D7.2

Training material – 2nd version

30 April 2024

OPTIMAI

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DOCUMENT HISTORY

Version	Date	Changes	Contributor(s)
V0.0	22 February 2023	Scope of deliverable agreed at plenary meeting	CARR, ALL
V0.1	3 May 2023	Draft Table of Contents shared with consortium	CARR
V0.3	3 May 2022	Contribution to module on AR glasses	YBQ
V0.4	12 May 2022	Contribution to module on metrology	UNIMET
V0.5	16 May 2023	Contribution to module on hand gestures vocabulary / AI library	FORTH
V0.6	18 May 2023	Contribution to module on hand gestures vocabulary / AI library	CERTH
V0.7	19 May 2023	Existing modules reviewed	UAB and TRI, CARR, EVT
V0.8	22 May 2023	Contribution to the module on the Decision Support System	CERTH
V0.9	26 May 2023	Contribution to the module on the VC 4.5 and 4.6 new features	VIS
V0.10	29 May 2023	Contribution to the module on the Intelligent Marketplace	ENG
V0.11	1 June 2023	Deliverable submitted for internal review	CARR
V0.12	1 June 2023	Deliverable reviewed by MTCL	MTCL
V0.12	11 June 2023	Deliverable reviewed by VIS	VIS
V0.12	30 June 2023	Reviewers' feedback addressed; revised version	CARR
V0.13	14 Sep 2023	Updated plan for D7.2 presented at project plenary meeting	CARR
V0.14	4 March 2024	Modules and their formats and links reviewed and updated	CARR
V0.15	22 March 2024	Sections 1 and 2 updated	CARR
V0.16	11 April 2024	Editing completed; Deliverable submitted for internal review	CARR
V0.17	12 April 2024	Deliverable reviewed by MTCL	MTCL
V0.18	16 April 2024	Deliverable reviewed by VIS	VIS
V1.0	17April 2024	Quality check and version ready for submission	ENG
V1.0	30 April 2024	Submission	CERTH

PROJECT PARTNERS

Logo	Partner	Country	Short name
	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	Greece	**CERTH**
	FINT FUTURE INTELLINGENCE LIMITED	Cyprus	**FINT**
	IDRYMA TECHNOLOGIAS KAI EREVNAS	Greece	**FORTH**
	EVT EYE VISION TECHNOLOGY GMBH	Germany	**EVT**
	VISUAL COMPONENTS OY	Finland	**VIS**
	YOUBIQUO SRL	Italy	**YBQ**
	PANEPISTIMIO THESSALIAS	Greece	**UTH**
	ENGINEERING – INGEGNERIA INFORMATICA SPA	Italy	**ENG**
	UNIMETRIK SA	Spain	**UNIMET**
	UNIVERSITAT POLITECNICA DE VALENCIA	Spain	**UPV**
	Carr Communications Limited	Ireland	**CARR**
	UNIVERSIDAD AUTONOMA DE BARCELONA	Spain	**UAB**
	TRILATERAL RESEARCH LIMITED	Ireland	**TRI**
	KLEEMANN HELLAS –INDUSTRIAL COMMERCIAL SOCIETE ANONYME FOR MECHANICAL CONSTRUCTION SA	GREECE	**KLEE**
	TELEVES SA	Spain	**TVES**
	MICROCHIP TECHNOLOGY CALDICOT LIMITED	United Kingdom	**MTCL**

LIST OF ABBREVIATIONS

Abbreviation	Definition
AI	Artificial Intelligence
AR	Augmented Reality
DMIS	Dimensional Measuring Interface Standard
DMSC	Dimensional Metrology Standards Consortium
DSS	Decision Support System
FOV	Field of View
GD&T	Geometric Dimensioning & Tolerancing
GPS	Geometrical Product Specifications
GUI	Graphical user interface
HD	High Definition
HMI	Human-Machine Interaction
HUD	Heads up display
HW	Hardware
IoT	Internet of Things
LIN	Linear motion
MIPI	Mobile Industry Processor Interface
MQTT	MQ telemetry transport
OMIDES	Operator - Machine Interaction & Decision Support
OMIDES-FE	Operator - Machine Interaction & Decision Support Front–End
OPC UA	Open Platform Communications Unified Architecture
PCB	Printed Circuit Board
PMI	Product Manufacturing Information
PTP	Point-to-point motion
QIF	Quality Information Framework
REST API	Representational state transfer application programming interface
RS232	A standard protocol used for serial communication
SDK	Software Development Kit
SW	Software
T	Task
TCP/IP	Transmission Control Protocol/Internet Protocol
UDP	User Datagram Protocol
WP	Work Package
XML	Extensible Markup Language

Executive Summary

End-user training plays a significant role in the successful implementation and deployment of the OPTIMAI solutions. A set of the training material has been produced to ensure that end-users understand how the OPTIMAI framework works, how to interact with the technology and how they fit into the broader picture of responsible, technology-driven production optimisation.

The modular OPTIMAI Training Catalogue is publicly available on the OPTIMAI website at https://optimai.eu/optimai-training-catalogue.

This document aims to help readers to easily identify which are the latest updated training materials and which materials have been developed since the first version was made available in August 2022.

The training material introduces relevant end-users and operators to the OPTIMAI concept and offers training in the use of the OPTIMAI tools. The catalogue contains a broad range of instructional presentations, learning videos and guidelines. The primary purpose of the training material is to provide end-users with a good understanding of the OPTIMAI technologies, associated rights and requirements as well as relevant supporting resources. Step-by-step guides and illustrated walkthroughs help users familiarise themselves with the parts covered in the training.

The catalogue is split into fifteen concise, standalone modules. Each module is available as a digital open access resource. The material is provided as a combination of PowerPoint presentations, PDFs and YouTube videos. It aims to be user-friendly through clear language, visual aids and an aesthetically coherent layout.

The final Training Catalogue will stay live on the OPTIMAI website for five years after the end of the funding period.

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1 Introduction

Manufacturing industries are constantly looking for new ways to improve quality control for both manufactured products and manufacturing processes. OPTIMAI is spearheading innovation in this area. Introducing new technologies designed to reduce scrap, eliminate defects, maximise productivity, and improve the quality of the shop floor processes, the OPTIMAI project is set to make a tangible impact on European industry and environmental sustainability.

Feeding into Industry 4.0 and gradually transitioning to Industry 5.0, OPTIMAI's innovations go beyond the state of the art and pave the way for a smarter, digitalised European manufacturing domain. Against this backdrop, OPTIMAI is seeking to provide training material and training activities that will familiarise users with these innovations and boost human performance in industry across Europe.

A dedicated task, "T7.1 OPTIMAI Training" therefore focuses on the development of training material and training activities aimed to introduce relevant end-users and operators to the OPTIMAI concept and to train them in the use of the OPTIMAI tools. The aim is to ensure that end-users understand how the system works, how to interact with the technology and how they fit into the broader picture of responsible, technology-driven production optimisation. By offering the material as an openly accessible online resource, the project facilitates self-study of the innovative solutions and their functionalities at the learners' own pace. The material can be used at each pilot site as the users are trained to take part in the piloting activities.

