

CLUSTER 4 SMART

IO2-A4 VALIDATION OF THE JOINT CURRICULUM

(Cluster 4.0 and Industry 4.0)

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4 Summary

This survey report is based on a preliminary draft of the IO2 – Cluster4Smart joint curriculum validation survey. The survey targeted 62 non-random respondents' i.e. their profile was known to the project partners as they had already taken part in previous Cluster4Smart surveys. The survey was opened via surveymonkey.com on the 17th of July 2018 and closed on the 21st of August 2018. The total number of participants analysed was 28 with the peak of the responses replying to the survey on the 8th of August (this was probably due to the summer vacation period). The survey invitation letter provided the web link to the questionnaire (<https://www.surveymonkey.com/r/DNMVF2Q>) and informed the respondents' that the responses obtained from the online survey will be anonymous and will be treated anonymously. The invitation letter was sent to participants representing a sample of twenty-one different countries. Nineteen of these countries were from Europe; (16) Spain, (9) France and Romania, (6) Germany, (2) Portugal, Bulgaria, Hungary, Slovenia, Italy, (1) Latvia, Sweden, Serbia, Macedonia, Croatia, Estonia, Denmark, Austria, Belgium, Ireland. Two countries represented North America; Canada and Mexico. There was a total of 18 countries that received the invitation letter from Eastern Europe.

Main Summary Findings:

- The main findings of this survey identified that the majority of respondents (21) indicated that the 'Joint curriculum' had met their needs with a further (5) identifying that the course had exceeded their expectations;
- The majority of the respondents (27) believe that the general participant will be satisfied with the knowledge obtained from the training;
- The respondents strongly acknowledged that the course will be easily tailored to suit the needs of their cluster and that key partnerships of potential innovation and networking opportunities will be enhanced through it. Furthermore; (10) respondents do believe that their daily activities will change by using the techniques learnt;
- An overwhelming majority of respondents are against the perceived barriers presented in section 6.1.4 with (18) of them responding negatively against the statement; "the topics covered in this course will not add value";
- The majority of the responses agreed with the perceived benefit; "the choice of modules, lessons and topics are essential to the needs of skills" with (10) respondents ranking this as a level 5;
- The perceived deliverable did that the use of English will improve the training experience; provided a positive response from (22) respondents, however (2) participants disagreed and (1) strongly disagreed;
- The specific comments question provided constructive suggestions such as "its seems that the content of the formation is very conceptual and theoretical. To my point of view, it would be interesting for the trainees to practice (for example agile methods) rather than learn what are the principles or the concepts because I think you understand those tools only by practicing them... or you forget them very fast."
- In response to whether the course is essential to the clusters commercial needs and growth, the results returned with (16) respondents agreeing and (10) stating maybe;
- There was no clear indication from the respondents if their managerial time will be greatly affected by introducing such techniques as online training;
- The majority of the respondents believe that the modules meet their needs and module 4 'internal collaboration' was ranked the highest while Module 3 'cluster management and communication techniques' was ranked the lowest;

5 Methodology

The purpose of this survey was to gauge the opinion of the stakeholders that the actual correct program has been designed. In a similar approach to identifying Business Requirements as part of a Business Mission analysis; the survey methodology focused on i) overview; goals and objectives, project performance, course assumptions, and project constraints, ii) the mission; issues, anticipated outcomes, recommendation and justification, and iii) commercial awareness; existing problems, organizational impact, and module migration, The survey questions were designed as a means to define business validation criteria i.e. a validation criterion that would establish the critical, desired services, thresholds and objectives of the curriculums performance needs that are critical to the Joint Curriculum parameters. The following topics explain how the questions were originally presented in their chronological sequence.

- **Goals and Objectives (question 1 - course overview)**
This question investigated if the course goals and objectives which are supported by the course has addressed them to-date.
- **Anticipated outcomes (question 2 - mission)**
This question investigated the anticipated outcome of the proposed course and how it will be implemented.
- **Course Assumptions (question 3 - course overview)**
This question reviewed the preliminary assumptions for the proposed course. As the course is selected and moves into detailed project planning, the listed modules were designed to be outlined and ranked.
- **Existing problems (question 4 - commercial analysis)**
This question was designed to challenge the traditional approach for which this course was created to address.
- **Project Performance (question 5 - course overview)**
This question investigated the anticipated measures that will be used to gauge the courses performances and outcomes as they relate to key resources, processes, or services.
- **Organizational Impact (question 6 - commercial analysis)**
This question focused on how the proposed project will modify or affect the organizational processes.
- **Justification (question 7 - mission)**
This question requested justification as to why the recommended course should be implemented and why it was selected over other alternatives.
- **Module Migration (question 8 - commercial analysis)**
This question analysed if the new modules associated with the course can meet the stakeholder needs and requirements.
- **Project Constraints (question 9 - course overview)**
This question listed the preliminary barriers for the proposed course. As the course is selected and moves into detailed project planning, the list of constraints will most likely grow as the course is developed. However, for validation purposes there should be at least a preliminary list from which to build.
- **Recommendation (question 10 - mission)**
This question was designed to summarize how the course will address the clusters problems. It will also to highlight what desirable results will be achieved by moving forward with the course.

