SENSE. The New European Roadmap to STEAM Education

D7.3 – First Version of the Digitised Educational Materials and Toolkits

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Abbreviations and Acronyms

Abbreviation or acronym used in this document	Explanation
DECP	Dissemination, Exploitation, and Communication Plan
DEMTs	Digitized Educational Materials and Toolkits
DoA	Description of Action
STEAM	Science, Technology, Engineering, Arts and Mathematics
STEM	Science, Technology, Engineering, Mathematics
WP	Work package

Glossary

Term	Definition used or meaning in the SENSE. project	Reference or source for the definition if applicable
Citizen Science	Activities conducted by scientists in collaboration or consultation with the public at any stage of a research project.	European Research Council [Link]

Digital hub	An online repository of learning materials to enable and empower learners to carry out STEAM activities tested and validated in the SENSE. project	D7.2
Early Adopters	Early adopters act as ambassadors for the Roadmap adoption beyond the project consortium and duration.	DoA
Learner Centredness	A radical shift from viewing learners as knowledge receivers to active creators of their own knowledge, promoting self-directed learning and empathy with others.	D3.5
Learning Sequence [SENSE. Learning Sequence]	A *learning sequence* refers to an activity of a STEAM Lab that focuses on communicating, teaching, or researching a topic or issue (in whatever form). In this context, characteristic *practices* are used, that involve, activate, or inform participants and can be content-centred, teacher-centred or equally focus on social interaction or refer to open learning environments.	D4.2
Practice [SENSE. Practice]	SENSE. *practices* involve, activate, or inform participants and can be content-centred, teacher-centred, or equally focus on social interaction or refer to open learning environments. The development, testing and documentation of such SENSE. practices are important goals of the project, as characteristic practices are used in the context of learning sequences.	D4.2
Reflective Feedback	"Feedback" drives development and transformation by prompting individuals to assess their emotions, thoughts, actions, and impact, fostering ongoing processes. Reflective feedback covers introspection and interaction,	D3.5

	enhancing personal encounters, empathy and engagement. This connecting expands to humans and non-humans (such as feedback provided through interaction with an object), nurturing a holistic perspective of being in the world.	
Roadmap	Roadmap is a strategic planning technique that helps to communicate to all the stakeholders of STEAM education the SENSE. project's goals, and their respective major deliverables over time which also supports them in defining their respective action plans. It is a step-by-step process for providing an implementation for future STEAM education. There are three phases of the Roadmap: Awareness, Action, and Advocacy.	D2.3
SENSE. / SENSE. project	The ambition of the SENSE. project is to make a significant contribution to STEAM education in Europe and to drive paradigmatically new ways of learning and teaching, by elaborating a future-making pedagogy whereby science and art come together to create future-making education, support students' ability to ask questions, develop empathy and critical thinking, and make learning meaningful.	D3.4
SENSE. Manifesto	A living document that succinctly articulates the partners' shared principles, values and goals, serving as a guiding framework that unifies members' efforts and communicates their distinctive perspective or transformative vision to a broader audience. This manifesto provides a clear direction that fosters cohesion and resonance within the collective, while signalling its distinctive contribution to STEAM to the larger discourse.	D3.4

SENSE. methodology	The SENSE. methodology, comprising a dedicated educational model and its pedagogy, with i) STEAM inquiry, ii) citizen science and art practices, iii) learner centredness and iv) reflective feedback as its building blocks.	D1.1
STEAM Inquiry	In STEAM inquiry various elements of knowing and sense making converge embodying experiences, probing questions, recognizing patterns, forging connections, showcasing empathy, embracing uncertainty, shaping significance, taking action, introspective reflection, and critical assessment. This framework finds application not only within the arts but also in the realm of STEAM research.	D3.5
STEAM Lab	A specialized learning environment for the implementation of SENSE., featuring diverse participant panels and addressing specific needs in varied social, cultural, geographical, and economic contexts.	D7.2
STEAM stakeholder	A stakeholder in the project SENSE. is any person, organisation or group that is affected by or who can affect the outcomes of this project.	D3.3
STEAM Wiki	A wiki-type webpage set up and embedded within the digital hub to gather all relevant materials generated by the project, enabling collaborative work on the wiki content by its users.	DoA

The SENSE. project

There is a widespread understanding that the future of a prosperous and sustainable Europe depends to a large extent on the quality of science education of its citizens. A science-literate society and a skilled workforce are essential for successfully tackling global environmental challenges, making informed use of digital technologies, counteracting disinformation, and critically debunking fake news campaigns. A future-proof Europe needs more young people to take up careers in science-related sectors.

Research shows that interest in STEM subjects declines with increasing age. This effect is particularly pronounced among girls and young women; even those of them who take up science studies gradually forfeit their motivation. But despite all image campaigns and efforts to remove the awe of science only “one in five young people graduates from STEM in tertiary education” and only half as many women as men, according to the European Skills Agenda.

The disinterest in science is striking and evokes the question of its causes. Stereotypes and lack of female role models seem to be only a part of the explanation. Nor is there a lack of career prospects that could explain a reorientation despite initial interest.

SENSE. has identified two major problems in current science education that need to be addressed: a) A distorted teaching logic that progresses from abstract models to procedural applications (“reverse ontology”) and b) The inability to implement a learner-centred pedagogy linking students’ everyday knowledge to science-based knowledge, thus promoting motivation, self-directed and life-long learning.

SENSE. advocates for the development of a high-quality future-making education that is equally accessible to all learners and promotes socially conscious and scientifically literate citizens and professionals. SENSE. aims at radically reshaping science education for a future-making society. By promoting the integration of all human senses into exploring and making sense of the world around us we will challenge conventional ideas of science and science education. Considering the pitfalls of current science education practices and the advantages of artistic and aesthetic activity, this innovative approach also considers social inclusion and spatial design as core components for a new STEAM education paradigm. With SENSE., future science learning will be moving away from the standardised classroom shapes and furniture layout entering new learning landscapes.

The project seeks to develop an accessible educational roadmap promoting socially conscious and scientifically literate citizens and professionals. It addresses outdated perceptions of current science education as well as gender stereotypes by

integrating the arts, social inclusion and spatial design as its core components. SENSE. will establish 13 ‘STEAM Labs’ across Europe to develop and evaluate the ‘SENSE. approach’ to STEAM subjects alongside students, educators, teachers, businesses, and other stakeholders.

The ‘New European Roadmap to STEAM Education’ will take the shape of a STEAM learning companion to support tomorrow’s educators and learners – be it in the classroom, in a museum or on a drilling rig. A digital hub will be established, where practitioners from all ages and backgrounds across Europe will be able to access tried and tested educational practices to increase engagement within these subjects.

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Executive Summary

This document presents the first version of the Digitized Educational Materials and Toolkits (DEMTs). These are envisioned as a first tangible visual representation of activities and toolkits in a digital format, that serve as central components of the SENSE. Roadmap.

The DEMTs are made accessible via a digital hub, which acts as an interactive platform to share knowledge, promote cooperation and create a sustainable infrastructure for the STEAM community.

The development of the DEMTs has been a collaborative effort and took place in several phases. Based on the SENSE. methodology, preliminary activities were tested and analysed in the STEAM labs across the consortium, while simultaneously implementing and evaluating strategies and methods that resulted in the toolkits for space and social inclusion (social creativity). Afterwards, the achievements and experiences were used for the creation of a prototype structure and design as well as content pages and related functionalities.

The design of the DEMTs is based on inclusive and flexible principles. They are intended to be suitable for a wide range of users – both educators and non-educators – and allow for easy navigation, customisation, and the promotion of active-creative processes, while conveying the SENSE. approach and intertwining the SENSE. methodology.

Activity pages are one of the key elements, as they present activity descriptions an elaborate design including some preliminary functionalities and visuals. A hierarchical structure ("parent-child") is used to display activity blueprints (parent) while offering variations as examples (child) from actual applications, that differ in certain features (e.g., age group, location, ...). First prototypes of such activity descriptions are in progress.

The other key elements so far are the toolkit pages, which consist of the space toolkit and the social creativity toolkit. These provide theory, strategies, and experiments to reflect on the cross-cutting issues space or social inclusion, respectively, and to actively integrate elements into interventions.

The next steps include further development on the activities (blueprint descriptions, feedback, variations) and the toolkits as well as certain functionalities, such as a tagging system. With the help of editorial improvements and the engagement of early adopters, the aim is to create an engaging, user-friendly and sustainable platform that emphasises the diversity and innovation within SENSE.'s approach to STEAM education.

Ultimately, the first version of the DEMTs is a significant milestone for the consortium and SENSE.'s stakeholders, as it facilitates lasting impact for those seeking innovative

and interdisciplinary ways of teaching and learning and eventually shapes the longevity of the digital hub beyond the project.

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1. Introduction

This section outlines important information on the deliverable itself.

1.1. Purpose of the Document

The deliverable presents the current state of affairs regarding the digitized educational materials and toolkits (DEMTs), while incorporating starting points, considerations for design, structure, and content, as well as the progress so far. Thus, it is supposed to accurately and shortly depict a first version of the bandwidth of tools and functionalities that are potentially going to be (or already are) part of the project website's expansion: the digital hub.

Albeit this report offers an overview of efforts, steps, and (preliminary) products, it does not exceed the importance of the task 7.3 "Educational materials and toolkits", that is focusing on producing DEMTs of best possible quality and goes far beyond this deliverable.

1.2. Intended Readership

The document is designed to update the consortium partners, associated partners, and the European Commission, on efforts towards harmonizing and digitalizing the educational materials and toolkits on our digital hub.
As the dissemination level is public, it is also intended for any stakeholders that are interested in the project's process, efforts towards digital learning materials, and considerations along the way. The report will be embedded on the project website and therefore available to the public right after delivery.

1.3. Structure of the Document

The document shows how the first version of the digitized educational materials and toolkits (DEMTs) was developed (chapters 2 to 4) and what the DEMTs look like (chapters 5 and 6).
The second chapter explains the deliverable's placing in the SENSE. project and outlines how principles for the design of DEMTs were compiled. The third chapter is about the progress of developing the DEMTs in five stages. The fourth chapter is dedicated to methodological and conceptual decisions affecting the design and content of the DEMTs. The description of activity pages is to be found in chapter 5, while the toolkit pages are elaborated in chapter 6.
The final seventh chapter draws conclusions and shows potential next steps.

1.4. Relationship with other Deliverables

This deliverable is strongly related to others from WP7, namely the D7.1 (First outline of the New European STEAM Education Roadmap) and D7.2 (First version of the SENSE.STEAM Wiki). Both provide indispensable considerations and decisions on the

final product, the STEAM roadmap and its learning companion. The deliverable at hand aims to line up with these.

As the DEMTs are an essential part of the digital hub, the principles and objectives outlined in D2.3 (Desing principles for the digital hub STEAM Academy and Laboratories) provided necessary guidance.

The phase of the STEAM labs was a crucial stage of designing, testing, and evaluating educational materials. Consequently, the corresponding deliverables D4.2 (Report on the implementation activities of the STEAM Labs), D4.3 (Report on the SENSE.STEAM evaluation of the four specific areas) and D4.4 (Recommendations for the Roadmap and the learning companion) are related to the report at hand by comprehending the results of the implementation phase, e.g. by outlining details on practices, learning sequences, and impact of activities. Similarly, the toolkits were established during the STEAM lab phase and depicted as deliverables D5.2 & D5.3 (space toolkit) and (D6.2 & D6.3 (social inclusion toolkit).

