

Operational Risk: Implementing Open Norms (ORION)



Intellectual Output 3 (IO3) Report November 2021 SMS Implementation Validation

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Table of Contents

Executive Summary	3
Acknowledgements.....	4
The ORION Project Overview	5
Background to the ORION Project.....	5
Intellectual Outputs	6
Introduction	8
ORION SMS Industry coverage.....	9
ORION SMS and Core Objectives	10
ORION: SMS Evaluation and innovation elements.....	10
ORION SMS Validation	13
ORION SMS validation process.....	13
ORION SMS validation measures	13
ORION-SMS measurements	18
ORION SMS Evaluation.....	20
ORION SMS validation: Findings	25
Discussion and Conclusions.....	28
References	29
Annex 1	30

Executive Summary

This reports define the ORION SMS training course approach to implement evaluate and validate the next generation SMS Training courses industrywide.

According the ORION Project the new ORION SMS training course is to be evaluated and validated. This IO3 then provides a set of validation and evaluation metrics concurrently to ORION SMS training instantiations within the Project timeframe. The core objective in this evaluation and validation strategy is to meet the requirements out of the IO1 and IO2 training needs analysis and gap-analysis findings. This is considered paramount to validate and evaluate the training system according to the evidence of the previous ORION outputs.

In particular, out of IO1 and IO2 results, a validation model is presented and a dedicated self-assessment survey is proposed both for future trainers and trainees in this IO3. The goal is to assess the expected and observed impact of the ORION SMS Training course on various stakeholders like ORION Trainers, course Designers and more importantly ORION Trainees

The results of this IO3 highlights that according to the chosen ORION SMS validation process the ORION SMS course does not overestimate or underestimate its training impact: the expected and observed impact is favourably balanced and the overall systematic comparison between ORION trainees, trainers as well as designers do not reveal a model discrepancy in the expected impact of this system: no real gap in expectations is present.

Acknowledgements

The ORION Consortium would like to thank the Associate Partners for their contribution to the ORION Project: Dublin Fire Brigade, Dublin, Ireland; SAS Airlines, Stockholm, Sweden; TUS Airways, Larnaca, Cyprus; Skylink Services, Larnaca, Cyprus; San Rafael Hospital, Milan Italy; and Association of Ambulance Physicians, Izmir, Turkey.



The Operational Risk: Implementing Open Norms (ORION) project is co-funded by the Erasmus+ Programme of the European Union.



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Erasmus+ Programme
of the European Union

The ORION Project Overview

The Operational Risk: Implementing Open Norms (ORION) project has developed and implemented training to foster soft socio-technical skills for fully implementing and embedding a safety management system (SMS) and managing operational risk. ORION focuses on the skills needed to make the transition between fulfilling the formal requirements of a SMS and having a system that is fully embedded in normal operational practice so that it is fully part of the culture of the organisation, ensuring effective practice according the best practicable standards and delivering a high and constantly improving level of safety. This requires the skills and capability to productively address the systemic factors that influence and motivate people to behave in particular ways and to facilitate change. It also requires learning from others' experience.

The ORION project is co-funded by the Erasmus+ Programme of the European Union.

Objectives

The overall goal of ORION is to improve outcomes in the management of operational risk, across a wide range of risk-critical industries. Knowledge can also be utilized to contribute to a stronger economy and business model in the provision of safety related services across safety critical industries, and to promote a culture of sharing and learning from best practice in implementation among industry partners.

The aims of the ORION project are delivered through five objectives:

1. To design and develop training materials to support and facilitate implementation and embedding of SMS in norms of practice and effective management of risk in the operation.
2. The training can be delivered in short courses in the associate organisations. A common train-the-trainer programme leading to training in the ORION project Associate Partner organisations, each was directly supported by an ORION partner.
3. The training and support aims to result an implementation case study approach. This is intended to build and extend the knowledge base of evidence that links multiple implementation cases studies.
4. A validation programme starting with stakeholder needs and progressively verifying delivery on those needs and validate the project outcomes.
5. Utilising evidence on each of these activities to contribute to the development guidelines for open norms of best practice in the full implementation of SMS.

Background to the ORION Project

The background to the ORION project are framed around several complementary identified needs:

Implementing SMS and Managing Operational Risk

The Associate Partners of this project are in various stages of implementing SMS and integrating SMS with OHSAS. They need to achieve real value from this organisational effort. Embedding SMS requires building actual norms of behaviour and performance, reporting, implementing improvement.

Creating an evidence base

An empirically grounded evidence base of SMS implementation is lacking. While ORION is based on a wide range of research in certain industries (aviation, maritime, health, emergency services), there is a need to create a more comprehensive evidence base of what works in implementing SMS across a range of industries and regions.

Best practice guidelines

There are not many standards or much guidance as to how to implement and embed SMS. One good example of best practice guidelines comes from the Civil Air Navigation Services Organisation (CANSO) who published a Standard of Excellence in Safety Management Systems (SoE in SMS) and an associated implementation guide to support ANSPs (Air Navigation Service Providers) in their safety management. The CANSO SoE in SMS is compliant with ICAO Annex 19 (ICAO. Annex 19: Safety management. International Civil Aviation Organisation; 2013). This is largely a generic standard that is easily applicable to other industries. Level E of this standard is the highest level of implementation and embedding of safety practices that are shown to be effective. Another example is Transport Canada guidelines for both development and assessment of SMS in aviation. However, while there is a strong logic to these documents it lacks a solid evidence base from actual implementation.

Generate Open Norms

Overall, it is important to demonstrate what is possible in terms of good practice in SMS implementation across a range of industries. This then shows what could and should be normal. Creating open access to this evidence in implementation case studies begins to build open norms of how to progressively improve the real functioning of SMS in dealing with the pervasive intractable problems of operational risk.

Intellectual Outputs

The results of the ORION project are linked directly to the Intellectual Outputs and Multiplier Events that have been delivered through the project. Each of the Intellectual Outputs provide important results that are of value to the industries and sectors who are represented by the Associate Partners in the ORION project. These are described briefly below:

Intellectual Output 1 (IO1) SMS Maturity Assessment

Intellectual Output 1 provides a report synthesizing research evidence and best practice guidelines, together with an analysis of the current maturity level of Safety Management Systems (SMS) in the Associate Partner organisations. This analysis will support the development of SMS Implementation Training.

Intellectual Output 2 (IO2) SMS Implementation Training

Intellectual Output 2 (IOS) provides an overall training design for train the trainers within the partnership as well as training SMS facilitators within the Associate Partners (including design of the facilitation and training to be offered by the facilitators in their organisations). This training includes developing an implementation case study approach. An initial training

design and development activity occurred ahead of training events delivered to each of the Associate Partners that supported the full SMS implementation activity.

Intellectual Output 3 (IO3) SMS Implementation Validation

The purpose of Intellectual Output 3 (IO3) is to demonstrate how to undertake validation to provide confidence that the concept being developed and implemented meets the stated objectives in practice. Key activities of the validation tasks in ORION are to:

- Ensure the SMS needs are fulfilled.
- Iteratively verify and validate components and activities through stages of concept, design, implementation and operations during project.
- Feedback to various providers of progression according to requirements along the development stages.

Intellectual Output 4 (IO4) SMS Implementation Framework

In Intellectual Output 4 (IO4) best practice guidelines are consolidated the initial evidence base, the training designed and delivered, and evaluated and validated using a case-based approach. This draws on the lessons learned about implementation to inform guidelines for best practice in implementation.