6 Survey results

The results of the survey are presented in their categorical sections; Course overview (questions 1, 3, 5 and 9); Mission (questions 2, 7 and 10); and Commercial analysis (questions 4, 6 and 8).

6.1 Course Overview

6.1.1 Expectations

The opening question asks the respondents if they thought that the attached draft of the 'Joint curriculum' meets their expectations on the needs for skills.

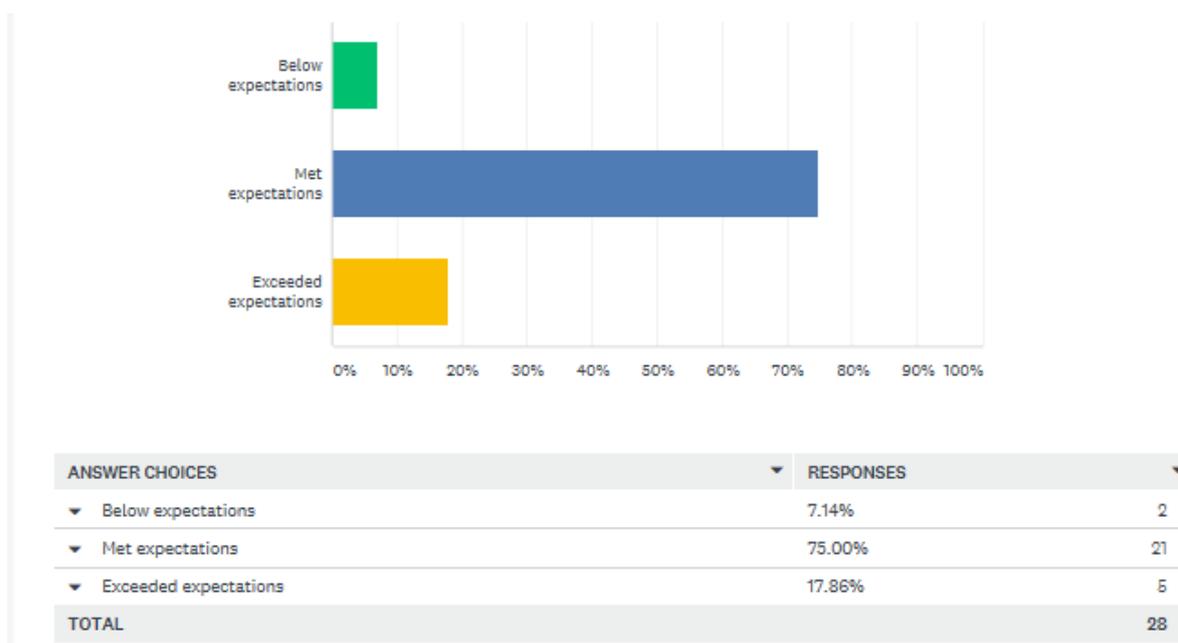


Figure 1. Do you think the attached draft of the 'Joint curriculum' meets your expectations on the needs for skills?

All (28) respondents answered this question with the majority (21, 75%) indicating that the 'Joint curriculum' had met their needs with a further (5, 18%) identifying that the course had exceeded their expectations. Only (2, 7%) respondents provided a negative indication towards the 'Joint curriculum'. The second part of this question was an open-ended section requesting the respondents to further express the reason for their chosen answer. (6) respondents replied to this part of question with positive comments such as:

- Quite deep analysis;
- All important thematic of general cluster management were considered in the curriculum;
- I think it specifies very well the needs linked with the competencies and knowledge;
- There are 4 basic modules together that represent what is important to cluster managers.

There was also constructive criticism:

“The evaluation / profiling of the main activity as a start point. Innovation is dynamic and relative to a reference...Also, the intellectual property and contexted issues has not been managed. There should also be some distinction at the individual and collective level. Also, please clarify the user position as it only addresses Managers of the Clusters that implies the cluster (is defined in a chapter). This works

as an economic entity with juridical identity.” And “I believe that Lesson 2.2 should include Blockchain and Security as topics. Regarding AI, ethical and regulatory issues should be clearly identified.”

6.1.2 Key drivers

This question provided a list of statements reflecting key drivers for moving the course forward. The respondents were requested to rank in order which statements they believe was a true reflection of the course.

