

RESPONSES RECEIVED ON DRAFT REPORT 'TAKEOFF WITH ERRONEOUS TAKEOFF DATA, EMBRAER 195-E2 - LEARNING TO REDUCE THE RISK OF USING ERRONEOUS TAKEOFF DATA'

Reading guide: The fourth and fifth columns provide the literal text of the responses of the parties. The last column contains an explanation from the Dutch Safety Board of the way the responses were processed.

Nr.	Organisation	Section	Text to be corrected (first ... last word)	Argumentation for response	Adopted	Dutch Safety Board's response
1	KLC	Summary		De summary was ten tijde van het toesturen van het drafrapport nog niet beschikbaar. Daardoor was er geen mogelijkheid hier eventueel commentaar op te leveren.	No	The summary was written during the draft period and cannot be commented upon. It is based on the report, which was reviewed and should therefore be correct.
2	KLC	Glossary	The operator defines the output of a safety investigation as safety issues, which are also called analysed risks.	The operator may define the output of a safety investigation by formulating safety issues., which are also called analysed risks. Een safety issue is niet hetzelfde als een analysed risk. Na het eventueel definiëren van één of meerdere safety issues, wordt aan deze safety issue(s) een risico toegekend.	Yes	Text has been amended accordingly.
3	KLC	1.1.1	The aeroplane took off with less thrust than required for that intersection	The aeroplane took off with an improper takeoff flap setting, improper takeoff speeds, and less thrust than required for that intersection.. <i>Toevoeging omdat niet alleen de thrust te laag was.</i>	Yes	Text has been amended accordingly.
4	Embraer	1.1.1	"A small mistake...required for takeoff".	Embraer understands that any mistake, big or small, could lead to an error in the takeoff data calculation. The quantifying word small does not add to the meaning of the sentence and thus Embraer suggests deleting the word "small".	Yes	Text has been amended accordingly.
5	KLC	1.1.1	The aircraft took off with a selected amount of takeoff thrust, based on erroneous takeoff data	Niet alleen de takeoff thrust was te laag, ook de takeoff flap setting. Daarnaast waren de takeoff speeds eveneens niet goed.	Yes	Improper flap setting and takeoff speeds were added.
6	KLC	1.1.2	When a flight crew enters data in the EFB or FMS errors occur frequently.	When entering data into the EFB or FMS, possible entry errors may go unnoticed. <i>Het maken van een entry error op zich is geen probleem, het niet opmerken ervan door de gehele crew wel. Op basis waarvan is dit frequently?</i>	Yes	The sentence is deleted here, because it was confusing. The problem is indeed unnoticed data entry errors and takeoffs with erroneous takeoff data. Nevertheless, this occurs probably frequently because of under reporting. Precisely because it goes unnoticed.
7	KLC	1.1.2		The Alinea starts with the conclusion that erroneous take-off data occurs frequently. In sentence 17 it is stated, subsequently, that such data is not available. How then can such a conclusion be drawn as in sentence 3.	Yes	The first sentence has been deleted because it was confusing.
8	Embraer	2.2	"The pilots compared...data was entered into the Flight Management System".	This excerpt states that the pilots compared the results and confirmed they were identical before they were entered in the FMS. However, the factual information is that the crew reported doing so. Therefore, Embraer suggest modifying the excerpt to highlight that those are information provided by the flight crew. In that regard, Embraer notes that the examination of the ePerf logs/history could provide additional factual information.	Partly	The text had been adjusted to: "The pilots reported they compared the outcomes ...". The ePerf logs were no longer available from the operator when Embraer pointed the Dutch Safety Board to the possibility of using the logfiles to check what calculations had been carried out.
9	KLC	2.3	All these circumstances demonstrate the reduced safety margins during the takeoff.	"all these...take-off" this is a conclusion drawn without an analysis. Sentence is suggestive and unsuitable for a factual part of report.	Yes	This paragraph is not about the circumstances. The text has been amended.