1.1 Purpose and structure of the document

The purpose of this document is to describe the second version of the OPTIMAI training material as well as the process leading to its development. It serves as a report explaining the training catalogue and its components, which are available as standalone open-access documents on the project website. This document aims to help readers to easily identify which are the latest updated training materials and which materials have been developed since the first version was made available in August 2022 (M20).

Section 1 of this report introduces the deliverable, describes its relationship with other deliverables and identifies the target readership. Section 2 discusses how V2 of the training material builds on V1, and explains the background, the methodology, and the five steps involved in the creation of the training material. Section 3 covers the actual training catalogue itself and the modules comprised in the catalogue. Section 4 concludes the deliverable and outlines the next steps.

1.2 Intended readership

As this deliverable is public, it is openly accessible in the Deliverables section of the project website. The content of this deliverable is disseminated both internally within the project consortium and externally to any interested parties outside the project. The intended readership primarily comprises OPTIMAI end-users including operators, technicians, engineers and managers who will be using the OPTIMAI tools. Secondary audiences include external stakeholders from the Industry 4.0 sector and beyond with an interest in the OPTIMAI solutions.

1.3 Relationship with other OPTIMAI deliverables

This deliverable is closely linked to the deliverables listed in Table *1*.

Table 1: Relationship with other deliverables

Deliverable no	**Title of deliverable**	**Link to D7.2**
D2.1	User and ethics and legal requirements I	The user requirements guide the development of the training material.
D2.2	User and ethics and legal requirements II	The user requirements guide the development of the training material.
D6.1	Decision support and early notification framework - 1st version	A training module explains the functionalities and use of the DSS
D7.1	Training Material – 1st version	D7.1 served as a base for D7.2.
D7.3	Ethics recommendations and regulatory framework	The content of D7.3 feeds into the training modules addressing ethical and legal aspects.
D8.1	Project website and branding	The training catalogue is hosted on the project website. The brand guidelines are applied throughout the training material.
D8.2	Communication and dissemination strategy	The principles of clear communication are applied in the training material.

2 From V1 to V2 of the training material

2.1 Background

End-user training plays a significant role in the successful implementation and deployment of the OPTIMAI solutions. End-user training is all about familiarising the users with the relevant tools and the optimal use of these tools. It is also about empowering users by building their confidence through skills development, by giving them a sense of ownership and responsibility, and explaining their role in the wider scheme of things. Offering appropriate training is essential to ensure that employees know and understand how the system works and how to interact with the technology.

This is why Task 7.1 OPTIMAI Training focuses on producing a comprehensive training catalogue containing guidelines and a set of learning presentations and videos introducing the OPTIMAI tools and procedures and teaching end-users how to use the tools. Users include factory floor operators, technicians, engineers, production managers, and production specialists among others.

The training material also serves as a good opportunity for the technical partners to promote their tools. The material presenting the tools will be shared across OPTIMAI channels and can also be showcased at events such as trade fairs and workshops, where they are likely to attract plenty of attention.

OPTIMAI places the end-user at the heart of the training material development. The material is instructional and includes guidelines on how to operate the tools. The aim is to give the user a good understanding of how each tool works. As each tool is different, each training module is consequently different as well. Each module aims to be user-friendly and comprehensible, and aims to contain step-by-step guides, walkthroughs with screen captures/recordings and/or illustrative imagery where relevant.

D7.1 was completed at M20, and this deliverable (D7.2) builds on its foundations.

2.2 Methodology

The process for the development of the training material (V1 and V2) is divided into five phases:

- Phase I: Needs assessment
- Phase II: Design
- Phase III: Development
- Phase IV: Delivery
- Phase V: Evaluation

The steps involved in each phase are described in detail in V1 (D7.1).

2.3 Phase I: Needs assessment

To establish the needs for V2 of the training material, the end users were asked to complete the OPTIMAI training feedback form in April 2023. The feedback form available as a Google form is an adaptation of the form that had been created in time for the submission of V1 in August 2022. Screenshots of the feedback form are included as Annex - A1: Feedback form.

Due to the small number of questionnaire responses received, no conclusions can be drawn regarding how well the responses represent the views of the end users in general. The small sample size naturally has its limitations and rules out any quantitative research or statistical analyses from being made. However, from a qualitative perspective, the responses received contain valuable feedback that is useful when developing the training material further. The numbers of responses received from each of the OPTIMAI end user organisations are presented in Table 2.

Table 2: Number of end-user responses to the OPTIMAI Training feedback form

Pilot partner	No of responses	Notes
KLEE	6	In the KLEE case, three (3) responses were submitted by engineers and three (3) responses were submitted by an EU Project Manager and Sustainability Researcher.
MTCL	0	MTCL was unable to provide feedback in spring 2023 as the participants in the pilot trials could not be reached. The modules piloted to date are the AR glasses and the cameras. Pilot testing has been limited to 30 minutes on one day per participant.
TVES	0	TVES was unable to provide feedback in spring 2023 as the pilot hadn't started yet. The training activities will be conducted in parallel with the pilot execution, meaning that the evaluation of the training modules will commence when the pilot kicks off in TVES.

The training modules that were evaluated by the respondents were the following:

- Augmented Reality Glasses
- Augmented Reality Interface
- Data Protection
- Decision Support System for the Shopfloor
- Sensor Installation
- Worked-focused legal aspects.

A high-level overview of the feedback provided on the modules is included in Annex 2: Summary of feedback responses. The free-form text responses and concrete actions taken are presented in Table 3.

Table 3: Free-form text responses

Question	Response	Actions taken in V2
What was/were the most useful part(s) of the training for you?	-OPTIMAI's training course provided a very good understanding of the developed DSS (Decision Support System) solution. -Video representations -The module provides a useful guide for sensor installation.	Inclusion of multiple additional video representations (DSS, marketplace, AR glasses).
What aspect(s) of the training programme could be improved?	-The duration/length of the training could be longer. -The length of the training programme could be longer and include maybe a more basic introduction to sensors' installation procedures.	Increasing the number of training modules from 11 to 15, updating relevant content in existing modules and making them more comprehensive. Sensor installation procedures can be complemented in line with the installers' availability.
Suggestions or additional comments:	Video presentation required to better understand the usage of glasses	Addition of video presentation of the AR glasses.

In addition, a dedicated set of questions was sent to KLEEMANN, TELEVES, and MICROCHIP in April 2023. The end users did not identify any further needs or gaps in the training material. No requests for 'training certificates' were made, and no accessibility issues (e.g., blind/deaf/dyslexic workers) were raised.

Subsequently, in February 2024, partners from KLEEMANN, TELEVES, and MICROCHIP were invited to identify additional training needs. No further training needs were identified by any of the pilot partners.

As regards translations of the training material into the local languages, Greek and Spanish, pilot partners KLEE and TVES have discussed the end-user requirement concerning training in the local languages with the individuals participating in the pilots. It was agreed that the requirement is met as the individuals participating in the pilots do receive training in Greek/Spanish. The trainers deliver the training in Greek/Spanish based on the material that is available in English. The participants consider this blended approach suitable.

