

Innovative Photonics Education in Nanotechnology
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Title:
Innovation audit: data gathering
from iPEN partners

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- Public - Intended for public use
- Restricted - Intended for Promes consortium only
- Confidential - Intended for individual partner only

Deliverable ID: 3.2

Title: Innovation audit

Summary / Contents:

A quality assurance mechanism regarding teamwork and coordination has been in place as part of the work package Quality Assurance (WP 3) of the iPEN project (WP leader: Dr. Katerina Zourou, Web2Learn, Greece). The purpose of this mechanism is to offer an insightful look at the internal processes regarding team coordination from the project launch (in October 2017) until the end of year 1 (October 2018) and to identify issues that need to be improved or reconsidered (cf. Synthesis). It is thus a feature leading to the ongoing improvement of the project. Results of this report will be communicated to the project manager and all partners and action points (from the Synthesis) will be implemented.

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CHANGE LOG

Vers.	Date	Author	Description
0.1	16.01.2021	Katerina Zourou	Framework of the innovation audit
0.2	19.01.2021	Konstantinos Petridis	Review of the framework of the innovation audit
0.3	21.01.2021	Katerina Zourou	Creation of the survey and dispatch to project partners
0.4	16.02.2021	Ania Skowron	Analysis of data sourced by university partners
0.5	19.02.2021	Katerina Zourou	1 st review of analysis of data sourced by university partners
0.6	19.02.2021	Konstantinos Petridis	2 nd review of analysis of data sourced by university partners
0.1	09.03.2021	Katerina Zourou	Release of final version



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1. OUTLINE OF THE DELIVERABLE

The innovation audit is the mechanism that serves to assess the added value of iPEN in terms of innovation. More importantly, it offers a mapping of innovation potential before the end of the project, as an opportunity to identify unused innovation potential and therefore address this gap effectively before the project is completed.

To achieve this, the audit focuses on the conceptual level of the project work by identifying strengths, weaknesses and unused innovation potential of the project, especially to the project's wider objective of impact on the socio-economic level in Israel.


This quality assurance mechanism lets the consortium know what is working well in terms of innovation, what inhibits innovation in the project practices and procedures, and whether penetration to the socioeconomic context in Israel in terms of nanotechnology is operationalized (and how).

TARGET AUDIENCE

University partners of the consortium are invited to express their opinion on project outcomes and results close to the end of the project. 2 persons by iPEN partner are expected to answer. We will also seek feedback from external stakeholders, namely from the business sector. The input of the academic and business sector is instrumental regarding the degree of fulfillment of the project objectives related to job market needs of university graduates in fields covered by the iPEN project. Input by academic and business stakeholders, both internal and external, serves as quality mechanism that allows the project to rethink its direction/s and make necessary changes to align the project outcomes into a more innovative fashion, if needed.

TIMELINE

The innovation audit is the result of a consultation that takes place between January 20 (dispatch of the survey to the two target groups) until February 10, 2021. The analysis is expected to take place until February 20, and results will be communicated to the team on February 28, 2021. Due to the COVID-19 pandemic, the iPEN project benefited from an extension therefore this deliverable has been postponed. However, it is still in line with the need to carry out the innovation audit at least 6 months before the project end (September 2021). The reason of a minimum 6-month period before the results of the innovation audit and the end of the project is to identify and more importantly carry out changes and adaptations that may be needed in the direction of innovation.

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2. INSTRUMENTS, DATA GATHERING AND ANALYSIS

2.1. INSTRUMENTS

The instruments to collect input for the innovation audit are:

1. The survey for project partners (Annex 1). It is distributed to project members online, due to lack of physical meeting (restriction of COVID-19).
2. The survey for external stakeholders (Annex 2) is also distributed online.

2.2. DATA GATHERING


Responses to the survey will be gathered through Google Forms. Data will remain anonymous (the WP leader will have access). All data (anonymized) will be shared with the coordinator, the partnership and the funding body (EACEA).

3. ANALYSIS OF IPEN PARTNERS' FEEDBACK

In this part of the report, we analyze replies to the survey section by section.

3.1. PROFILE OF RESPONDENTS

11 individuals replied to the questionnaire from each of the 11 out of 14 partners of the iPEN consortium. Partners were asked to reply to the questionnaire with at least one representative of their institution.