Nr.	Organisation	Section	Text to be corrected (first ... last word)	Argumentation for response	Adopted	Dutch Safety Board's response
10	KLC	2.3	This explains why the aircraft became airborne at the very end of the runway.	Tekst laat nu ruimte voor interpretatie. Zie screenshot uit FDM data voor feitelijke duiding.	Yes	The Board added exact distance to runway end (derived from FDR data) and annotated Figure 2.
11	Embraer	2.3	"A contributing factor to the occurrence was the selection error in the takeoff performance application (ePerf) by both pilots."	As already noted, the factual information is that the pilots reported that they had independently calculated and reported the results. However, it is a fact that the performance was calculated based on wrong inputs. Therefore, Embraer suggests deleting the "by both pilots" at the end of this excerpt.	No	The fact that both pilots could make the same mistake is an important finding of this report.
12	Embraer	2.4	"According to the aircraft manufacturer ... improvements for this application". Suggestion: "According to the Aircraft manufacturer, this feature is in the short-term list of improvements for this application".	Embraer notes that the graphical representation feature of the runway on ePerf is under development and is expected to the first semester of 2024. It is worth to clarify that when this question was raised to Embraer in the end of 2022, there was still no definition if or when this feature would be effectively developed. Also, it is important to note that the decision to develop this feature did not derive from this incident, but rather as result of a collaborative process with its operators, which involves ranking priorities for new developments based on their vote on a forum held yearly. Therefore, Embraer suggest modifying this excerpt to: "According to the aircraft manufacturer, the inclusion of a graphical representation of the runway is under development and expected to be incorporated in the software in 2024."	Yes	Text has been amended accordingly.
13	Embraer	2.4	"The operator also requested... several operators".	Embraer clarifies that the ePerf relies on an airport database to be provided by the customer. This database may be customized by its provider to meet specific operators' needs. Also, the information to be presented for the flight crews may be edited by the airline to match these special needs through the "ePerf manager". The aircraft manufacturer (and software developer) is not responsible for providing or modifying the airports database. Based on the exposed above, Embraer suggests modifying the information accordingly or to delete this paragraph.	Yes	The text was deleted in this Section and changed in Section 3.4 as it doubled.
14	Embraer	2.4	Table. "Both pilots...(ePerf)". Suggestion: "A wrong intersection was selected in the application for takeoff performance (ePerf)."	As already noted on previous comments, the factual information is that both pilots reported selecting the same wrong intersection. Therefore, Embraer suggests replacing "Both pilots selected" by "A wrong intersection was selected" or an equivalent wording.	No	The fact that both pilots could make the same mistake is an important finding of this report.
15	Embraer	2.5	"The Dutc safety board identified four reasons why the selection error propagatged". Suggestion: "The Dutch Safety Board identified four possible reasons why the selection error propagatged"	Considering that some of the outlined reasons could not be confirmed to have contributed to this event, Embraer suggests replacing "reasons" for "possible reasons".	Yes	'Propagated' was changed in 'could propagate'.
16	Embraer	2.5	"The crew compared the outcomes of their calculations".	As already noted in previous comments, the factual information is that the crew reported that they had independently calculated and compared results. Therefore, Embraer suggests modifying this excerpt to "The crew reportedly compared the outcomes of their calculations"	Yes	Text has been amended accordingly.
17	KLC	2.5	At least once a month.	Not at least once a month, but the aim is to do it once every 4 weeks. Hard limit was 60 days, after 60 days without exposure Route instruction/Simulator is mandatory.	Yes	Text has been amended accordingly.