Intellectual Output 5 (IO5) SMS Norms of Practice Manual

Intellectual Output 5 (IO5) offers guidance on SMS Norms of Practice and consolidates lessons representing the core aspects of each of the previous outputs. This is designed to maximise transferability and impact by presenting in appropriate media the essential content of the ORION programme. This is innovative in providing concise evidence-based standards of good practice in SMS implementation, that are carefully designed to be easily transferable between organisations, across industrial and service domains, and spanning different regions. The SMS Norms of Practice provides a material report for the that can be used to support ORION SMS activities.

Introduction

The *Operational Risk: Implementing Open Norms* (ORION) project has designed, developed and implemented training to foster soft socio-technical skills for fully implementing and embedding a safety management system (SMS) and managing operational risk. This requires the skills and capability to productively address the systemic factors that influence and motivate people to behave in particular ways and to facilitate change (Royal Aeronautical Society, 1999). It also requires learning from others' experience.

In particular, this Deliverable IO3 (Intellectual Output 3) reports on the chosen evaluation and validation approach of the ORION SMS Training courses, and their relative validation deployment and delivery as specified in the previous IO2 deliverable.

The aims of the ORION project centre on the following core elements:

- To design and develop training content and materials embedding standard and advanced-level SMS in norms of practice and effective management of safety risks.
- To deliver short courses in the associate partner organisations directly supported by an ORION partner.
- To evaluate and validate this complete ORION SMS training programme
- To develop a framework to support the implementation of a SMS based on the lessons learned through the ORION project

The evidence on each of these activities will contribute to the development guidelines for open norms of best practice in the full implementation of an industry-wide SMS system: the ORION SMS system

Overall the purpose of validation is to provide confidence that the concept being developed and implemented meets the stated objectives in practice.

In essence, the evaluation and validation activity of this IO3 would target both present and “prospective” SMS needs industry-wide, then verify their SMS relevance and finally shall validate the systemic ORION SMS outcome in terms of its SMS training courses and fit.

Notably the main ORION SMS rationale for selected ORION-SMS topics would engage with the two main SMS drives *for innovation* in SMS implementation:

- a) standards in SMS compliance
- b) proactive governance of safety which calls for evidence based management and accountable change: introducing *data science evidence* and *SMS risk in change*

These two drives above mirror a possible definition of the Advanced ORION courses. And they are not contradictory but complement each other. In fact, while rigorously ensuring that the SMS is in keeping with regulations, an active process of system governance is part of the standard when implementing a cutting edge SMS as open norm dedicated to keep track of change and SMS evolution in content and objectives.

ORION SMS Industry coverage

The approach and findings in deliverable IO1 and IO2 have identified the key drivers of a Safety Management System and its best practices. Notably the SMS frameworks are derived out from a specific domain: the aviation sector. In particular the commercial aviation context has certainly lead the major advances in the SMS field and dispositions for safety risk management (ICAO, 2013).

In fact, the worldwide regulatory agencies ranging from the European Aviation Safety Agency (EASA), the FAA in US, and various regulatory agencies and international Authorities like ICAO and IATA put much effort to what can be strategically considered the best practice to regulate and implement a Safety Management System operating in mandatory mode (EASA 2017, ICAO, 2010).

But this modality may not be directly scalable or applicable to other businesses, sectors and work contexts, especially where the SMS presence, if any, be a restricted or simplified application of some SMS functions (e.g., internal emergency plan of a hospital). In particular a baseline and simple review of strengths and weaknesses of the aviation SMS approach is necessary to map it to different working environments. In particular 3 industries in four European regions are involved in the ORION project:

- Emergency services
- Aviation: Airline/Ground Handler
- Healthcare: Large scale Hospitals

Overall, the application in ORION of an SMS is thus designed capitalizing upon the aviation sector but generates an SMS model, the ORION SMS, across diverse work sectors. And each sector, aviation, (SMS source), emergency and fire brigades and healthcare has been assessed against standard SMS objectives as well as new ones.

ORION SMS and Core Objectives

The ORION SMS framework is primarily derived by the ICAO SMS framework and it results composed of four main core application domains (see also IO1 deliverable):

- Safety policy and objectives:
 - Management commitment and responsibilities;
 - Safety accountabilities;
 - Co-ordination of emergency response planning;
 - SMS documentation.
- Safety risk management
 - Hazard identification;
 - Risk assessment and mitigation.
- Safety assurance:
 - Safety performance monitoring and measurement;
 - Management of change;
 - Continuous improvement of the SMS.
- Safety promotion:
 - Training and education;
 - Safety communication.

Content of the above core SMS elements has been studied and selected throughout IO1 and IO2 activities over the course of 2019. A complete and extensive SMS Maturity Analysis and Training Development process has been carried out (see IO1 and IO2 Deliverables). The core ORION-SMS Training topics, contents, stakeholders and functions within aviation, healthcare, emergency services as well as fire brigades is now consolidated.

From this operations the present IO3 Deliverable shall thus finally deal with evaluation and validation purposes on such topics.

ORION: SMS Evaluation and innovation elements

Content of SMS elements in ORION has been studied and selected throughout IO1 and IO2 and activities over the course of 2019. It is clear within the ORION Project how safety oriented work domains like Aviation, the complex world of the Healthcare (Hospitals, Healthcare driven research centres or Hospital universities) as well as Emergency Response, would greatly benefit from showing capacity building in advanced SMS design and deployments.

From one side the ORION effort is on improving and innovating on SMS *content* and, on the other side, on *scope and SMS generalisation* to wider industry and business audiences. In this line, the evaluation and validation approach of the ORION SMS competence has to deal with ORION proposals and advances beyond (but comprising) standard SMS key topics about safety and risk management.

Cross-industry Gap analysis: SMS presence

It is paramount ascertain and verify *what is working* and *what is not* in SMS terms across industries before embarking upon a train development plan, especially for sensitive topics like organisational risk and safety topics across differentiated work sectors.

According to IO1 findings the following Table 1 would synthesise the SMS adoption level clustered by work domain.

Table 1 status of cross industry SMS deployment

	Aviation	Emergency Response	Healthcare	Airline
SMS is present	SMS is a standard	SMS is present in some emergency services	SMS is not present (standard emergency plans and procedures)	SMS is a standard
SMS is mandatory	SMS is mandatory	SMS is not mandatory (nice to have)	SMS is not mandatory (unclear position)	SMS is mandatory
SMS topics/content	Regulated by (EASA) and FAA (USA)	Follows aviation framework	partial/sparse coverage	Regulated by (EASA) and FAA (USA)
SMS maturity (level)	Compliant	Functional (advanced emergency procedures)	Low (advanced emergency procedures)	Advanced
SMS process, procedure and Audit	Internal and External Audit procedures	Internal and External Audit procedures	Not present	Internal and External Audit procedures

Table 1 clearly defines some clear differentiation in the implementation and deployment of an SMS as such across the ORION targeted work domains. These findings emerged very clearly in the workshop/interviews carried out in IO1 and IO2 activities (ion 2019 – see IO1 Deliverable). Although generalisations must be refrained the results of ORION analysis in IO1 activities are reliable indications with some implications on the validation aspects within the ORION project.