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Your institution

11 responses

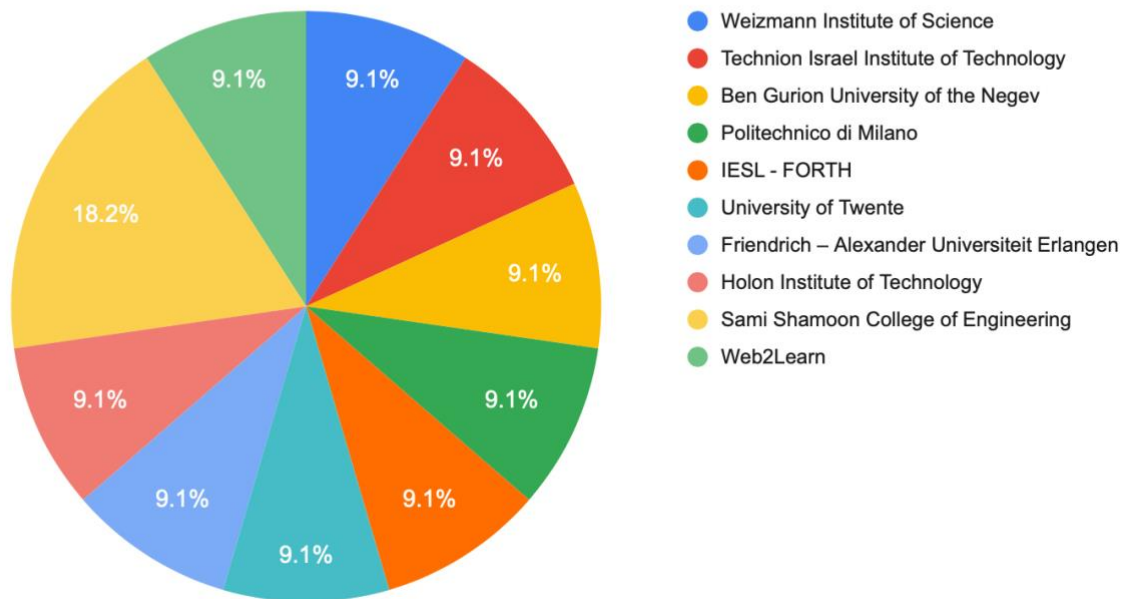



Figure 1: profile of respondents

3.2. INNOVATION IN THE PROJECT

Partners were invited to express their views on what they find innovative in the project and in an open-ended question. All replies are provided below, without any interference of the author.

Q3 What do you consider to be innovative in the project?

- Collaboration between academic institutions for teaching courses
- The research on nanotechnology and the ways it is enabled by the project
- The online teaching and combination of expertise from different places
- The cooperation of various academic institutes from Europe and Israel in creating new curricula and courses in photonics and nanotechnology.
- Collaboration of partners for promoting online courses
- A new approach that addresses needs
- Online courses
- The new combination of topics and their delivery
- Educational seminars on the selected topics of the photonics and methods of learning
- the way to involve students in photonics

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- soft skills

When asked whether they think there was anything that could have been done in a more innovative way, 7 out of 9 respondents replied there was not. The replies of the two remaining respondents are provided below, without any interference of the author.

Q4 Is there anything in the project which could have been done in a more innovative way? if yes, what would that be?

- perhaps to include more forefront topics
- Visits of leading professors to a university, with new innovative co-operation ideas.

3.3. STRENGTHS AND WEAKNESSES

This section corresponds to questions (Q) 5 and 6 and aims at identifying the strengths and weaknesses of the project considering the fact that the iPEN project aims to enhance innovative photonics education in nanotechnology in Europe and in Israel. 10 respondents replied to both questions and they identified more strengths than weaknesses.


All replies are provided below, without any interference of the author.

Q5 Given that the iPEN project aims to enhance innovative photonics education in nanotechnology in Europe and in Israel, what do you consider to be the strengths of the project, if any?

- *The team that includes experts in photonics and experts in science teaching and the collaboration. The coordinator is a very innovative person and leader.*
- *The collaboration of knowledge between universities*
- *Yes*
- *the realization of a full course based on international teachers*
- *Organization of extensive schools*
- *Courses were produced, quite a lot of energy was generated*
- *Methodology of learning and writing of manuscripts on photonics*
- *online, free access courses*
- *The intensive courses in which student and staff members are meeting together.*
- *The emphasis put in Israeli capacity building; the many opportunities to upskills scholars and students in this innovative field*

Q6 What do you consider to be the weaknesses of the project in terms of innovation?

- *none*
- *I don't know.*
- *The difficulty of inserting new courses to the existing learning plan in each university*
- *the subject of photonics/nanotechnology is well established and known*
- *The implementation did not get as far as was perhaps hoped for*
- *I can not answer it, I don't know*
- *In my opinion, there is not enough emphasis on the field of nanotechnology.*
- *The project includes researchers who specialize in the field*
- *I do not see weaknesses*

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3.4. OPPORTUNITIES AND THREATS

Questions 7 and 8 focus on the opportunities and threats the respondents can identify in terms of innovation. Similarly to strengths and weaknesses, the respondents could name more opportunities and threats. All replies are provided below, without any interference of the author.

Q7 What opportunities do you identify in terms of innovation?

- *Learning new approaches, and meeting new people.*
- *Creating new collaborative options*
- *not sure*
- *New collaborations*
- *The Corona crises has increased the interest in online teaching*
- *hard to say...*
- *Cooperation between academic institutions in Europe and Israel based on the industry needs can also lead to cooperation in the industry.*
- *Each researcher participating in the project was given a course to deal with in their field of specialization. So the knowledge given in the course includes the most innovative developments that exist today*
- *Cross-international collaboration not only between European and Israeli partners but also on the international scene. There have been international encounters that were facilitated by the project*

Q8 What threats do you identify in terms of innovation?

- *The institutions that are mostly conservative regarding teaching.*
- *Difficulties in adding new learning methods*
- *not sure*
- *After the crises there will be a dip in interest (maybe even a hostility) for online teaching*
- *I can not answer it...*
- *I don't see any threats.*
- *Does not detect threats*
- *Perhaps copyright. There is lots of reluctance in sharing.*

3.5. TOPICS AND THEIR INNOVATIVE POTENTIAL

Q9 and Q10 try to investigate how the respondents perceive the innovation potential that topics addressed in the iPEN project hold for the future and what their opinion was on the extent to which these topics have been tackled during the iPEN project in terms of innovation. The answers vary between the topics, but the overall impression is that the partners perceive the topics as holding innovative potential for the future and think that the topics were tackled to a great degree. Among topics which the biggest number of respondents perceive as holding high innovation potential for the future are: Quantum Optics, Nanotechnologies and Nanodevices, Biomedical and Biosensing Optical Devices and Nanosensors. Detailed results are presented below:

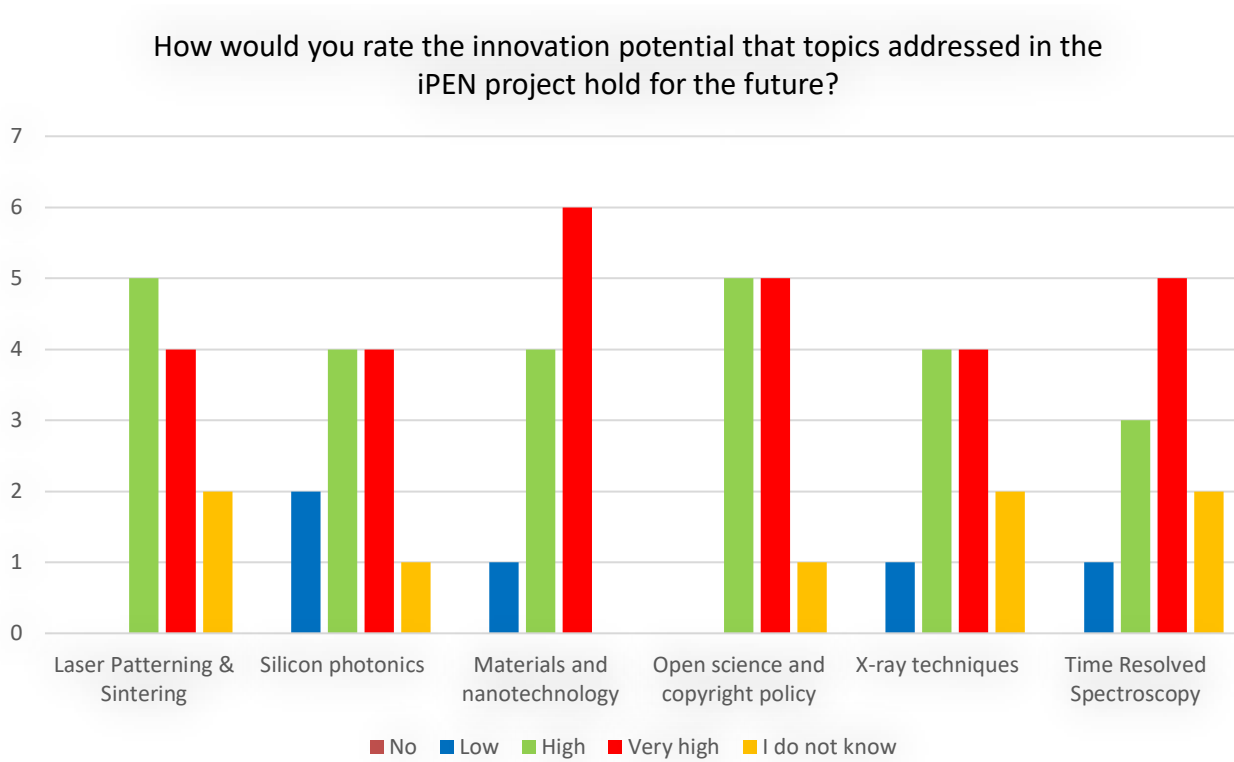


Figure 2a: Innovative potential of the topics addressed in the iPEN project (part 1)

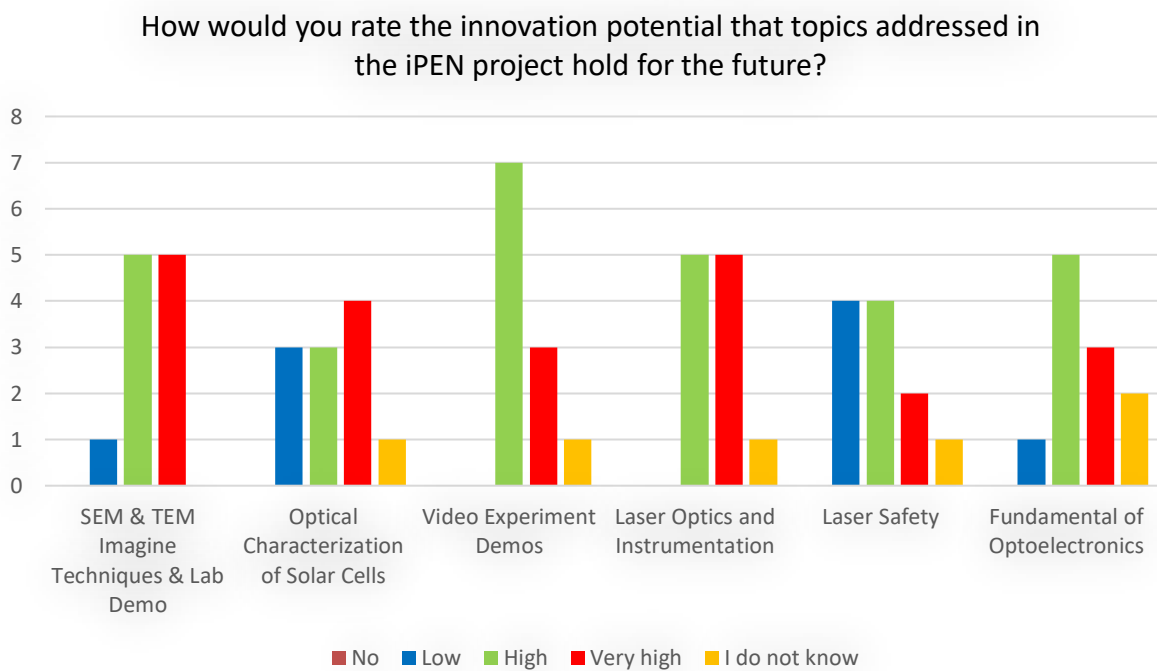


Figure 2b: Innovative potential of the topics addressed in the iPEN project (part 2)