Nr.	Organisation	Section	Text to be corrected (first ... last word)	Argumentation for response	Adopted	Dutch Safety Board's response
18	Embraer	2.5	"Automation" section	<p>The first paragraph in this section states that the N1 was not presented on ePerf because of the increased automation in the E2 aircraft and argues that the lack of N1 indication in the ePerf did not permit the crew to assess N1 before the flight. This paragraph states that this may have contributed to this occurrence. However, the second paragraph argues that the N1 calculated for the wrong intersection is "reasonably" close to the N1 value that would be generated if the correct intersection was selected (albeit with different T/O modes, flap and assumed temperatures) and draws on this fact to explain why the crew believed that the calculation was correct.</p> <p>Embraer notes that the two paragraphs are contradictory and does not agree that the lack of N1 target in the ePerf results or the E2 automation contributed to this event. If the calculated N1 was provided to the crew in the ePerf results, the crew would simply verify that it would match the value presented on EICAS (which it effectively did in this case). And since the N1 value alone does not clearly indicate an input error (as shown in the second paragraph), Embraer understands that showing the N1 in the ePerf results would not alter the outcome of this event. Besides that, Embraer notes that the second paragraph focus on the similarity of N1 values only, but does not examine the other variables at play (which are arguably more tangible to the crew such as flap position and speeds) and how they widely differ on the results using the L5 and K5 intersections.</p> <p>Based on aircraft takeoff performance knowledge, results with flaps 1 and high takeoff speeds are not expected for a typical operational weight on a significantly reduced TORA. This could have led the crew to detect an inconsistency and recover from the takeoff data input error. Embraer considers that this should be noted in the report.</p> <p>Based on the exposed above, Embraer respectfully disagrees that the E2 automation played a role in this incident and suggests removing this section.</p>	Yes	The Board agrees with this comment and removed the text about N1 under Automation and placed part of it under Expectation as the calculated N1 agreed with the pilots' expectation.
19	Embraer	2.5	"The crew's....occurrence".	Based on the exposed on the previous comment, Embraer suggests removing this excerpt.	Yes	Text has been amended to specify the ePerf application.
20	KLC	2.5		The N1 assessment for the E1 is one between the number on the EICAS and E-perf. The N1 value is not to 'get a feeling' about the available performance. The Derate temperature is for crews. The whole Alinea on N1 check is questionable in comparison with how it is assessed in flight operations.	Yes	This alinea has been deleted due to a comment of Embraer.
21	KLC	2.5	Automation The calculated primary thrust indicator (N1) was not presented on ePerf, because of the automation of this particular variant.	Een voetnoot met toelichting m.b.t. hoe het komt dat ePerf deze waarden niet laat zien zou helpen. Is er qua range bv verschil met de thrust weergave op de andere Embraer varianten waardoor ePerf dit niet laat zien? Tegelijkertijd was de waarde na engine start voor de crew zichtbaar (al was dat niet op ePerf) en riep deze geen vragen. Dus het wel/niet beschikbaar hebben van de thrustwaarde op ePerf lijkt daarmee niet heel relevant. Of zou de crew anders geacteerd hebben in het geval dat de waarde wel op ePerf beschikbaar was?	Yes	This alinea has been deleted due to a comment of Embraer.
22	KLC	2.6	It is a well-known phenomenon that crew members hesitate to select full thrust	Het woord hesitate suggereert dat ze er aan denken en in dubio zijn of er wel/niet gas moet worden bijgegeven. Maar HF research laat zien dat er vaak in het geheel niet aan gedacht wordt gas bij te geven (zie footnote 25 en daarnaast tevens surprise effect)	Yes	The words 'hesitate to' were replaced by 'do not'.
23	KLC	2.6	It is the dominant response, common and trained, that pilots do not add thrust during the takeoff.	It is the dominant response that pilots do not add thrust during the takeoff. "common and trained" weglaten of in aparte zin toelichten. Zoals het er nu staat suggereert het bv dat er expliciet op getraind wordt geen gas bij te geven, wat niet het geval is.	Yes	The subconclusions were reformulated.

Nr.	Organisation	Section	Text to be corrected (first ... last word)	Argumentation for response	Adopted	Dutch Safety Board's response
24	Embraer	2	"The Board did not find any evidence... played a role". Suggestion to delete this highlighted table.	Embraer notes that this sentence, which seems to encompass all factors capable of impairing the crew performance is not compatible with the statement in the preceding text: "The investigation did not further examine to what extent fatigue played a role or contributed to the occurrence of the incident". Also, although the report relies on the crew report to conclude that factors such as operational pressure did not play a role, there is factual information that suggest otherwise. For example, the crew contacted the operator in the day before to report fatigue and during this contact were informed that the flights would have to be cancelled if they could not perform them. Also, the report from the investigator pilot on pages 29 and 30 seems to support the concern about work demands and fatigue. Therefore, Embraer suggests modifying this excerpt to indicate to: "The investigation could not determine if, and to what extent, factors such as fatigue, operational concern, rush or operational pressure, last minute changes and distraction played a role."	Partly	The sentence 'The investigation did not further examine to what extent fatigue played a role.' was added. This was due to the late reporting to the Dutch Safety Board. The Board not able to interview the crew shortly after the occurrence, see Section 3.5. The crew had sufficient time preparing for the return flight to Schiphol as their flight was on schedule and there were no last-minute changes. Furthermore, the crew did not report on these factors in the interviews. This makes it likely that these factors did not play a role. Moreover, the Board did not find any contradictory evidence against it for these factors.