Additionally, the educational materials and toolkits built on what was developed in the first year of the project, eventually resulting in the deliverables D3.1, D3.3, D3.4, & D3.5. Early considerations, experiences, and methodological backgrounds are to be found herein.

2. Background & Design Principles

This chapter begins by siting the digitized educational materials and toolkits (DEMTs) within the overall context of the project before going on to give an overview of design principles examined and used. Finally, this chapter arrives at an outline of DEMTs for SENSE. and the aims they seek to serve.

2.1. Background: Placing within the Project

The **digitized educational materials and toolkits** (DEMTs) are part of the supporting tools of the project's final product, the New European Roadmap to STEAM Education. This central outcome of the project provides, inter alia, resources and materials produced through the STEAM Labs via a digital hub (DoA (part A), pp. 3, 11).

Together with the unique SENSE. methodology the **digital hub** forms the backbone of the learning continuum, supposed to eventually grow into an open community that promotes STEAM and enriches the roadmap (DoA (part B), p. 24). It is intended to become a hybrid platform for knowledge and experience sharing between STEAM stakeholders (DoA (part A), p. 7). Therefore, it will include a repository of tools and reports, a STEAM Wiki and interactive spaces ("KPI 4.1" in DoA (part B), p.13) while providing both knowledge and policy recommendations for implementing the STEAM Roadmap (DoA (part B), p. 18).

Explicitly started by task 4.2 ("Development of educational materials by the STEAM Labs") and continued by task 7.3 ("Educational materials and toolkits"), this report also covers parts of task 7.4, which is dedicated to accompanying mechanisms that supposedly offer guidance through the diverse digital material. The tasks are attached as annex 1.

2.2. Starting Points

As outlined above (section 2.1), the digital hub will be the hybrid platform where all DEMTs will be collected and connected to each other. Consequently, the digital hub will be further examined as a starting point.

According to the **Description of Action (DoA)**, the digital hub

- is for sharing and co-creating knowledge in the large field of STEAM ((part B), p. 21), eventually supporting STEAM beneficiaries to co-create and take forward educational innovation ((part A), p. 31).
- is "part of an open community, supporting networking, knowledge and experience sharing, peer learning, etc." ((part B), p. 18).
- requires "an easy navigation and user-friendly interface" ((part A), p. 7).

- involves communication and networking tools to create synergies between stakeholders and support the evolution of the project's materials ((part B), p. 20).
- offers project outputs free for use as an upgrade to the project website ((part B), p. 23).

The previous deliverable D2.3 ("Design Principles for the digital hub STEAM Academy and Laboratories") has the end user, who creates, shares, and applies material, in mind and builds on the project methodology, especially the SENSE. manifesto as well as the cross-cutting issues space and social inclusion. It presents **three design principles** that place learners at the centre of creating, using, and growing the digital hub and available materials and tools:

Table 1: Design Principles for the Digital Hub

Principle	Explanation
Be generative	• Materials should encourage to go beyond replication, users shall expand, experiment, add their creativity • Structure of the hub (and activities) should encourage exploration
Be inclusive	• Don't prescribe activities as best for whom (rather suggest?) • Digital accessibility, universal design, linguistic inclusiveness • Hub shall use senses, avoid being purely visual, consider screen-readers
Go beyond digital	• UI/UX for materials that have physical space in mind • Hub shall promote new ways to overcome line between digital & physical • Materials should be platform/ device agnostic (tablet, desktop, mobile) • Materials to recognise varying levels of digitisation and access to devices

Assessed Needs for Designing & Implementing in the STEAM Labs

While the section before addressed the principles previously outlined for the digital hub, the next step is to further examine the principles derived from users' needs.

In early stages of the implementation phase, the needs of the STEAM beneficiaries were assessed across the STEAM labs (D4.1) to expand the insights that were already harvested via stakeholder interviews (D3.3). Then the desires that are common amongst various stakeholders from different areas were collated to generate needs to consider when designing and applying STEAM in order to have a higher chance of successful implementation (D4.2). The following components of the five principles (Assessed Needs across the STEAM Labs) were taken into account when reconsidering the "new" design principles for DEMTs (section 2.3):

Table 2: Assessed Needs in the STEAM Labs

Assessed Need	Examples relevant for the DEMT's principles
Consider Beneficiaries' Variety	No stereotypes, for all, share & exchange perspectives, foster empathy and involvement…
Accessibility	Different channels & tools, overcome constraints (language, pre-knowledge, …)
Change Agents	Promote networking, support & guide users
Transdisciplinarity	Transdisciplinary structure (show real-life applications, back and improve methodology, …)
Tailored practices	Responsive, real, personal, adaptive, flexible, spontaneous, …

Design Principles / Considerations from Lab Experiences

Herein the experiences from the implementation phase in the STEAM Labs are reflected to derive a few important notes for the DEMTs. The STEAM Labs were focused on developing materials and actions as foreseen (DoA (part A), p. 3), as thoroughly documented in the corresponding reports from the WPs 4, 5, and 6. When reflecting on the implementation and development of activities and corresponding educational materials and toolkits, the following important experiences can be noted:

- Flexibility and thoughtful adaptation as well as suitable variations are crucial keys to success.
- Inclusivity, accessibility, and multi-modality are important principles.
- Non-educators need appropriate support to adopt STEAM and SENSE.
- Core factors in activities: learner centeredness, fun, hands-on phases, (partly) taking agency, unconventional/ unique elements, responsiveness, sensorial experiences.

Inputs on design and content from earlier deliverables

Beyond the demands from the perspective of the project (DoA), the inputs from the digital hub design principles (D2.3), and the users (i.e. beneficiaries') needs, the following inputs on design and content were drawn from various previous reports:

- The design of DEMTs must match the SENSE. Visual Identity and align with the website structure. [D2.1]
- Consider potential users by displaying DEMTs relevance for beneficiaries by addressing specific needs and offering variations. [D4.2, chapter 5.1]
- DEMTs should fit with curricula and societal & industrial needs, have an impact on interest and participation and target EU policy areas. [D4.3]
- DEMTs should be flexible, adaptable, unique, creative, open-ended. [D4.4]
- The Roadmap needs a Learning Companion with adequate clarity & informativity on proven practices representing interdisciplinary STEAM learning materials,

embedded in a lasting & expandable interactive infrastructure to increasingly engage actors. [D4.4, chapter 4]
- Collaboration, personalization, fun, overarching themes of sensing and experience are superior to right or wrong. Promote STEAM, engage other STEAM actors. [D7.1]

2.3. Design Principles for DEMTs

The aim is to now generate a few comprehensive and elaborated design principles from today's perspective, harmonizing the visions from the DoA with what previous deliverables portrayed and the experiences from the STEAM Lab phase. The final digitized educational materials and toolkits should at least largely cover the following five resulting overall design principles:

Table 3: Design Principles for digitized Educational Materials and Toolkits

Principle	Description
Accessible	• Be inclusive by providing different channels & tools for multi-modal access addressing different senses. • Overcome constraints (language, pre-knowledge, ...), universal design. • Consider varying levels of digitisation and access to devices. • Materials should be platform/ device agnostic (desktop, mobile, tablet).
Flexible	• Focus on variety of potential end users. • Educational material to be unique and creative, but still flexible, spontaneous, open-ended. • Be responsive to facilitators, the process, and participants, by highlight adaptation and variations. • Don't prescribe activities as best for some, rather suggest. • Consider and rig physical space, offer ways to overcome line between digital & physical.
Encouraging	• DEMTs should be generative, to encourage beyond replication but rather to push users to creatively expand and experiment. • Convey fun, be learner centred, foster taking agency. • Show real-life applications to back/ improve models. • Go beyond the settings, (beyond classrooms, all groups & ages, across contexts...). • Encourage and guide to reflect on Space & Inclusion
Interactive & Durable	• Promote networking, allow to share and exchange opinions, perspectives, experiences. • Support and guidance for users, especially non-educators.

	• Tools to generate, collaborate, and enter; reduce barriers to provide (or improve) educational materials & toolkits. • Implement lasting, expandable infrastructure to increasingly engage actors. • Set up channels for interaction.
Interconnected	• Display relevance for beneficiaries and their needs (skills, participation, knowledge, problem-solving…) • Show alignment with curricula, industrial and societal needs. • Show advantages in impacts (motivation, interest, participation, inclusivity, creativity, real-world issues, …). • Show relevance for progress on EU areas. • Connect to STEAM wiki, structure and design aligned with VI and website, tools to generate & collaborate & share, ….

While these design principles are derived from previous principles, deliverables, and experiences, section 4.4 in comparison outlines principles the DEMTs aim to fulfil based on overall intentions and conceptual decisions within work package 7.

As the design principles imply, the DEMTs are supposed to be much more than an activity catalogue. Indeed, we rather work on (and support) an attitude towards teaching and target those who (are going to) share our attitude!

3. Stages of Developing DEMTs

This chapter explains different phases of developing digitized versions of educational materials and toolkits. The first stage is about the related processes that were already part of building the unique SENSE. methodology, while the second stage is dedicated to the implementation phase in the STEAM labs and outlines how the foundations for educational materials and toolkits were laid herein. The following stages 3 to 5 are no longer chronologically but thematically separated instead, describing how the structure (3rd stage), activity pages (4th stage), and toolkit pages (5th stage) were tackled in parallel. Each stage just provides an overview about series of efforts that went into it, consisting of discussions, prototypes, research, modifications, and else. The chapter hereafter (4.) elaborates the journey from the theoretical and methodological background of the SENSE. approach towards the digitized educational materials and toolkits, the chapters 5 and 6 show the most recent version of what was developed so far.

3.1. First stage: Methodology Development

In preparation for the SENSE. DNA workshop that was reported within D3.1 the consortium partners and associated partners of the project were asked to prepare a characteristic activity to conduct as part of a series of workshops at the in-person meeting. On the one hand, this led to participants being engaged in a bandwidth of different (learning) activities from various backgrounds and settings resulting in substantial experiences. On the other hand, it meant collecting practical interventions that were one important step on the way to build a common ground for knowledge and practices amongst the actors. These activities were documented using a simple template, at the time called “ID cards”, and fed into the report D3.4 about knowledge and practices, posing as an indispensable part of the unique SENSE. methodology.

This collation of practices in a uniform template embedded in methodological contexts can be seen as the first stage of developing educational materials within the project – especially, since it posed as a common ground for the implementation phase in the STEAM labs.

3.2. Second stage: Educational Materials and Toolkits in STEAM Labs

Subsequently, the STEAM labs represent the second stage of developing educational materials and toolkits. The so called “Learning Companion Visionary Workshop”, that was part of the Tbilisi project meeting in October 2023, heralded the second stage. The present participants shared understandings and visions on what the digital hub

might consist of by the end of the project, especially focusing on material that is supposed to support future users in attempts to apply the SENSE. methodology.