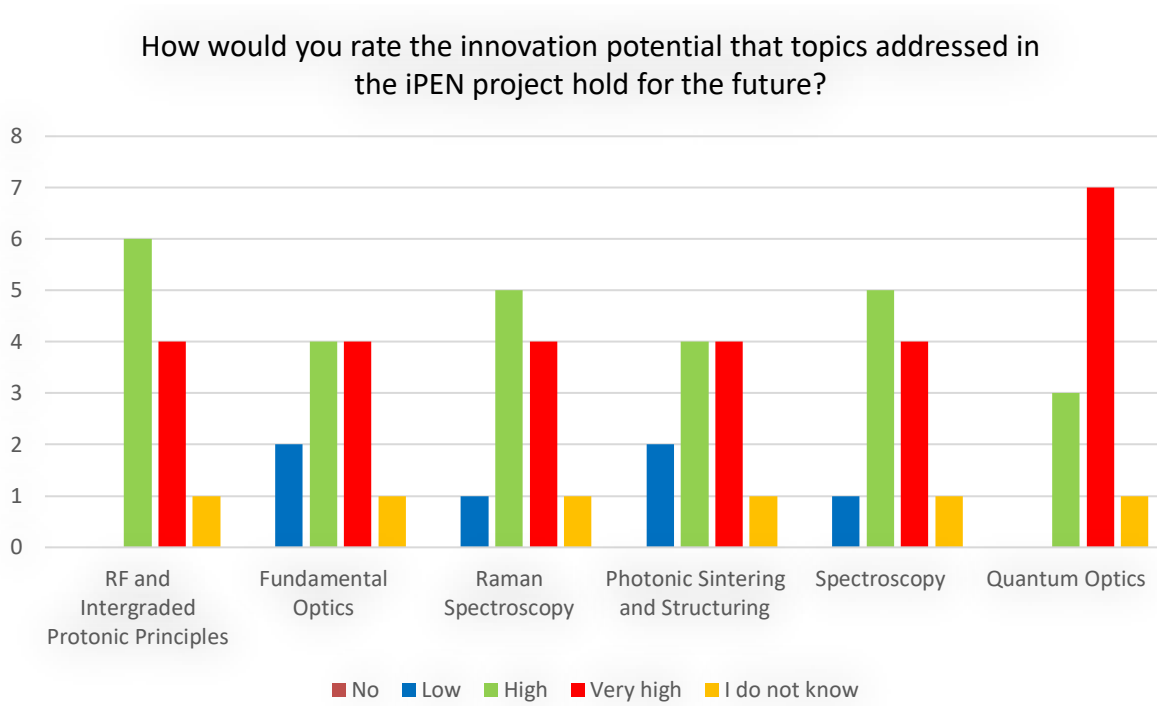


Figure 2c: Innovative potential of the topics addressed in the iPEN project (part 3)

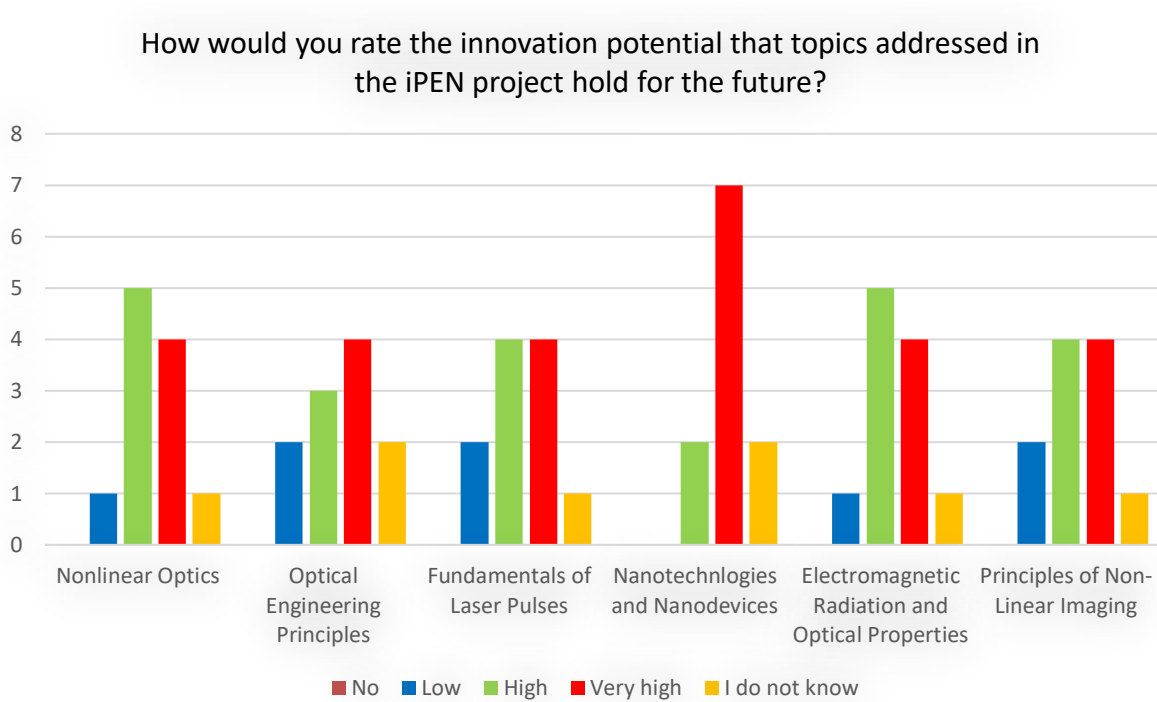


Figure 2d: Innovative potential of the topics addressed in the iPEN project (part 4)

