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CAATS II

COOPERATIVE APPROACH TO AIR TRAFFIC SERVICES II

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PROCEEDINGS EPISODE 3 / CAATS II JOINT DISSEMINATION EVENT

“ATM Concept Validation: The Challenge of Single Sky and next generation ATM”

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PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	



**“Cooperative Approach to
Air Traffic Services II”**

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1. Introduction

1.1. Document scope

Although presented as a CAATS II deliverable, this document presents the proceedings of the entire workshop. All presentations of the event are on-line available (<http://www.episode3.aero/news/episode-3-caats-ii-joint-dissemination-event>).

1.2. Intended audience

These are public proceedings and the intended audience consists of all those involved in the workshop (Episode 3 and CAATS II consortiums, European Commission, SESAR JU) and more generally those who will be involved in the planning, management, or conduct of validation activities related to the development of ATM Operational concepts.

1.3. Document structure

These proceedings of the workshop are structured in the following manner:

- Chapter 1 provides the introduction to these proceedings;
- Chapter 2 gives the workshop objective and the agenda of the event;
- Chapter 3 summarizes the event sessions;
- Chapter 4 shows the results of the questionnaires;
- Chapter 5 ends these proceedings with some conclusions;
- Annex A provides the complete participants list.



photographie Stefan Meyer



2. Workshop overview

2.1. Workshop Objective

On October 13th and 14th, 2009, the EPISODE 3 / CAATS II joint dissemination event (3rd Workshop for CAATS II) called “ATM Concept Validation: The Challenge of Single Sky and next generation ATM” was held in the Pullman Hotel Brussels Airport. The event was focused on the dissemination of the results of the two EC projects.

Episode 3 and CAATS II are the two key EC projects which pave the way towards the validation of the target concept for the future air traffic management system of Europe, the core objective of SESAR and Single European Sky policy.

Episode 3 deals with the complexity of the SESAR target concept, the break-down of a high level concept into scenarios for validation and new and pragmatic validation techniques to use to validate concepts at an early stage of development, such as gaming or expert groups. SESAR projects will use this gained experience in validation of ATM concepts.

CAATS II provides material and guidance how to validate operational concepts at different stages of research and development, considering particular objectives and constraints related to the safety, human factors, environment and business cases (the "case based approach" for validation). SESAR projects will have to develop cases in these areas as the development of concepts progress towards validation.

The results of both projects provide meaningful input to refine the European Operational Concept Validation Methodology (E-OCVM) adopted by the SESAR work programme and support the SESAR Joint Undertaking and its participants at both the conceptual level as well as in their practical work to validate ATM concepts in a coherent European approach.

2.2. Participants

About 100 people participated to this workshop¹. Based on the information provided during registration, the profile of the audience given in Figure 2-1 was drawn up.

There was a good dispersion of nationality (even the Chinese Episode-3 project partners were present) with a major representation from France (Eurocontrol Experimental Centre). The daily occupation of most attendees (65%) was higher level management: R&D managers and project managers.

The majority of the attendees (41%) said that their knowledge of the E-OCVM was on a level of applying, although only 17% of the audience on a level of validation practitioner.

Finally, it was seen that almost half of the audience was somehow involved in the SESAR JU. The majority of the attendees was (also) involved in the Episode-3 and / or the CAATS II projects.

¹ See Annex A for the participant list.