2.4 Phase II: Design

The training design phase aims to answer the "what, where, who, when, and how" details of the training. The results of the previous phase, the needs assessment, answers these questions to a

certain degree (see D7.1). A further step in the OPTIMAI training design process was to dedicate a plenary meeting slot to the planning of the scope of D7.2.

At the OPTIMAI plenary meeting in Santiago de Compostela in February 2023, CARR dedicated the T7.1 slot to discussing the training material and to achieving consensus on the training modules to be included and updated for D7.2. The main questions discussed during the meeting slot were:

- Scope: What should be included in the training material?
- Partner input and collaboration: What role does each contributing partner play?
- Layout and structure: What will the end result look like?

The plenary meeting session was followed by email exchanges between a) CARR as the partner coordinating the development of the training material and b) contributing partners, to agree on details regarding the delivery of the individual training components.

The design phase therefore primarily builds on: 1) the results of the needs assessment, 2) the planning session, and 3) email correspondence with partners.

2.4.1 Partner roles

Most OPTIMAI partners are involved in T7.1, and each contributing partner plays an important role in the production of the training material for D7.2:

- The pilot partners **MTCL, KLEE** and **TVES** contribute with end-user requirements, preferences and feedback. They implement the training activities.
- **CERTH** contributes with new content for the module on the Decision Support System (a series of videos), for the module on the hand gesture vocabulary, and a review of the module on the installation of the sensors.
- **VIS** contributes with new content for the module on virtualization and simulation (new VC 4.5, 4.6, 4.7, and 4.8 features and functionalities).
- **YBQ** contributes with updated content for the module on the Augmented Reality (AR) glasses.
- **UNIMET** contributes with new content for the module on the metrology tools and a review of the module on the Quality Information Framework (QIF).
- **TRI** and **UAB** contribute with a review of the modules on Data Protection, Employee & Equality Rights and Health & Safety (worker-focused legal aspects) and the module on Raising Awareness of Ethical Principles.
- **CARR** creates the Training Catalogue and its modules and reviews and coordinates all contributions. CARR also contributes with new content for the Introduction to end user training module and a review of the Train-the-Trainer module.
- **FORTH** contributes with a new presentation for the AR interface module.
- **EVT** contributes with a review of the EyeVision module.

- **ENG** contributes with new content (a series of videos) for the Intelligent Marketplace module.
- **ENG** and **UTH** play a key role in the reviewing and quality assurance efforts.

2.4.2 Scope of material

The training material included in V2 does not replace V1, which was produced in 2022. V2 complements V1, all existing modules have been reviewed, and where relevant, they have been updated. Four new modules have been created, thus increasing the total number of training modules from 11 to 15. These are presented in Section 3.

The scope of V1 of the training material was determined by the state of maturity of the different technologies and processes in spring/summer 2022. Certain solutions, such as the Intelligent Marketplace, the hand gesture vocabulary, and the metrology tools, were not mature enough in terms of user interfaces or functionalities to be included in V1. Such solutions are included in V2.

OPTIMAI training does not by any means intend to replace any existing end-user training. On the contrary, it will complement existing training efforts in the pilot organisations to equip end-users with the necessary skills and knowledge to participate in the OPTIMAI pilot activities.

2.4.3 Format

Just like V1, V2 of the training material is offered exclusively as a digital resource. OPTIMAI aims to limit the provision of printed material to reduce the environmental footprint. The end-users are unanimous about the preferred use of digital material over print.

The material is provided as a combination of PDF presentations and YouTube videos. The material aims to be concise and user-friendly through clear language, visual aids, and an aesthetically coherent layout.

The material is openly accessible on the project website, and partners can also access the modules in the restricted-access OPTIMAI Nextcloud repository.

Potential users external to the OPTIMAI project are instructed to contact the relevant OPTIMAI partner in advance if they intend to reuse, distribute, remix, adapt, and build upon the material in any medium or format. This note is included on the Training Catalogue page of the project website.

2.5 Phase III: Development

The development of V2 of the training material commenced in February 2023 once it had been determined what will be included in the training material, by whom and how. The labour-intensive and time-consuming development phase was highly iterative and included planning, content development, turning content into presentations, preliminary reviews and editing.

The web platform had already been developed for V1, and the new content could be added to the existing platform seamlessly. CARR, who hosts, designs, maintains and updates the project website also manages the dedicated webpage for the training material, the Training Catalogue.

The partners involved in the creation of the V2 modules drafted content within their internal teams. They then sent the content to CARR for editing. CARR made any necessary modifications to the content and/or design; turned textual contributions into illustrated presentations and videos. For the videos, subtitles and the OPTIMAI start and end cards were added, presenting the material as instructional videos. CARR also gave the modules a unified structure and look that matched the modules produced for V1.

2.6 Phase IV: Delivery

The delivery phase takes place within each end user organisation, and it starts once the needs assessment, design, and development have been carried out. While the earlier phases focus on the content of the training material, the delivery phase focuses on the process of teaching and methods of learning.

In OPTIMAI, each end-user organisation has a different existing training setup, and the OPTIMAI training can be adapted to end-user requirements. The delivery phase goes hand in hand with the OPTIMAI pilot activities as the preparation of the respective demos takes place in parallel with the training. The piloting activities are carried out at different intervals in KLEE, MTCL and TVES over the course of 2022, 2023 and the first half of 2024.

Depending on established end-user practices and preferences, the delivery can take various forms, including lectures / classroom-style training, group discussions/tasks, on-the-job learning on the shop floor, and virtual classes.

2.7 Phase V: Evaluation

The training evaluation combines structured evaluation (written post-training participant feedback through feedback forms), informal evaluation (verbal “How did it go?” discussions at the end of a training session), and trainer assessment where the trainer assesses the progress of the training. The trainers can run post-training tests, e.g., quizzes, to measure training success if they find it appropriate.

Annex A2: Summary of feedback responses presents an overview of the end-user feedback gathered through forms in spring 2023. Further feedback can be gathered in the first half of 2024 upon completion of training and piloting activities.

3 Training catalogue – 2nd version

The training catalogue is publicly available on the OPTIMAI website at https://optimai.eu/optimai-training-catalogue.

The OPTIMAI training catalogue introduces relevant end-users and operators to the OPTIMAI concept and offers training in the use of the OPTIMAI tools. The catalogue contains a broad range of instructional presentations, learning videos, and guidelines. The primary purpose of the training material is to provide end-users with a good understanding of the OPTIMAI technologies, associated rights and requirements as well as relevant supporting resources. Step-by-step guides and illustrated walkthroughs help users familiarise themselves with the parts covered in the training.

The catalogue is divided into 15 concise, user-friendly standalone modules. Each module is available in open access mode, free of charge. The individual training modules are also available to the project team in the internal document repository Nextcloud.