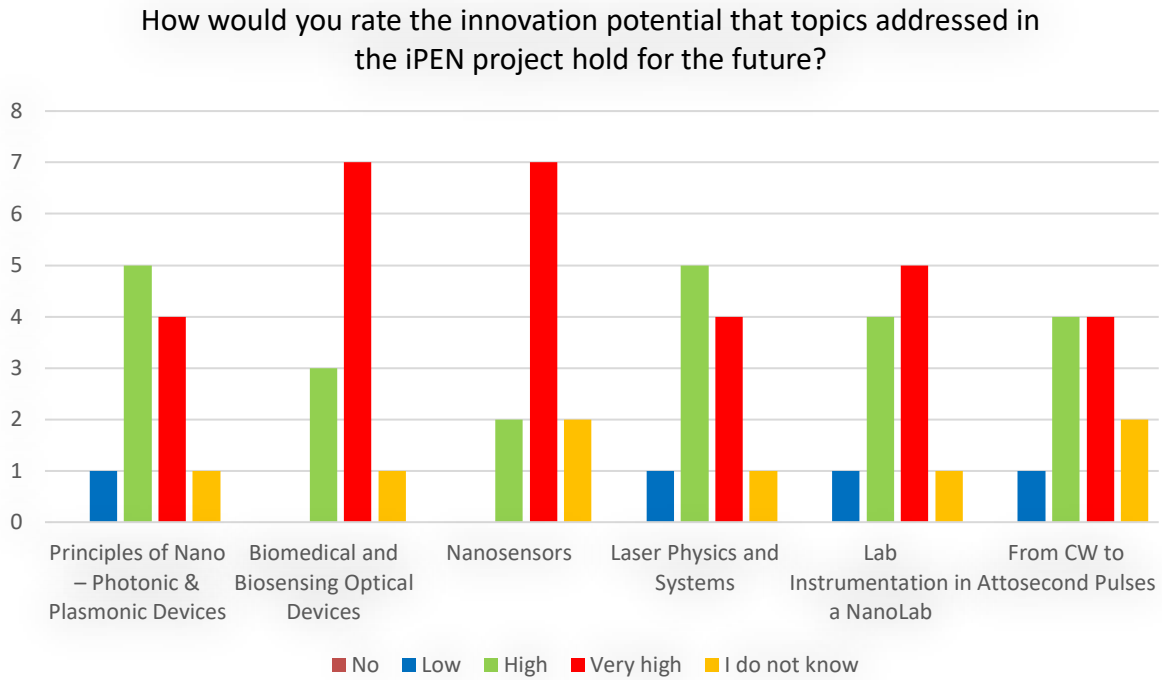


Figure 2e: Innovative potential of the topics addressed in the iPEN project (part 5)

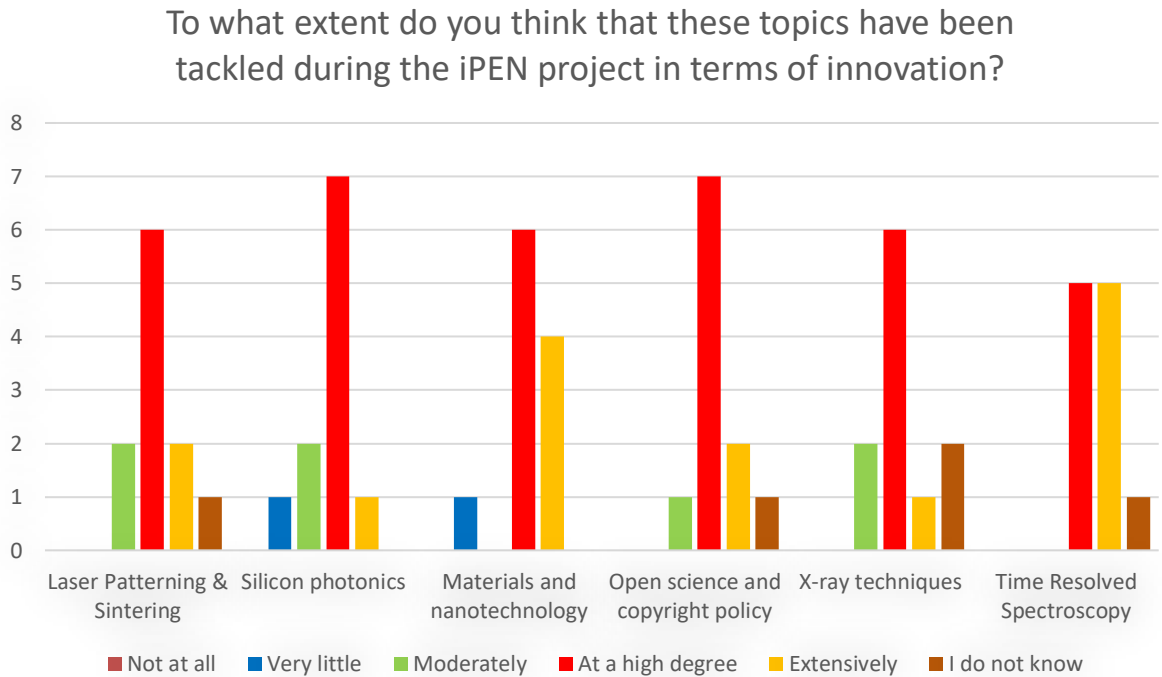


Figure 3a: Extent to which the topics have been tackled (part 1)

To what extent do you think that these topics have been tackled during the iPEN project in terms of innovation?