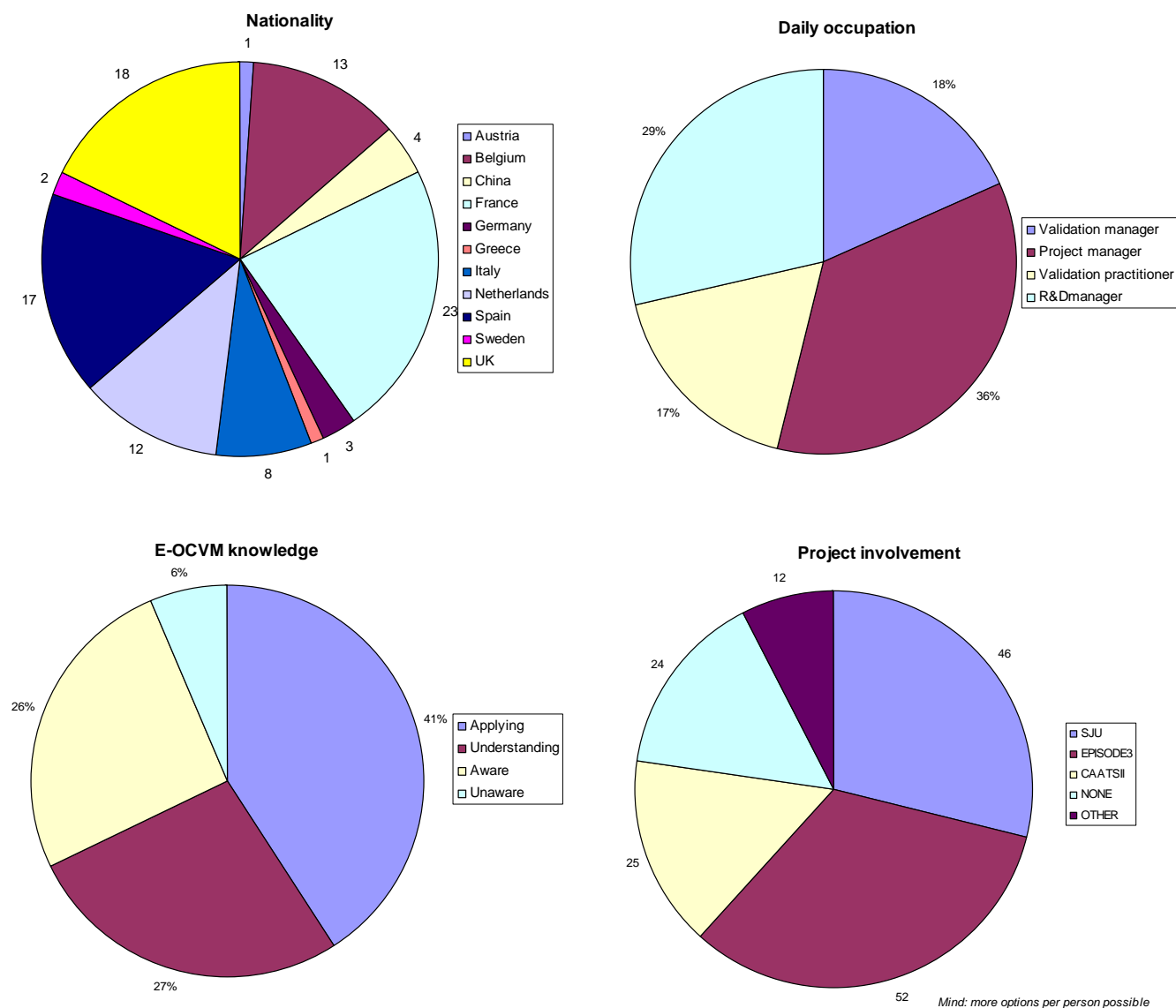


Figure 2-1 Profile of audience



2.3. Agenda

Day 1: Tuesday, 13 October 2009

09:00-09:30	Registration			
09:30-09:35	Introduction	Welcome	5 min	M. Koolloos
09:35-09:50		Keynote Speech European Commission	15 min	L. Tytgat
09:50-10:05		Keynote Speech SJU	15 min	M. Standar
10:05-10:15		Workshop Agenda / Intro Episode3 and CAATS II	10 min	M. Koolloos
10:15-10:30		E-OCVM (V2) explained	15 min	A. Jackson
10:30-11:00	COFFEE			
11:00-11:15	CAATS II	Scene setting for CAATS II	15 min	C. Regidor
11:15-12:00		Safety Case	45 min	J. Scholte
12:00-12:45		Human Factors Case	45 min	A. Pasquini
12:45-14:00	LUNCH			
14:00-14:45	CAATS II	Environment Case	45 min	H. Foster
14:45-15:30		Business Case	45 min	I. Zozaya
15:30-15:50		Interrelation between cases	20 min	J. Harrison
15:50-16:00		Conclusions	10 min	C. Regidor
16:00-16:30	COFFEE			
16:30-16:50	Episode 3	Scene setting for Episode 3	20 min	P. Leplae
16:50-17:25		Episode 3 Validation Strategy / Industrial view	35 min	A. Jackson / P. Lelièvre
17:25-17:30	Wrap-up	Overview of day, what next	5 min	M. Koolloos
18:00-19:30	COCKTAIL & Demonstration of Episode 3 tools			