The previously mentioned task 4.2 (see section 2.1) explicitly instructed to develop educational materials within the STEAM labs in order to form and extend foundations for the final product – the STEAM roadmap and its accompanying materials & tools – in the implementation phase. This was achieved by inventing & composing (mostly educational) interventions, prototyping, testing & documenting all actions, and reflecting the activities. As elaborated in deliverable D4.2 (“"Report on the implementation activities of the STEAM labs”), different practices and learning sequences were implemented across multiple settings and reported using a comprehensive template, that included practical information, drawing connections to methodological aspects, and reflections on the conduction and outcomes of the individual activity. The collected reports were analysed to gain knowledge about supportive conditions, potential impacts on different beneficiaries, and to sort and categorize learning activities while identifying promising ones. The corresponding reports D4.2 and D4.3 offer further details.

In parallel, preliminary versions of the Space toolkit and the toolkit for social inclusion and gender awareness were developed. The experts from the consortium partners University of Barcelona and Hawkins Brown created specific strategies for profitably applying and reflecting on aspects of space and social inclusion, respectively, which were then implemented and evaluated across the STEAM labs. This was also reported in the associated deliverables D5.2 & D6.2. Eventually, the gained experience resulted in the self-experimentation toolkit for STEAM spaces (D5.3) and the toolkit for social inclusion and gender awareness through and for STEAM education (D6.3).

After this phase there was a range of SENSE. toolkits from different shapes and origins (as one could also consider the often-cited SENSE. manifesto a “toolkit”), along with example activities, experiences and premature case studies on particular educational sequences, accompanied by the aspiration to build a repository of useful and successful digital materials out of it that would complement the existing parts of the website and its digital hub, e.g., the STEAM wiki, and back the future roadmap.

3.3. Third stage: Content Sketch, Structure & Functionalities

As outlined in task 7.3 (DoA (part A)) the joint efforts now had to focus on harmonizing the educational model (WP3) with the educational materials, toolkits, and experiences derived from the implementation phase (WP4-6). The process of merging these materials will ultimately lead to an ideally enhanced digitised version of the building blocks, which will be embedded in the digital hub as the digitized educational materials and toolkits (= DEMTs).

The third, fourth, and fifth stage are running in parallel. Nevertheless, splitting them herein allows to depict them more clearly. The third stage is dedicated to the overall content and structure of the DEMTs on the digital hub, the fourth stage focuses on the activity pages, while the fifth stage describes the progress on the toolkit pages.

Content Sketches

The first sketch of what the DEMTs could consist of was already drafted during the STEAM labs in Spring 2024. At this point, a three-part structure consisting of example activities, SENSE.Toolkits [sic], and case studies was envisioned. Building on these potential elements, the task lead CREDA created an advanced visual that depicts the preliminary content of the DEMT website. Herein, blocks for evaluation considerations and for cross-references were added along with the option to download the DEMTs as a comprehensive booklet. Something that crystalized early-on was the metaphor of an iceberg, depicting any kind of content (i.e., learning material) on a surface level while offering the opportunity to dive deeper and explore the constituents below the surface. On an organizational level, the team working on the DEMTs set up multiple discussions with the toolkit experts, the digital hub designers, and the professionals for the methodological and roadmap topics in order to secure high levels of engagement and quality.
A later sketch of the what the DEMTs could consist of was created collaboratively within a Miro board, wherein some elements were added. The graphic below shows the components that were considered:

Figure 1: Content Sketch of the DEMTs from the WP7 Miro board

Although not depicted here, evaluation (as part of pedagogical tools) and useful cross-references (for example to the manifesto) still were part of the discussions.

Structure

Based on these efforts the experts from Velvet mapped a tentative structure that envisioned a landing page featuring multiple links as well as spots for the digitised materials that should be grouped into similar activities. These would be displayed as cards with a title and a visual along with some core information that allows users to imagine if the activity suits their interests or not. A click on a group of materials would lead to a selection of activity pages (see 3.4).

The landing page was elaborated further and given the name “SENSE. for you”, imagined as the entry point into the STEAM digital hub and especially the digitized educational materials and toolkits. Besides the DEMTs, it would offer a “Media” section (not further elaborated yet, possibly videos) and links to relevant aspects of SENSE., such as the methodology or the glossary.

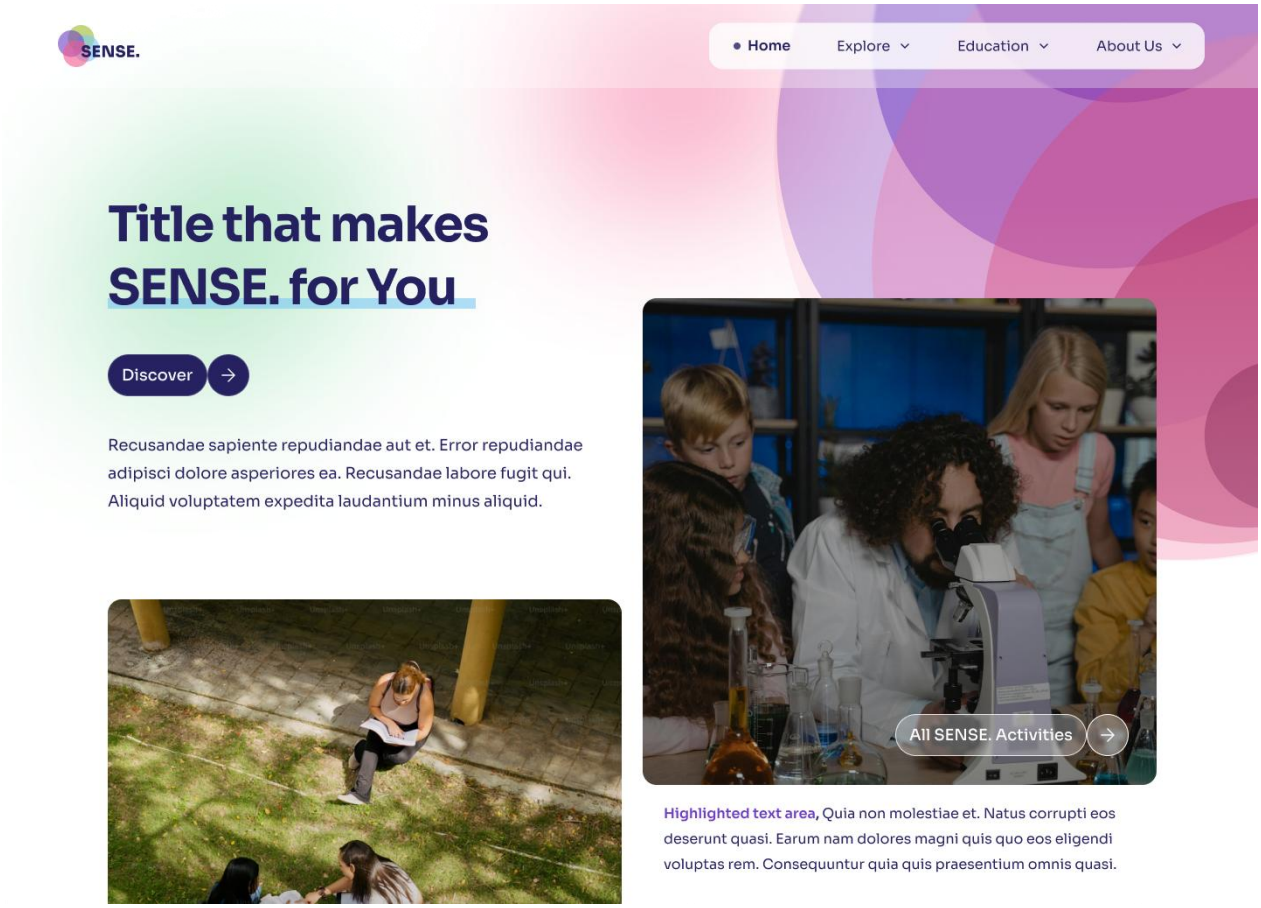


Figure 2: Visualization of the digital hub landing page "SENSE. for you"

The current SENSE. for you page offers information packages for different stakeholders, aka presentations about how they are addressed. These will probably be embedded in the future digital hub landing page as well.

Functionalities

As the digital hub is supposed to be a user-friendly, interactive and interconnected platform (see chapter 2), discussions about possible functionalities emerged early on.

Besides the aforementioned cross-links to methodology-related subpages, it seems important to enable users to reduce complexity and to actively engage with material. Thus, early thoughts involved:

- Sort-by option and filter-by option for the (grouped) activity pages
- Possibilities to share feedback on subpages, especially about practical implementations
- Opportunities to contribute to the DEMTs
- A search function

Of course, these all had an impact on the activity pages prototype and reveal the necessity of some sort of categorization (topic) or characterizations (keywords/ tags) for the activity pages.

3.4. Fourth stage: Focus on Activity Pages

Special attention was paid to the digitised descriptions of directly applicable or adoptable learning activities, as they are on the one hand the vital practical demonstration of the SENSE. methodology and needed for the early adopters of the educational model we promote. On the other hand, the implementation phase showed us the immense diversity of practices and (larger) learning sequences, particularly extended by the need for variations due to the adaptation of activities to specific contexts and particular needs, implying that the efforts of harmonizing, categorizing, and displaying learning activities would mean a remarkable joint endeavour. Accordingly, efforts in Summer 2024 included task forces specifically focusing on suggestions on how activities could be collected, displayed, and embedded in an interconnected information architecture.

Activity Page Prototype

A set of “areas of SENSE" which cover different approaches towards STEAM were developed to potentially serve as starting points when landing on the digital hub's DEMT page. A user would choose their interest (e.g., “Citizen Science”) and then be requested to pick what goal (e.g., “Being creative”) shall be achieved with an activity. This would result in receiving a selection of possible activities. Although the initial approach faded, this led to valuable insights on what an activity page should contain: a representation that conveys methodological and conceptual foundations while providing all relevant information for actual application or adoption (see section 4.2 [about challenge of DEMTs]). Sticking to the iceberg metaphor, the prototype visualisation of an activity page was imagined consisting of boxes, that are firstly displayed in a compact view, and each can be expanded with a mouse click. The basic information was put at the top, while further items found their way into lower sections, i.e. boxes, of the activity page draft (Annex 2).

