a cup and what if there is turbulence, will that make the cans in the fridge shake too much?

[3] The screen is quite nice but it would be difficult to use if there is a queue behind me. It is low positioned for me. (About area D) I would maybe think this is self-service too. It looks may be too inviting. I can reach the upper row of cans in the fridge. I might walk to the area in the centre now to drink my beverage (next to lavatory).

[4] A soup may be tasty to have during a flight but that is personal taste. It still may feel a little uneasy and little scary to use because of moving around with a hot beverage in my hand.

Participant 12 – passenger
(36 years old, height 1,54m)

[1] Looks good, very spacious and clear. Color of lighting is bright and soothing.

[2] The height seems right to me, despite I am small.

[3] It is spacious to walk through and nice to use. I think it looks innovative considering the fact that this will be over 30 years. Although, the fridge door is very wide so it comes really near me when I open it. This is less comfortable to use.

[4] Sufficient. I would not need more and I do not necessary want to drink alcoholic beverages.

Q: What do you think of zero alcohol onboard?

A: It is a good thing. It would be safer and healthier. It would not influence my choice for an airline.

Participant 13 – passenger
(59 years old, height 1,55m)

[1] I like the position of the self-service, in the centre of the wing so both side passengers can easily access it. There should be a curtain in area D to know that it is not for passengers.

[2] The coffee machine looks easy to use. Fridge likewise. Just as normal.

[3] Pretty. It gives me a feeling of cleanliness and the translucent walls makes the self-service area look spacious.

[4] Sufficient. I miss some snacks may be. I would like to walk a bit and have a drink more often. But it may result in more cup waste.

Participant 14 – passenger
(37 years old, height 1,73m)

[1] The lavatory is now next to the galley, I do not think that is good, I would not expect that there is a lavatory as well next to a pantry. I think it is good for the crew to have the kitchen in the back of the plane.

[2] Beverages are very accessible. I wonder if it is not too accessible, that passengers will take a lot because they don't want to walk anymore. I suggest an automatic stop on the hot beverages machine when there is turbulence. And some lids! What about children by the way? Are they using it too? It needs to be childproof then.

[3] Looks like a futuristic pantry, like a coffee lounge. The door feels a bit dangerous when it is opened, because passengers around the corner might walk up to a transparant door that is hard to see. There should be some sort of introduction when I am on this plane for the

first time, because otherwise I would not know that I can get my drinks here.

[4] I would like a water tap and may be some things that I normally have to ask a cabin attendant but actually rather get it myself. For instance a bit of soup or cup noodles, because I feel like I look hungry when I have to ask for it, so it would be nice if I could get it myself.