Day 2: Wednesday, 14 October 2009

08:30-09:00	<i>Demonstration of Episode 3 tools</i>			
09:00-09:15	Introduction	Recap Validation Strategy /	15 min	M. Koolloos / A. Jackson
09:15-09:35	Episode 3	Expert Groups	20 min	R. Garcia
09:35-09:55		Gaming Exercises	20 min	P. Lopez
09:55-10:15		Prototyping Sessions	20 min	B. Booth
10:15-10:30		Questions & Answers	15 min	M. Koolloos / A. Jackson
10:30- 11:00	COFFEE			
11:00- 11:20	Episode 3	Combining Modelling & Gaming techniques:	20 min	P. Sanchez
11:20-11:40		Combining techniques: Expert Groups & FTS & Prototyping	20 min	H. de Jonge
11:40-11:55		Questions & Answers	15 min	M. Koolloos / A. Jackson
11:55-12:15		Industrial assessment: methods and results	20 min	P. Lelièvre
12:15-13:30	<i>LUNCH & Demonstration of Episode 3 tools between 13:15 and 13:30</i>			
13:30-13:50	Episode 3	Performance Framework	20 min	L. Tabernier
13:50-14:20		Operational Concept Detailing / Example of OPS scenario	30 min	R. Eveleigh / E. Hugg
14:20-14:40		Overall Lessons Learnt from the project	20 min	P. Leplae
14:40-14:50	Wrap-up	Summary of the Event	10 min	M. Koolloos
14:50-15:10	COFFEE			
15:10-15:25	Conclusions & Discussion	E-OCVM V3: What's new?	15 min	M. Poppe
15:25-15:35		SJU (impact of results)	10 min	B. Graham
15:35-15:55		Panel discussion	20 min	P. Leplae / C. Regidor
15:55-16:00		Farewell	5 min	M. Koolloos
16:00-16:30	<i>END OF EVENT & Demonstration of Episode 3 tools</i>			

3. Event sessions

3.1. Presentations

The first day of the event started with a general session about the purpose of the workshop and two keynote speeches of the European Commission and the SJU.

Luc Tytgat, the Head of Unit TREN.F.2. ‘Single sky & modernisation of Air traffic control’ within European Commission was happy to see cooperation, flexibility and coherency from two EC funded projects with different perspectives. He mentioned that: *‘This is best practice. Validation will be essential for a successful deployment of SESAR. And not only can we build on your results and promote a coherent European Validation Methodology, in addition you reduced emissions and costs by organizing a joint event for these two complementary projects’.*

Michael Standar, Chief Operations & Validation in the SESAR Joint Undertaking, added *‘These two particular projects have already positively impacted the SESAR programme. Operational validation ensures that we will develop fit for purpose technologies at the services of all actors involved. This is the only approach in view of the deployment phase’.* He emphasized that the people involved in CAATS II and/or Episode 3 are indispensable for the SJU because they gathered a lot of knowledge about key issues for the SESAR validation programme, like Operational Concept, Validation Methods, Performance Frame, Case Based Approach and Maturity Assessment.



photographie Stefan Meyer

After a short overview of the Episode 3 and CAATS II projects and an introduction to the E-OCVM the members of the CAATS II project presented the guidelines on the case based approach for ATM Concept Validation. Each case team (Safety, Human Factors, Business and Environment) presented their results in sessions with both a theoretical and a practical character, after which a short overview of the global relations between the cases was presented.

Next, Episode 3 presented their experience gained with the break-down of the SESAR concept into scenarios for validation and new and pragmatic techniques to use to validate concepts at an early stage of development, such as gaming or expert groups.