25	Embraer	2	"The Embraer aircraft are not equipped... such a system".	This statement is applicable to most aircraft currently in operation. Therefore, Embraer suggests modifying this excerpt to: "Most current airplanes are not equipped with a system that detects erroneous takeoff data. Therefore, these aircraft do not alert the flight crew during takeoff of abnormally low accelerations for the actual aeroplane configuration, nor for insufficient runway length available in case of intersection takeoffs. " Also, Embraer clarifies that it will comply with requirements that may arise from regulators regarding such systems.	Partly	The words 'As most aircraft currently in operation' were added, as that is the case. However, other manufacturers have been working on technical solutions and Embraer not.
26	Embraer	2	"To date, the European Union Aviation Safety Agency...have no plans to develop these systems".	As noted in the previous comments, Embraer will comply with requirements that may arise from regulators regarding such systems. Embraer suggests modifying this excerpt to: "To date, the European Union Aviation Safety Agency has not decided on rulemaking activities regarding their Best Intervention Strategy (BIS) for erroneous takeoff data."	Partly	The Board agrees with Embraer that the use of erroneous takeoff data is a general concern and not specific to any aircraft type. Regulation on onboard systems that prevent the use of erroneous takeoff data or detect slow acceleration is the ultimate goal. Therefore, the Board inquired about the 2020 recommendation to EASA. However, in order to develop requirements technical solutions are needed. That's why it is necessary that manufacturers as Embraer develop these systems. The Board recommended to Boeing to start developing these systems in 2020. To place the position of Embraer in perspective the Board added the 2020 recommendation to Boeing to the text.
27	Embraer	2	"A contributing factor to the occurrence was the selection error in the takeoff performance (ePerf) by both pilots".	Embraer notes that the factual information is that the pilots reported that both independently calculated and crosschecked the results. However, the selection error is a fact. Embraer suggests modifying this excerpt to remove the "by both pilots".	Yes	Text has been amended accordingly.
28	EASA	2.8	The DSB says that Boeing and Airbus 'are working on technical solutions to prevent the use of erroneous takeoff data'.	Airbus already developed some design solutions that have been certified by EASA. Info is available here: https://safetyfirst.airbus.com/takeoff-surveillance-and-monitoring-functions/ The Airbus TOS2 function is able to alert on the type of error made during this incident (T/O from a wrong runway intersection). This could be added to the investigation report.	Yes	The technical solutions that have been certified and are available on some aircraft types were added to Section 2.8.
29	EASA	2.8		Regarding EASA actions, we may inform the DSB that we are initiating a new rulemaking task (not yet in the EPAS) to propose new rules mandating design means of protection against take-off performance and position errors (the draft Terms of Reference are currently under consultation with our Advisory Bodies).	No	Noted.

Nr.	Organisation	Section	Text to be corrected (first ... last word)	Argumentation for response	Adopted	Dutch Safety Board's response
30	Embraer	2	"The trust of the crew in the Embraer 195-E2 automation may also have been a contributing factor to this occurrence."	As already explained in the previous comments, Embraer considers that the rationale presented on section 2.5 does not support automation as a contributing factor and suggests removing this excerpt.	Partly	Text has been amended to specify the ePerf application.
31	Embraer	2	"The Board did not find any evidence... played a role". Suggestion to delete this highlighted table.	For the reasons already explained in the previous comments, Embraer suggests modifying this excerpt to: "The investigation could not determine if, and to what extent, factors such as fatigue, operational concern, rush or operational pressure, last minute changes and distraction played a role."	No	See previous point.