This draft was refined and digitalized, resulting in a first tangible activity page display:

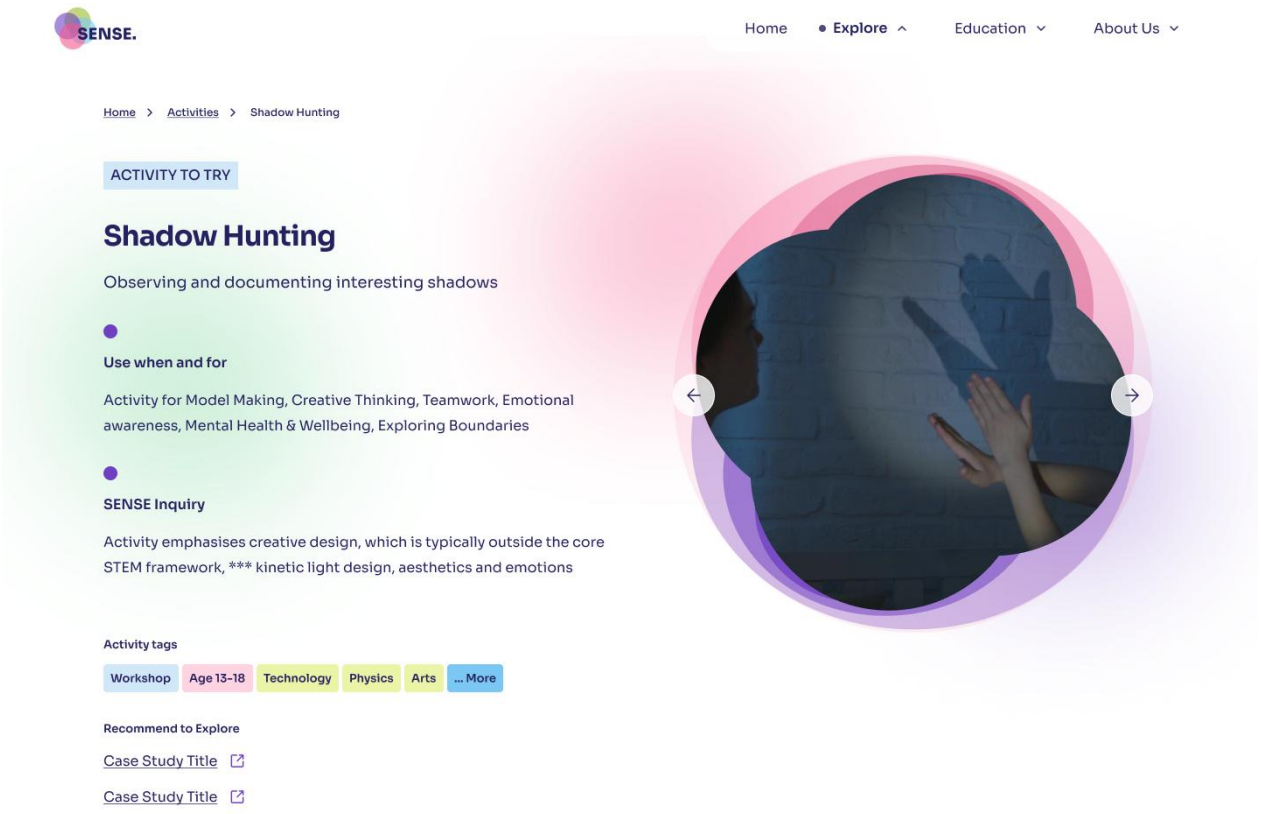


Figure 3: Digital prototype of a single Activity Page

The draft involves some visual upgrades, such as a header and a content overview as a sidebar menu. Additionally, the functionalities discussed at this point, such as keywords, media & download links, and the expand-collapse pattern (= a minimal view of the activity's core information with the option to make additional information visible in an extended view) were already implemented. The description would be supplemented by the possibility to give feedback or leave a review at the bottom of the activity page.
The most recent version of activity pages is elaborated in chapter 5 of this report.

Collecting Activities

Testing the activity page prototypes and its later versions led to identifying all considerable aspects that should be harvested when describing an activity for the website, eventually leading to an elaborated and revised draft template for activity collection. As the phase of the STEAM labs proved prominently, each application of a practice or learning sequence is full of singularities depending on individual circumstances. Thus, a template had to gather basic indispensable information on an

activity and additional information on a specific (successful) adoption. The challenge in forming the template laid in balancing the effort it would take to complete it and the bandwidth of potentially relevant information. The discussion whether to separate the activity description from the example application ended in the final decision to harvest the information together in the same process, as a mere blueprint of the unchangeable components would be pretty vague, and it is more efficient and lucid to compile a specific adoption.

The template is highly related to how an activity is foreseen to be displayed on the digital hub: The core information is at the top; the more detailed information equals the parts that are probably going to be hidden in the page's minimal view. The singularities of the case-specific application might be shown as variations, implying that the same activity can be written about more than once to refine the core information and suggest different alternatives of adaptation.
Conclusively, the template consists of the following frames:

Table 4: Frames of the Activity Collection Template

Frame	Content
Frame 1	Brief description
Frame 2	Detailed step-by-step description
Frame 3	Practical details (e.g., duration, space requirements, materials)
Frame 4	SENSE. relation (connections to methodology and curricula)
Frame 5 (opt.)	Concrete application (example application in a specific context)
Frame 6 (opt.)	Variations (further ideas how to alternate elements)

The template is attached as annex 3.

Ultimately, the challenge of choosing which activities (practices, learning sequences) to collect for the digital hub arose. As there are many possible ways to make a justified decision, the collection should still not be constrained by any criteria – as any approved learning activity that matches the SENSE. approach and is of premium quality should be heartly welcome. The future choice will surely be influenced by considering the corresponding activities' suitability for the early adopters we are progressively involving in testing the approach and materials. Also, it depends on which partners (or external contributor) engage on this, as their background affects the eligibility.
The currently planned activity pages are outlined in chapter 5.

3.5. Fifth Stage: Digitizing Toolkits

As described in the second stage (section 3.2), elaborate toolkits were developed in the implementation phase addressing the cross-cutting issues space and social inclusion and delivered as specific reports D5.3 and D6.3. On the way to create DEMTs, the aim is to foster a digital representation of both the toolkits embedded in a lucid and interconnected structure, that provides all valuable information and resources (i.e. strategies, reflections, practices, etc.) in a user-friendly and engaging way, ideally complemented with cross-connections within and beyond the project.

When considering a potential user entering the digital hub, no matter if they are an educator, organization/ business representative, learner, researcher, etc., each of them that chooses to dive into the Space toolkit or the Social Inclusion toolkit should be caught by providing information on *why* it might be valuable or successful to further engage with the toolkit.
As the structural development started with progressing on the Space toolkit, this would mean presenting a page that provides core information about "Why Space" as a starting point to delve into the toolkit. Some core motives include that a potential career relevant skill can be developed, that can even serve as an alternative approach to a range of topics, and enhancing spatial thinking can help to reduce complexity, e.g., making it a tool for problem-solving or organizing. From this point, the user would pick the next component according to their interests. Thus, the Space toolkit page shall present the options to engage in conceptual parts of the toolkits (motives, what is space, etc.), or to directly access descriptions of applicable experiments to implement in various contexts.
In a collaborative effort, the space experts from Hawkins Brown and the designers from Velvet developed a first version of the digitised Space toolkit along this aforementioned structure.

Analogously, the structure of the Social Inclusion toolkit is supposed to start with promoting the components per a "Why you should delve into this" entry point – and then offer different aspects to start your journey with, e.g., guiding questions for self-reflection, or approaches to explicitly or immanently engage with social inclusion.

Both toolkits might be placed on a dedicated landing page, which would potentially offer additional cross-links to relevant other content on the digital hub.
The most recent – and therefore official first version – of the digitized toolkits is outlined in chapter 6.

Other potential toolkits might be developed in the future, e.g., for evaluation and reflection of applying SENSE. activities, or for composing learning sequences (involving SENSE. practices) adapted to specific circumstances (see section 4.4).

4. Towards a Description of Digitized Educational Materials and Toolkits

The project summary of the DoA (part (A)) states prominently that SENSE. will provide a flexible roadmap towards a future-making and innovative STEAM education "by connecting schools with life and society with work" (p. 3). This implies a rather broad spectrum of potential users of the digitized educational materials and toolkits (DEMTs). In particular, DEMTs should be useful for both educators and non-educators and, analogously, for both users with and without prior knowledge of or experience with STEAM. This section describes the fundamental concepts and defining characteristics of SENSE. and develops the aspects that are relevant for the design of DEMTs.

4.1. General Characteristics and Intentions

The prospective fields of application — e.g. educational, societal, environmental, creative, and economical contexts — define several relevant use cases as, for example, STE(A)M teaching, group or community building, citizen science, or developing practical or social competences or work readiness. The project provides a robust methodology to achieve specific qualities in such application scenarios (see Deliverables D3.5, D4.2, D4.3):

- Learner Centredness
- Robust Practices for Citizen Science and Art Integration
- Robust Practices for STEAM Inquiry
- A Culture of Reflective Feedback for Learning Environments

Other typical features of SENSE. STEAM applications would include the integration of sensorial experiences, interdisciplinary approaches, and high adaptability.
The methodology for implementing SENSE.STEAM in concrete scenarios revolves around the concepts of learning sequences and practices. Here, *learning sequences* refer to events, interventions, exchanges, etc. focusing on communicating, teaching, learning, or researching a topic or issue (in whatever form). In the context of such a learning sequence or other activities, characteristic *practices* are used.

Additionally, the project developed the "Self-experimentation toolkits and design principles for STEAM spaces" (D5.3) and the "Toolkit for social inclusion and gender awareness through and for STEAM education" (D6.3). The first provides a rich set of ideas and activities for experiencing and exploring spatial qualities and creative transformations of spaces.

The second aims to make STEM education more inclusive and dynamic by integrating artistic processes, sensory experiences, and personal identity empowerment. It offers a flexible framework with examples, recommendations, and reflective tools to foster diverse and equitable learning environments and activities supporting adaptable, open-ended design, social inclusion, intersectionality, and participatory art.

4.2. Activities and Learning Sequences

A set of certain didactical attitudes are essential to the SENSE. project: STEAM activities and learning sequences should be open and accessible to all participants (especially for people who are potentially disadvantaged in traditional formats), they should be based on concrete experiences and events, they should promote creative or collaborative processes and encourage interdisciplinary perspectives.

The project has developed a set of methodological elements for conceptual concretization of such attitudes. These elements reflect both the fundamental didactic approach and the recognized principles of successful competence- and action-oriented learning. They are collected in the form of the SENSE. manifesto:

Figure 4: Elements of the SENSE. manifesto

Generally, SENSE. practices aim at implementing the methodological elements, serve as application of the SENSE.STEAM methodology, and include challenges that were formulated, for example, in connection with STEAM inquiry or address crosscutting issues such as space or inclusion. Activities (e.g. learning sequences) are to be designed using such practices.

In the context of DEMTs, the challenge is to develop a representation that equally conveys methodological and conceptual foundations while providing an appropriately diverse and lively depiction of the practical application of activities and practices. This includes the challenge of presenting the project's practical outcomes

(such as the developed activities and practices), the experiences gathered, and the conceptual objectives in a coherent way.

4.3. Toolkits

The Space toolkit and the Social Creativity toolkit provide concepts, methods, strategies, and practices for including our spatial or social environment in STEAM activities on different levels (from implicit to principal).
While both toolkits are already well documented (D5.3 and D6.3), there will be the challenge to develop a digital representation that highlights cross-connections to conceptual objectives both within and beyond the project, as well as points of intersection with other practices and activities. The process so far is outlined in section 3.5. The most recent, i.e. first version of the digitized toolkits is presented in chapter 6.

Additionally, the possibility of developing digital representations of other toolkits will be elaborated in the future.

4.4. Aspects for Content and Structure

Ambition of the Digital Hub

Conceptual discussions within the project identified four main tasks for a digital representation of the project:

Table 5: Four Ambitions of the Digital Hub

Presenting conceptual *points of departure*, e.g., the SENSE. Manifesto (Link) or the SENSE. methodology (Link)
Sharing SENSE. by presenting conceptual and practical materials such as policy briefs to inform educational practitioners, scientists, and the public
Reflecting and understanding SENSE. by presenting and inter-connecting the conceptual framework of the SENSE. project
Inviting to *Making SENSE.* by presenting the rich stock of practical examples, innovations, developments, or experiences of the project

These will have a big impact on the final structure of the website. Although the DEMTs then would probably put in the “Making SENSE.” array, the tasks are entangled and affect the ambitions the DEMTs aim to pursue.

