

Harmonization of Cabin Placards

A Contribution to
Safety and Efficiency



Background

Markings and placards on aircraft serve to:

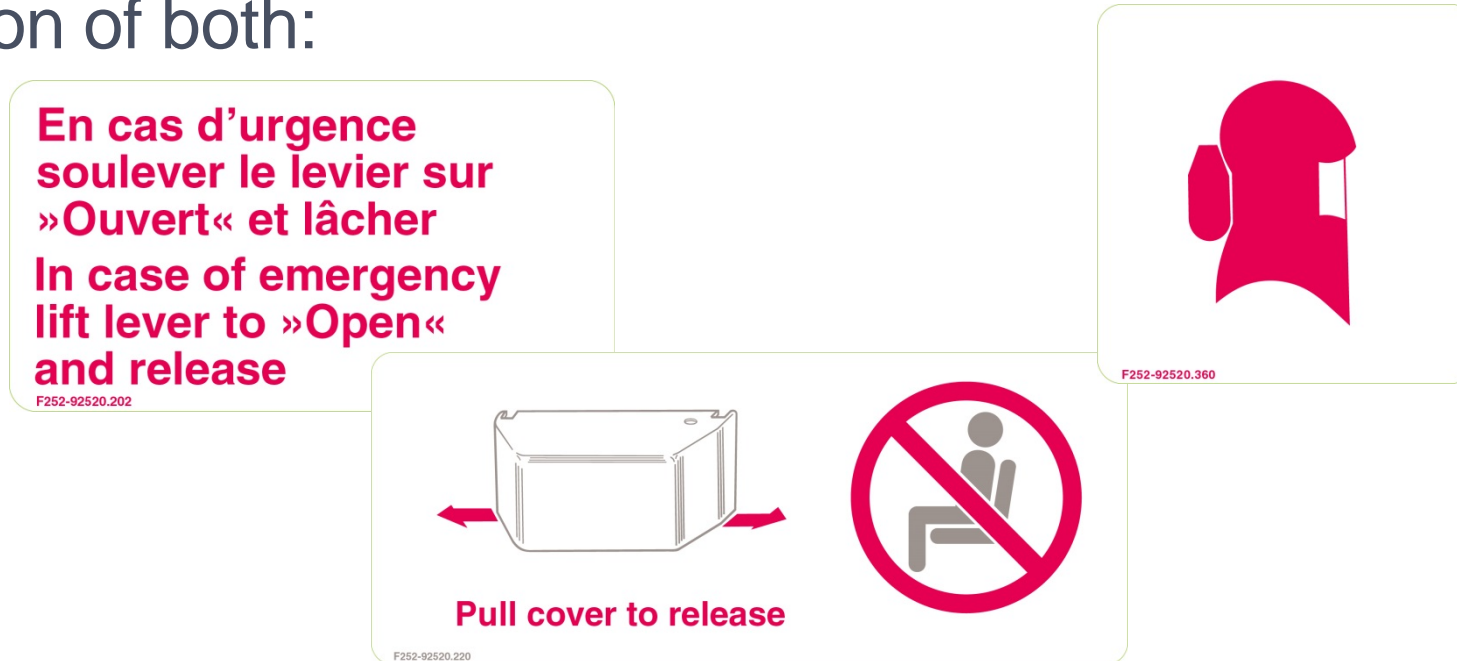
- Warn of dangers
- Give instructions
- Locate equipment

They are to be understood by

- Targeted populations (e.g. passengers, cabin crew, ground personnel)
- People from different cultures and with different skills

Status Quo

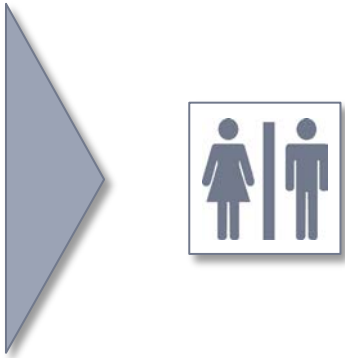
- Current placards consist of textual messages, pictograms or a combination of both:



- Reviews of textual descriptions sometimes revealed inaccuracies or ambiguities

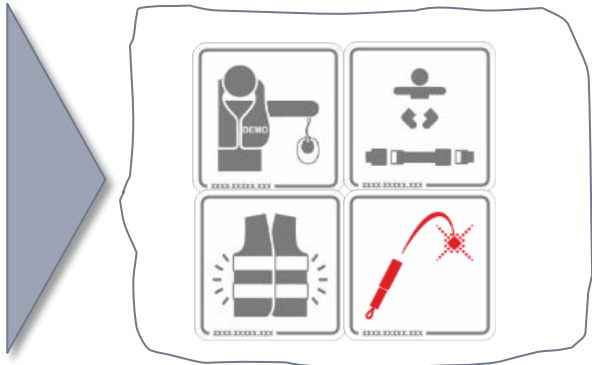
Aspects for Harmonization of Placards

مرحاض
туалет
厕所
Toilet



Standardization

Demo kit
Infant seat belts
High visibility vest
Signaling kit

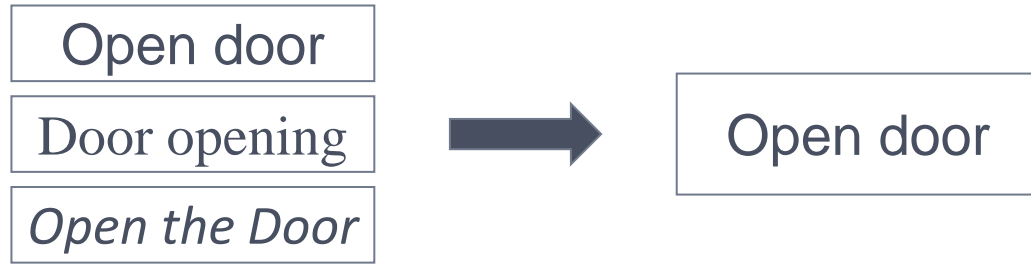


Aesthetics

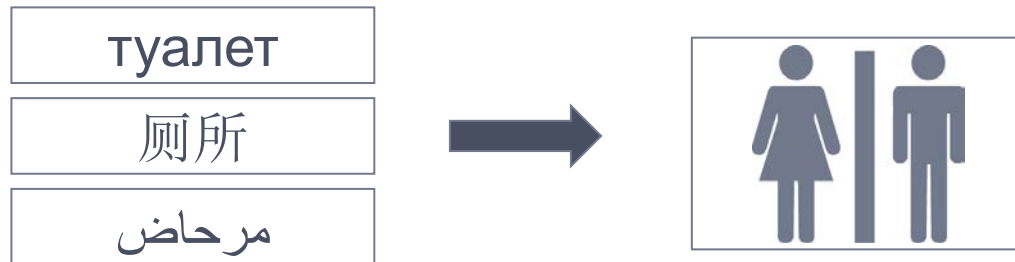
Global Comprehensibility



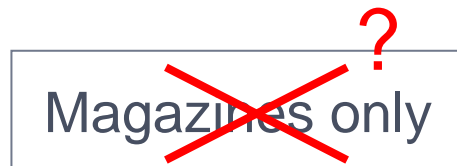
Project Scope and Objective



Harmonization across aircraft types



Replace words by pictograms



Challenge necessity

Design Criteria

Congruence

(of presentation and content of all information)

Conciseness

(completeness of form, harmony of content and empty space, eye catching impact)

Efficiency

(avoid information overload, reduce the unnecessary to strengthen the necessary)

Consistency

(repetition improves recognition)