Cross-industry Gap analysis: SMS objectives

A more critical outcome with strong implication on ORION SMS training validation is again from the Maturity Assessment in IO1. Specifically, Table 2 summarises some selected major cross-industry training gaps in major need (see IO1 Deliverable for a full review). These issues are an expert-based selection from all interviews and workshops held in IO1. They appear to be common across the targeted industries and such evidence is critical to generate some *validation keys* to measure directly the ORION SMS capacity to meet SMS core objectives. This is a qualitative research finding which would favour face validity but further data evidence is recommended to confirm confidence beyond the scope of the ORION Project.

Table 2 Consolidated findings of Gap Analysis from IO1 Deliverable

	Consolidated Challenges (IO1 Maturity Analysis) cross industry trends
Safety Policy	Management commitment to safety is not evident
	Low level of Just Culture
	Low level of understanding of each one's contribution for an effective SMS
Safety Risk Management	Reporting Culture is very low. Confidential reporting is very limited
	Only a small number of employees identify and report Hazards
	The available sources of information for Hazard Identification are not fully utilised
	Human Factors related hazards are rarely identified
	Low level of understanding and implementation of the Risk Assessment process
Safety Assurance	Difficulties in setting of Safety Performance Indicators (SPIs) and Safety Performance Targets (SPTs)
	Many and drastic changes over the last year which require in depth MOC
Safety Promotion	Safety Management training requirements are based only on the legal requirements. No structured TNA performed
	Significant events and investigation outcomes are occasionally communicated to staff but not in a structured manner.

Clearly any evaluation and validation means in ORION Project shall consider the wide variety of differentiations across industries as reported in Table 1 for SMS adoption readiness and more concretely in Table 2 for SMS training content and objectives. Overall this justify the need to assess the fit of standard or new SMS training objectives/contents with differential industry-specific capacity to benefit from it. This assessment of fit demands a validation strategy as described in the next section.

ORION SMS Validation

The purpose of validation is to provide confidence by dedicated ORION SMS *validation measures* that the concept being developed and implemented meets the stated objectives in practice. This confidence is measured by a validation process assessing that:

- SMS training needs are fulfilled;
- SMS training objectives are met;
- Feedback from/to SMS training participant is accounted for.

ORION SMS validation process

The validation concept is proposed to apply a set of ORION SMS *validation measures*. Such measurements shall test the *degree of success, the impact, to meet the stated ORION SMS training objectives* according to designers and trainers from one side and trainees from the other one. It is a process depicted in Figure 1 to verify by ORION SMS *validation measures* if the ORION Project team, the Internal validation, might overestimate or underestimate the ORION SMS training impact with respect to the External validation, that is, the exposed trainees to the ORION SMS training. The comparison would produce the expected versus the observed impact, and indirectly the level of under- vs over-confidence in meeting the ORION SMS objectives. This process in essence tests to what degree the objectives of the SMS training would fit the actual needs and gaps ascertained in the preceding SMS Maturity Assessment and Training Development process in IO1 and IO2. This ORION Validation process is described here below in Figure 1.

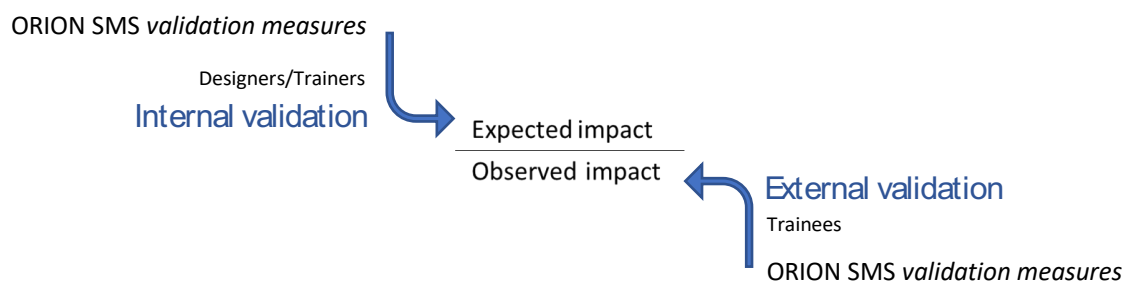


Figure 1 - Expected vs Observed ORION SMS impact 2021

ORION SMS validation measures

The validation measurements have been developed taking reference to Table 1 and Table 2 contents, and Table 3 is now the ORION SMS Validation Measures Template. It describes the ORION SMS validation measures to validate the ORION SMS capacity to deliver and meet the SMS training objectives.

Table 3 ORION SMS Validation Measures Template

	Gap Analysis Findings [I01 + I02]	ORION SMS validation measures [I03]
Safety Policy	Management commitment to safety is not evident	1) ORION course can increase management safety awareness 2) ORION course can increase Management commitment to safety
	Low level of Just Culture	3) ORION course can increase management's understanding of the importance of Just culture. 4) ORION course can increase Just Culture practices
	Low level of understanding of each one's contribution for an effective SMS	5) ORION course can increase awareness on SMS importance of everyone's role in safety processes
	Safety Policy is not agile enough, predominantly due to lack of evidence base	6) ORION course can increase knowledge on importance of data evidence to support safety practices/policies
	Safety policy needs to be performance oriented - hence needs to be able to measure progress towards an improved state	7) ORION course can increase competence to safety data management and data projects.
	There needs to be effective accountable oversight of the improvement process	8) ORION course can increase capacity to monitor SMS improvement processes
	Safety information needs to play an effective role in strategic decision making	9) ORION course can improve knowledge on the importance to integrate safety data with other operational/business data to drive better decision making

Safety Risk Management	Reporting Culture is very low. Confidential reporting is very limited	10) ORION course can improve Reporting Culture 11) ORION course can improve the use of a more transparent process for information management.
	Only a small number of employees identify and report Hazards	12) ORION course can increase employee hazard awareness and promote reporting. 13) ORION course can improve awareness on importance of transparent safety information management.
	The available sources of information for Hazard Identification are not fully utilised	14) ORION course can improve awareness on the criticality of integrating data and databases for safety risk management.
	Human Factors related hazards are rarely identified	15) ORION course can raise awareness in relation to Human Factors Hazards 16) ORION course can improve understanding of these issues as variants of system performance
	Low level of understanding and implementation of the Risk Assessment process	17) ORION course can increase awareness on the actual processes used for Risk Assessments. 18) ORION course can favour the use of more safety controls to minimise the risks.
	Systemic performance drives	
	Risk assessment in isolation is less effective than as part of evidence based governance process	19) ORION course can augment Focus from partial/isolated risk assessments into a more systemic approach
	There is a lot of data, but a lack of formal explicit procedure and method for acquiring system knowledge	20) ORION course can increase the awareness to aggregate and analyse different types of data for more systemic understanding: safety data, normal operational data,

		implementation projects, cost of safety disruption, etc.
Safety Assurance	Difficulties in setting of SPIs and SPTs	21) ORION course can increase awareness on the effective utilization of SPIs and SPTs
	Many and drastic changes over the last year which require in depth MOC	22) ORION course can increase awareness of better management of change
	Goals and outcomes are underdefined and not well linked	23) ORION course can increase Integrated risk management to better support strategic priorities
	Engagement with change processes is not well developed or productive	24) ORION course can increase more awareness to monitoring change into normal management activity
	Verification of outcomes of change is rare and inconsistent	25) ORION course can increase accountability for implementation of risk change initiatives 26) ORION course can increase capacity to track SMS project progress
Safety Promotion	Safety Management training requirements are based only on the legal requirements. No structured TNA performed	27) ORION course can increase interest to beyond compliance in relation to SMS Training Needs
	Significant events and investigation outcomes are occasionally communicated to staff but not in a structured manner.	28) ORION course can increase knowledge on communication needs to keep employees informed on safety issues
	Lack of systematic integration of risk, safety and change management across different levels of the organisation	29) ORION course can enhance across operational, implementation of SMS projects
	Current safety information does not flow freely around relevant parts of the organisation	30) ORION course can favour more safety information flows across the organization