Ambition of the DEMTs

More concretely, DEMTs should provide a comprehensive documentation of conceptual, methodological, and practical results of the SENSE. project. In conclusion, the following table shows the ambition of DEMTs in line with the overall philosophy of SENSE.:

Table 6: Ambition of the digitized Educational Materials and Toolkits

DEMTs should...
... make it easy for the future user to identify suitable materials and the potential for variation of presented materials
... provide strategies for adaptation and planning of activities or learning sequences
... support the design of learning environments or other activities as well as the didactical decision making, by providing conceptual background, scientific cross-references, or the project's evaluation results
... offer opportunities to get involved (share experiences, discuss content, collaborate, etc.)
... make it easy to comprehend the SENSE. approach and methodology

Addressing the Variety of Users

As mentioned above, the broad aim of the project for applicability across a spectrum of institutional teaching, societal and participatory applications, vocational training and professional development scenarios, as well as usability across all age groups, makes it impossible to precisely determine the range of future users and their needs in advance.

The partners within WP7 of the project decided on several principles for the design of DEMTs to address the immeasurable variety of potential users.

Table 7: Principles of the DEMTs to address Users

DEMTs should be	
essential	= present information in an incremental way, i.e. starting with concise basic information that can be interactively expanded
transparent	= explicitly and implicitly equipped with tags that enable cross-references with other content to be established
flexibly accessible	= accessible in flexible ways, e.g. by grouping along particular keywords, specific use cases, or beneficiaries
adaptable	= enable or support development of individual variations, modifications, or extensions of depicted activities or examples

These principles affect both the structure and the user interface of the DEMTs. Although there is naturally some strong overlap with the design principles outlined in section 2.3, the principles mentioned above are based on conceptual decisions.

Approaches as an Entry Point: Areas of STEAM

Additionally, it was considered during the conceptual phase to offer future users a complementary approach via *areas of STEAM*, i.e. a set of typical approaches for their respective application scenarios, e.g. investigations into light and colour, into plants, soil, sand, or stones, into designing and working with space or architecture, building

community-based activities such as citizen science, discussing and developing gender or societal issues, and future-making.
Although this is not elaborated by time of this writing, it might affect the overall structure and functionalities of the digital hub as well as the tagging system (see 5.2).

Composing SENSE. Learning Sequences

Last but not least, during the conceptual phase it was generally recognized that the integration of practices into activities from a STEAM perspective can only be meaningful and sustainable if certain steps are followed: future users need to reflect or understand which of the pedagogical intentions represented and developed in the project are suitable or appealing to them. The development of activities or learning environments should involve the respective target groups, at least in the form of needs assessments, and time requirements and resource planning should be aligned with the specific circumstances. A generic approach for planning activities was already described in D4.2, chapter 5.1. The task 7.4 (Annex 1) focuses on user guidance and self-experimentation; herein, this will possibly affect future steps as well.

5. Activity Pages

As discussed in chapter 2 and section 3.4, it is an essential part of the DEMTs to present activities that were developed, performed, evaluated, or modified within the project. By time of this writing, there is no final prototype for activity descriptions. However, the principles outlined in sections 2.3 & 4.4 will apply to any realizations. In this line, Velvet presented a draft.

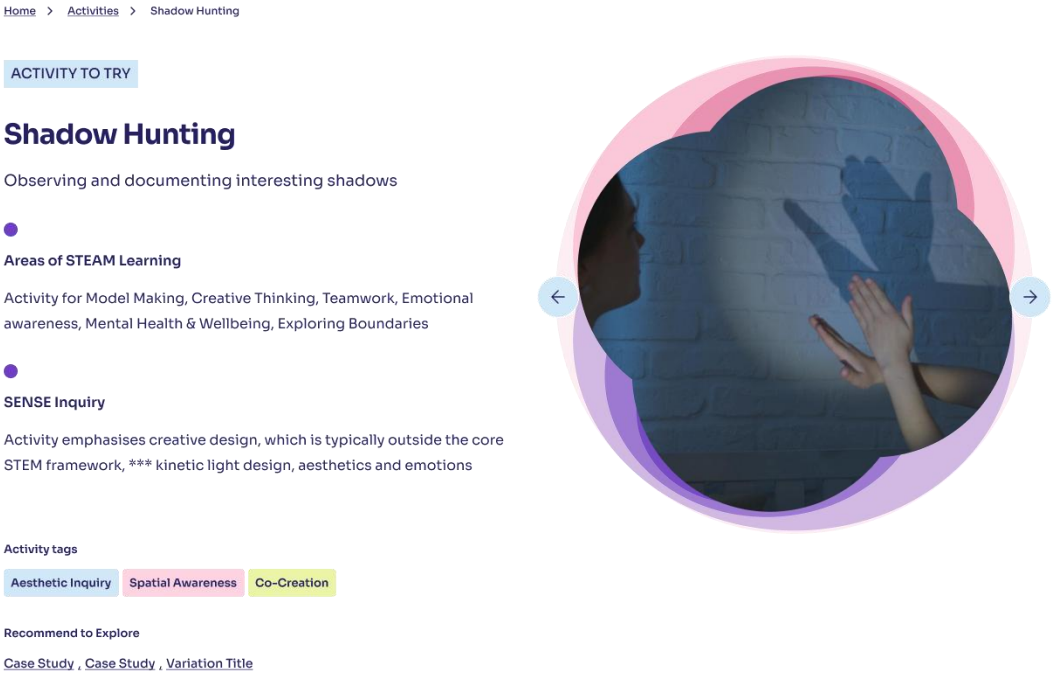


Figure 5: Example Activity Page displaying the activity "Shadow Hunting"

This draft already implements

- an elaborated design for the web page,
- an incremental approach towards presenting information,
- the presentation of visual materials,
- some ideas for the necessary orientation and navigation.

From the discussions within WP 7 it emerged that for a final version, there will have to be a balanced mix of substantial and even detailed information about properties and material or organisational requirements of an activity while, on the other hand, presenting the content in an inspiring and stimulating manner that clearly connects to the project's goals and ideas.

The draft activity page implements this by a hierarchical approach, a concept from computer programming. Each activity is described with an initial “parent” version. Variations, termed a “child” are then linked back to a parent version. In the latter case,

there are further variations. In this differentiation process, instances get more and more detailed and distinct attributes. This means after describing a main idea, (the parent), the concrete adaptations of different STEAM labs or future early adopters (the 'children') can be recorded and show how they differ in their attributes. This structure is depicted below:

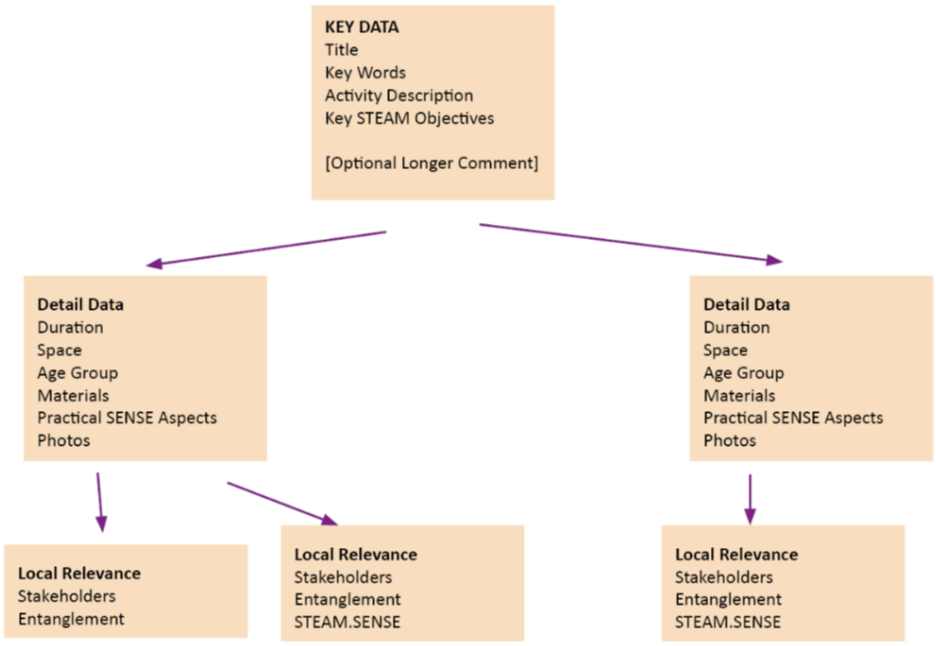


Figure 6: Hierarchical Parent-Child Structure for STEAM lab activities

Accordingly, the description of activities would start with a description of the main idea (again, the example is "Shadow Hunting") and offer variants that differ in certain parameters or (educational) goals:

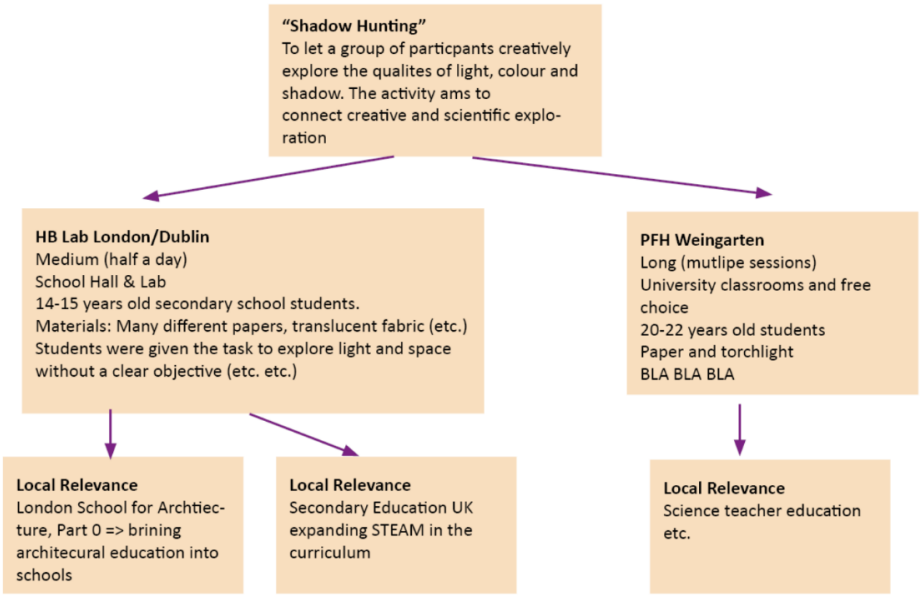


Figure 7: Parent-Child structure of "Shadow Hunting" with two variations

Transformed to the structure of activity pages, this parent-child structure means an activity page offers a main idea in the form of a blueprint description along with expandable information on details, and opportunities to delve into variations or real-life examples, which are for example derived from potential in-depth case studies.