4.4 ● S

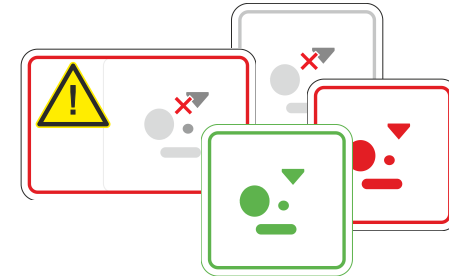


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Design Process

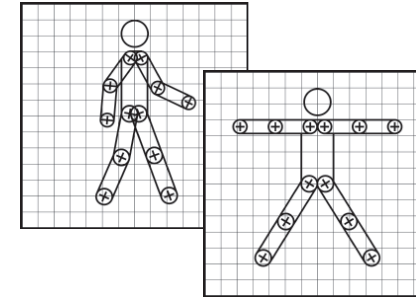
Specification of a design concept

- Visual distinction of different categories of placards



Definition of a design language

- Harmonization of shapes and proportions

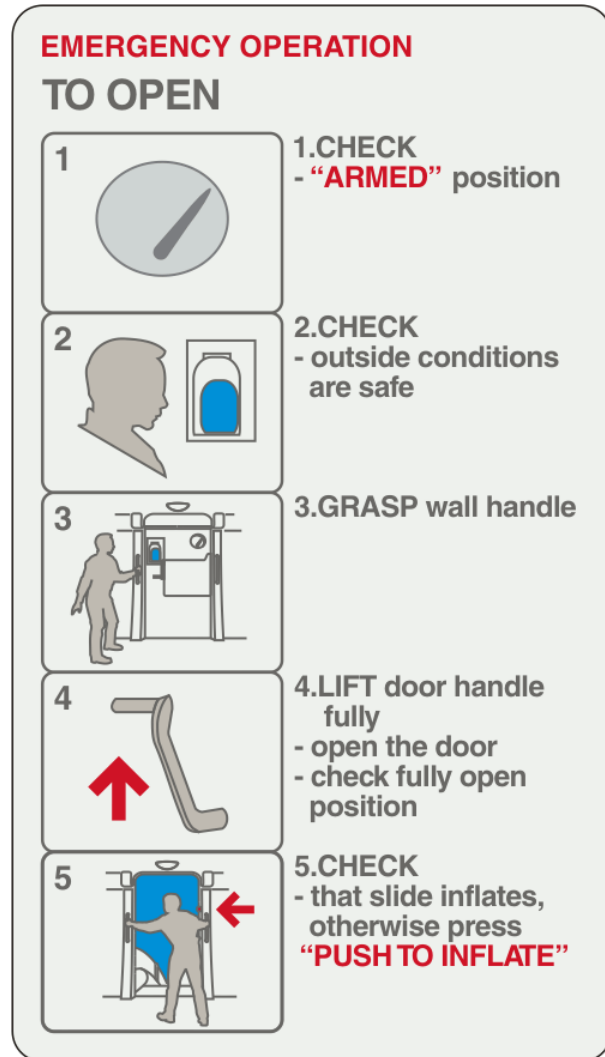


Introduction of a grid pattern

- Structured arrangement of placards of different sizes



Example for Simplification during Design



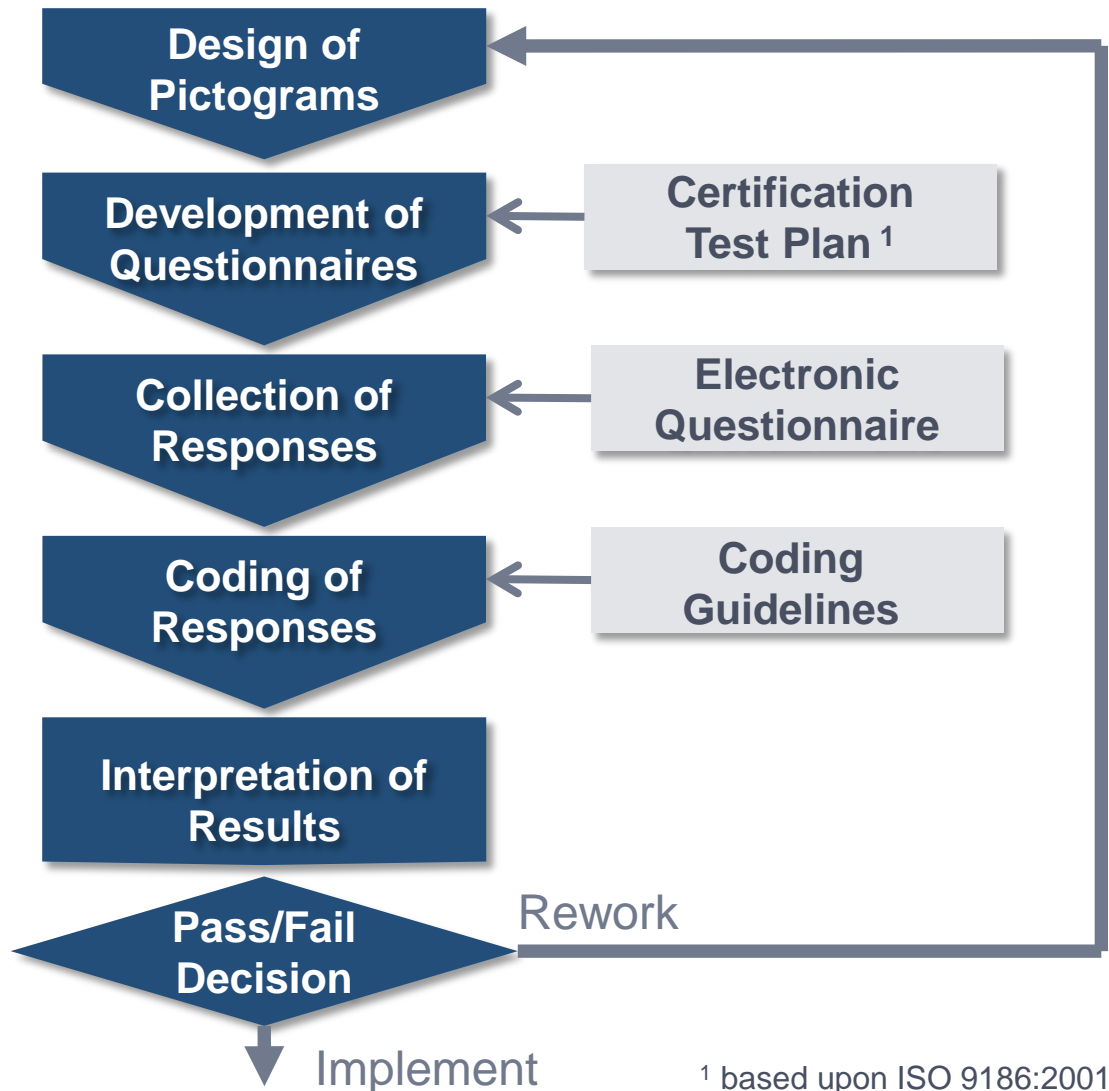
Validation Process

ISO and ANSI standards for comprehensibility testing of safety-critical symbols and signs exist

Aviation specific procedure developed in co-operation between Airbus, EASA, FAA and CAMI

- Specific target groups to be considered
- Specific gender and age distribution to be considered
- Potential influence of cultural aspects to be considered

Development Procedure



Validation of cabin placards to be certified

Test campaign in Germany	✓
Test campaign in the USA	✓
Test campaign in China	✓
Test campaign in Colombia	✓
Test campaign in Russia	✓
Test campaign in the UAE	✓

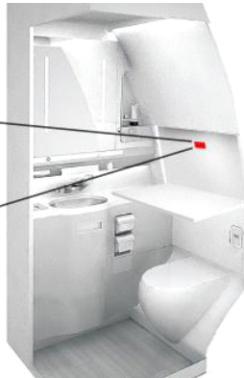
Validation of placards not to be certified

Tests in London-Heathrow	✓
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✓ = completed