32	KLC	2.9	Pilots likely only focused on performance output	Implicates crew did not follow the standard KLC procedure to check both input and output. Zie ook voorgaand statement: P22 R12 "it did not become clear whether the crew checked the input".	No	This is already described in Section 2.5.
33	KLC	3.2	who will contact the crew.	Moreover, the OC Fleet Lead will set up a conference call with the crew including relevant parties so this is not required by the RA. If required the RA may also contact the crew later.	Yes	Some additional information was added in a footnote.
34	KLC	3.2		The text states that the FO was not familiar with the reporting procedure. In de yellow conclusion(?) box it is concluded that the "crew" was not familiar, which is incorrect.	No	The captain also did not know when to contact OCC.
35	KLC	3.3	The safety officer informed the management team of KLC, including the director of safety and compliance and the process manager of the SCO about the occurrence	the Risk Analyst informed the process manager SCO, who informed the KLC Director Safety & Compliance and the KLC corporate SAG.	Yes	Text has been amended accordingly.
36	Embraer	3	"The runway synoptic is part of the new tools for takeoff performance calculations for the Boeing (Dynamic Source) and Airbus (Fly Smart) fleet".	As already noted on previous comments, the graphical representation feature of the runway on ePerf is under development and is expected to the first semester of 2024. Also, Embraer notes that the graphical representation of the runway (referred to as runway synoptic in the report) is not an exclusivity of the mentioned solutions. Therefore, Embraer proposes modifying this excerpt to: "The runway synoptic is present on some new tools for performance calculations provided by other OEMs and/or Service Providers."	No	The report has been changed and included the development of runway synoptic in various sections, but not in this section. This section is about the assessment of the occurrence by the SCO, which includes consulting previous investigations. Table 3 shows relevant outcomes of previous investigations including mitigation measures. This Table shows that new tools with runway synoptic have been implemented by KLM.
37	KLC	3.3	Both data collection and analysis of the incident were carried out by a single investigator. The assessment was therefore based on one person's knowledge and evaluation	Dit is incorrect elke event based risk classification >Low wordt door minimaal 2 collega's bekeken. Elke EAF wordt gecontroleerd door 2e RA collega, en approved door de process manager.	Yes	Text has been amended accordingly.
38	KLC	3.3	Previous safety investigations	SCO per February 2021. Before 2021 Safety & Compliance KLC was monitored and analysed by KLC Safety organization. For KLM it was performed by Integrated Safety Services Organization in the period 2016-2021.	No	The information about the SCO being founded in February 2021 is described in Section 1.3. The merger of the two safety organisations occurred a half year before the serious incident. One of the advantages of a joint safety organisation is that the databases with previous investigations may be combined which may lead to increased knowledge available and more learning.
39	KLC	3.3	Mitigation measure: awareness campaign	Add: adjustments in lay-out. ePerf search functionality, warning regarding confusing intersections added in station information.	Yes	The table has been adjusted to include the suggested mitigations and an explanatory footnote had been added.
40	KLC	3.4		The RAM does not finalize an EAF, the process manager finalize the EAF after review by second Risk analyst, after which the EAF will be sent to stakeholders.	Yes	Text has been amended accordingly.

Nr.	Organisation	Section	Text to be corrected (first ... last word)	Argumentation for response	Adopted	Dutch Safety Board's response
41	Embraer	3	"The airport information in ePerf... removing unused intersections was not pursued any further."	As already explained, the airport database provider or the operator itself may edit the information to be displayed in the flight bags and remove the intersections that it sees fit.	Yes	Text has been amended accordingly.
42	Embraer	3	"Consideration was also given....not a priority for the manufacturer."	As already explained in the previous comments, the graphical representation of the runway is under development and expected to 2024. The decision to develop this feature did not derive from this incident, but rather as result of a collaborative process with its operators, which involves ranking priorities for new developments based on their vote on a forum held yearly.	No	The report has been changed and included the development of runway synoptic in various sections, but not in this section. This section is about the assessment of the occurrence and mitigation actions by the flight operations division after the occurrence. As Embraer states, the decision to develop the feature did not follow this incident. Therefore, this development is not mentioned in this section.