In this deliverable, each module is marked either **NEW, UPDATED** or **REVIEWED** as follows:

- **NEW** means that the module is new and did not exist as part of V1 of the training material.
- **UPDATED** means that the module was included in V1, but its content has since been updated and complemented with new content.
- **REVIEWED** means that the module was included in V1 and has since been reviewed, but no significant changes or additions have been made.

The training catalogue is presented as an accordion menu, a vertically stacked list where a total of fifteen (15) training modules are displayed in alphabetical order (apart from the introductory module, which is presented first). The modules focus on relevant OPTIMAI technologies and on horizontal aspects such as ethical, legal, and training facilitation aspects.

Each module comes with a brief description on the webpage. The format of the training, the target groups, and the language of the module in question is presented as well, and the partner organisation acting as a point of contact is stated. Each module on the website contains a link that opens the training resource and allows the user to download it.

The catalogue is built in a way that works seamlessly across multiple devices. The page therefore allows users to smoothly access all training material regardless of whether they are using a laptop, mobile phone or tablet.

The date (month and year) of the latest update/review of each module is indicated on the website.

The training material will stay live on the OPTIMAI website for five years after the end of the funding period.

Figure 1 illustrates the placement of the training catalogue on the OPTIMAI website.

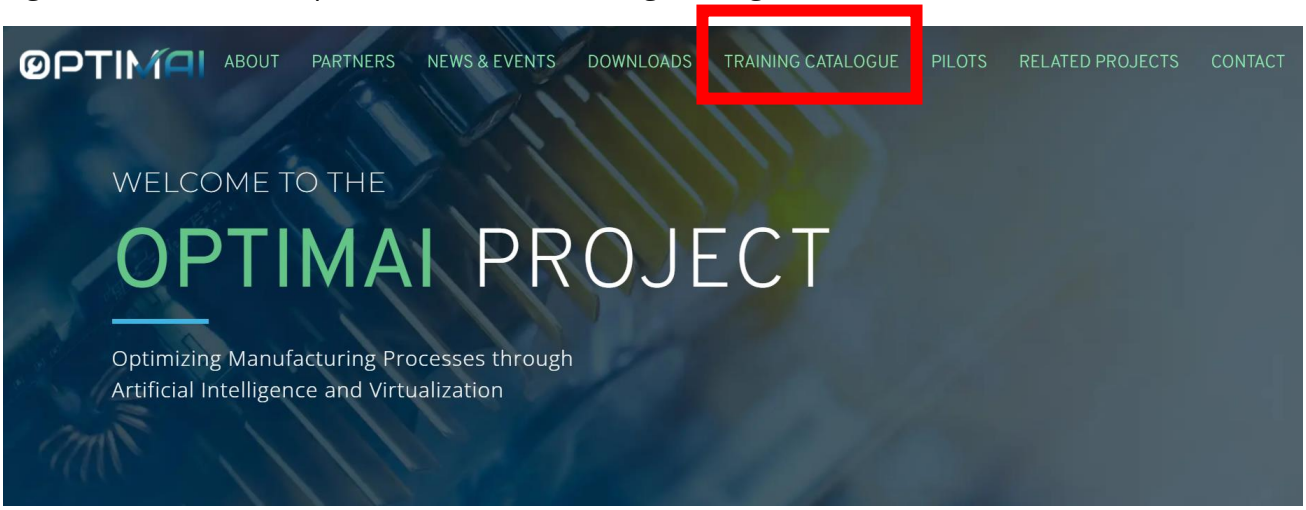


Figure 1: Training catalogue tab displayed on landing page

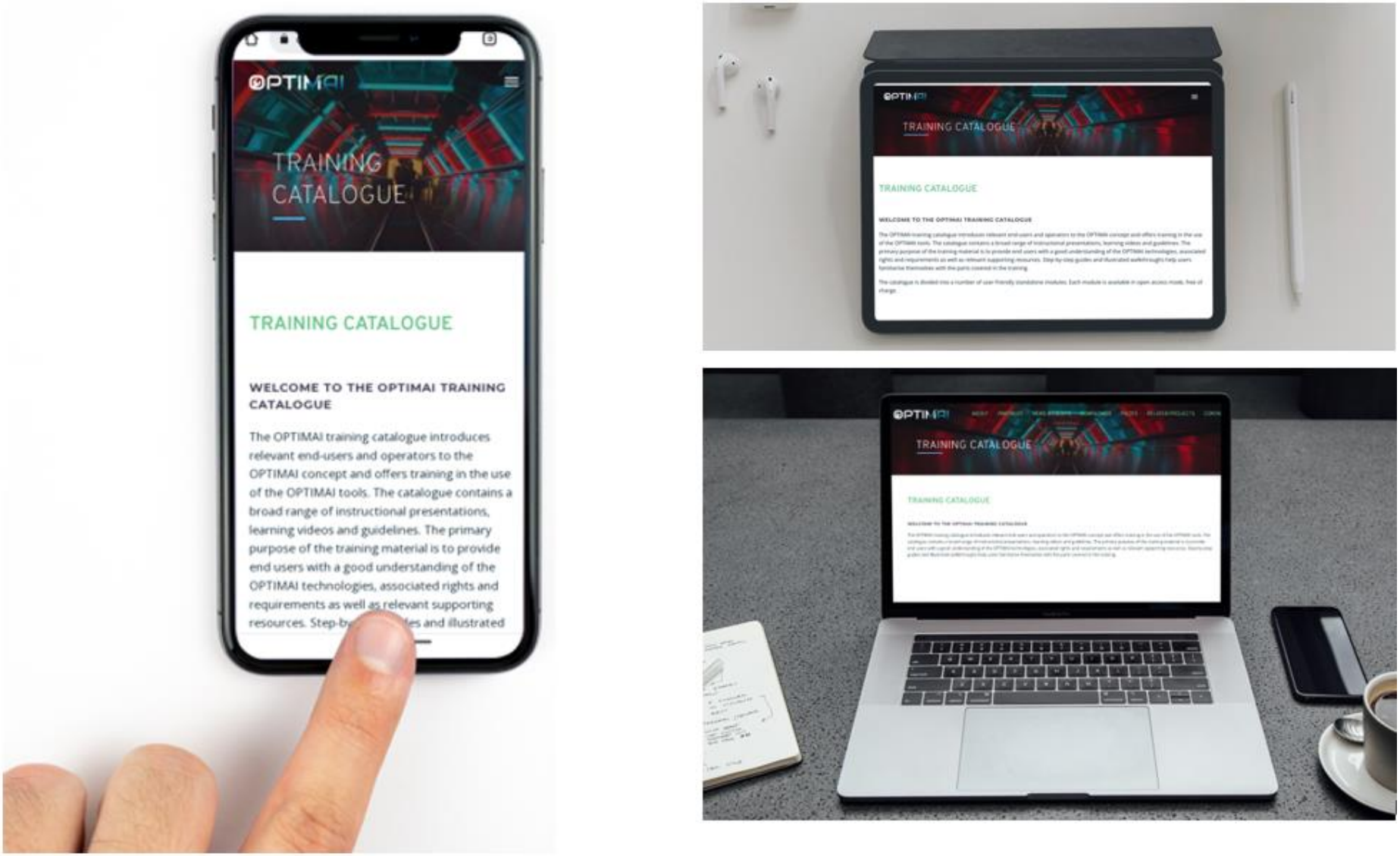


Figure 2: Mobile phone, tablet and laptop

The catalogue is broken down into fifteen (15) modules and listed as an accordion menu as in Figure 3.