On the second day, the Episode 3 project continued the presentation of their practical experience, focusing on how the E-OCVM was applied in the various validation activities. The review of validation techniques was supported by demonstrations of some of the applied tools and techniques.



The event was closed by a summary of both projects results followed by a panel discussion (see section 3.2) on their implications for on the one hand the new version of the E-OCVM and on the other hand the SJU and its projects. It was recognised that the development of methodologies in CAATS II and the practical experience on new techniques gained in Episode 3 would be key inputs to SESAR validation.

All presentations of the event are on-line available:
(<http://www.episode3.aero/news/episode-3-caats-ii-joint-dissemination-event>).

3.2. Panel Discussion

In order to stimulate the final discussion the audience was requested to fill in a questions form. From the submitted questions a selection was made to be discussed during this final session. All submitted questions and answers (both directly answered and afterwards answered by the respective project teams) are given below.

The panel consisted of Philippe Leplae (project coordinator Episode-3), Carlos Regidor (project coordinator CAATS II), Bob Graham (SJU representative), Alistair Jackson (Episode 3 Validation expert), Manuel Dorado (Aena) and Colin Smith (NATS).



CAATS II

- Is the Business Case the one coordinating all cases or a case like the others? If the latter, who supervises, coordinates, handles differences and ensures coherency and consistency between the cases?
 - The Business Case is a structured way to prepare the required evidence for decision-makers (stakeholders) on the advantages and disadvantages of the different concepts under consideration. It represents an overarching position relative to the other cases: it brings them together, balancing the positive and negative aspects of each, and presents the underlying economic assessment to enable decision makers to make informed trade-offs. A Business Case is therefore a collaborative process involving a multi-disciplinary team aiming to ensure the ownership and buy-in of all stakeholders.
- How and when do you involve the regulator in the E-OCVM?
 - The stakeholders identification and the way you address them are some of the first validation steps to be taken. The regulator, being an important stakeholder, should be involved during the very first phases on the lifecycle model. As current safety regulations may stand in the way of healthy, safe operational improvements, safety regulations need to be addressed in an early stage of safety case development. It is noted that version 3 of the E-OCVM will also introduce a dedicated Standardisation & Regulation case.
- Case based presentations are repetitive. Could we get a clarification on specificity (i.e. more concrete description of indicators, criteria) of each case (if any)?
 - Please refer to the CAATS II Deliverables for detailed information. (<http://www.caats2.isdefe.es/> - Documentation)
- Is it the objective to create a case per KPA?
 - The 11 KPAs represent those key aspects of concept performance in which stakeholders are generally interested. Even in a project that aims to improve just one KPA (e.g., capacity), each of the other KPAs will be usually of interest to one or more stakeholders. It should then for example be validated that performance on those other KPAs is not negatively affected. The cases should thus provide coherent evidence across all KPAs, with the balance of emphasis between different KPAs reflecting their importance to the stakeholders. The division into separate cases is mainly driven by the need for different specialist disciplines, some of which relate strongly to a single KPA (like Safety) while others span many KPAs (like Human Factors).
 - CAATS II focussed on developing guidelines for four cases (Safety, Human Factors, Environment and Business) which will be, along with the separately developed Standardisation & Regulation case, included in version 3 of the E-OCVM. Although more case guidelines should be developed (e.g. security) CAATS II did identify that the concept performance with respect to all KPAs should at least be taken into account in the business case, irrespective of whether those other KPAs are addressed in a specific case.
- The SESAR JU presentation emphasises system development. CAATS is about concept development. Why was the link between the two not properly addressed?
 - System development requires the conjunctive execution of many activities such as requirements management, concept development, concept validation, verification, development of a performance framework, etc. The interplay of these activities needs to be established depending



on the specific system development strategy (e.g. that of SESAR), and were outside the scope of CAATS II.