Data Collection Procedure

Above a nursing table you see the placard shown below:



What do you think this symbol means?

What action, if any, does it suggest to you?

Questions to be answered by test persons:

1. “What do you think this symbol means?”
2. “What action, if any, does it suggest to you?”

Responses have been collected through a questionnaire (electronically)

Test persons have been **crew** (mainly cabin crew plus some pilots) and **passengers**

Each placard has been evaluated by at least **50** crew members and **50** passengers in each country

Test Campaigns

Testing the Test: Two Pilot Test Campaigns in 2013

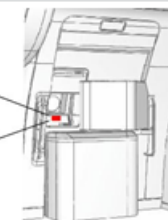
Test Campaign	With crew	With public
Germany , June 2013	Lufthansa, Munich	Pedestrian area, Frankfurt
USA , December 2013	American Airlines, Dallas	Shopping mall, Mesquite (near Dallas)

Completing the Test: Four Test Campaigns in 2014

Test Campaign	With crew	With public
Russia , June 2014	Aeroflot, Moscow	Public area, Moscow
Colombia , July 2014	Avianca, Bogotá	Commercial area, Bogotá
UAE , August 2014	Etihad Airways, Abu Dhabi	Commercial area, Abu Dhabi
China , August 2014	China Eastern Airlines, Shanghai	Commercial area, Shanghai

Data Evaluation

On a waste flap you see the placard shown below:



When you handle at the aircraft door you see the placard

Answer 1	Answer 1 (translated)	Answer 2	Answer 2 (translated)
تجنب اطفاء السجارة في سلة المهملات	Avoid putting out cigarettes in the trash	عدم حمل السجارة في الطائرة	Do not carry cigarettes onto the plane
رمي النفايات في المكان المخصص لها	Throw waste in the appropriate places	عدم رمي اشياء قابله للاشتعال في النفايات	Do not throw flammable items away in the waste bin
عدم وضع السجائر المشتعلة في سلة المهملات	Do not throw lit cigarettes in the trash	عدم وضع السجائر المشتعلة في سلة المهملات	Do not throw lit cigarettes in the trash
عدم وضع اشياء تسبب الحرائق في سلة المهملات	Do not place flammable items in the trash	الالتزام بالتعليمات وعدم الالتقاء	Adherence to instructions and do not throw away items
عدم رمي مخلفات التدخين	Do not throw away remnants of smoking products	عدم رمي مخلفات التدخين	Do not throw away remnants of smoking products

Guideline for Response Coding (1)

Category	Meaning
	ISO 9186:2001
1	Correct understanding of the symbol is certain (estimated probability of correct understanding over 80%)
2	Correct understanding of the symbol is very probable (estimated probability of correct understanding between 66% and 80%)
3	Correct understanding of the symbol is probable (estimated probability of correct understanding between 50% and 65%)
4	The meaning which is understood is opposite to that intended
5	Any other response
6	The response given is “Don’t know”
7	No response is given

Target population	% of correct responses required to pass the test
Cabin crew	67%
Passengers	80%

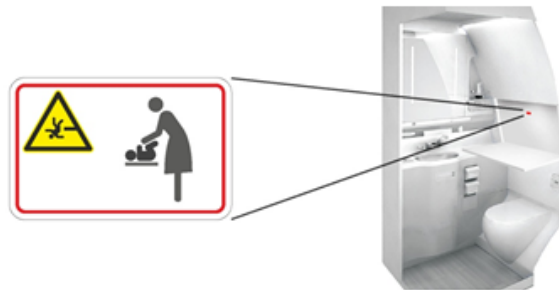
27,013 responses collected through the questionnaires became listed per placard and coded according to their **level of correctness**

For each placard, a **score** has been calculated based on the coding of all responses for this placard

The pass/fail decisions were made according to the achieved score of each placard

Guideline for Response Coding (2)

Example Placard



The placard is shown above a nursing table.

Intended meaning:

Attention shall be paid to the baby, as there is a risk that the baby could fall off.

None of the questions is answered

Fields are empty or entries do not refer to any of the questions



Category
7

The given response shows that ...

Estimated probability of correct understanding over 80%

... the respondent is aware of the risk resulting from not paying enough attention to the baby



Category
1

Estimated probability of correct understanding between 66% and 80%

... the respondent would pay enough attention to the baby



Category
2

Estimated probability of correct understanding between 50% and 65%

... the respondent understood a warning



Category
3

The given response is opposite to the intended meaning

The respondent feels requested to leave the baby unattended



Category
4

The response is like "Don't know"