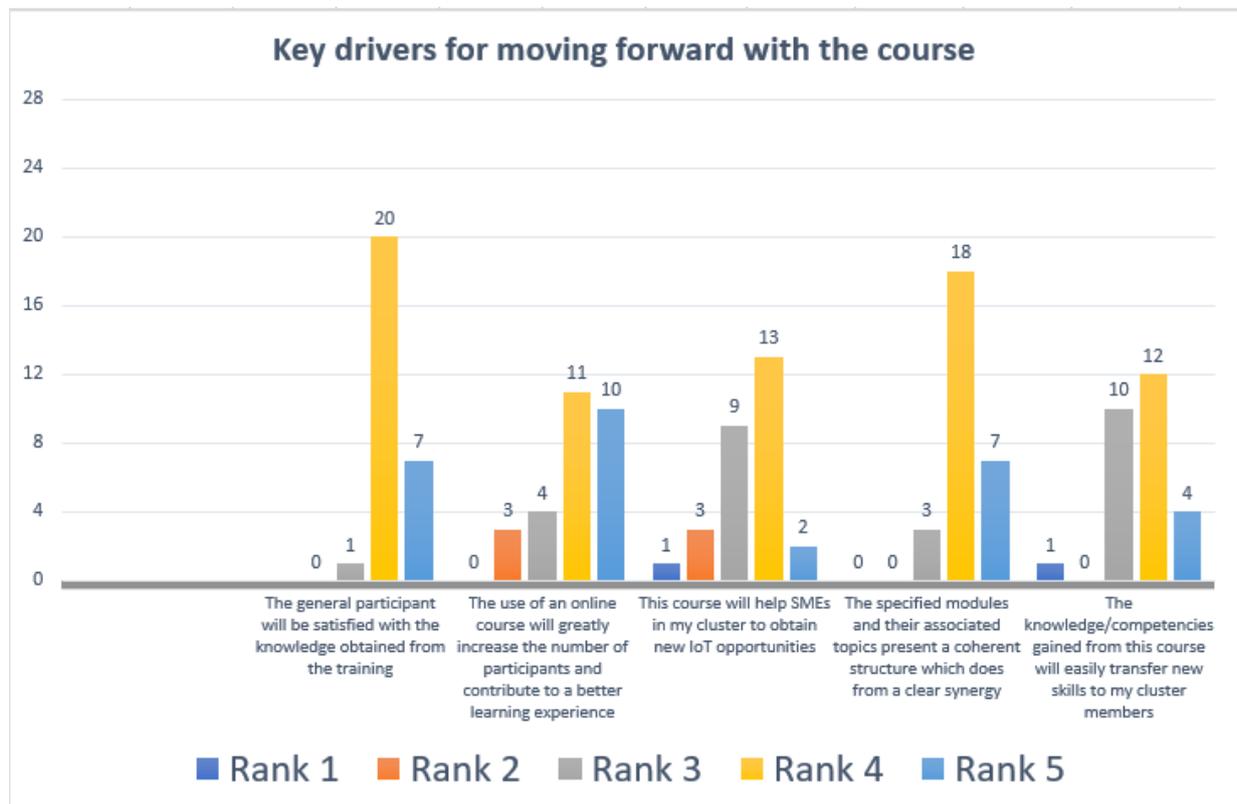


Figure 2. Please rank in order 1 to 5 (with 5 being the highest) the key drivers for moving forward with the 'joint curriculum'

Key drivers for moving forward with the course	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Weight avg
The general participant will be satisfied with the knowledge obtained from the training	0	0	1	20	7	4,21
The use of an online course will greatly increase the number of participants and contribute to a better learning experience	0	3	4	11	10	4,00
This course will help SMEs in my cluster to obtain new IoT opportunities	1	3	9	13	2	3,43
The specified modules and their associated topics present a coherent structure which does from a clear synergy	0	0	3	18	7	4,14
The knowledge/competencies gained from this course will easily transfer new skills to my cluster members	1	0	10	12	4	3,67

Table 1. Key drivers for moving forward with the course

- The following statement; “the general participant will be satisfied with the knowledge obtained from the training”, provided the highest weighted average with 4,21%. It received (20) rank 4 responses and (7) rank 5;
- “This course will help SMEs in my cluster to obtain new IoT opportunities,” scored the lowest weighted average ranking 3,43% with (9) respondents marking it with a rank 3;
- Overall, the majority of the respondents agreed with the statements; such as (10) respondents ranking the statement; “the use of an online course will greatly increase the number of participants and contribute to a better learning experience” with a level 5.
- (2) respondents indicated the lowest rank of 1 for; “this course will help SMEs in my cluster to obtain new IoT opportunities” and “the knowledge/competencies gained from this course will easily transfer new skills to my cluster members.”

6.1.3 Preferred Choice

The preferred choice of statements enabled the respondents to measure their attitudes towards the key working arrangements of the course by indicating; strongly approve, approve, disapprove or strongly disapprove. Unfortunately, as Table 2 shows not all of the respondents participated in this question. This fact could relate to difficulties with the online survey or simply a negative interest in the question statements.

Preferred Choice of Statements	Strongly approve	Approve	Disapprove	Strongly Disapprove	Total
This course can be easily tailored to suit the needs of my cluster	5	7	1	0	13
Key partnerships of potential innovation and networking opportunities will be enhanced through this course	5	5	0	0	10
This course will present me with cluster financing opportunities	2	4	4	3	13
Cluster managers daily activities will not change by using the techniques learnt	3	1	10	3	17
This course was designed to take into consideration relevancy performance and robustness	3	8	1	0	12

Table 2. Preferred choice of statements

- The highest number of participants (17) was for the statement; “Cluster managers daily activities will not change by using the techniques learnt”, a total of (10) respondents disapproved with this statement and (3) strongly disapproved.
- (8) respondents out of (12) did approve with the statement; “this course was designed to take into consideration relevancy performance and robustness.”

Two statements received a strongly approval rating with (5) respondents acknowledging that “this course can be easily tailored to suit the needs of my cluster” and “key partnerships of potential innovation and networking opportunities will be enhanced through this course.” Overall, both of these statements received high positive responses from (12 out of 13) respondents and (10 out of 10) respondents respectively.

6.1.4 Perceived Barriers

In order to fully observe a study, the key questions of barriers and drivers needs to be investigated. The main perceived barriers question presented four negative statements about the 'Joint curriculum'. The respondents were asked to measure their attitudes towards each statement.