Figure 3: List of training modules as displayed on the website

The individual training modules are described in the following subsections, and the links to each module are provided.

3.1 Introduction to End-User Training (NEW)

Title of module: Introduction to End-User Training

Brief description: In this module, you will learn about end-user training, about why it is important, about what is included in the training catalogue and about what the learning objectives are.

Format: Presentation (PDF)

Target groups: OPTIMAI end-users and external stakeholders interested in end-user training.

Language: English

Point of contact: Carr Communications

Latest update/review: March 2024

Download: PDF

Figure 4: Introduction to end-user training module

3.2 Augmented Reality Glasses (UPDATED)

Title of module: Augmented Reality Glasses

Brief description: In this module, you will learn about the OPTIMAI Augmented Reality (AR) glasses and their role in providing real-time assistance on the shop floor. You will learn about the device features, usage and interactive controls.

Format: Presentation (PDF)

Target groups: OPTIMAI end-users and external stakeholders interested in context-aware AR glasses for better human-machine collaboration.

Language: English

Point of contact: Youbiquo

Latest update/review: March 2024

Download: PDF

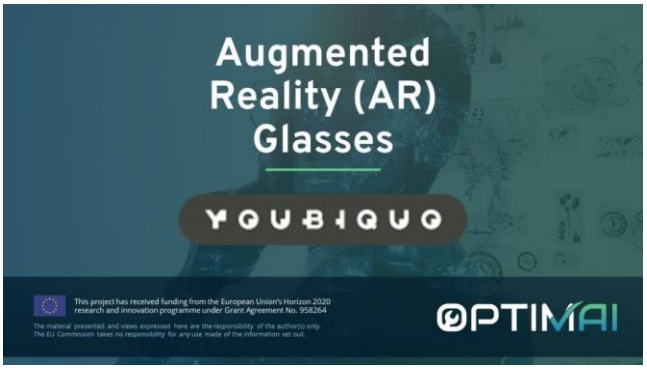


Figure 5: Augmented Reality Glasses module

3.3 Augmented Reality Interface (UPDATED)

Title of module: Augmented Reality Interface

Brief description: In this module, you will learn how the OPTIMAI Augmented Reality (AR) interface is used for human-machine interaction in the OPTIMAI pilot sites; how the virtual elements are displayed in the end-users' field of vision through the OPTIMAI smart glasses; and how the adaptive and adaptable graphical user interface (GUI) is visualized and how it allows users to address any deficiencies on the production line in situ.

Format: Presentation (PDF)

Target groups: OPTIMAI end-users and external stakeholders interested in novel AR applications and visual analytics.

Language: English

Point of contact: The Institute of Computer Science (ICS) of FORTH – Foundation for Research and Technology Hellas

Latest update/review: March 2024

Download: PDF

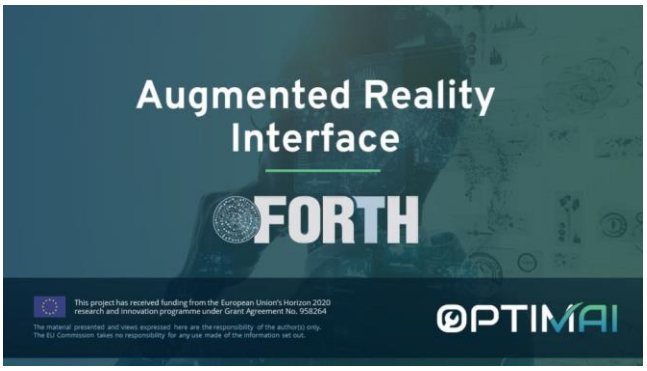


Figure 6: Augmented Reality Interface module

3.4 Basic Use of Metrology Tools (NEW)

Title of module: Basic Use of Metrology Tools

Brief description: In this module, you will learn about the use of metrology tools for quality control based on 3D scanning and point clouds. More specifically, you will learn about some of the key concepts of metrology, quality control sensors and software, the reference architecture of the quality control solution, and basic use of the solution.

Format: Presentation (PDF)

Target groups: OPTIMAI end-users and external stakeholders interested in the use of metrology tools.

Language: English

Point of contact: Unimetrik

Latest update/review: March 2024

Download: PDF

Figure 7: Metrology tools module

3.5 Data Protection (REVIEWED)

Title of module: Data Protection

Brief description: In this module, you will learn about worker-focused legal aspects of the OPTIMAI pilots. You will learn about the General Data Protection Regulation (GDPR), about consent and legitimate interest, data processing and rights of data subjects.

Format: Video with audio and presentation (PDF)

Target groups: OPTIMAI end-users and external stakeholders interested in data protection and employees' rights.

Language: English

Point of contact: Trilateral Research

Latest update/review: March 2024

Download: PDF

Figure 8: Data Protection module

3.6 Decision Support System for the Shopfloor (UPDATED)

Title of module: Decision Support System for the Shopfloor

Brief description: In this module, you will learn how to use the OPTIMAI Decision Support System. You will learn about how it supports different actors on the shop floor in their daily work. You will be presented with the interface that is easy to use, easy to learn how to use, available on multiple devices and personalized and adapted to the context, the preferences and behaviour of the user. You will learn about how the DSS notifies the user about the detection of defects, anomalies and suboptimal machinery operation in manufacturing processes.

Videos included:

1. Introduction to the Decision Support System (here)
2. Administration Manage Devices & Processes & Store Activity on Blockchain (here)
3. Administration: Manage Devices and Processes and Configure AI Models (here)
4. Automatic Near Real-Time Defect Detection (here)
5. Defect Detection in the Production Line (here)
6. Monitoring and Predicting Measurements & Defects in the Production Line (here)
7. Monitoring Measurements During Quality Inspection (here)

Format: Presentation (PDF), videos with audio/subtitles

Target groups: OPTIMAI end-users and external stakeholders interested in novel shop floor applications designed to improve efficiency and decision making in the production chain.

Language: English

Point of contact: Centre for Research and Technology Hellas (CERTH-ITI)

Latest update/review: March 2024

Download: PDF

Figure 9: Decision Support System module

3.7 EyeVision & the Multisensorial Data Acquisition Network (UPDATED)

Title of module: EyeVision & the Multisensorial Data Acquisition Network

Brief description: In this module, you will learn about quality control sensors for defect detection and production monitoring, and more specifically about the role of industrial vision sensors in OPTIMAI. To help you familiarize yourself with the EyeVision software, this module offers you access to the EyeVision Wiki page, tutorials in the EyeCademy, webinars and technical support.

Format: Presentation (PDF)

Target groups: OPTIMAI end-users and external stakeholders interested in industrial vision sensors.