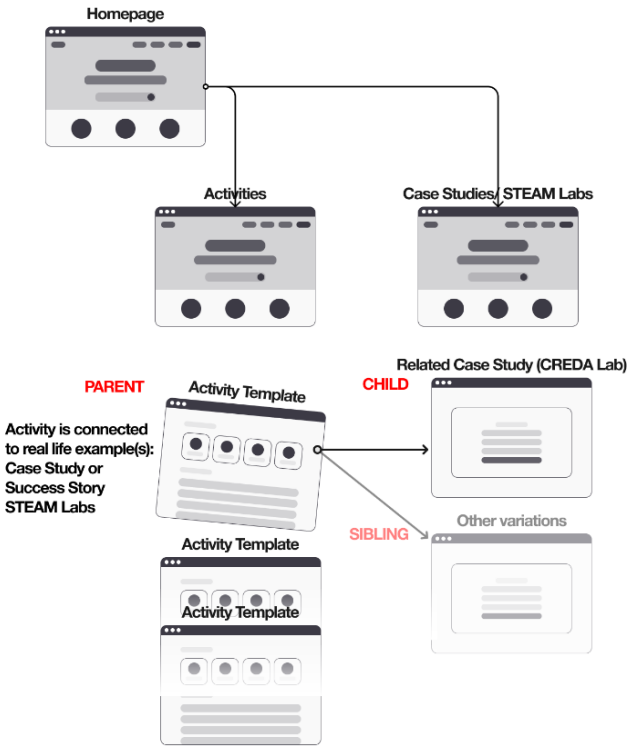


Figure 8: Parent-Child structure applied to the Activity Page prototype

The template for collecting activities for the digital hub as part of the DEMTs takes this ambition into account (see annex 3).

A future user would land on such an activity page based on their interests and conditions (e.g., via tags, see 5.2) and would possibly pick an activity with the objective to compose some sort of event, intervention or learning opportunity under a certain aim or educational intention (e.g., taken from the SENSE. manifesto). The variations and explicit examples are supposed to show the applicability across a variety of contexts and to encourage the adoption of this activity to eventually modify it to suit further potential applications. It is important to have the openness of the learning activities under the SENSE. approach in mind: *what you want* to do and achieve and *what you end up* doing and achieving might and may differ from each other. Adaptation, variation, and flexibility are keys to successfully implementing STEAM – the activity pages try to live up to this.

5.1. Planned Activities

As mentioned in section 3.4, there was no final decision on which activities to collect but rather the guideline to not limit potential components yet. For the first prototypes the WP7 team agreed to stick with activities that have the capacity to address a variety of elements of the SENSE. manifesto and at the same time have been successfully implemented across STEAM labs.

At the time of writing, we aim to publish activities gradually in the final months of the project after testing and feedback from early adopters. But as some are already in the process of being written, revised, and collaboratively enriched with example applications, it is possible to display the ones planned based on the abovementioned agreement. The activities below are sorted into four categories:

- Full description: detailed description and variations / example applications
- Blueprint description: detailed description
- Prototype: preliminary description (e.g., in older template)
- Planned: promising activities that are chosen to become activity pages

  ➔ Full description completed: Article from the Future, Bodyclock Architecture
  ➔ Blueprint description completed: DINE
  ➔ Prototype completed: House for the Fairy, Shadow Hunting *or* Light and Shadow, Photovoice, Drawing Sounds, Gender Norms
  ➔ Planned: Order of Things *or* Taxonomy (Soil), Extraterrestrial Life, Mapping Activities

5.2. Tagging System

To connect the interest and needs of future DEMTs users with the content, it is necessary to offer approaches and categories mapping educational intentions and boundary conditions to activities. This is achieved by a tagging system.
At the time of writing, there was no definite set of tags decided. However, tags need to reflect the key and detail data from the hierarchical representation as well as STEAM approaches (space, citizen science, social inclusion, scientific and artistic inquiry, sensual experiences, future making) and the educational elements from the SENSE. Manifesto.

At present, the design allows for tagging in 3 to 4 distinct taxonomies categorised with an easily recognisable colour code. Once a preliminary set of activities and variations have been documented and edited for consistency and clarity, the consortium will move to agree on a tagging and categorisation system to serve the needs of users (STEAM stakeholders). Time is set aside for undertaking this work when the consortium meets in February 2025. The aim of multiple taxonomies is to serve different stakeholder needs and different points of departure.

Figure 9: Potential tagging system depicted in the mobile view.

The figure (Fig. 9) above shows a mock-up of a potential tagging system, wherein the suggested taxonomies were selected by the UX/UI designer based on project content as a means of generating discussion. Therefore, it is not binding.

6. Toolkit Pages

The topics Space and Social Inclusion & Gender are crosscutting issues of the SENSE project. The work packages 5 and 6 are dedicated to elaborating the conceptual framework as well as guidelines for implementing activities with the respective focus. Together with policy briefs at the European level, each work package created a toolkit for use in conjunction with the activities described in chapter 5.
The toolkits detailed in deliverable D5.3 ("Self-Experimentation Toolkits and Design Principles for STEAM spaces") and D6.3 ("Toolkits for Social Inclusion and Gender Awareness through and for STEAM Education") serve as the inputs for creating digitised versions of the toolkits. These must present the existing content considering both possible amendments and the nonlinear structure of the medium. In both cases, the starting point is an outline of conceptual explications (section 3.5).

6.1. Space Toolkit

The Space toolkit consists of three main modules:

- Module 1: explains how SENSE. deals with physical space
- Module 2: explains the relevance of the subject to STEAM education and the SENSE. approach
- Module 3: lists 10 experiments as inspiration for STEAM stakeholders

The three modules are presented as an image-rich PDF (D6.3) with supporting visualizations (pictures, diagrams) to further illustrate the concepts and experiments. Work on the digital hub aims to digitise the content of the deliverable in a way that is suitable for a web-based context regardless of the users' device. The focus is on bringing out the essence with limited amount of text and making best possible use of the visual information.

A preliminary version focused on presenting the 10 experiments from a single landing. This would allow users to quickly get to descriptions of hands-on advice to be used in practice. After review of the prototype and collaborative work across the consortium, it was decided that the experiments need to first be placed in context by drawing on the content in Modules 1 and 2.

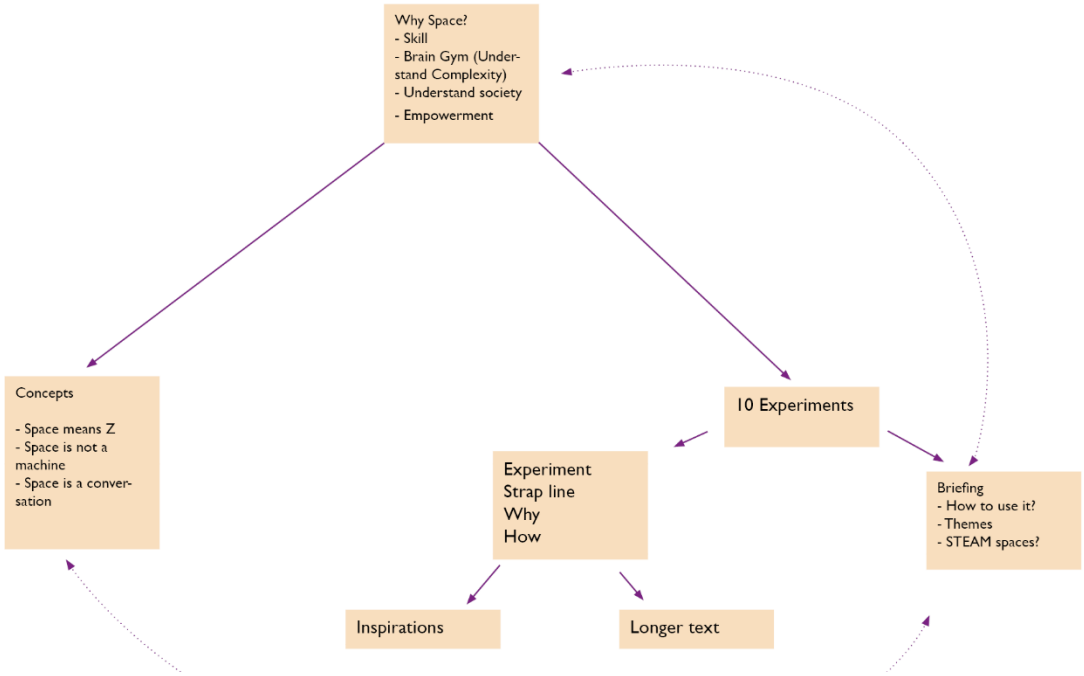


Figure 10: Conceptual Structure of the Space Toolkit

Mirroring the approach of the activities, each experiment will be presented with the most essential information in brief, followed by a detailed description.
For users interested in going further, the full PDF is available for download.

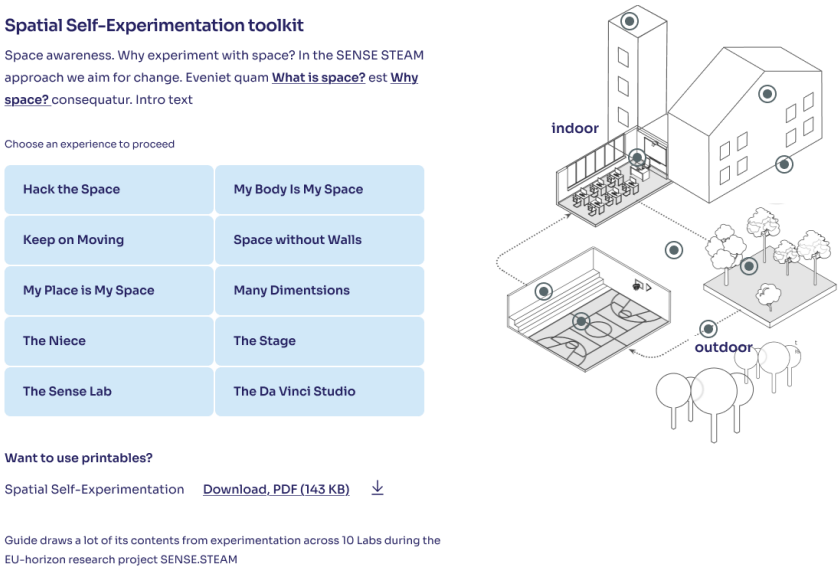


Figure 11: Space Toolkit landing page showing the 10 space experiments and option to download

The figure above (Fig. 11) shows the first version of the Space toolkit's landing page. Building on feedback, there are cross-links to introductory background information. The figure below (Fig. 12) shows an example of an experiment page, wherein the 'continue' button gives room for additional content.