43	KLC	3.4	Further investigation of the incident was not necessary	Accident scenario was known based on other investigations. Focus on mitigation instead of starting up a new investigation. Investigation contribute little to finding new mitigations on the safety issues from previous investigations. These safety issues were made 'active' again in the risk register and the event was used to enrich the mitigations.	Partly	The conclusion at the end of Section 3.5 remains unchanged but the explanation in the main tekst was expanded.
44	Embraer	3	"The analysis showed that both crew members independently..."	Embraer notes that the factual information is that both pilots reported that they have independently calculated and compared results. Therefore, Embraer proposes the following change to remain factual: "The pilot interviews indicated that both crew members independently..."	Partly	It is the outcome of the operator's analysis. The word 'operator' was added to the conclusion of Section 3.3 and 3.6.
45	Embraer	3	Furthermore, the limited investigation concluded that the outcome variability of the takeoff performance calculation tool contributed to the occurrence.	Embraer did not understand the use of the word "variability", since it suggests providing different results for the same set of inputs, which obviously is not the case of the ePerf software. Also, the term "variability" was used for the first time in the conclusions section, without factual information, or analysis to support it. Embraer respectfully suggests removing this excerpt.	No	The words 'outcome variability' are introduced in the assessment by the operator (Section 3.3). The board therefore does not change it for another term. The operator means that a small variation in input (e.g. wind) may lead to a large variation in output (e.g. different flap setting, assumed temperature). That makes it hard for crews to develop a feel of numbers.
46	KLC	3.6		An EAF is not a limited investigation, but an assessment whether further investigation has learning potential.	Partly	This is a matter of definition. KLC carried out some investigation activities in the assessment. Therefore, the DSB calls it a limited investigation. The text was clarified.
47	KLC	3.6	Important information was lost, resulting in missed opportunities to learn from the event.	Specify the important information that missed to learn from the event and was not known to the operator. Was there a lack of memory from the flight crew (this is not described in Chapter 2). Also no additional interview requests where received to speak flight crew again.	Yes	The Board agrees that this is an omission and added a paragraph about the loss of memories over time which hinder for instance the investigation of fatigue at the end of Section 3.5.
48	KLC	4.2.3	The SCO performed 130 SIRAs in the period 2012-2021 for the operator	SCO from February 2021, before these investigations were performed by the KLC Safety & Compliance.	Partly	This also applies to other sections in the report. When the report writes the SCO it refers to the SCO and the KLM and KLC organisations for safety & compliance that existed before 2021, i.e. KLC Safety organization and KLM Integrated Safety Services Organization. A footnote was added in Section 1.3.
49	KLC	4.2.3	The SCO carried out ten safety investigations related to erroneous takeoff data in the period 2012-2021, of which five safety investigations were performed for the operator (KLC), Table 5. These were all predictive.	As stated above KLC only joined the SCO in February 2021. Investigations before that date performed by respectively SPLOI/ISSO and only apply to KLM and not to KLC SPL/ZQ.	Partly	This also applies to other sections in the report. When the report writes the SCO it refers to the SCO and the KLM and KLC organisations for safety & compliance that existed before 2021, i.e. KLC Safety organization and KLM Integrated Safety Services Organization. A footnote was added in Section 1.3.

Nr.	Organisation	Section	Text to be corrected (first ... last word)	Argumentation for response	Adopted	Dutch Safety Board's response
50	KLC	4.2.3	The header of the table includes "literature".	What is meant by "literature"? Under "literature" it states YES for the 2020 KLM report concerning a proactive SIRA type. But it states NO for the first two reactive KLM SIRA types, while comprehensive reports were published for both occurrences. Apart from that, KLM investigations in table 5 are not relevant for the KLC operation, as KLC was not in any way involved in the KLM investigations. This applies to all KLM investigations in table 5, which have no bearing on KLC as an operator. (Note: page 57 of this reports mentions the entry date of KLC in the SCO).	Yes	The Board meant public information, e.g. scientific literature or reports and changed this in the header of the Table. Section 4.3.3 refers to this column.