- Who are the actors involved in each of the processes? Who is the customer, i.e. where do the requirements come from? Requirements in general, seem to not have been addressed well enough.
 - The European ATM system is not owned by a single ‘customer’, so incremental changes to it (which is how ATM concepts are implemented) can not have a single ‘customer’ either. Customers funding specific developments that result from a concept will have ‘Requirements’ for what is to be implemented, and those requirements will take account of the needs, constraints and compromises emerging from the earlier phases of the concept validation process..
- The life cycle can be used with different scopes depending on the research topic. Did you think about this when describing the cases? Or did you concentrate on SESAR as the scope (which could stretch the timeframe from V1 to V3 enormously)?
 - As the E-OCVM, CAATS II focused on the phases V1 to V3. and the case guidance is intended to be scaleable to support a wide range of validation activities from small-scale projects to large ATM system development programmes like SESAR. This implies that it should be interpreted to particular activities in their particular scopes.
- Are guidelines available how to tailor (apply) the cases in SJU projects?
 - There are no specific guidelines for SJU projects. Nevertheless, CAATS II guidance material was developed in close cooperation with the SESAR JU (as main customer), and with focus on application in SESAR-emerging projects.
- Is there any indication of how much effort is needed to conduct a Human Factors case (on average)? Are there any experiences with this methodology in this area?
 - There is no ‘standard’ cost of a Human Factors case – it all depends on the extent of people-related risk and opportunity associated with the concept. Early work to scope and understand the issues need not be expensive, and can be very effective, provided it is done by people with the right understanding, and is properly integrated with concept development. Once the issues are understood, the amount of work needed to address them can be assessed and prioritised along with other work needed to develop and reduce the risk of a concept..
- Is it possible to link safety analysis to security analysis and meet the [emerging] guidance/standards? If not, we might be spending the same money twice!
 - CAATS II focused on the development of guidelines for four cases, and “security” was not one of them. However, the guidelines on ‘relations between cases’, which was also defined during CAATS II, are generic and therefore also valid for links between the safety case and the security cases. It is indeed a good idea to consider in further detail how the safety and security cases can optimally benefit from each other, but – again – that was outside the scope of CAATS II.
- Can we show what happens to the behaviours of the system under failure conditions, especially multiple failures caused by e.g. terrorist attack?
 - Validation is about demonstrating that a concept is fit for purpose. There will be a range of ‘normal’ and ‘exceptional’ situations that may need testing to establish this fitness for purpose and using a Safety (or Security) Case is a way of identifying such situations. This should be done as early as in V2 of the lifecycle model, where the feasibility of a valid concept depends on



whether these issues can be properly mitigated. It is even recommended to start the safety analysis already in V1, in order to avoid spending time and money in V2 on concepts that will eventually not turn out to be valid.

- Is it possible to scale analysis techniques to cover the whole of SESAR in order to feed evidence into the "planned macro safety case"? How would these techniques cope with change during the design/development phase, through roll-out [whilst interfacing with legacy ATM] through the next 50+ years?
 - SESAR indeed identified this need for a 'macro safety case', next to several other emerging needs for safety case development for advanced concepts in R&D. We have identified existing and emerging approaches to satisfy these needs. Many analysis techniques may be suitable in multiple phases, but the integration of these techniques so far is limited.
 - For dealing with changes in concepts, it is of major interest to document exactly for which concept versions which evidence has been derived, and that these should be re-interpreted for different concept versions.
- Who is the "Gate keeper" and how independent are they?
 - The "Gate keeper" is the decision maker. They are those who are responsible to take decisions based on facts and evidence. They should be first sufficiently independent not to be biased, but on the other hand, they should have sufficient knowledge about the concept and the activities carried out to impartially decide about the go or no-go decision.

EPISODE 3

- What type of expertise is required to solve the hot topics
 - The hot topics are identified mainly in the expert groups and within the team detailing the concept. The expertise required to solve the hot topics, is essentially the same, but a decision mechanism must exist to close the issue. This decision mechanism should rely on a stakeholders group that has the power to decide when several solutions to detail the concept exist. Such a group could not be created in Episode 3, as it was being set up in SESAR and duplication of such groups was not wanted.
- Why changing from OSED to DOD?
 - Initially Episode3 intended to produce OSED's. However, when we started looking at the concept, we realised that it was not mature enough to provide the information required in the OSED template we had developed. Therefore we chose to create a new document type called DOD, inspired from OSED, but tuned to collect the kind of details we were able to provide at this stage of maturity.
- EP3 used a lot of techniques and combined them. Are there experience / considerations about cost efficiencies?
 - Not yet, but we intend to provide this information in the final report, i.e. costs of deploying the techniques used.
- There is experience with gaming now. The objective of gaming was, as I understood, that it should lead to decision making in controversial processes. Is there any view that gaming may lead for



example to acceptance of a controversial difference of interests between some airlines in the fair negotiation on conflicts of interest?