	There is little feedback from operations concerning the impact of safety information	31) ORION course can favour feedback exchange about impact of safety solutions or information adequately
	There are few opportunities for informal participation in safety activity	32) ORION course can improve wider participation to formal/informal safety discussions in the

The first two columns of the above Table 3 describe respectively the four main SMS topics and the main cross-industry gaps as identified in IO2 Deliverable (see Appendices - IO2 Deliverable). Finally, based on these first two columns the third column operationalize the relative questions or items reflecting the gaps and relative SMS topics. These are the ORION SMS validation measures to take into consideration for validation purposes. Such ORION SMS validation measures in Table 3 are now sampled and refined to generate a final validation instrument.

ORION-SMS measurements

The ORION SMS evaluation comprises both a standard system of evaluation means to gauge reaction and evaluations of trainees' as well as measures of ORION impact as expected by trainers and trainees exposed to the ORION material (O'Connor et al., 2008).

The pilot ORION-SMS implementations across the available associate partners in the project is not to be considered fully embedded SMS training courses, but SMS pilot implementations of next generation SMS courses and topics. In this context, it was effective to measure the level of:

1. Trainees reaction on:
 - a. training contents,
 - b. layout,
 - c. trainers,
 - d. scope and type of course deployment

2. Expected ORION impact:
 - a. Safety policy
 - b. Safety risk management
 - c. Safety assurance
 - d. Safety promotion

For the trainees' reaction measures a *Trainee Reaction Template* (in Annex 1) employed a 5-point likert scale with 1(minimum) to 5 (maximum) agreement rating 13 key items about common course content reactions and perception (O'Connor, et al., 2008). A 4-point rating ranged from 1(disagree) to 4 (agree) scale was applied instead to the 11 multiple-choice items of a Validation Template (see Annex 1). This latter measure rated the expected ORION impact and it was delivered both to trainees and trainers. These 11 items were selected out of the 32 original items sourced from the third column of Table 3 above. This item selection for the Validation Template was carried out by a dedicated measurement focus group held by the ORION partners in 2019.

The overall sampled data (14 subject total) comes from two dedicated ORION training sessions delivering ORION SMS training with the advanced ORION SMS Data Analytics course (module 3):

- 1) *Aviation domain session*: on the 16th of June 2021 with 10 representatives from two aviation companies
- 2) *Healthcare domain session*: on the 25th of June 2021 with four representatives from two healthcare hospitals that included doctors, other healthcare professionals and safety managers

ORION evaluations in Healthcare and Emergency Response

An additional sample of 6 trainees evaluated a further additional ORION SMS training Module (Module 2 Proactive Risk Management). This on two continued sessions (workshops) on 24th of June 2021 and 8th of July 2021. The course was delivered to Quality/Safety assurance Leads at a city hospital and to members of an emergency service who have responsibility for SMS in their organisation. Only trainees' reactions, with dedicated key items were assessed in this case.

ORION review and evaluation by Turkish EMS providers

In addition to the validation and evaluation of ORION training content outlined above, two members of AAHD, the Associate Partner in Turkey reviewed and provided evaluative feedback on the ORION Advanced training materials. Each of these are emergency medical physicians with extensive experience in Emergency Medical Services (EMS) operations. They also participate in research into Human Factors, Crew Resource Management and Socio-Technical Systems related on disaster resilience and emergency response. They undertook their review during July 2021.

ORION SMS Evaluation

Trainee' reaction findings

Targeting the Trainee Reaction Template some descriptive statistical analyses have been carried out on the available 14 samples dataset. In figure 2, 3 and 4 are average values for "Training content and material evaluation", "Trainer Evaluation", as well as "Administration and Venue Evaluation" elements respectively. All measures are anchored to higher values representing more favourable/positive reactions.

Training content and material is favourably higher than 4.5 points for all measures (figure 2). In particular adequacy and usefulness of all training material was highly perceived as very positive (see the rating system in previous section ("ORION SMS Measurements"))

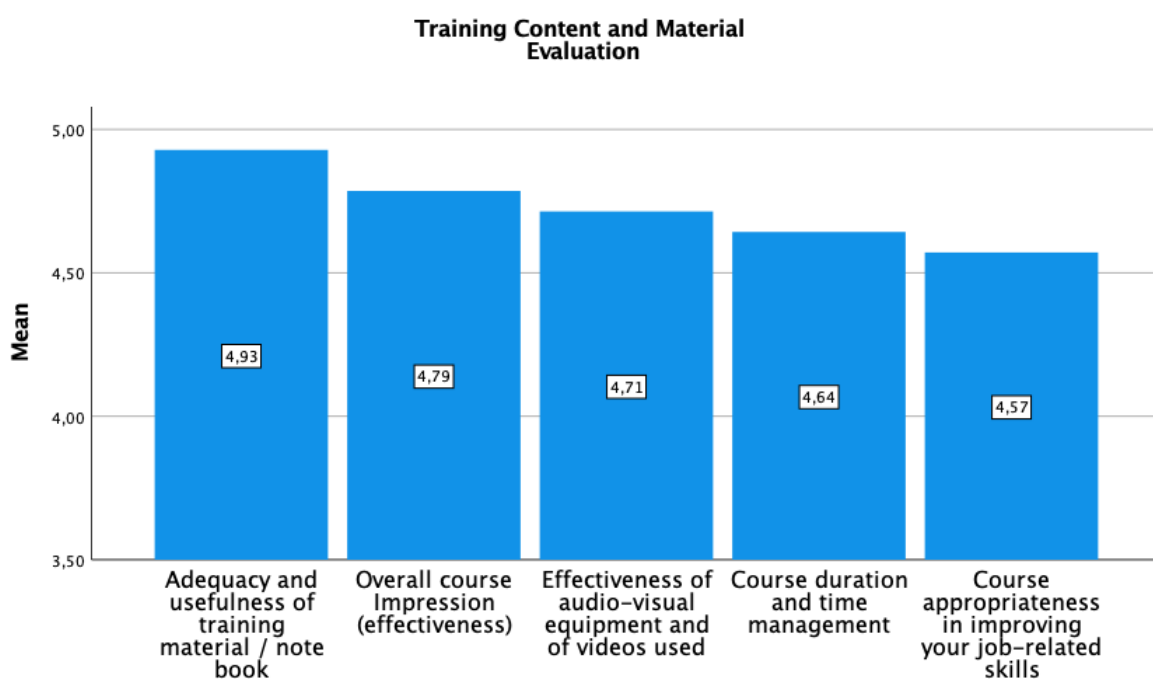


Figure 2 Means of trainees' reaction of the "Training Content and Material"

The *trainees' evaluation of trainers proficiency* was clearly positive as well. Trainers were on average well suited for the ORION purpose and all values pointed above 4 point ratings as well (Fig 3). Instructors clarity, competency and communication were highly appreciated.