51	KLC	4.2.3	The present investigation reveals new contributing factors which were not in the risk register.	Contributing factor is nog geen Safety Issue en komt daarmee ook niet in risk register.	Yes	Text has been amended accordingly.
52	KLC	4.2.3	In the period 2012 – 2021, the SCO only performed predictive SIRA investigations regarding erroneous takeoff data. The SCO did not perform any reactive or proactive investigations on the matter even though several incidents did occur and a safety concern had been formulated in that period.	Text only applies to KLC as the operator, not to the SCO. The only incident for which the SCO decided not to investigate is the Berlin incident subject to this report.	Yes	The words 'for the operator' were added twice.
53	KLC	4.3.2		Organisations or individuals are not resilient, they have the possibility to respond resilient in various situations. The ability to act resilient. The text suggests that organizations are resilient.	Yes	Text has been amended accordingly.
54	KLC	4.3.3	in three of the ten performed safety investigations on erroneous takeoff data (see Fout! Verwijzingsbron niet gevonden.).	The number 'ten' does not apply to the operator, refer to earlier comments made on table 5 above. Check (see Fout! Verwijzingsbron niet gevonden.)?	Partly	The header in Table 5 and the invalid reference has been changed. Ten investigations refers to ten investigations by the SCO. Another way to quantify the use of external public information is to say in one of the five investigations performed for the operator.
55	KLC	4.4		Replace SCO for "The operator". A number of the five predictive SIRAs were KLM only and were not in any way related to KLC. See comments made above. Furthermore, KLM did not define concerns but safety issues. Instead.	Partly	The Board made some textual changes but did not replace the word SCO in every sentence.
56	Embraer	5	"because both pilots selected... application"	As noted in multiple comments, the factual information is that both pilots reported that they have independently calculated the takeoff performance and compared the results. However, it is a fact that the takeoff calculation was incorrect. Therefore, Embraer suggests removing the excerpt after the comma in this phrase.	Partly	The word 'likely' was added.
57	Embraer	5	"The crew trusted the automation in the Embraer 195-E2"	As explained in the previous comments, Embraer considers that the rationale presented on section 2.5 does not support automation as a contributing factor and does not agree that the automation on the E2, or the fact that the crew trusted in the automation on the E2, was a contributing factor for this occurrence. Therefore, Embraer respectfully suggests removing this excerpt.	Yes	Text in conclusion has been amended in line with the text in chapter 2.
58	Embraer	5	"The limited investigation concluded that the outcome variability of the takeoff performance calculation tool contributed to the occurrence.."	Embraer did not understand the use of the word "variability", since it suggests providing different results for the same set of inputs, which obviously is not the case of the ePerf software. Also, the term "variability" was used for the first time in the conclusions section, without factual information, or analysis to support it. Embraer respectfully suggests removing this excerpt.	No	The words 'outcome variability' are introduced in the assessment by the operator (Section 3.3). The Board therefore does not change it for another term. The operator means that a small variation in input (e.g. wind) may lead to a large variation in output (e.g. different flap setting, assumed temperature). That makes it hard for crews to develop a feel of numbers.
59	KLC	4.4	In general 'contributing factors'	Verwarrende benaming van intersecties L5 en K5 wordt in het rapport nauwelijks genoemd. Heeft relatie tot de verkeerde selectie in ePerf en volgens KLM/KLC een essentiële contributing factor in dit voorval.	No	The intersection names were not confusing for the pilots. They just clicked on the line below the intended line.

Nr.	Organisation	Section	Text to be corrected (first ... last word)	Argumentation for response	Adopted	Dutch Safety Board's response
60	KLC	5	Therefore the approach was fragmented	Juist het voortbouwen op bestaande kennis en onderzoeken uit het risk register voorkomt dat je gefragmenteerd werkt.	Partly	Although, the risk register contributes to preventing a fragmented approach, the operator's approach is still fragmented because it does not cover the wide range of factors underlying the use of erroneous takeoff data. The last alinea of chapter 5 explain why the approach is fragmented. The Board deleted the sentence about the fragmented approach under 'Limited learning from the occurrence' because it was confusing.