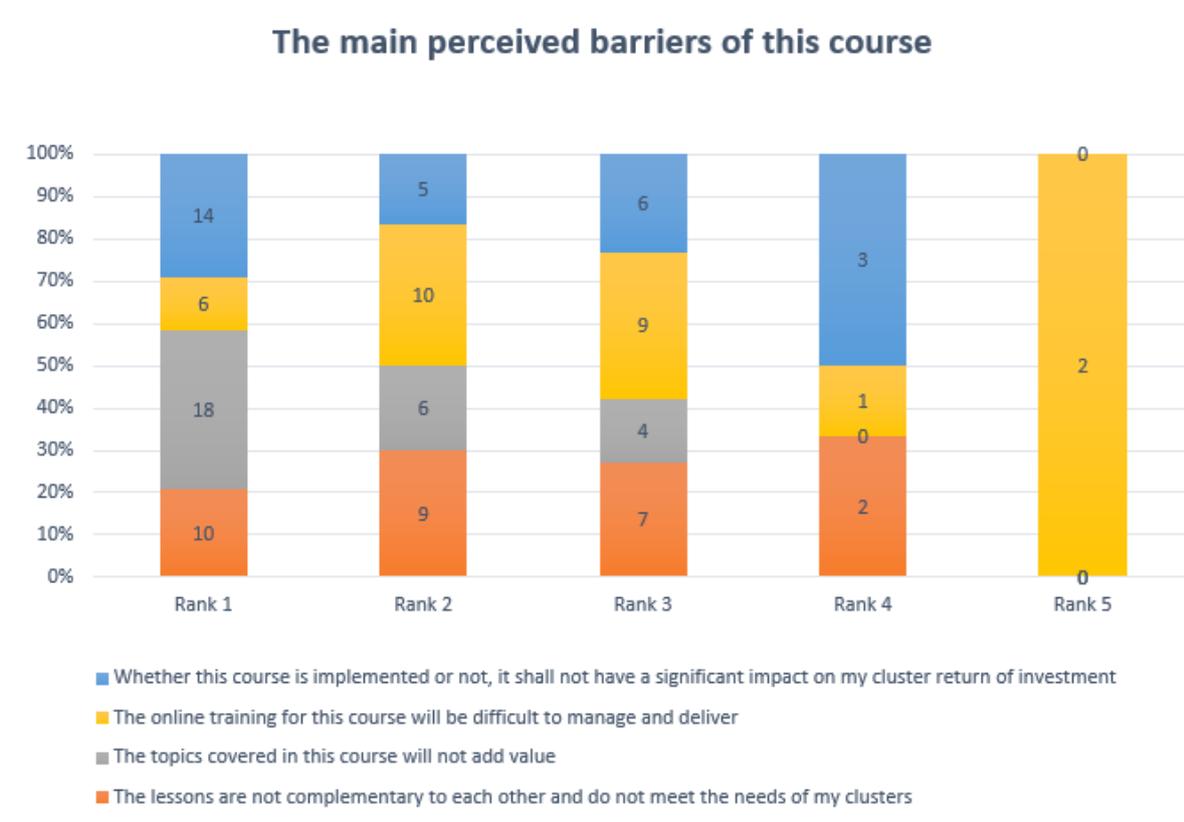


Figure 3. Please rank in order 1 to 5 (with 5 being the highest) the main perceived barriers of this course

The main perceived barriers of this course	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Weight avg
The lessons are not complementary to each other and do not meet the needs of my clusters	10	9	7	2	0	2,04
The topics covered in this course will not add value	18	6	4	0	0	1,50
The online training for this course will be difficult to manage and deliver	6	10	9	1	2	2,39
Whether this course is implemented or not, it shall not have a significant impact on my cluster return of investment	14	5	6	3	0	1,93

Table 3. The main perceived barriers of this course

- All (28) respondents completed the survey;

- The majority of the respondents ranked the negative responses very low, such as; (18) respondents giving the statement; “the topics covered in this course will not add value” a value rank of 1 and (14) respondents likewise valued the statement; “whether this course is implemented or not, it shall not have a significant impact on my cluster return of investment” with a rank of 1. However, (3) respondents did indicate a high rank of 4 for the latter statement;
- The highest weighted average of negativity 2,39% was for the statement; “the online training for this course will be difficult to manage and deliver”. The key drivers question in section 3.1.2 had previously requested the respondent the reverse of this statement; “the use of an online course will greatly increase the number of participants and contribute to a better learning experience” and in a similar response (3) respondents ranked it low while (21) ranked it with a positive high, suggesting that the cross-tabulation between the driver and barriers for online training indicates a positive response from the participants.

6.2 Mission

6.2.1 Perceived Benefits

The perceived benefits statements focused on the advantages of the ‘Joint curriculum’ to the cluster managers such as; the choice of lesson providing new skills on the modules associated topics; increase HR excellence and advance distance learning opportunities; and encourage mobility and attract new talents.