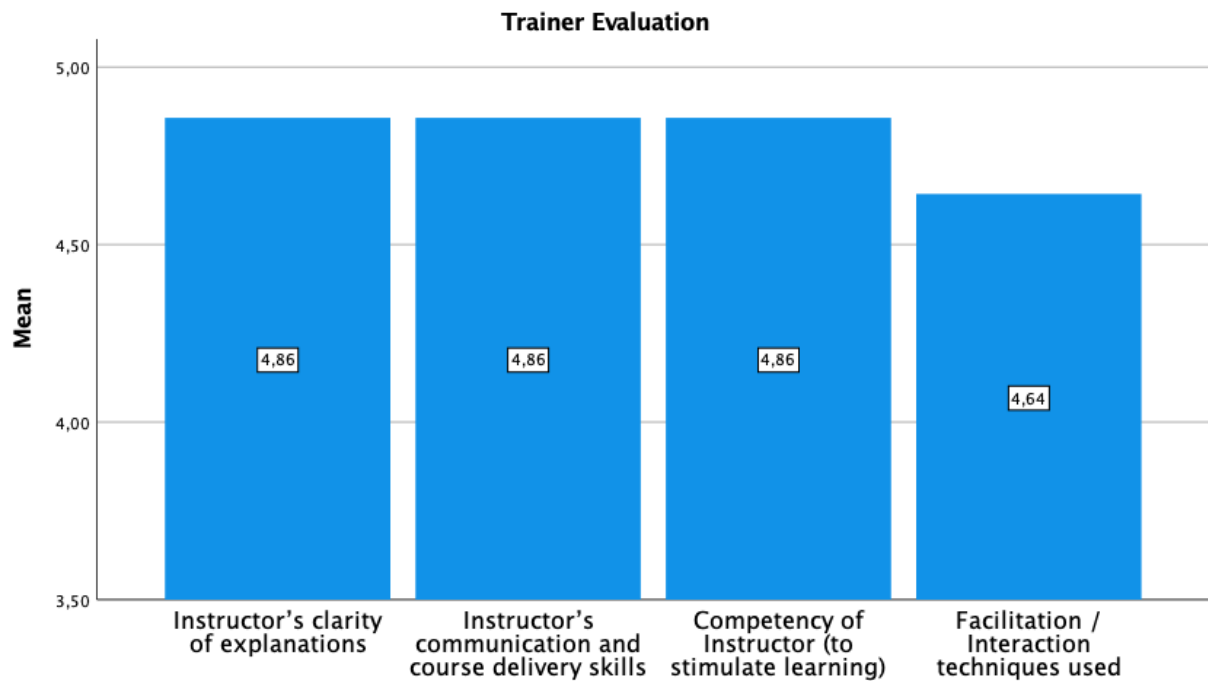


Figure 3 Means of trainees' reaction of the "Trainer Evaluation"

Finally the training administration and venue elements were favourably well received and rated (above 4.5 ratings, Fig 4).

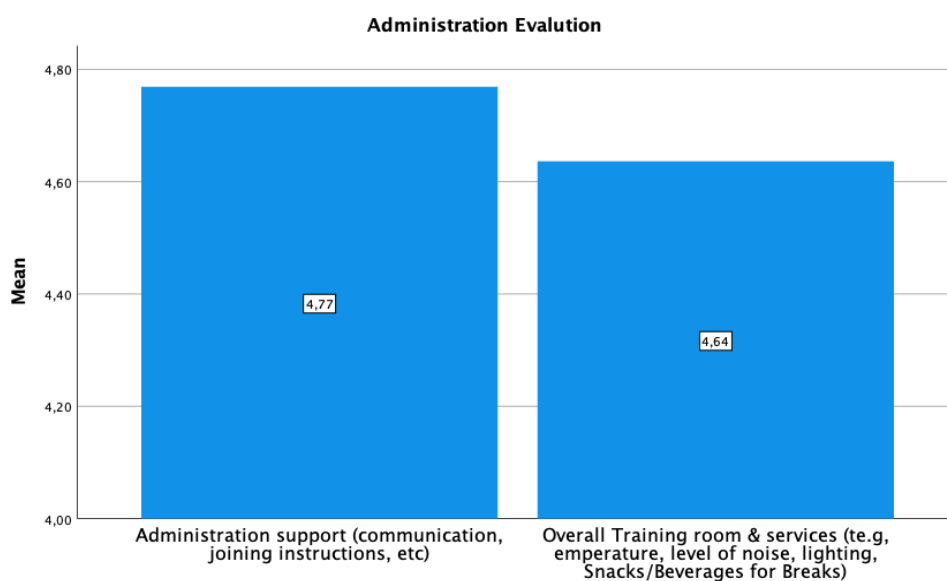


Figure 4 Means of trainees' reaction of the Administration and Venue

Additional evaluations of Irish Healthcare and Emergency Response Personnel

An specific sample of 6 trainees evaluated the ORION Module on Proactive Risk Management (module 2). This sample comprised four quality and safety healthcare managers at a hospital and two safety managers from an emergency service. For ORION logistic and scheduling reasons this evaluation setting utilized an alternative set of items for trainee’s evaluations, but mirroring the same rating approach. With a rating set from 1-low to 5-high (positive anchoring), the following items in Figure 5, 6, 7 and 8 were rated. These results can be compared (descriptively) with findings about trainees’ reaction on the previous section.

Overall course impression (effectiveness)

6 risposte

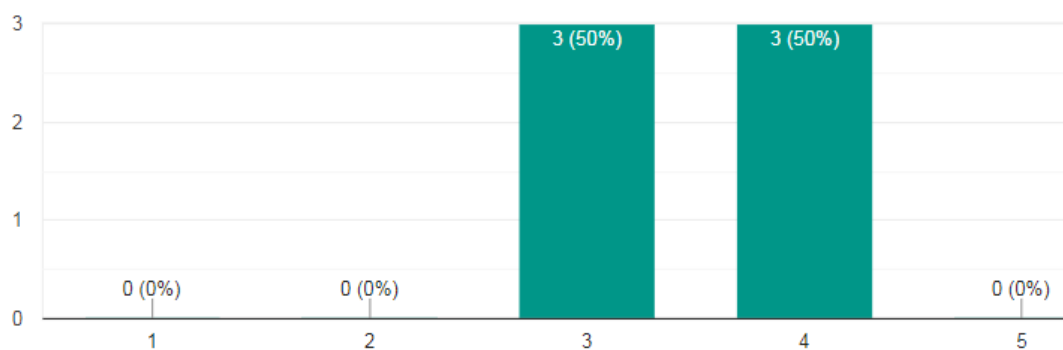


Figure 5 - alternative trainees’ reaction template - Feedback

Figure 5 reports on the perceived effectiveness of the ORION SMS course and clearly the trend (descriptive level) is favourably towards an average rating of 3,5.

Additionally, as shown in Figure 6 with an average rating of 3, trainees seem to suggest that ORION SMS course is in line with actions to improve job-related skills, but possibly (being only at mid-point evaluation) demanding potential improvement.