61	Embraer	7	"Within the aviation industry, OEMs are working on technical solutions to prevent the use of erroneous takeoff data. This investigation concludes that Embraer has no immediate plans to develop these onboard systems and that erroneous data entry is common using its performance calculation tool."	Regarding the development of technical solutions to prevent the use of erroneous takeoff data, Embraer will comply with requirements that may arise from regulators regarding such systems. However, Embraer disagrees that the erroneous data entry is common using its performance calculations tool. The data presented in this report do not support such statement, or that erroneous data entry in Embraer performance calculation tool is more common than in other developers' calculation tools. In fact, all other similar incidents mentioned in the report refers to aircraft from other manufacturers and the table 5 (section 4.2.3) does not list a single Embraer aircraft event. On page 43, section 4.2.4 there is a report from an event with an Embraer aircraft in Nurnberg, but it is related to wrong flap selection, and not an erroneous data entry in the ePerf. Therefore, Embraer suggests modifying this excerpt to: "Within the aviation industry, some OEMs are working on technical solutions to prevent the use of erroneous takeoff data. This investigation found that Embraer is not currently working on such a technical solution."	Yes	The part about the performance calculation tool ePerf was deleted because Embraer started working on improving ePerf recently (2023).
62	Embraer	7	"To develop an independent onboard system that detects gross input errors in the process of takeoff performance calculations and/or alerts the flight crew during takeoff of abnormal low accelerations for the actual configuration as well as insufficient length available"	Embraer understands that this recommendation should be directed to the regulator, in the same manner that it was done in the report "Dutch Safety Board, Insufficient thrust setting for take-off, 2018". Moreover, as mentioned on section 1.2, "there was no specific reason to choose this incident involving this specific operator for this investigation with this focus", and thus it is not reasonable to direct this Safety recommendation to one aircraft manufacturer while there are probably others in the exact same situation. Therefore, Embraer suggests modifying this excerpt to: "To require the aircraft manufacturers to evaluate the development of an independent onboard system that detects gross input errors in the process of takeoff performance calculations and/or alerts the flight crew during takeoff of abnormal low accelerations for the actual configuration as well as insufficient length available"	No	The Board did not change the recommendation. Instead, the motivation for the recommendation is clarified.

Nr.	Organisation	Section	Text to be corrected (first ... last word)	Argumentation for response	Adopted	Dutch Safety Board's response
63	Embraer	7	To improve the performance calculation such that misselections are less likely to occur or more easily detected.	<p>Embraer clarifies it is currently developing a modification to introduce two steps in the intersection selection (first runway, and then intersection on a separate menu) on ePerf. This change is expected to be released by the end of July 2023.</p> <p>Along with this modification, the intersection used for the calculation, which is currently already presented in the results page header, will be displayed on inverse video.</p> <p>Also, as already explained in the previous comments, the graphical representation feature of the runway on ePerf is under development and is expected to the first semester of 2024.</p> <p>It is worth to clarify that when the question related to the intentions of introduce a graphical representation of the runway on ePerf was raised to Embraer in the end of 2022, there was still no definition if or when this feature would be effectively developed.</p> <p>Also, it is important to note that the decision to develop this feature did not derive from this incident, but rather as result of a continued collaborative process with its operators, which involves ranking priorities for new developments based on their vote on a forum held yearly. There are other criteria that may override voting, such as safety concerns.</p> <p>Considering the new developments and the continuing process exposed above, Embraer understands that the goal pursued by the proposed recommendation is already met.</p> <p>Therefore, Embraer proposes removing this safety recommendation and include the information in the report as "safety actions taken by the manufacturer".</p>	Yes	The Board deleted this recommendation. The information about the improvements by Embraer are added in Section 2.4.
64	KLC	D1	The operator left the decision to them, but did inform the crew that the flights would have to be cancelled if the could not perform them.	Informing crew about consequence of stepdown is not compliant with instructions Crew Control	No	Noted.
65	KLC	D2	At least once a month	Not at least once a month, but the aim is to do it once every 4 weeks. Hard limit was 60 days, after 60 days without exposure Route instruction/Simulator is mandatory.	Yes	Text has been amended accordingly.