Language: English

Point of contact: Eye Vision Technology GMBH

Latest update/review: March 2024

Download: PDF

Figure 10: EyeVision module

3.8 Hand Gesture Vocabulary (NEW)

Title of module: Hand Gesture Vocabulary

Brief description: In this module, you will learn about hand gesture recognition, the AI method deployed in OPTIMAI for understanding the operator's motives in the factory floor using the AR glasses. You will familiarise yourself with how hand gesture recognition is performed in the feed from the AR glasses aiming to understand the operator's intentions.

Format: Presentation (PDF)

Target groups: OPTIMAI end users and external stakeholders interested in hand gesture recognition.

Language: English

Point of contact: Centre for Research and Technology Hellas (CERTH-ITI)

Latest update/review: March 2024

Download: PDF

Figure 11: Hand gesture vocabulary module

3.9 Intelligent Marketplace (NEW)

Title of module: Intelligent Marketplace

Brief description: In this module, you will learn about the OPTIMAI Intelligent Marketplace helping manufacturing ecosystem players to easily decrease scrap within their production lines and accompanied services. You will be able to follow step-by-step screen recordings explaining how to register an organisation, how to add a document, how to add a piece of scrap, and how to enter AI algorithms.

Videos included:

1. OPTIMAI Marketplace – Document Library (here)

2. OPTIMAI Marketplace – AI Algorithm Addition (here)
3. OPTIMAI Marketplace – Scrap Addition (here)
4. OPTIMAI Marketplace – Registration of an Organisation (here)

Format: Screen recording videos

Target groups: OPTIMAI end-users and external stakeholders interested in the intelligent marketplace, AI sharing and scrap re-use.

Language: English

Point of contact: ENGINEERING Ingegneria Informatica S.p.A.

Latest update/review: March 2024

Figure 12: Intelligent Marketplace module

3.10 Quality Information Framework (UPDATED)

Title of module: Quality Information Framework (QIF)

Brief description: In this module, you will learn about the QIF standard and about its role in OPTIMAI. This module defines QIF and explains who is involved. You will be familiarised with the QIF Version 3.0 Information Architecture and the QIF Results Information Model. Finally, you will learn how to approach a QIF XML document.

Format: Presentation (PDF)

Target groups: OPTIMAI end users and external stakeholders interested in the QIF community.

Language: English

Point of contact: UNIMETRIK

Latest update/review: March 2024

Download: PDF

Figure 13: Quality Information Framework module

3.11 Raising Awareness of Ethical Principles (REVIEWED)

Title of module: Raising Awareness on Ethical Principles

Brief description: In this module, you will learn about worker-focused ethical aspects of the OPTIMAI pilots. The module covers the ethics research framework applicable to OPTIMAI, principles for ethical trustworthy AI, human autonomy, human dignity, voluntariness, informed decision-making, risk minimisation, prevention of harm, fairness and explicability.

Format: Presentation (PDF)

Target groups: OPTIMAI end-users and external stakeholders interested in ethical principles and responsible research.

Language: English

Point of contact: Universitat Autònoma de Barcelona, Institute of Law and Technology (IDT)

Latest update/review: March 2024

Download: PDF

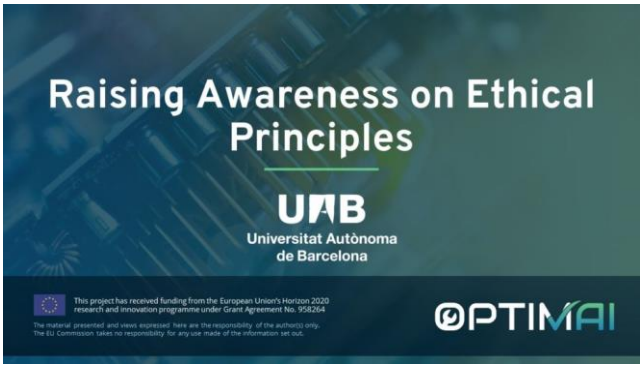


Figure 14: Raising Awareness of Ethical Principles module

3.12 Sensor Installation (REVIEWED)

Title of module: Sensor Installation

Brief description: In this module, you will learn about quality control sensors for defect detection and production monitoring. This module explains 1) the installation of a modular supporting device for various types of cameras; 2) the installation of the hardware setup for automatic calibration of an elevator valve block.

Format: Presentation (PDF)

Target groups: OPTIMAI end-users and external stakeholders interested in smart sensors for production quality control.

Language: English

Point of contact: Centre for Research and Technology Hellas (CERTH-ITI)

Latest update/review: March 2024

Download: PDF

Figure 15: Sensor installation module

3.13 Train-the-Trainer Guide (REVIEWED)

Title of module: Train-the-Trainer Guide

Brief description: In this module, you will learn how to understand the role and identify the skills of an effective trainer; develop the skills to create training objectives, activities, and materials for planned training activities; identify tools, techniques, and approaches for the assessment of learning; and demonstrate the skills required for the effective delivery of training programmes.

Format: Presentation (PDF)

Target groups: OPTIMAI team / project leaders responsible for facilitating and delivering technical and non-technical training in the end-user organisations; external stakeholders in the private, public or community sector looking to improve their facilitation skills and to train others.

Language: English

Point of contact: Carr Communications

Latest update/review: March 2024

Download: PDF

Figure 16: Train-the-Trainer module

3.14 Virtualization and Simulation (UPDATED)

Title of module: Virtualization and Simulation

Brief description: In this module, you will familiarise yourself with the 3D simulation platform used to create digital models in OPTIMAI. You will learn how to build such virtual models in OPTIMAI following a process aligned with the life cycle of the production system. This module provides an introduction to Visual Components, to process modelling and to robotics and automation. It also provides links to a training library in the Visual Components Academy.

Format: Presentations (PDFs)

Target groups: OPTIMAI end-users and external stakeholders from any sector interested in novel virtualization and simulation approaches.

Language: English

Point of contact: Visual Components

Latest update/review: March 2024

Download:

1. Virtualisation and Simulation (PDF)

2. Introduction to Visual Components (PDF)
3. Introduction to Process Modelling (PDF)
4. Robotics and Automation (PDF)
5. VC 4.5 and 4.6 new features and improvements (PDF); VC 4.5, 4.6, 4.7 and 4.8 new features and improvements (PDF)

Figure 17: Virtualization and simulation module

3.15 Worker-Focused Legal Aspects (UPDATED)

Title of module: Worker-Focused Legal Aspects of the Pilots

Brief description: In this module, you will learn about worker-focused legal aspects of the OPTIMAI pilots. This module covers employee and equality rights, including dismissal and discrimination, and health and safety aspects including risk assessments and health and safety officers and developments.

Format: Video with audio, presentation (PDF)

Target groups: OPTIMAI end-users and external stakeholders interested in employee and equality rights as well as health and safety.