Course appropriateness in improving your job-related skills

6 risposte

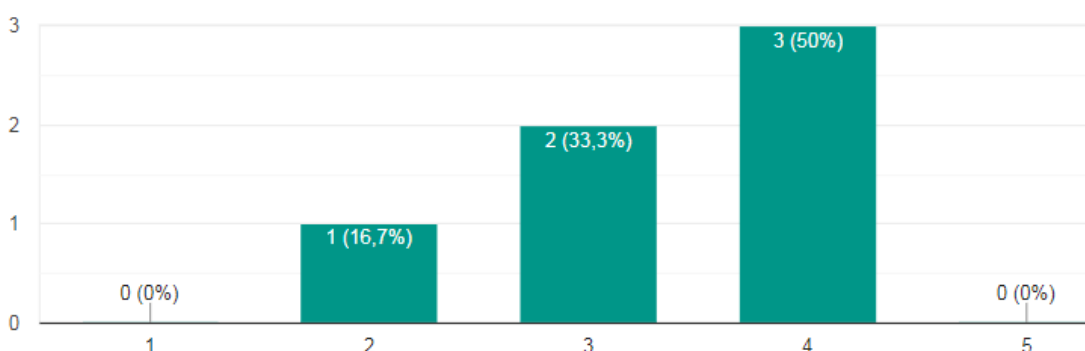


Figure 6 - alternative trainees’ reaction template - Appropriateness

Figure 7 and 8 show that also instructor competence and explanation skills are highly regarded by this set of trainees with average rating of 3,83 and 4,17 respectively.

Competency of instructor (to simulate learning)

6 risposte

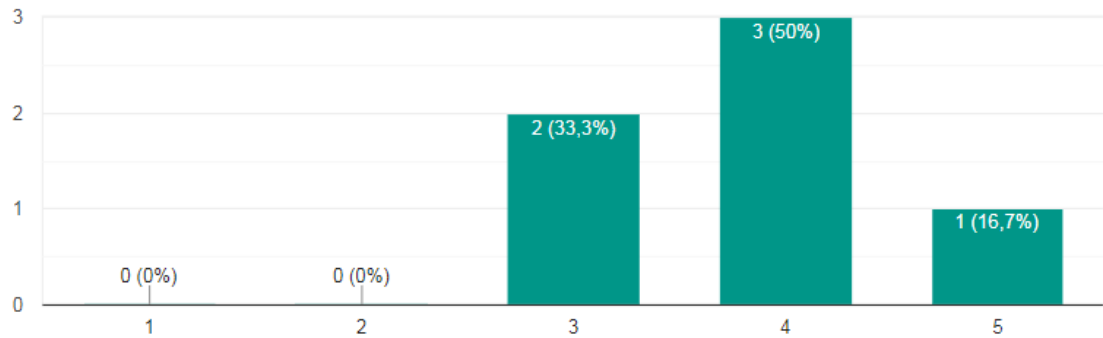


Figure 7 - alternative trainees' reaction template - Trainer competence

Instructor's clarity in explanations

6 risposte

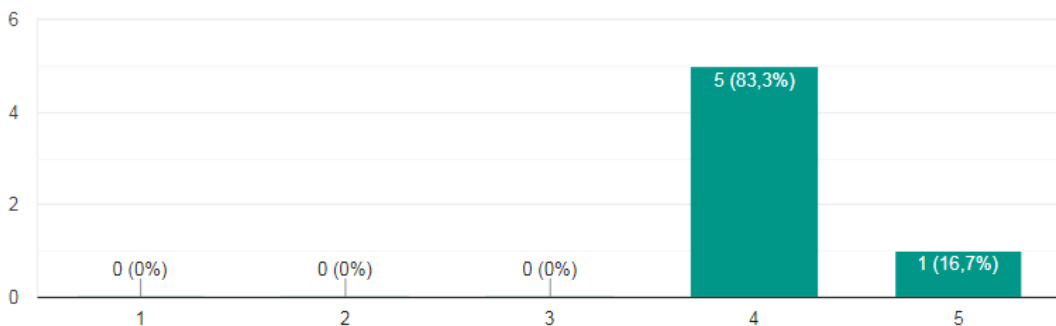


Figure 8 - alternative trainees' reaction template - Explanations

Notably the trainee's reaction to this ORION module on Proactive Risk Management is favourably well aligned to the preceding evaluations on the 14 subjects exposed to other ORION training modules and sessions.

ORION Validation and Evaluation by Turkish EMS providers

The Turkish ORION associate partners, AAHD, undertook a validation and evaluation of ORION training content. Two members of AAHD conducted the review of training content. Each of these are emergency medical physician with extensive experience in Emergency Medical Services (EMS) operations. Their review of material focused on providing evaluative feedback on the ORION Advanced training materials. As reported above AAHD participate in research into Human Factors, Crew Resource Management (CRM) and Socio-Technical Systems related on disaster resilience and emergency response. While they are familiar with these topics generally and have expertise in CRM in emergency medical services, they are relatively novice in the use of safety management systems (SMS).

The novice validation and evaluation of the ORION Implementation Training material for advanced risk management was valuable to determining the accessibility, comprehension and perceived usefulness of the training content. Some of the feedback from within the ORION partnership and target groups had considered the ORION Implementation Training material to be somewhat complex. This position was validated by the AAHD reviewers. They did rate the training material design, visual impact and content areas positively. They reported that they were also motivated to develop their knowledge and competence in SMS Implementation. However, they reported that they found much of the material content to be overly complex for novice users. They also reported that they would require to participate in core SMS training, and ideally SMS training that is developed specifically for the emergency services sector (EMS).

ORION SMS validation: Findings

Expected ORION impact

Targeting the Validation Template, some descriptive statistical analyses were carried out on the available 14 samples providing trends and expectations (average values) for each single question of the total 11 items gauging the expected ORION impact on trainees' or trainers working activities and contexts. This is shown in Figure 9 for Trainees and Fig 10 for Trainers respectively.

As shown in figure 9 the highest expected impact of ORION training course is to support a *more systemic approach to safety risk assessment* and to *push SMS training beyond compliance and regulatory aspects* (both at 4 point rating). Lower impact is expected on the *actual processes used for risk assessments* and for *accountability for implementing risk change initiatives* (both at 3.5 point rating).