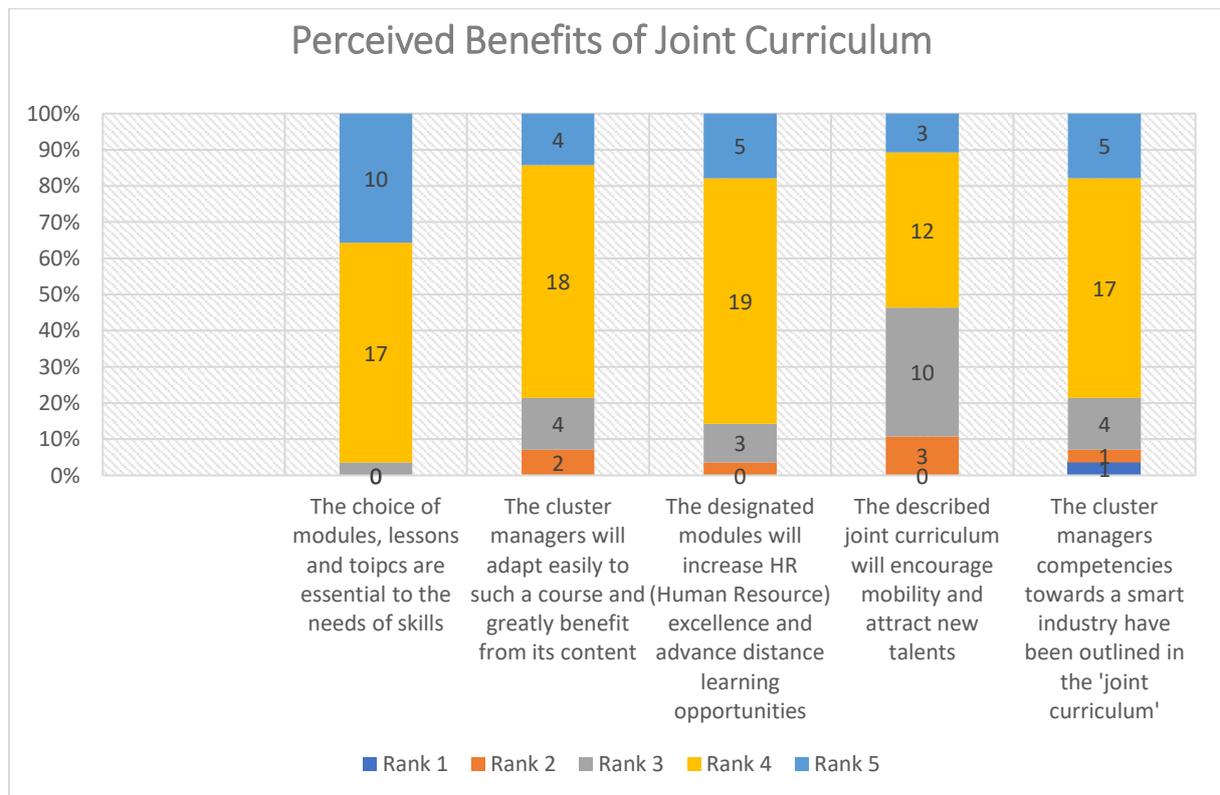


Figure 4. Please indicate in your opinion on the following perceived benefits of the 'joint curriculum' with 5 being the highest

Perceived Benefits of Joint Curriculum	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Weight avg
The choice of modules, lessons and topics are essential to the needs of skills	0	0	1	17	10	4,32
The cluster managers will adapt easily to such a course and greatly benefit from its content	0	2	4	18	4	3,86
The designated modules will increase HR (Human Resource) excellence and advance distance learning opportunities	0	1	3	19	5	4,00
The described joint curriculum will encourage mobility and attract new talents	0	3	10	12	3	3,54
The cluster managers competencies towards a smart industry have been outlined in the 'joint curriculum'	1	1	4	17	5	3,86

Table 4. Perceived benefits of the Joint Curriculum

- Again all (28) respondents replied to this question;
- The lowest weighted average of 3,54% was for the perceived benefit; “the described joint curriculum will encourage mobility and attract new talents” this was based on (10) respondents giving it a medium rank of 3.
- The highest weighted average of 4,32% was for the perceived benefit; “the choice of modules, lessons and topics are essential to the needs of skills” with (10) respondents ranking this as a level 5. The benefits statement; “the designated modules will increase HR (Human Resource) excellence and advance distance learning opportunities” can also be cross referenced with section 3.1.3 statements; “the online training for this course will be difficult to manage and deliver” and section 3.1.2 statement; “the use of an online course will greatly increase the number of participants and contribute to a better learning experience”. The analysis shows once again that the participants are in favour with the online content of the ‘joint curriculum’ as for perceived benefits (19) respondents registered a high-ranking level of 4 and (5) respondents ranked it at the highest level 5.

6.2.2 Perceived Deliverables

The statements drafted in Table 5. were to reflect thought provoking meaning to the deliverables such as “the use of English will improve the training experience” which may be interpreted as the key to a successfully delivery of the ‘Joint curriculum’ is the use of English.