Language: English

Point of contact: Trilateral Research

Latest update/review: March 2024

Download: PDF

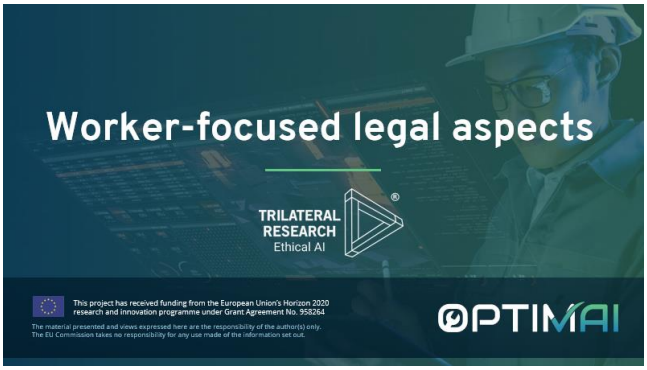


Figure 18: Worker-focused legal aspects module

4 Conclusions and next steps

In conclusion, this deliverable has presented the OPTIMAI Training Catalogue and discussed why it was produced, by whom, when and how. It has provided an overview of the underlying requirements and the motivation for the development of the training material. It has also described the phases involved in the creation of the material as well as the structure, look and functions of the product.

This second version of the OPTIMAI training material complements the first version that was developed in 2022. The training activities have been carried out in parallel with the execution of the pilots. Close collaboration with the pilot partners ensures that existing training resources can be further developed and adapted if needed.

Feedback on the second version of modules will be elicited from end-users and other partners through feedback forms, informal verbal evaluation and trainer assessment. The findings will provide valuable insights in terms of planning for future training programmes. The next steps may also include translation of material should such needs arise.

The OPTIMAI Training task (T7.1) has been running in parallel with the piloting tasks (T7.3, T7.4 and T7.5). As the pilot activities conclude and the Final Pilot Evaluation milestone (MS14) is reached with the availability of D7.5, D7.7 and D7.9, the lessons learned may provide valuable insights that can shape future training activities in Industry 4.0 environments.

The Training Catalogue will stay live on the OPTIMAI website for 5 years after the project ends.

References

[1] Burch, N. (1970). The Four Stages of Learning. Developed for Gordon Training International. Retrieved 1 June 2022 from: https://www.gordontraining.com/free-workplace-articles/learning-a-new-skill-is-easier-said-than-done/

[2] Learn 3D Simulation using Visual Components. (2022). Visual Components Academy. Retrieved 15 May 2022 from: https://academy.visualcomponents.com/

[3] EVT EyeCademy Tutorials, Webinars, Commands. (2022). Vision EyeCademy. Retrieved 20 June 2022 from https://www.evt-web.com/en/eyecademy/.

[4] OPTIMAI D2.1 User and ethics and legal requirements – 1st version.

[5] OPTIMAI D2.2 User and ethics and legal requirements – 2nd version.

[6] OPTIMAI D6.1 Decision support and early notification framework – 1st version.

[7] OPTIMAI D7.1 Training material – 1st version.

[8] OPTIMAI D7.3 Ethics Recommendations and Regulatory Framework.

Appendices

A1: Feedback form

The reviewed feedback form is available here and a screenshot of it is included below.

OPTIMAI training feedback form

Thank you for taking part in this OPTIMAI Training. Please take a few moments to respond to the questions below.

Title of training module:

Multiple choice

- Please select
- Augmented Reality Glasses
- Augmented Reality Interface
- Data Protection
- Decision Support System for the Shopfloor
- EyeVision & the Multisensorial Data Acquisition Network
- Quality Information Framework
- Raising Awareness of Ethical Principles
- Sensor Installation
- Train-the-Trainer Guide
- Virtualization and Simulation
- Worked-focused legal aspects
- Other...
- Add option

Required

Date: *

Month, day, year

Participant name (all names will be anonymised)

Short answer text

Participant title (e.g., operator, engineer, technician or manager) *

Short answer text

Organisation *

- KLEEMANN
- TELEVES
- MICROCHIP

Please indicate your level of agreement with the statements listed below.

Description (optional)

a) The training was relevant to my needs

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

b) The training was presented in a meaningful way

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

c) The training met my learning objectives

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

d) I can apply the skills/knowledge that I learned

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

e) The duration/length of the training was appropriate

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

f) The training format was suitable

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

g) I would recommend the training to others

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

What was/were the most useful part(s) of the training for you?

Long answer text

What aspect(s) of the training programme could be improved?

Long answer text

Please provide any suggestions or additional comments below.

Long answer text

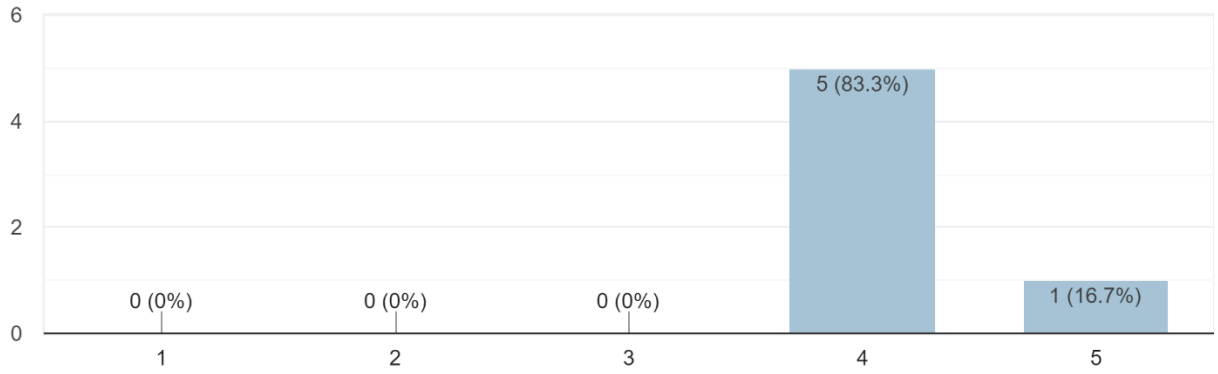
Thank you for your collaboration!

The OPTIMAI Team

A2: Summary of feedback responses

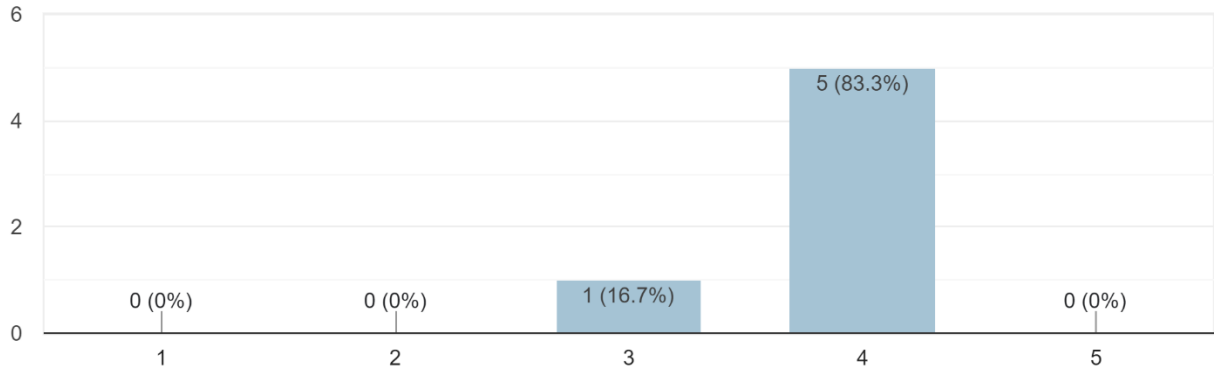
a) The training was relevant to my needs