- First of all, just for clarification, the gaming scope is focused on assessment of processes feasibility where the showstoppers and bottlenecks are detected. One of them is the conflict of interests between airlines. For that, using gaming techniques, the need of predefined indicators to solve this situations has been identified. Equity indicators (such as degree of SBTs affection , historical SBTs distortions,...) are key indicators to support the decision making in an equitable way. Further more, a new role/function was identified (the Airline Coordinator) as a mediator of users interests. All these solutions to solve the decision making in controversial processes have been already detected through this gaming technique, and therefore its proven its usability.
- There is a trade-off between capacity and efficiency. Increase of demand may require maximising deployment of available capacity (e.g. Heathrow), but climate crisis and scarcity of resources may require a shift towards efficiency/environment, deploying preferably less than the maximum capacity. What is SESAR doing to position adequately to a moving world scenario?
 - This should be handled through revision of the ATM master plans, where ultimately the high term goals may be re-evaluated.
- How do we validate behaviour/processes in an asynchronous environment?
 - Episode 3 used a tool called PROMAS which is able to model processes involving multiple actors, and obtain measurements. Asynchronous processes can also be modelled in PROMAS by creating processes cycling and waiting for a particular condition to occur. However, we have only used PROMAS inside Episode 3 on synchronous series of processes.

SESAR JU

- Many of the concepts & techniques developed / used in CAATS II and Episode 3 will be useful for specific projects within SESAR. How is the SJU planning to support the projects in education and use of these techniques?
 - There will be some mechanisms and arrangement within the SESAR Work Programme that will be dedicated to training and education in the usage of such tools.

4. Questionnaire

The audience was requested to fill in a questionnaire at the end of the 2nd day in order to measure the success of the event. 27 persons completed this questionnaire. The profile of these 27 persons deviated slightly from the profile of the entire audience.

Daily activity	R&D Manager	Validation Practitioner	Project Manager	Validation Manager	Other*
	4	7	6	3	7
Years in present position	0-1	1-3	3-5	5+	
	5	9	3	9	
Level of knowledge about the E-OCVM before the workshop	Unaware	Aware	Understanding	Applying	
	0	11	8	8	
Main validation-related project in the near future	SJU project(s)	Other	EC FP VI/VII project(s)	None	
	14	4	3	5	

*: "Other" is Safety Regulator, ATM Architecture Director, Operational Expert, R&D Design Expert

Table 4-1 Profile of participants that completed the questionnaire.

Concerning the content and design of the event, appraisal questions were asked in the categories “General”, “CAATS II” and “Episode 3”. All questions had to be answered on a scale of 1 to 5 (1=Strongly disagree 2=Disagree 3=Neither agree nor disagree 4=Agree 5=Strongly agree). Figures 3-1 to 3-3 show the results of these questions. The vertical line indicates the average of the appraisal within each category.

In the category “**General**” the following aspects had to be appraised:

1. I was well informed about the objectives of this workshop
2. This workshop lived up to my expectations
3. The difficulty level of this workshop was appropriate