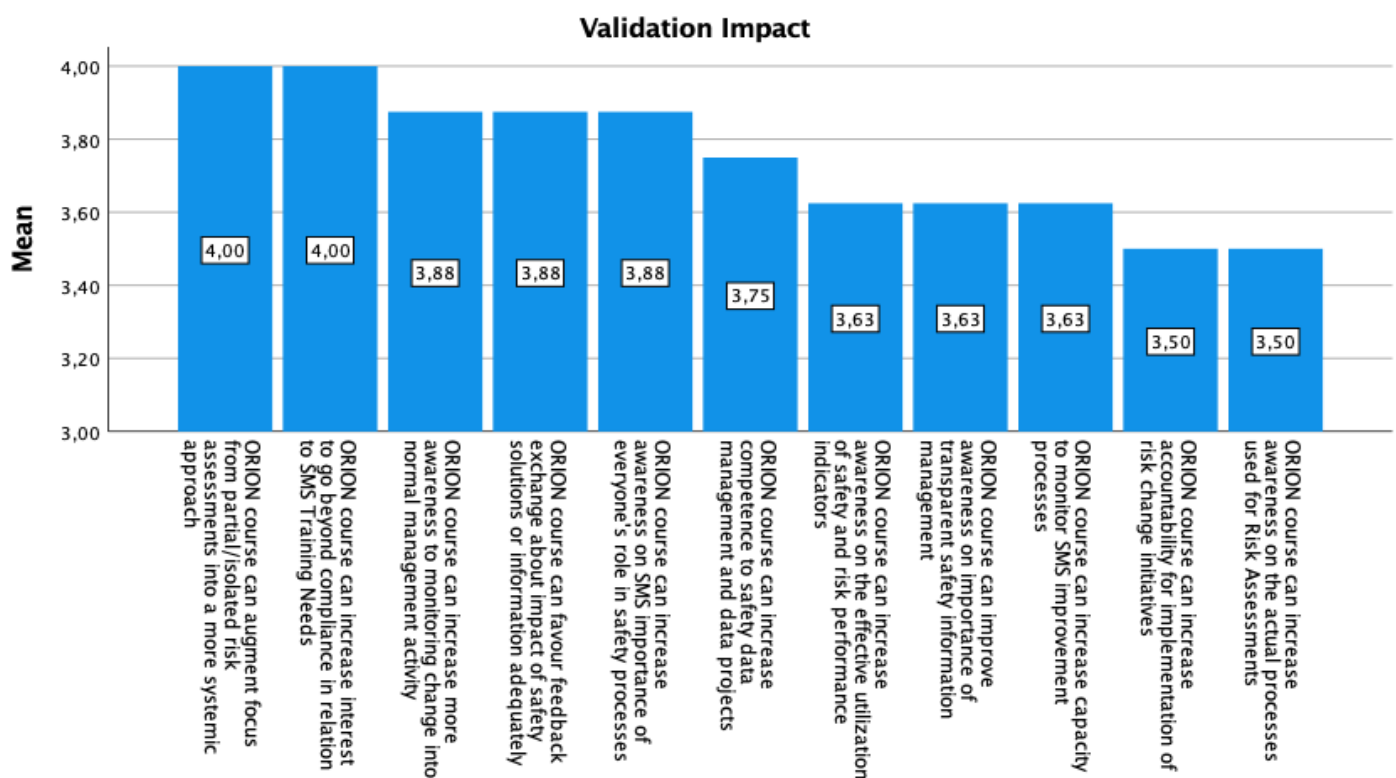


Figure 9 Means of trainees' responses for each statement of the survey. (1=fully disagree, 2=slightly disagree, 3=slightly agree, 4= fully agree)

However all 11 scores were amply above the mid-point rating of 2.5 suggesting a positive overall trend in terms of the expected impact of ORION SMS training into the trainees' activities on SMS key factors.

Figure 10 instead shows on the same measures the trainers' perception about the ORION SMS course impact. The trends is reassuringly similar to those one by the trainees sample with an overall ratings of 3.5, well above a 2.5 mid point rating

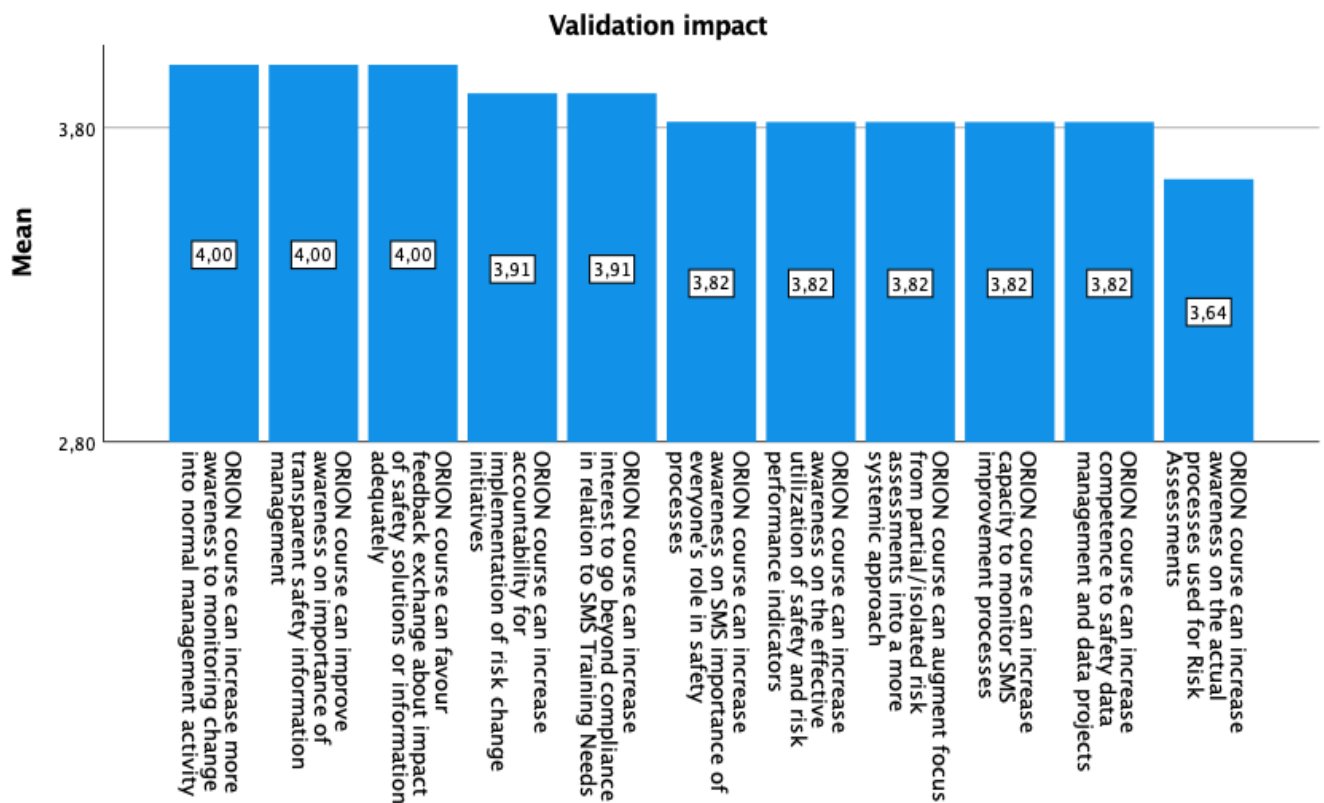


Figure 10 Means of trainers' responses for each statement of the survey. (1=fully disagree, 2=slightly disagree, 3=slightly agree, 4= fully agree)

All measures showed an averaged expected impact rating above 3.5. The trainers' expected impact of ORION course would increase *awareness to monitoring change in safety management and more transparent safety information management*. Also, *improved feedback about impact of safety solutions* is expected by the ORION course.

Impact Index (a measure of ORION expectation)

Finally, in order to measure the ORION impact, as described in Figure 1 model, the overall 11 items above of the Validation Template (see Annex 1) were pooled together to generate a simple linear non-weighted composite measure called *Impact Index*. This validation index provided a simple direct comparison between trainees and the trainers expected global impact of ORION SMS training course on SMS activities at work.

The mean (a central tendency indicator) and the Standard Deviation (a measure of variability in responses) of the Validation Index have then been compared between trainees and trainers as shown in Figure 11 and Figure 12.