Thoughts on the following perceived deliverables of the 'joint curriculum'	Strongly Agree	Agree	Disagree	Strongly Disagree	Total	Weight avg
The 'joint curriculum' has addressed all the anticipated goals and objectives to-date	3	22	0	0	25	1,88
The course performance will have a significantly positive impact on my cluster	4	21	1	0	26	1,92
Each of the modules identified are essential to my needs	8	16	1	0	25	1,76
At the moment this course indicates no recognizable constraints	1	15	5	1	22	2,55
The use of English will improve the training experience	7	15	2	1	25	2,00

Table 5. Thoughts on the following perceived deliverables

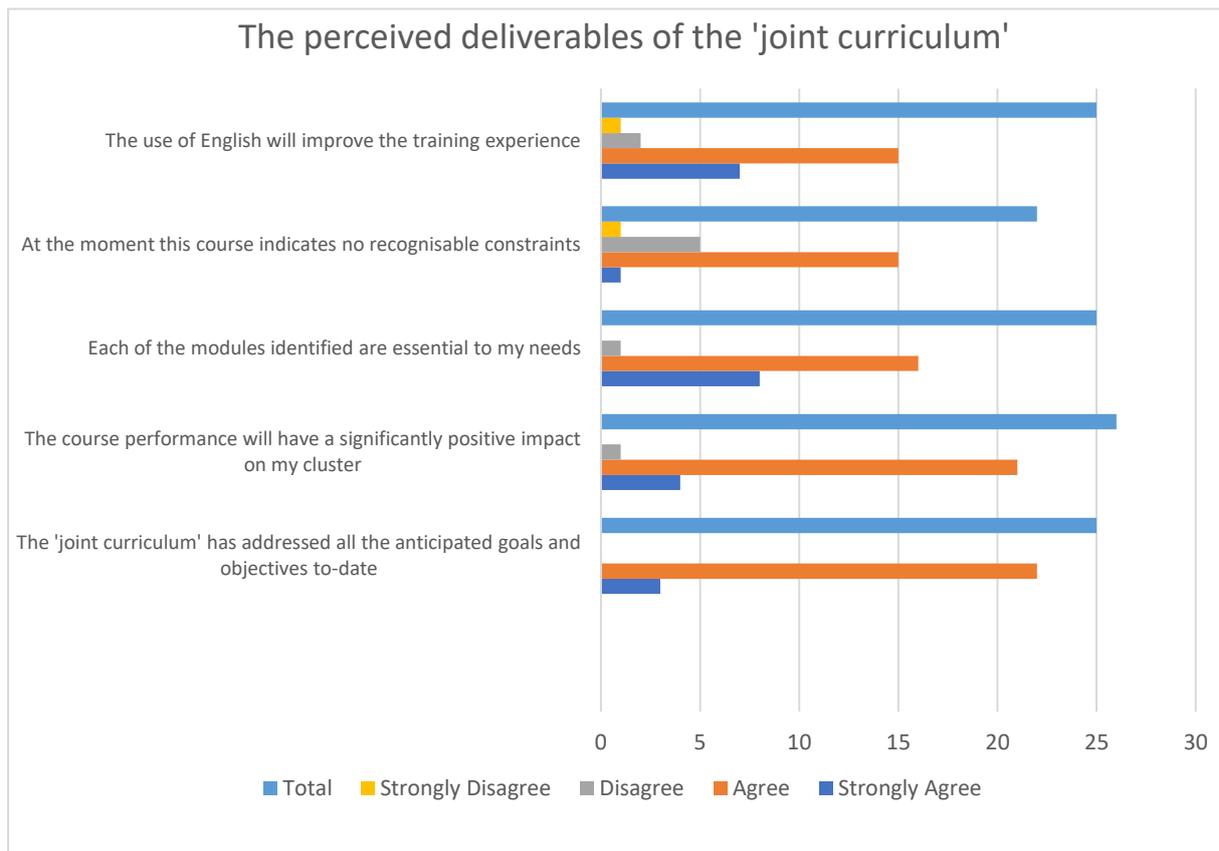


Figure 5. Please indicate what you think about the following perceived deliverables of the 'joint curriculum'

- Not all (28) respondents responded to this question;
- The concept that the use of English will improve the training experience provided a positive response from (22) respondents, however (2) participants disagreed and (1) strongly disagreed. This is an interesting result as the invitation letter was only sent to one anglophone representatives however, given as English is the standard business language the result is not unusual;
- The suggestion that the course performance will have a significant positive impact on the participants cluster also received a high positive response from (25) respondents (4) strongly agreeing and (21) agreeing. As did the suggestion that each of the modules identified are essential to their needs with (24) respondents responding positively;
- The statement referring to the course having no recognisable constraints received a negative response from (6) respondents with (1) of these respondents strongly disagreeing. However, at this stage this is to be as expected with a preliminary draft 'joint curriculum document' and the fact that (16) respondents viewed this statement positively is verification to the work achieved to-date.

6.2.3 Specific Comments

The question 'do you have any specific comments to add' is an open-ended question that enables the respondents to give additional feedback based on their views, experiences or wishes. The question received responses from (9) participants of which (7) respondents provided feedback and the other (2) just stated 'no'. However, (1) respondent asked to be kept-up-date and another respondent suggested giving advice if required. Of the (5) respondents that did give constructive advice please see comments below;

- a) "All modules are important tools for the cluster managers, but I think it will be useful to present a module regarding the Cluster development from seed to internationalised one. There is some steps to be passed through, from a young structure towards a mature one and, of course towards an old and rigid structure. Also, please receive my sincere appreciations and congratulation for this BIG idea! Success and positive huge impact!"
- b) "As stated before, it's fundamental to describe opportunities that arise from the potential usage of blockchain. It's also critical to discuss security and privacy when presenting IoT challenges and opportunities. Following EC communication to Parliament about AI, it's also very important to create awareness about ethical issues that come from the wide use of AI (and data gathering) and also how regulations could be in place to limit its misuse."
- c) "Its seems that the content of the formation is very conceptual and theoretical. To my point of view, it would be interesting for the trainees to practice (for example agile methods) rather than learn what are the principles or the concepts because I think you understand those tools only by practicing them... or you forget them very fast. Also, too my mind there's something missing about collective management abilities, when you have to deal with so much different people and such different personalities."
- d) "During the training it is important to learn, to communicate, to argue with other cluster managers, so there must not only be online courses. It is important, that people have an opportunity to study in the same room."