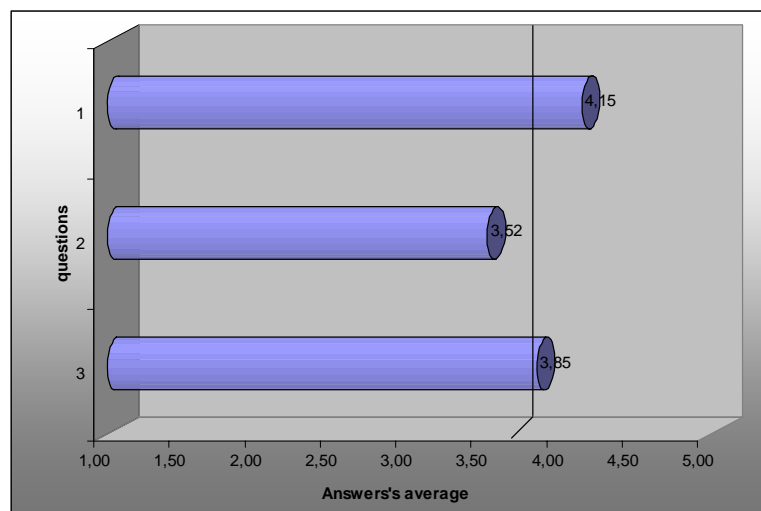


Figure 4-1 General appraisal



Figure 4-1 shows the results. It is seen that the objectives of the workshop were well communicated in the announcement, but that the workshop in total did not live completely up to the expectations.

In the category “**CAATS II**” the following aspects had to be appraised:

1. The CAATS II results were presented well
2. The CAATS II results are relevant to the work I will perform in the future
3. I will (now) be able to apply/manage the case based approach
4. I am going to actually use the best practices/guidelines
5. I know where to go to find out more about CAATS II results

Figure 4-2 shows the results. As expected the participants responded that the workshop did not result in enough knowledge to actually apply the case based approach. However, the CAATS II results are considered relevant to the participants (future) work, they do know where to find the guidelines material and they are more than willing to apply these guidelines. Given that the objective of the workshop was to give an overview of the case based approach, indicating the importance of it, this result is considered very positive. The results also indicate that the presentations could be improved.

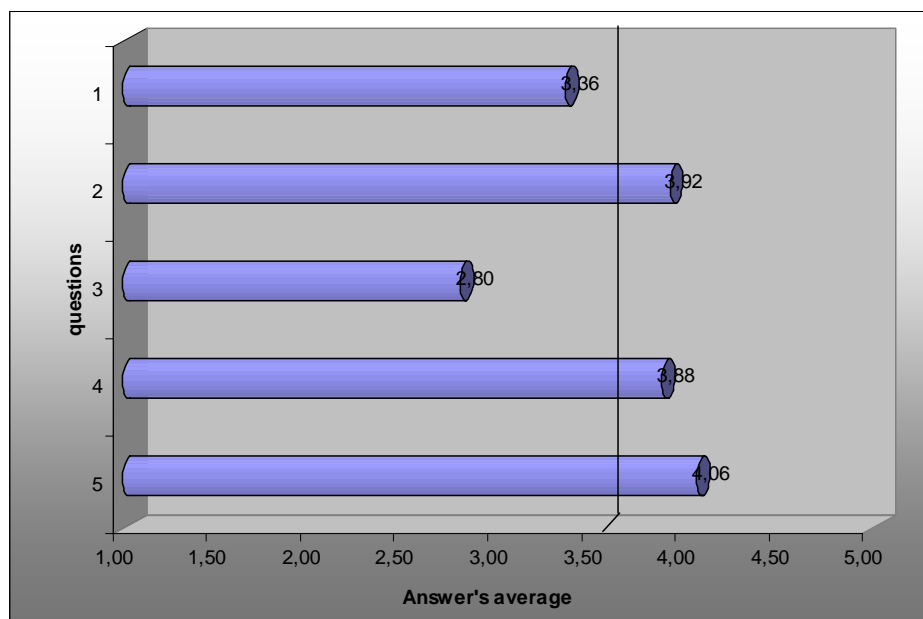


Figure 4-2 CAATS II appraisal

In the category “**Episode 3**” the following aspects had to be appraised:

1. The Episode 3 results were presented well
2. Episode 3 results are relevant to the work I will perform in the future
3. I now understand better the challenges of applying E-OCVM to concept wide validation
4. I know which techniques/tools to use for validating concepts elements at low maturity levels
5. I know where to go to find out more about Episode 3 results

Figure 4-3 shows the results. The appraisal for the Episode-3 part of the event show the same tendency as those for the CAATS II part (albeit overall slight higher appreciated): Relevant for the (future) work, known where to obtain more detailed results, but not directly applicable.