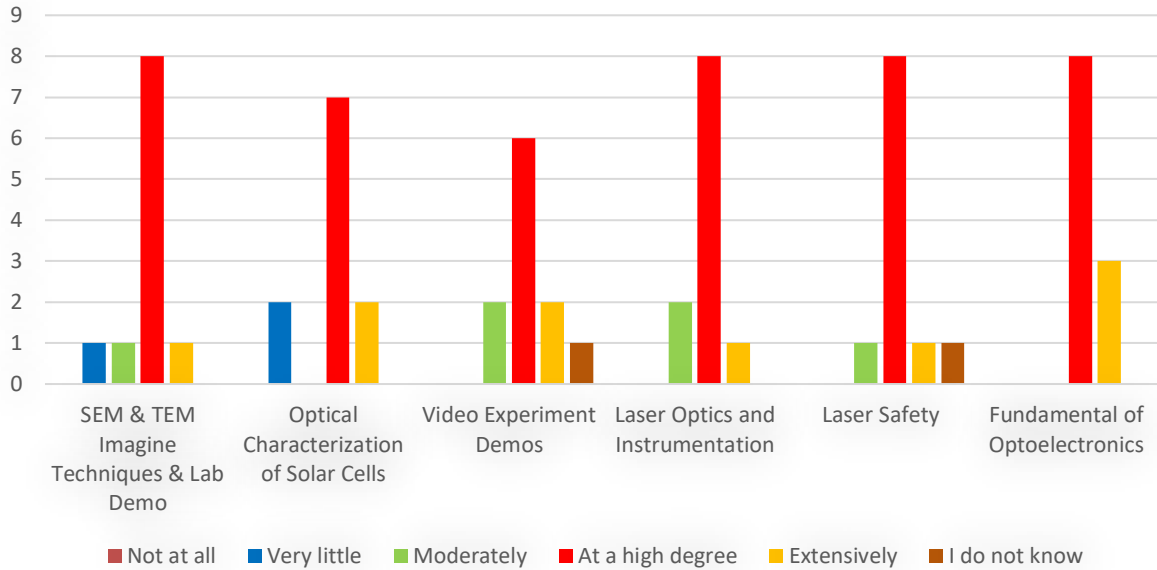


Figure 3b: Extent to which the topics have been tackled (part 2)

To what extent do you think that these topics have been tackled during the iPEN project in terms of innovation?

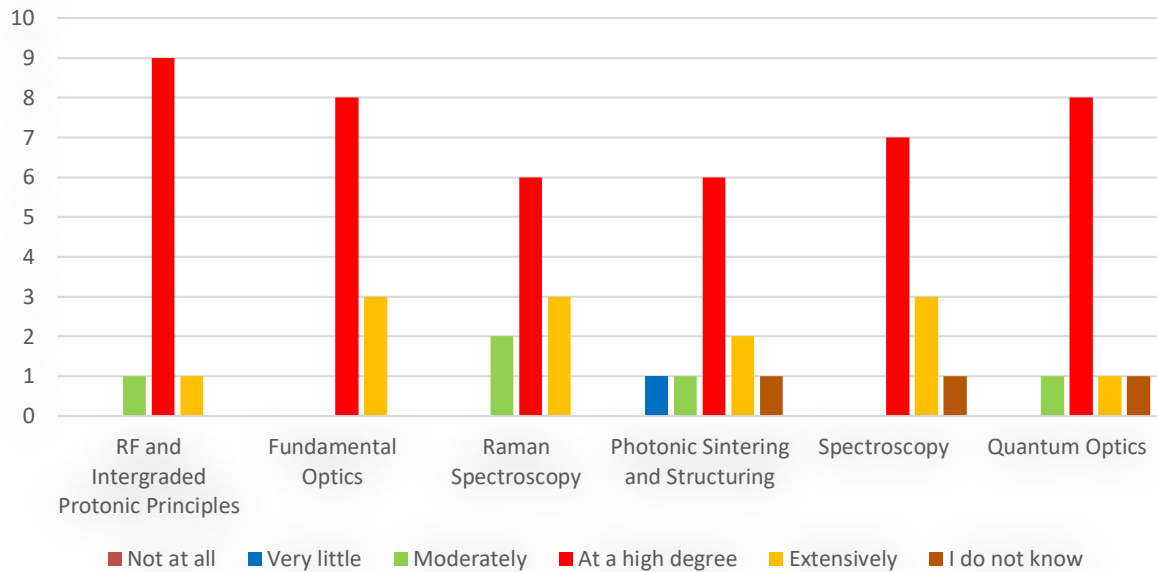


Figure 3c: Extent to which the topics have been tackled (part 3)

To what extent do you think that these topics have been tackled during the iPEN project in terms of innovation?

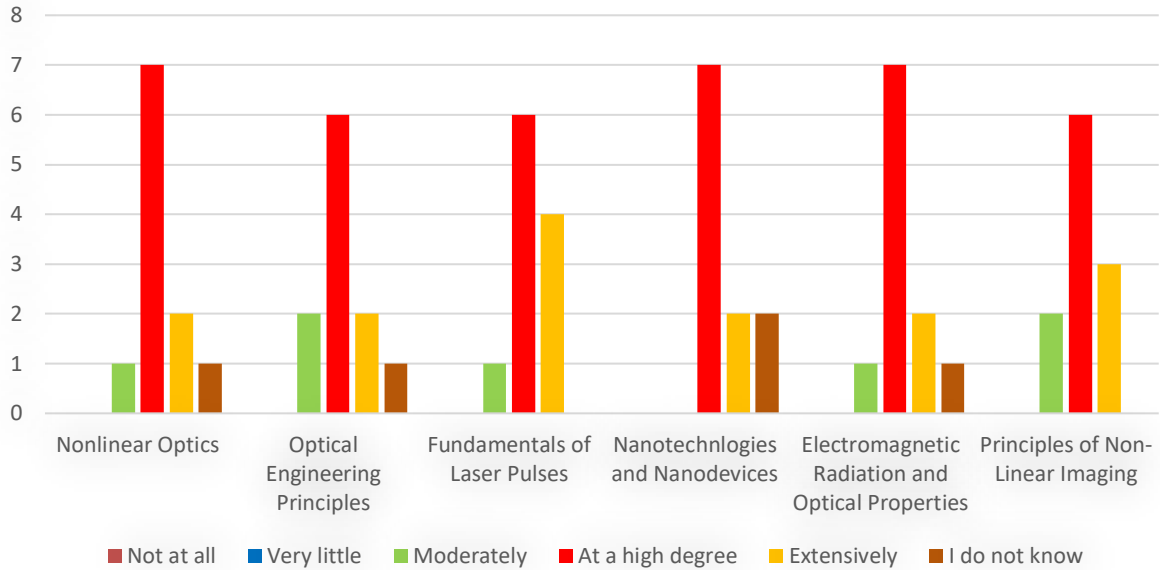


Figure 3d: Extent to which the topics have been tackled (part 4)

To what extent do you think that these topics have been tackled during the iPEN project in terms of innovation?