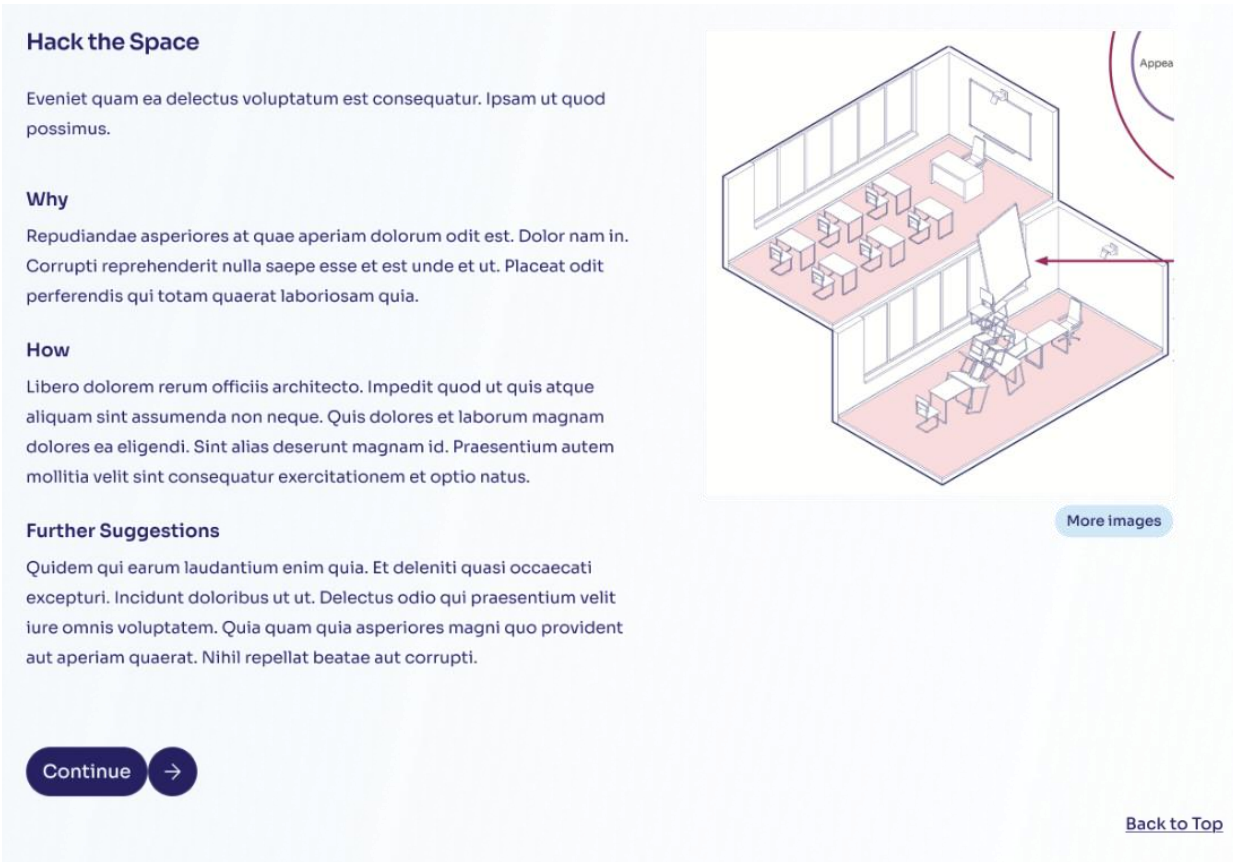


Figure 12: Prototype of a Space Experiment page with explanatory image

6.2. Social Inclusion Toolkit

The Social Inclusion toolkit was renamed into “Social Creativity Toolkit”, as this name better reflects the purpose of the components. The Social Creativity Toolkit uses self-reflective questions to help users navigate the remaining learning materials to consider their and users’ needs in planning and facilitating activities. This is designed to increase social inclusion by helping envision STEAM education through the lenses of citizen science, gender inclusion and participatory art.

After introducing the main concepts of social creativity, the preliminary prototype of the social creativity toolkit guides users through the toolkit in the form of a digital questionnaire for each of the self-reflective questions.

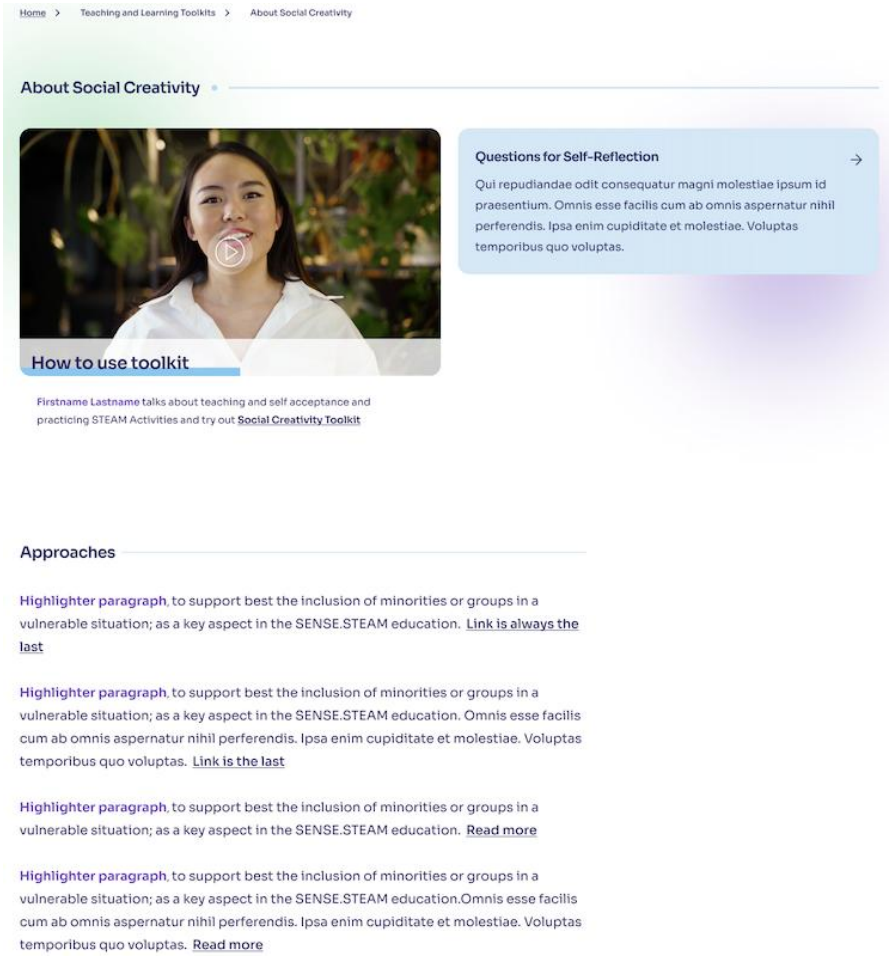


Figure 13: Social Creativity Toolkit landing page, offering self-reflection questions

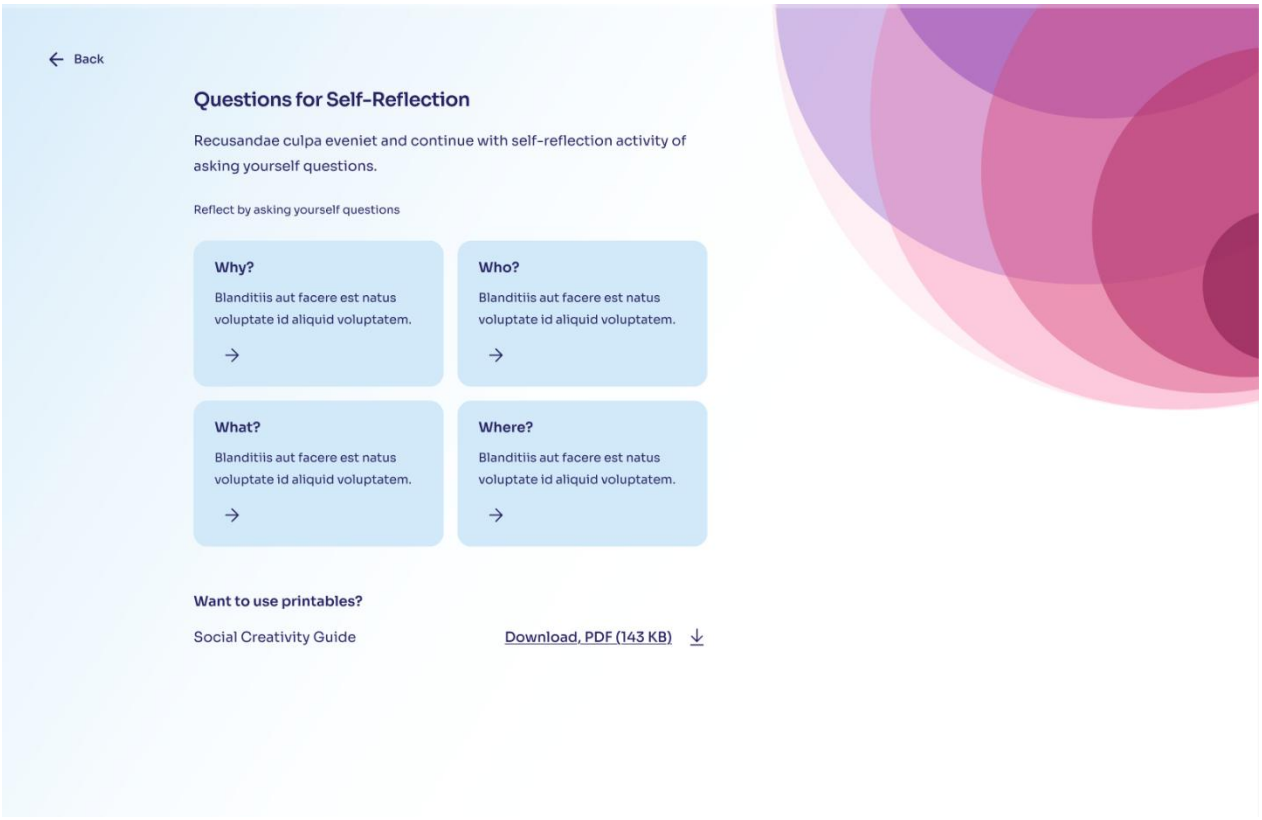


Figure 14: Self-reflection Questions page

Work on the Social Creativity Toolkit is less advanced than that of the Space toolkit. Further work will address the lack of visual material to present the concepts with more supporting graphics. Additionally, the toolkits will be designed hand-in-hand to ensure a consistent user experience.

6.3. Further Tools and supporting Material

The current state of design allows for incorporation of additional supporting materials. Of those completed in the project to date, many are available on the project website, within deliverables or the project's data bank.

These include:

- The SENSE. manifesto
- Academic publications informed by, and completed in conjunction with work on the project
- Reports and lived experiences during implementation and testing of activities in STEAM labs
- Reflections and supporting theoretical underpinnings of concepts used throughout the project.

Preliminary mock-ups for these exist in alignment with the overall visual language and user experience of the digital hub. These, however, have not been widely discussed across the consortium. The exact content means of linking to and including and needs of stakeholders will be addressed in upcoming work.

7. Results & Conclusions / Summary / Next Steps

7.1. Next Steps: Advancing SENSE. STEAM Materials Development

7.1.1. Formation and Tasks of the Writing Taskforce

To ensure the coherence and completeness of the SENSE.STEAM activities, a dedicated taskforce has been established. This team will prioritize drafting the remaining 'parent' activities, bringing the total to a minimum of 18. These activities will be structured following the standard format outlined in Chapter 5, ensuring consistency and clarity across the board. By focusing on this structured approach, the taskforce aims to provide a comprehensive foundation for the digital hub's educational content.

7.1.2. Prototyping and Feedback

In February 2025, a prototype encompassing around five activities will be presented to the consortium. This prototype will serve as the cornerstone of the upcoming Tallinn workshop, allowing for:

- Addressing diverse stakeholder needs.
- Establishing the tagging system.
- Developing a framework for selecting relevant variations of activities.

This collaborative discussion will help refine the activities further and set the stage for the roadmap's next phases.

7.1.3. Expanding Activity Variations

The taskforce will also draw upon material collected during the implementation of STEAM labs as part of WP 4. Reports, observational notes, and feedback from these labs will serve as primary sources for expanding and diversifying the variations of the parent activities. This process ensures that the content reflects real-world application and practical insights from diverse educational contexts.