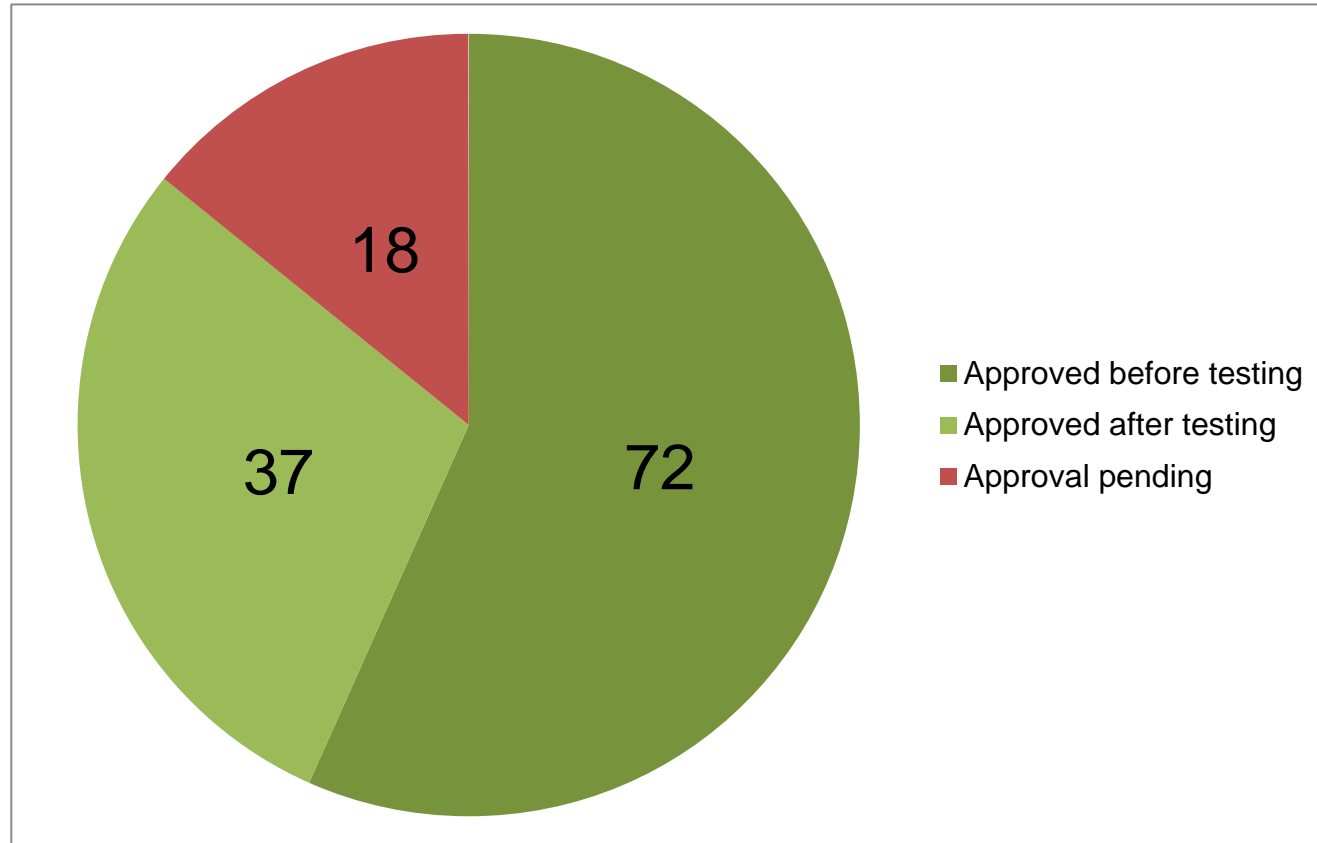
Category
6

For any other response



Category
5

Overall Test Results




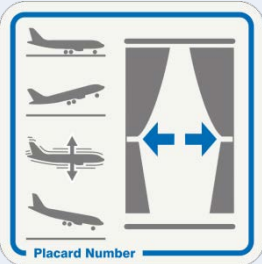
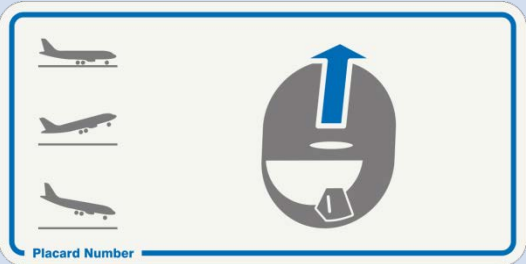
72 placards became approved without certification testing

- No impact on safety or
- Symbol already in broad use



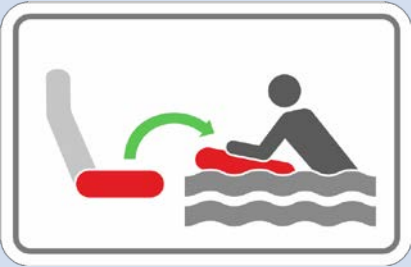
37 placards became approved after certification testing

18 placards did not achieve the required score and need to be modified and re-tested

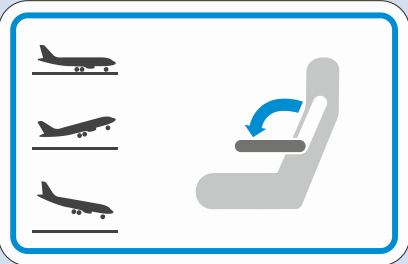
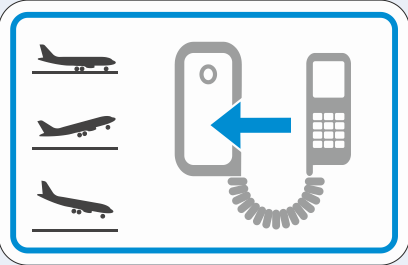
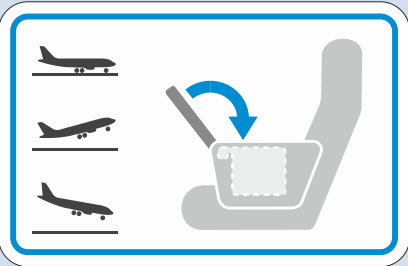
Examples of Placards that Obtained EASA/FAA Approval