There was also a comment about using a business tool;

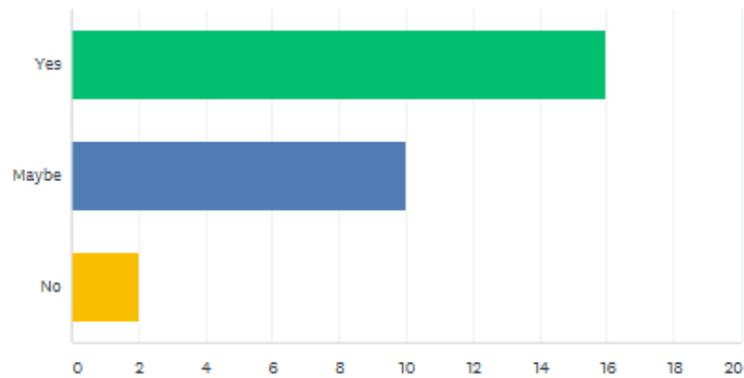
- e) The Innovation Health Check tool developed by Enterprise Ireland is a really interesting tool to learn a lot about all aspects of innovations in enterprises and maybe it also could be used by clusters (<https://www.leanbusinessireland.ie/about-us/are-you-an-enterprise-ireland-client/innovation-health-check/>). Also, the Canvas business model tool is really interesting to think about cluster business models.¹

¹ (https://en.wikipedia.org/wiki/Business_Model_Canvas).

6.3 Commercial Analysis

6.3.1 Commercial Needs and Growth

In order to define if the stakeholder's requirements for the 'joint curriculum' had provided the capabilities needed by the users, the commercial needs and growth question presented an opportunity to identify if the market was ready.



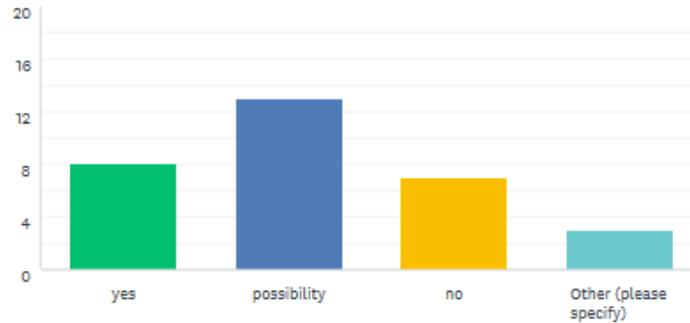
ANSWER CHOICES	RESPONSES
Yes	57.14% 16
Maybe	35.71% 10
No	7.14% 2
Total Respondents: 28	

Figure 6. Do you think this course is essential to your commercial needs and growth?

- The responses invoked a sense of caution with (16, 57%) respondents stating yes and (10, 35%) stating maybe. However, only (2, 7%) respondents thought that this course was not essential to their commercial needs and growth.
- The open-ended section of this question provided (4) responses:
 - a) "I think it's useful because it increases the level of knowledge of a cluster manager and also encourages to connect to the latest management techniques and innovation thus assuring the transfer of know-how."
 - b) "There are several country specific framework conditions which have influence on commercial needs and growth e.g. business culture or access to innovative financial instruments."
 - c) "Very useful but needs some additions as specified in 3.1.1 Expectations."
 - d) "This could be in partnership with other EU Universities (ex. Tallinn University of Technology)"

6.3.2 Managerial Time

The use of online training aspect of the 'joint curriculum' was previously examined based on; moving the course forward; difficult to manage; and distance learning opportunities. All these suggestions provided positive results. However, for the specific comment section (1) respondent did note that the course would require additional classroom interaction. For this specific question the respondents were asked about the time management implications of introducing such a course.



ANSWER CHOICES	RESPONSES
▼ yes	28.57% 8
▼ possibility	46.43% 13
▼ no	25.00% 7
▼ Other (please specify)	Responses 10.71% 3
Total Respondents: 28	

Figure 7. Please indicate if your managerial time will be greatly affected by introducing such techniques as online training?

- The results provided to the managerial time impact was non-conclusive as (8, 29%) respondents stated 'yes' and (7, 25%) stated 'no' while (13, 46%) remained undecided.
- (3) participants they give their thoughts on the subject:
 - a) "In our cluster it is something that we usually do, it is a part of our work culture;"
 - b) "We need to create the learning time! As a working paid time;"
 - c) "Currently, I have not had that many online training sessions;"
 - d) "This could be in partnership with other EU Universities (example; Tallinn University of Technology).