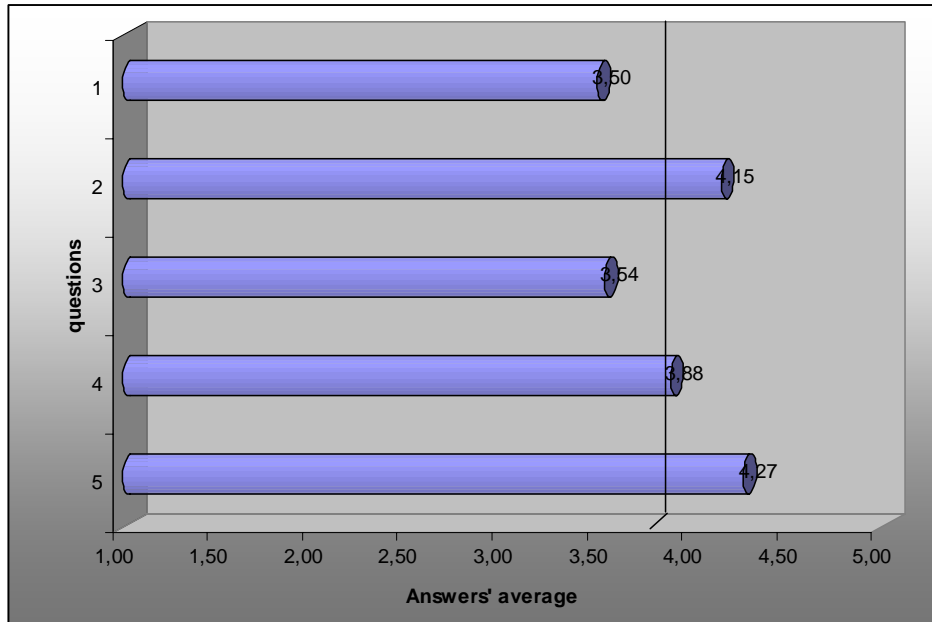


Figure 4-3 Episode 3 appraisal

Finally the participants were asked to give their opinion about the most and the least valuable aspect of the event, about the work presented and discussed and about the organization, facilities and service of the event. Table 4-2 shows the common denominator of the answers.

What was most valuable about this workshop?
Providing an overview of two validation projects; Networking: meeting colleagues from different organizations and countries; To learn about techniques for concept validation and how to use them; A better understanding of the case based approach; The participation of SJU and EC representatives.
What was least valuable about this workshop?
Too much information in a short time; The presentations were not result focussed; The lack of more specific data and examples made the contents so theoretic and high level; The absence of concrete validation results; The lack of involvement of the audience, too little discussion.
Comments on the work presented and discussed at the workshop
Episode 3 results were not well structured, and the level of content heterogeneous; CAATS II results were too high-level; too much "you should read the guidelines"; Lack of examples and figures in order to reduce the amount of information at the same time.
Comments on the Organisation, Facilities and Services of the Workshop
Very good organisation and facilities; Good time management; Optimal use of time, although time for discussion was limited; Good food, bad coffee;



Expensive rooms, no possibility to book cheaper rooms;
Bad connection to the centre of the city;
Temperature in the room was too low.

Table 4-2 Participants general opinion about the event

5. Conclusions

Based on the feedback obtained during the event and through the questionnaires it is concluded that the final Episode 3 / CAATS II dissemination event, that was organised on October 13th and 14th, 2009, in the Pullman Hotel Brussels Airport was a success. The European Commission and the SESAR JU also confirmed the importance of the results of the two projects.

The event was focused on the dissemination of the results of the two EC projects and because the time schedule was tight only high level results could be presented. The participants indicated that the project results were certainly relevant to the work they will perform in the future and that they now know where to find the information. However, due to the high level character of the presentations the participants did not think they were able to directly apply the obtained knowledge.



**“Cooperative Approach to
Air Traffic Services II”**

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Annex A. Participants List.



Participants List
Episode 3 / CAATS II Joint Dissemination Event
“ATM Concept Validation: The Challenge of Single Sky and next generation ATM”
Pullman Hotel Brussels Airport, 13-14 October 2009

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