7.1.4. Toolkit Development and Integration

Simultaneously, another taskforce is focusing on the development of supporting toolkits. These toolkits aim to enrich the activities by providing educators and

stakeholders with practical resources. Discussions at the Tallinn workshop will explore the most effective ways to integrate these toolkits with the activities. Linking the toolkits seamlessly with the educational materials will enhance usability and relevance.

7.1.5. Editorial Oversight and Finalization

As the activities, variations, and toolkits near completion, an editorial taskforce will take responsibility for:

- Ensuring clarity, consistency, and quality across all content.
- Inputting textual, visual, and multimedia elements into the Content Management System (CMS).
- Identifying opportunities for further enrichment of the materials.

This process will guarantee that the digital hub offers a polished and user-friendly experience.

7.1.6. Testing and Early Adopter Engagement

Once a test version of the digital hub is ready, it will undergo a thorough review by the consortium. This collaborative review process will help identify areas for improvement and ensure alignment with project goals.

In parallel, as the prototypes evolve, early adopters will be engaged to provide feedback. These stakeholders' insights will be invaluable in refining the activities and ensuring their practical applicability in diverse educational settings.

7.2. Conclusion

The development of digitized educational materials and toolkits for the SENSE. STEAM project is progressing steadily. A collaborative and consensus-driven approach has been pivotal in establishing a harmonized yet flexible format for documenting outputs. Initial visual prototypes have significantly facilitated discussions and laid the groundwork for the project's final stages. With these steps, the tangible realization of the Digital Educational Materials and Toolkits (DEMTs) and the SENSE. roadmap is now within reach.

The journey towards developing the digitized educational materials and toolkits for the SENSE. project has been characterized by remarkable progress and collaboration. By fostering a highly participatory and consensus-driven environment, the project has succeeded in crafting a framework that balances harmonization with adaptability – essential qualities for addressing diverse educational needs.

The initial visual prototypes have proven to be pivotal, serving not only as a tool for facilitating discussions but also as a tangible representation of the roadmap's vision. These prototypes have inspired productive dialogues among partners and established a strong foundation for refining the project's outputs.

Looking ahead, the combination of taskforce expertise, stakeholder input, and early adopter feedback ensures that the final outputs will be both innovative and practical. The inclusion of real-world insights from STEAM labs further enriches the materials, grounding them in authentic experiences and enhancing their applicability across various educational contexts.

Furthermore, the seamless integration of toolkits with activities is poised to empower educators and stakeholders, offering them accessible resources to facilitate impactful learning experiences. The meticulous attention to editorial detail, coupled with the incorporation of multimedia elements, will guarantee a user-friendly and visually engaging digital hub.

The forthcoming test version of the digital hub and the iterative feedback loops with early adopters signify the project's commitment to continuous improvement and responsiveness to user needs. These steps underscore the collective effort to create an ecosystem of resources that resonates with the evolving landscape of STEAM education.

Ultimately, the project is on track to achieve its goals. The realization of the Digital Educational Materials and Toolkits (DEMTs) and the broader SENSE. roadmap represents a significant milestone, not only for the consortium but also for the wider educational community seeking innovative, sensory, and interdisciplinary

approaches to learning. The impact of this collaborative endeavour promises to extend beyond the project's lifespan, shaping future educational practices and fostering a culture of creativity and inclusivity in STEAM learning.

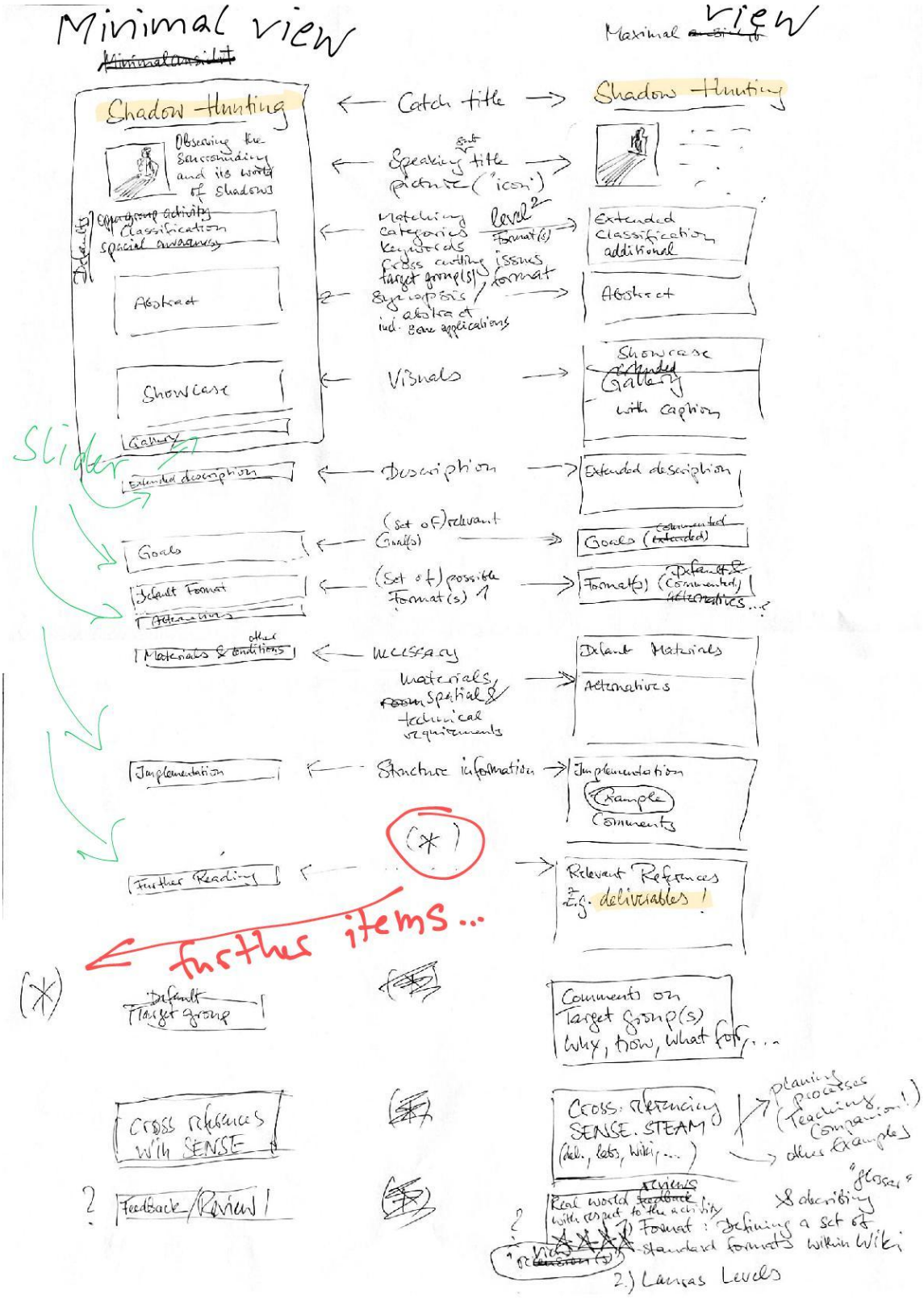
Annex 1: Related tasks from the Description of Action (part A)

Task 7.3 Educational materials and toolkits (M13-36): The SENSE.STEAM educational model as well as the educational materials from WP4 and toolkits from WP5 and WP6 will be harmonised and enhanced in digitised formats and added to the document library.

Task 4.2 Development of educational materials by the STEAM Labs (M13-24): All Labs develop educational sequences based on the results from WP3 through the three types of events. All Labs will pay attention to embed citizen science and art-science activities.

Task 7.4 Guidance, self-assessment and peer-learning (M24-36): Guidance on how to access and use the digital hub, use the different materials and interact with other community members will be developed, in particular the How-to-guide SENSE.STEAM learning companion. The consortium will develop SENSE.STEAM learning continuum support mechanisms together with the Associated Partners.

Annex 2: Draft Activity Page – First Sketch



Annex 3: Activity Collection Template

A template for presenting activities for the learning companion

This template is used to display SENSE.STEAM activities for the learning companion and digital learning hub. These activities will be implemented by educators and teachers. The activity and its potential should be presented in general, encouraging users to modify and implement it in their specific setting.

Tips when filling in the form

1. Try to keep the language as easy and clear as you can, also understandable for non-native speakers
2. Keep the texts as short as possible and as detailed as needed
3. Give clear instructions so that the activities can be implemented by people who are not specialists in your field
4. Provide a picture or graphics for illustration

[title of the activity you want to describe]	
Frame 1 – What in Brief	
Subtitle – a little bit more about it	
Keywords (tags) workshop, seminar, project, CS, practice, role play	
Activity description in brief (summary) Ca. 300 words Really important: Define the STEAM-specific objective of your activity! What do you exactly want to achieve?	
Frame 2 – What in detail	Describe what is useful or necessary.
A detailed description of the activity – a narrative Make it as precise and clear as you can, so that another person will be able to implement it. Preferably work with a step by step approach with time indication for each step	
Further readings	

Frame 3 – Practical details	
Duration E.g. elicit if a range is better than a fixed number, don't be specific if it is not helpful. But if it is, please provide this information. Some info about this specific case would be helpful.	
Requirements for space indoors / outdoors / lighting ... Formulate it positive, or negative Meaning did you try it in a place where it really does not work	
For whom? (age, group size, etc.)	
List of Material needed	
Practical aspects Barriers to be aware of. Any needed support related to space and context organization for learners' inclusiveness.	
Any extra practical tips for engaging lessons	
FRAME 4 - Why and how is the activity related to "SENSE.STEAM?	
The potential of this activity in relation to SENSE STEAM. You can consider several possibilities here: for example, the design principles of the manifesto or the indications of the social-creativity toolkit, or the insights from the space toolkit, or other links you find critical and that this activity could embrace/develop How is the activity linked to STEAM inquiry, to the nine capacities from lincoln center https://imaginationnow.wordpress.com/wp-content/uploads/2010/03/aeii.pdf to imagination.	
Connection to national Curriculum Which areas of formal curricula are touched?	
Entanglements Which areas of learning or topics are involved? Think broadly, beyond curriculum (e.g. cross cutting topics, encouragement, crossing boundaries?)	
Cross-cutting issues (digital technology, social inclusion, creativity, environmental sustainability, art(s), space, CS, work readiness, STEAM/ holistic inquiry, imagination, future making Also affirmative categories like "friendship" should be developed to go beyond technical thinking!	

Frame 5 – (optional) How has this activity been concretely applied in a real-world context?	
A short description of how this activity was implemented in your real-world context– for example, in your STEAM lab). Don't forget to describe here: 5. A little bit of the context to understand the implementation 6. Who were the participants 7. What were your goals 8. The type of learning journey where this activity was included 9. What were the entanglements/the areas of learning touched 10. The adjustments you did of the activity to suit your context, goals, needs	
Recommendations for composing a sequence with this activity Here please fill in which feedback activities worked best for you in connection with this activity. For example, one technique from the DAS Arts feedback or an evaluation or moderation technique like fast networking or body portraits? For das arts please watch the full video!!! https://www.atd.ahk.nl/en/theatre-programmes/das-theatre/study-programme/feedback-method-1/	
Frame 6 – (Optional) Possible Variations	
Possible variations Invite the user to be creative and stakeholder needs specific. If applicable, point out fields from the manifesto that you used for this activity.	