Placard / Pictogram	Meaning
	Warning – do not open the door in case of a red warning light (cabin pressurized)
	Curtain must be open and secured during taxi, take-off, turbulence and landing
	Window blind must be open during taxi, take-off and landing

Examples of Placards that Did not Pass the Test

Placard / Pictogram	Meaning
	Survival kit
	After ditching, take survival kit before door opening
	Use seat cushion for flotation

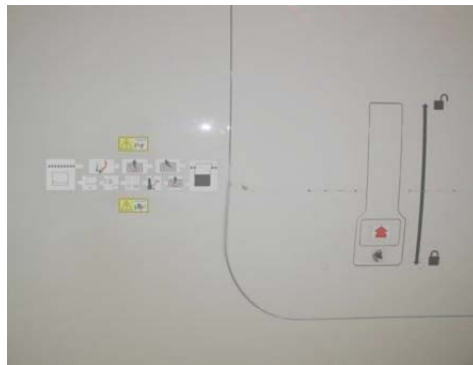
Examples of Placards that Marginally Failed the Test

Placard / Pictogram	Meaning
	Fold the armrest down for taxi, take-off and landing
	Stow handset for taxi, take-off and landing
	Stow table for taxi, take-off and landing

Lessons Learnt from Test Campaigns

- Impacts resulting from different test environments and conditions superseded potential effects of cultural differences
- People from general public volunteering to fill the questionnaire were often primarily motivated by incentives
- The location of the test has an impact on social classes and educational levels of test persons
- People from general public had great difficulties to evolve a notion of the context due to their unfamiliarity with both, the physical and the operational environment

The Roots: Visualization of External Markings



- Prior to the development of pictograms for cabin placards, the development of pictograms for external markings had started
- The draft test plan for external markings served as a starting point for the definition of the test plan for cabin placards
- The lessons learnt from validating cabin placards are now fed back to the upcoming tests of external markings

Similarity with Cabin Placards Validation

The test plan for external markings follows the test plan for cabin placards:

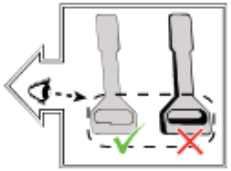
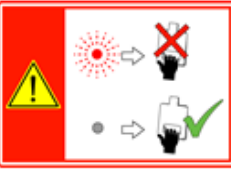
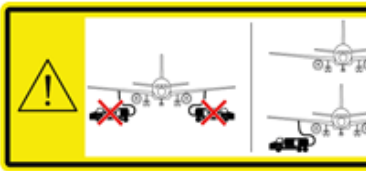

- Test persons from four cultures to be involved
- Validation of the process through one pilot test campaign
- Then conducting of test campaigns in four countries to cover four cultural groups
- Using the same principle for response coding and data processing

Table 1: Countries for Regional Campaigns covering Different Cultures

Country for Regional Campaign	Culture
France	Occidental (pilot campaign)
China	Asian
Russia / Ukraine	Slavonic
United Arab Emirates / Algeria / Morocco	Arabic
United States of America	Occidental

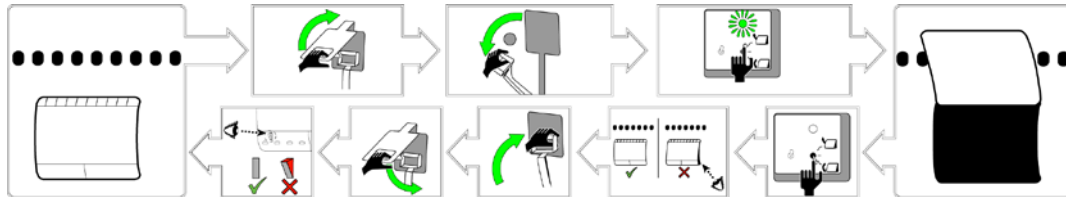
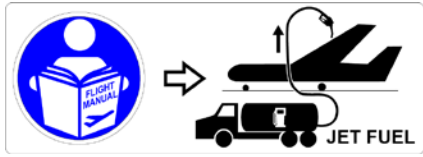
The test plan is close to be agreed with EASA and FAA