6.3.3 Modules that meet your needs the most

The objective of this question was to define tailoring needs to the 'joint curriculum'. The respondents were simply asked to rank in order the value of their preferred module.

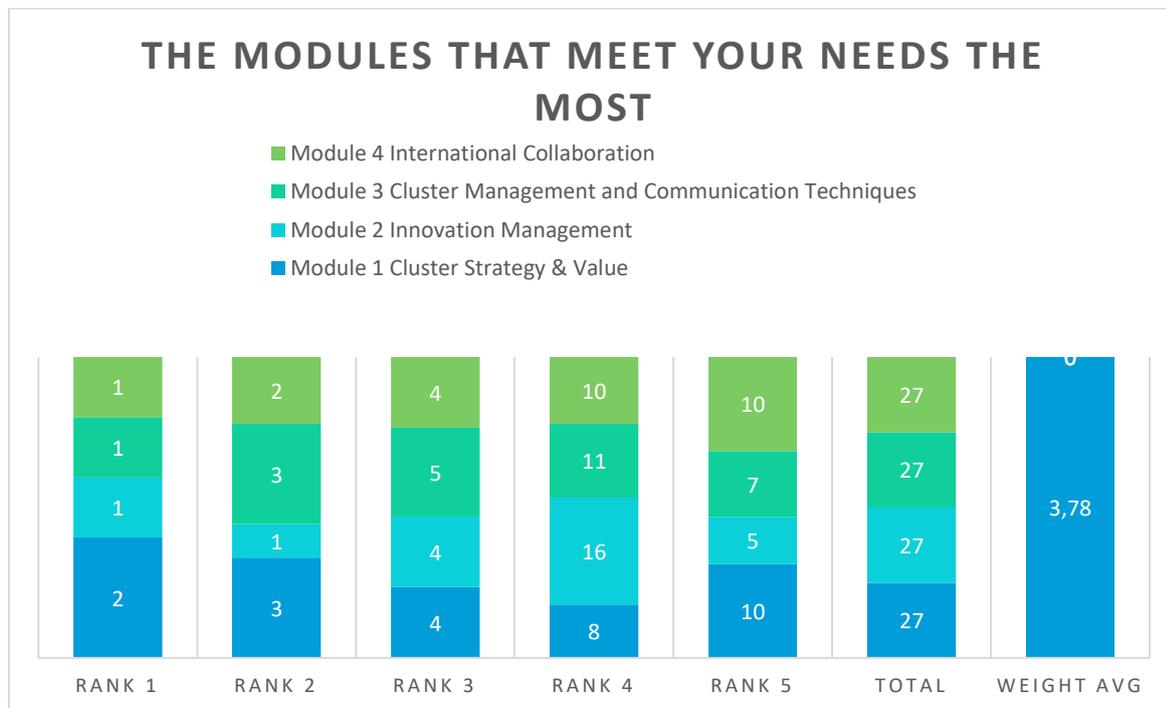


Figure 8. Please rank in order 1 to 5 (with 5 being the highest) the modules that meet your needs the most

The modules that meet your needs the most	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Total	Weight avg
Module 1 Cluster Strategy & Value	2	3	4	8	10	27	3,78
Module 2 Innovation Management	1	1	4	16	5	27	3,85
Module 3 Cluster Management and Communication Techniques	1	3	5	11	7	27	3,74
Module 4 International Collaboration	1	2	4	10	10	27	3,96

Table 6. The modules that meet your needs the most

- (27) respondents answered this question;
- Module 4 'International Collaboration' received the highest value weighted average of 3,96% with (10) respondents ranking level 4 and level 5. Only (3) respondents ranked below level 3;
- Innovation management also received positive ranking from (20) respondents with (16) indicating a level 4 and (5) participants identifying level 5;
- Cluster Management and Communication Techniques did receive the lowest weighted average of 3,74% however, (7) respondents did give it a ranking of 5.;
- Overall, the scoring would suggest that the respondents are content with the modules and the weighted averages are close but of course there is some areas that need more attention.

7 Conclusions

The responds receive to the survey shows the high interest on the future Cluster4Smart training course and the validity of the proposed content. The vast majority of the respondents expressed their interest in all proposed modules and is possible to analyse how it matches with their expectations to improve their knowledge on cluster management.

Although the proposed Cluster4Smart joint curriculum was well received, some points have to be considered at the hour to develop all training materials. Respondents expressed their doubts about the final impact on cluster members or SMEs of the developed training (6.2.1 key drivers). Thus, it will be necessary to do an effort in order to include real practical cases on how the acquire knowledge could be implemented in the industry. Moreover, some comments indicate the necessity of including some aspects about the security of IoT and intellectual property issues. Both points should be discussed by the project Consortium in future steps

Finally, answers about the use of English (6.2.2 Perceived Deliverables) and the managerial time (6.3.2 Managerial Time) prove that the selected training methodology for Cluster4Smart course fulfil all requirements of the final target group and matches with their needs.

8 Next Phase

The next phase of the validation process will be based on targeting a small group of individual experts selected from the original list of 62 participants with a mixture of either or both epistemic and performative knowledge. In order to establish their opinion on the most updated version IO2 – Cluster4Smart joint curriculum, the selected participants will be subjected to a semi-structured interview process. This process will consist of asking the experts to explain in detail their attitudes on the main themes presented from this survey.