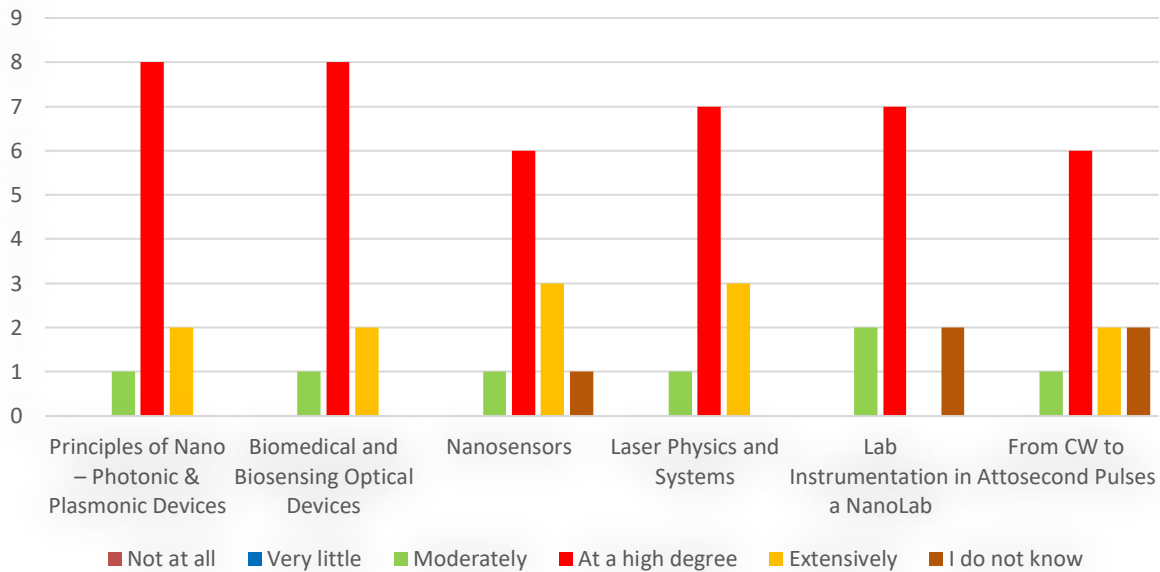



Figure 3e: Extent to which the topics have been tackled (part 5)

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3.6. TYPES OF INNOVATION

In the last question the respondents were presented with a picture of the four types of innovation (see Figure 4) and were asked if, in their opinion, the iPEN project has tackled any of these types of innovation?

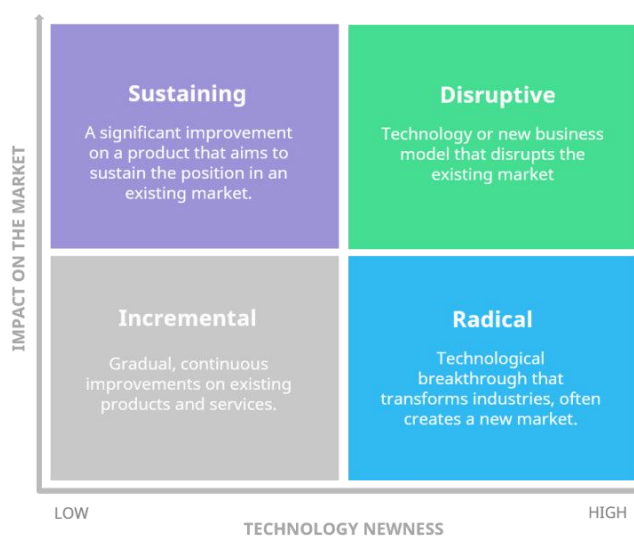



Figure 4: Four types of innovation

Q12 In market terms, innovation is often associated with four types (picture below). Do you consider that the iPEN project has tackled any of these types of innovation? If yes, in which sense?


All replies (except for two respondents to whom the picture was unclear) are provided below, without any changes by the author of this report.

- Sustaining. iPEN support and consolidate photonics knowledge as a tool for innovation
- It has tried to do something sustaining (to make an impact with somewhat new technology). It has partially succeeded
- Incremental. Students understand more about new methods and necessity to learn more intensively
- Incremental, because the project makes it possible to improve the sharing of knowledge and its adaptation to the industry's requirements in Israel and Europe.
- no
- To me IPEN succeed in disrupting the way scholars were thinking about scholar production and knowledge circulation. It radicalized sharing and opportunities for knowledge exchange as no other project we participated before.

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4. SYNTHESIS OF FINDINGS

- **Understanding of innovation and the pursue of innovative actions:** it is very clear that partners' replies (Q3) that innovation is not only about products but mostly about research, new collaboration opportunities and new ways of seeing things. The iPEN project has been very successful with this respect.
- **SWOT analysis (Q4-Q8):** one can synthesize partners' replies as follows.
 - **Strengths:** quality of iPEN Schools and seminars organized; quality of pedagogical resources created; focus on partner country (Israel) capacity building
 - **Weaknesses:** curriculum integration
 - **Opportunities:** cross-country collaboration and research; the new opportunities of digital education under COVID-19; new methodologies in education and research
 - **Threats:** reluctance in sharing; ill integration in pedagogical curricula
- Innovative achievements by topic (30 topics addressed during the iPEN project) : there is big consensus among all partners about the degree of coverage of these topic with respect to innovation.
- The answers vary between the topics, but the overall impression is that the partners perceive the topics as holding innovative potential for the future and think that the topics were tackled to a great degree.
- Among topics which the **biggest number of respondents perceive as holding high innovation potential for the future** are: Quantum Optics, Nanotechnologies and Nanodevices, Biomedical and Biosensing Optical Devices and Nanosensors.