Adaptations of Test Procedure for External Markings

New Placard	Placard to be replaced	Target Populations								
		P	BC	GT	FF	MM	T	F	WW	C
	CHECK THAT HANDLE AND HANDLE-FLAP ARE FLUSH WITH OUTER SKIN			30		30				30
	WARNING DO NOT OPEN DOOR IF THE RED WARNING LIGHT IS FLASHING		30	15		15				
	CAUTION: ONLY REFUEL FROM ONE SIDE OF THE AIRCRAFT AT A TIME			20				30		
	NO TOW						50			

- Test persons from nine target populations to be involved:
 - Pilots (P)
 - Baggage handlers (BC)
 - Ground mechanics (GT)
 - Fire fighters (FF)
 - Staff for aircraft towing (T), refuelling (F), water/ waste service (WW), mechanics and maintenance (MM) and catering (C)
- Each pictogram will be tested by at least 50 test subjects in total, covering all concerned target populations

Specific Challenges for Validation of External Markings

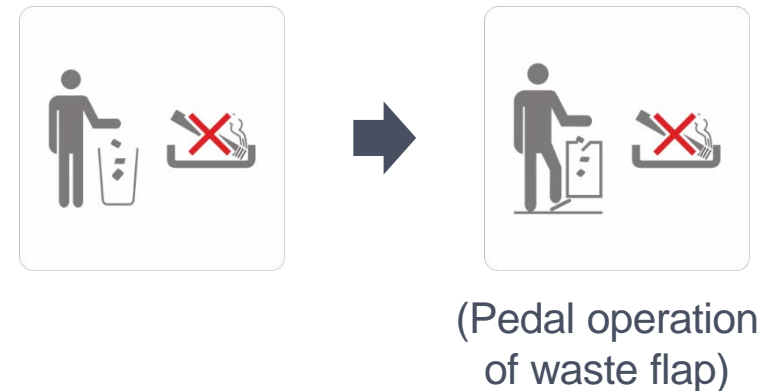
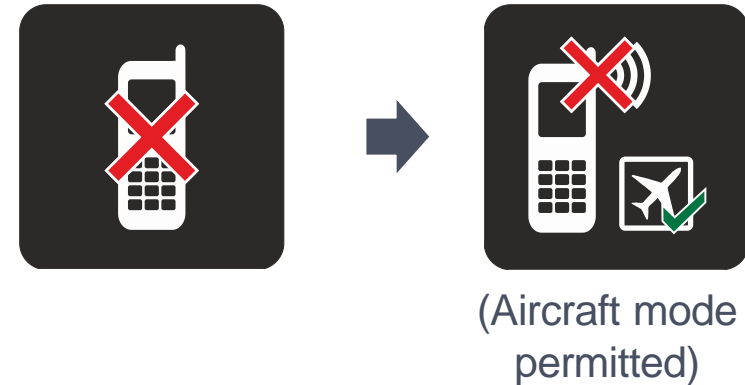


- Support by airport authorities needed to conduct the test campaigns
- Gender and age distribution for test subjects difficult to achieve
- Test persons with the required nationality difficult to recruit for some target populations in some countries
- Recruiting the required number of test persons on a single airport difficult for some target populations (e.g. aircraft tug drivers)

Way Forward for the Cabin Placards

- Definition of an Efficient Test Procedure for the Future
 - To be agreed with EASA and FAA
 - Applicable to small sets of placards
 - Pilot application to demonstrate functionality
- Industrial Process
 - Update of placard brochures and offer to airlines
 - Co-ordination with suppliers

- Development of derivatives of accepted pictograms:



Conclusion

- Test plan for cabin placards as initially developed in co-operation between Airbus and EASA, FAA and CAMI proved successful
- Lessons learnt through testing cabin placards will be helpful for testing external markings
- Pictogram-based placards are highly appreciated by airlines
- Efficient process needed to react to future design changes or customer requests in due time

Dissemination of Results

Airbus willing to share achievements to

- Contribute to a global standard of pictograms
- Increase the safety level by learning through repetition
- Avoid usage of proprietary symbols, which ...



... may lead to confusion!

Thank you very much
for your attention!