6 responses



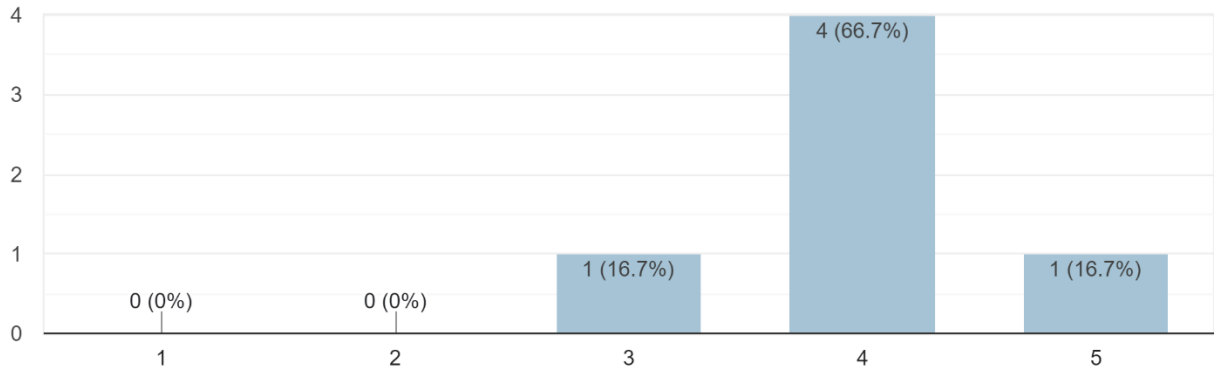
b) The training was presented in a meaningful way

6 responses



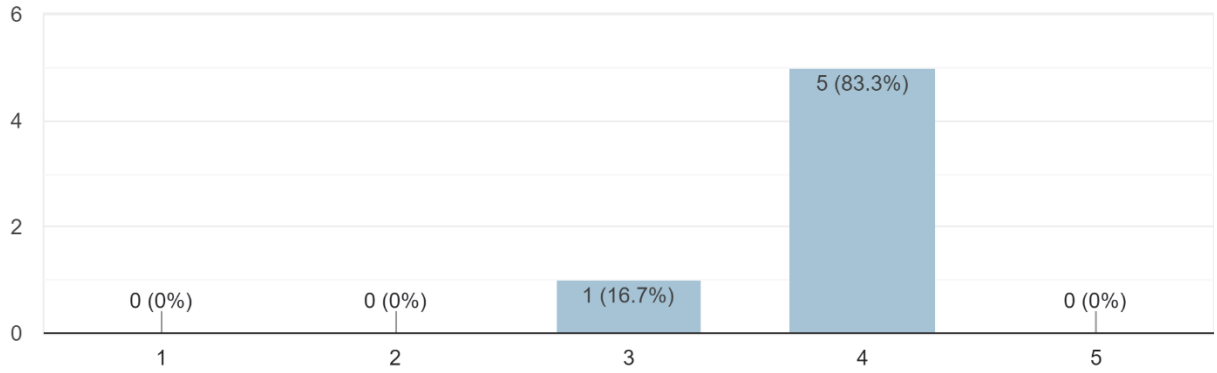
c) The training met my learning objectives

6 responses



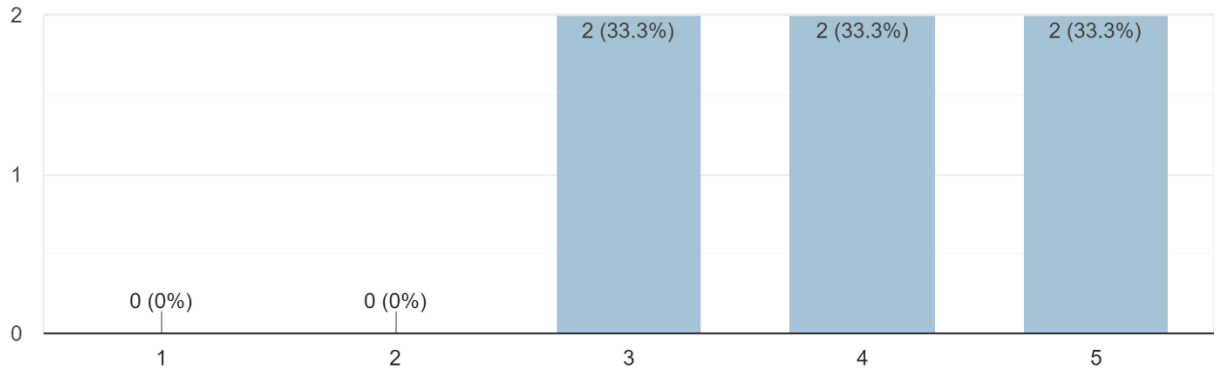
d) I can apply the skills/knowledge that I learned

6 responses



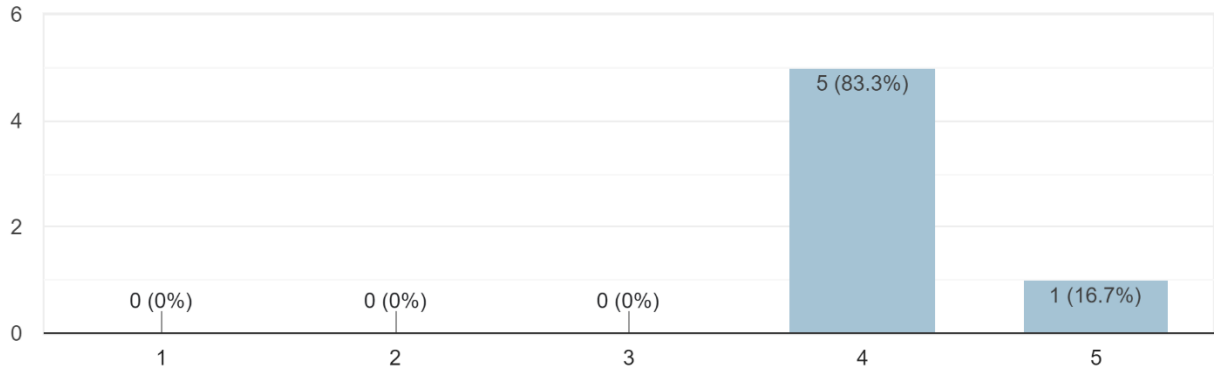
e) The duration/length of the training was appropriate

6 responses



f) The training format was suitable

6 responses



g) I would recommend the training to others

6 responses