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5. ANNEX: SURVEY FOR PROJECT MEMBERS

The survey, available online via Google Forms from January 20 to February 2, 2021, figures below.

Innovation audit: data gathering from iPEN partners

This form serves to gather views of iPEN project members on what they consider as innovative 6 months before the end of the project. This survey is part of deliverable 3.2, named "Innovation audit" and will be completed by a consultation with external stakeholders.

The innovation audit focuses on the conceptual level of the project work identifying strengths, weaknesses, opportunities and threats and more importantly aims to depict any unused innovation potential.

Data are gathered and kept anonymously by the leader of Work Package Quality Assurance, Katerina Zourou.

Thank you for your contribution!

1. What do you represent? Please choose.

A university

A company or industry

Both

2. What does the word Innovation mean to you in the framework of the iPEN project?

3. What do you consider to be innovative in the project?

4. Is there anything in the project which could have been done in a more innovative way? if yes, what would that be?

5. Given that the iPEN project aims to enhance innovative photonics education in nanotechnology in Europe and in Israel, what do you consider to be the strengths of the project, if any?


6. What do you consider to be the weaknesses) of the project in terms of innovation?

7. What opportunities do you identify in terms of innovation?

8. What threats do you identify in terms of innovation?

9. How would you rate the innovation potential that topics addressed in the iPEN project hold for the future?


Topic	Choices: No/low/high/very high/ I do not know
1. Laser Patterning & Sintering	
2. Silicon photonics	
3. Materials and nanotechnology	
4. Open science and copyright policy	
5. X-ray techniques	
6. Time Resolved Spectroscopy	
7. SEM & TEM Image Techniques & Lab Demo	
8. Optical Characterization of Solar Cells	
9. Video Experiment Demos	
10. Laser Optics and Instrumentation	
11. Laser Safety	

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12. Fundamental of Optoelectronics	
13. RF and Intergraded Protonic Principles	
14. Fundamental Optics	
15. Raman Spectroscopy	
16. Photonic Sintering and Structuring	
17. Spectroscopy	
18. Quantum Optics	
19. Nonlinear Optics	
20. Optical Engineering Principles	
21. Fundamentals of Laser Pulses	
22. Nanotechnologies and Nanodevices	
23. Electromagnetic Radiation and Optical Properties	
24. Principles of Non-Linear Imaging	
25. Principles of Nano – Photonic & Plasmonic Devices	
26. Biomedical and Biosensing Optical Devices	
27. Nanosensors	
28. Laser Physics and Systems	
29. Lab Instrumentation in a NanoLab	
30. From CW to Attosecond Pulses	

10. To what extent do you think that these topics have been tackled during the iPEN project in terms of innovation?

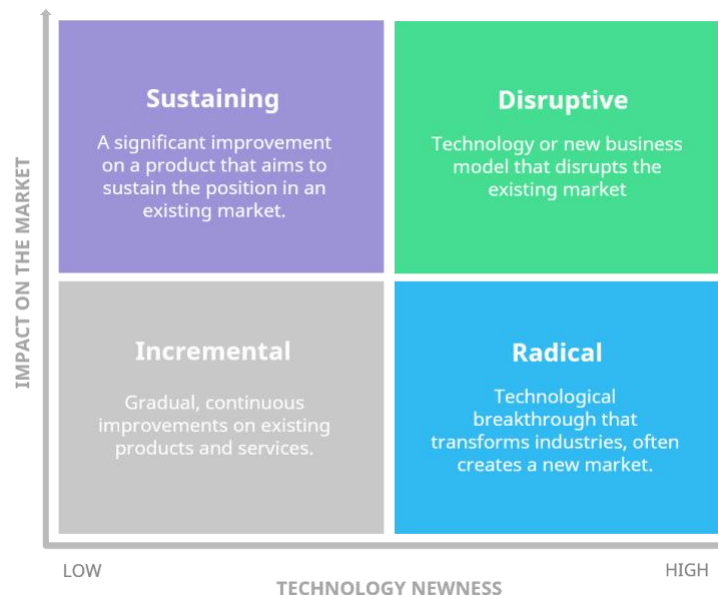
Topic	<i>Choices: Not at all/very little/moderately/at a high degree/extensively/I do not know</i>
1. Laser Patterning & Sintering	
2. Silicon photonics	
3. Materials and nanotechnology	
4. Open science and copyright policy	
5. X-ray techniques	
6. Time Resolved Spectroscopy	
7. SEM & TEM Image Techniques & Lab Demo	
8. Optical Characterization of Solar Cells	
9. Video Experiment Demos	
10. Laser Optics and Instrumentation	
11. Laser Safety	
12. Fundamental of Optoelectronics	
13. RF and Intergraded Protonic Principles	
14. Fundamental Optics	
15. Raman Spectroscopy	

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16. Photonic Sintering and Structuring	
17. Spectroscopy	
18. Quantum Optics	
19. Nonlinear Optics	
20. Optical Engineering Principles	
21. Fundamentals of Laser Pulses	
22. Nanotechnologies and Nanodevices	
23. Electromagnetic Radiation and Optical Properties	
24. Principles of Non-Linear Imaging	
25. Principles of Nano – Photonic & Plasmonic Devices	
26. Biomedical and Biosensing Optical Devices	
27. Nanosensors	
28. Laser Physics and Systems	
29. Lab Instrumentation in a NanoLab	
30. From CW to Attosecond Pulses	

11. In market terms, innovation is often associated with four types (picture below). Do you consider that the iPEN project has tackled any of these types of innovation? If yes, in which sense?

12.



(open ended question)