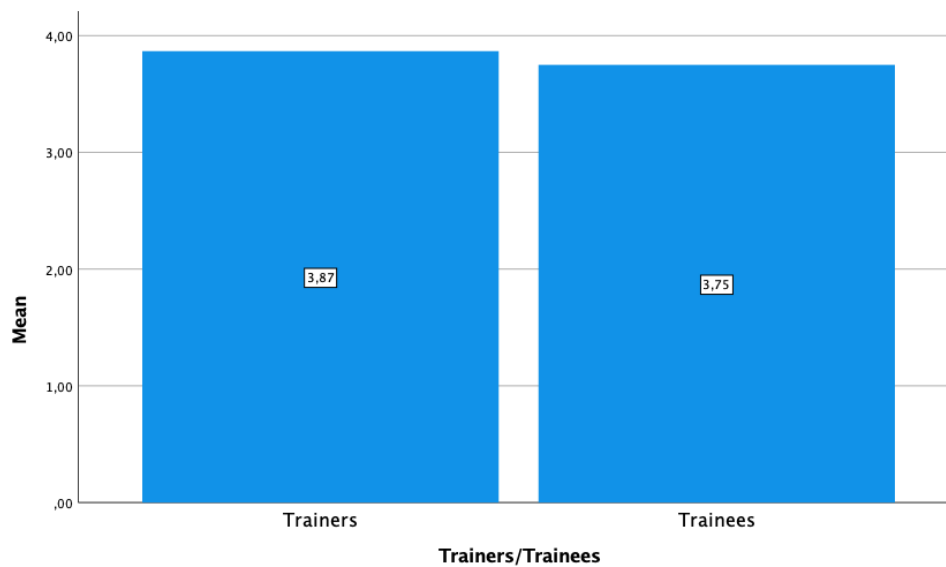


Figure 11 - Compared Means of trainers index evaluation and trainees index evaluation

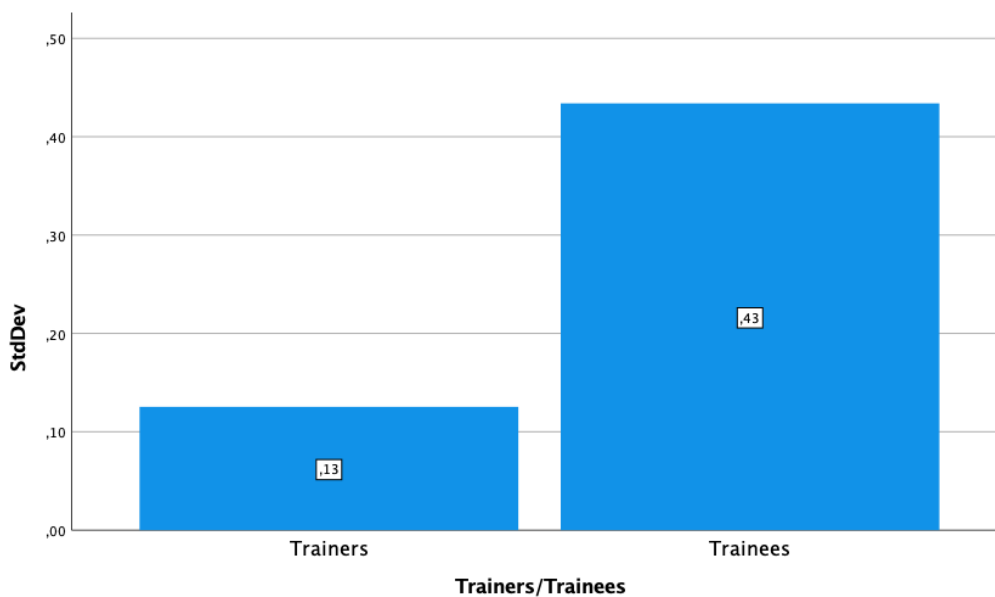


Figure 12 - Compared Standard Deviation of trainers index evaluation and trainees index evaluation

With a high and similar rating of 3.75 and 3.87 (sd .43 and .13) for trainees and trainers respectively the ORION SMS training course delivers face and concurrent validity to the validation process described in Figure 1. This ORION training system is reported explicitly (face validity) and between different groups (concurrent validity) as impactful model of SMS delivery and instantiation. Notably, trainers seem more similar in their averaged ratings (sd .13) than trainees (sd .43).

Overall the descriptive comparison (averages) on the Validation Index between trainees and trainers do not reveal a model discrepancy in the expected impact, no real gap in expectations is present. Thus, according to the ORION SMS validation process (see ppxx) the ORION course does not overestimate or underestimate its training impact: the expected and observed impact is favourably balanced.

Discussion and Conclusions

Overall, as shown in figure 2,3,4,5,6,7 and 8 the training sessions, trainers, materials, methods and logistics for the ORION SMS courses were positively endorsed. The ORION SMS trainees exposed to various ORION training modules have a positive endorsement of the training delivered to them.

Furthermore, the indication from the evaluation of ORION impact in figure 9, 10 and 11 shows a clear alignment between trainees (exposed to ORION process) and trainers/designers (generating/delivering ORION system) this similar expectations on impact is experimental but suggest that under or overconfidence on the ORION added value is balanced with a proper trade-off between stockholders of ORION SMS training.

This findings apparently are taken as valid for these first samples available at the time of the ORION Project timeframe. Thus it is suggested that the process model for validation in Figure 1 be repeated to re-test the results accuracy and cross-generalization every time the ORION SMS delivery is planned and scheduled.

References

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Annex 1

Trainee Reaction Template

Course / Training Name:

Trainer:

Date:

Please indicate with a V or X or √ your evaluation for each of the following criteria:

A/A	Training Assessment Indicators (Criteria)	Rating (5=max / 1=min)				
		5	4	3	2	1
Training Content and Material						
1.	Overall course Impression (effectiveness)					
2.	Course duration and time management					
3.	Adequacy and usefulness of training material / note book					
4.	Effectiveness of audio-visual equipment and of videos used					
5.	Course appropriateness in improving your job-related skills					
6.	Meeting of course objectives					
Trainer						
7.	Competency of Instructor (to stimulate learning)					
8.	Instructor's communication and course delivery skills					
9.	Facilitation / Interaction techniques used					
10.	Mannerism / Attitude / Approach by Trainer					
Administration And Venue						
11.	Administration support (communication, joining instructions, etc)					
12.	Training room Suitability (temperature, level of noise, lighting)					
13.	Snacks and Beverages for Breaks/Lunch Provided					

Thank you for your valuable feedback and support – this will help us to improve further and strengthen our programs

Validation Template

Training Name: ORION SMS and course materials

Designer/Trainer:

Date:

Please indicate with a V or X or √ your level of agreement to the following sentences:

		Agree	Slightly agree	Slightly disagree	Disagree
Safety Policy					
1.	ORION course can increase awareness on SMS importance of everyone's role in safety processes*				
2.	ORION course can increase competence to safety data management and data projects*				
3.	ORION course can increase capacity to monitor SMS improvement processes*				
Safety Risk Management					
4.	ORION course can improve awareness on importance of transparent safety information management*				
5.	ORION course can increase awareness on the actual processes used for Risk Assessments*				
6.	ORION course can augment focus from partial/isolated risk assessments into a more systemic approach				
Safety Assurance					
7.	ORION course can increase awareness on the effective utilization of safety and risk performance indicators				
8.	ORION course can increase more awareness to monitoring change into normal management activity				
9.	ORION course can increase accountability for implementation of risk change initiatives				
Safety Promotion					
10.	ORION course can increase interest to go beyond compliance in relation to SMS Training Needs				
11.	ORION course can favour feedback exchange about impact of safety solutions or information adequately				

Thank you for your valuable feedback and support – this will help us to improve further and strengthen our programs