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ATRIUM – Advancing Frontier Research in the Arts and Humanities

Work Package WP7

Fostering Cross-Disciplinary Research through Training and Open Science

Deliverable D7.2

The Guidelines for Producing the ATRIUM Curriculum

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15 May 2024	v. 0.6	TT, VG	Draft for internal work package review
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30 Sept 2024	v. 1.0	TT, VG	Final draft

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List of Abbreviations

ANDI	Accessible Name and Description Inspector
APA	American Psychology Association
ARIADNE	ARIADNE Research Infrastructure AISBL
ATRIUM	Advancing Frontier Research in the Arts and Humanities
AUEB	Athens University of Economics and Business
BCDH	Belgrade Centre for Digital Humanities
CLARIN	Common Language Resources and Technology Infrastructure
CMS	Content Management System
DARIAH	Digital Research Infrastructure for the Arts and Humanities
D	Deliverable
DoA	Description of Action
DOI	Digital Object Identifier
ELEXIS	European Lexicographic Infrastructure
FAIR	Findable, Accessible, Interoperable, Reusable
IBL PAN	Instytut Badań Literackich Polskiej Akademii Nauk
INRIA	Institut national de recherche en informatique et en automatique
JAWS	Job Access With Speech screen reader software
NET7	Net7 Srl.
NLP	Natural Language Processing
NVDA	NonVisual Desktop Access
OER	Open Educational Resources
OEAW	Austrian Academy of Sciences
OPERAS	Open Scholarly Communication in the European Research Area for Social Sciences and Humanities
PIDs	Persistent Identifiers
PRISMA	PRISMA CULTURA S.R.L.
PSNC	Poznan Supercomputing and Networking Center
RI	Research Infrastructure
Skills4EOSC	Skills for the European Open Science Commons
SSHOC	Social Sciences & Humanities Open Cloud
WP	Work Package

1 Introduction

To maintain its competitive edge in research and innovation, Europe needs active users who keep up-to-date with the latest technological developments, appreciate the role of standards, and are themselves interested in contributing to the evolving landscape of research infrastructures (RIs). The social sustainability of research infrastructures and technology-enabled frontier research cannot be achieved without a highly skilled user base. That is why ATRIUM is dedicating significant resources to training and education, including virtual and in-person workshops as well as an innovative online curriculum to be published on DARIAH-Campus[1], a discovery framework and hosting platform for learning resources. Such an approach should guarantee the maximal exploitation of the assembled ATRIUM service catalogue[2] and boost Europe's place at the forefront of the global learning curve in the digitally-enabled arts and humanities.

These *Guidelines for Producing the ATRIUM Curriculum* (hereafter referred to as the *Guidelines*) provide a comprehensive set of recommendations and best practices for the creation, development, and presentation of training resources within the ATRIUM project. The overall goal of these *Guidelines* is to ensure that all training materials adhere to the highest standards of quality, accessibility, consistency and usability. At the same time, the *Guidelines* also align with the broader goals of the ATRIUM initiative to provide vastly improved access to a rich portfolio of state-of-the-art services available to researchers across countries, languages, domains and media.

Specifically, these *Guidelines* have three sets of goals:

1. Establish the general principles of Open Science and FAIR data (Findable, Accessible, Interoperable, Reusable) in the context of Open Educational Resources[3] (OER) as the overall framework for developing and disseminating the ATRIUM Curriculum;
2. Foreground the guiding pedagogical principles underlying the ATRIUM Curriculum to be published on DARIAH-Campus; and
3. Provide a detailed style guide for structuring and formatting ATRIUM training materials in order to ensure consistency across the curriculum, which will be produced by different project partners.

[1] https://campus.dariah.eu/ (accessed 24 Sept 2024)
[2] https://atrium-research.eu/services/ (accessed 24 Sept 2024)
[3] https://oercommons.org/about (accessed 24 Sept 2024)

It is important to note that the goal of these *Guidelines* is *not* to replicate the DARIAH-Campus documentation[4] on the use of the content management system (CMS) and other technical aspects of the hosting platform. Instead, these *Guidelines* focus on the principles and standards for creating high-quality, pedagogically sound, and stylistically consistent training materials.

For detailed information on using the CMS and other technical instructions, please refer to the DARIAH-Campus documentation.

2 The ATRIUM Curriculum

2.1 What is the ATRIUM Curriculum?

The ATRIUM Curriculum is a coherent set of courses to be hosted on DARIAH-Campus.

The main goal of the ATRIUM Curriculum is to contextualise the service offerings of the participating research infrastructures and other project partners within larger pedagogical narratives on digital tools and methods.

On DARIAH-Campus, a curriculum is defined as an ordered list of courses designed to provide a structured learning pathway for students. The structure of the curriculum should enable students to benefit from:

- **Sequential Learning**: An ordered curriculum ensures that learners build their knowledge and skills in a logical sequence, with each course building on the previous one.
- **Coherence**: A well-structured curriculum helps maintain coherence across different courses, ensuring that they collectively contribute to the overarching educational objectives.
- **Progression**: By following a predefined order, learners can progress through increasingly complex topics, which enhances their understanding and retention of the material.
- **Assessment Alignment**: A structured curriculum allows for better alignment of assessments with learning objectives, providing clear benchmarks for measuring student progress.

[4] See https://campus.dariah.eu/docs/about.

For an example of a curriculum on DARIAH-Campus, please check out the ELEXIS Curriculum[5]. This curriculum was developed for the European Lexicographic Infrastructure (ELEXIS), a Horizon 2020 project, with the specific goal of showing how the tools and services developed in the ELEXIS project were a) embedded in both lexicographic theory and practice; and b) representative of and contributing to the development of digital skills among lexicographers.

2.2 Target Audiences

Before developing a training curriculum, it is essential to first identify the target audiences who would benefit most from training and to assess the gaps between the current offerings and their specific needs. To achieve this, Task 7.1, entitled "The ATRIUM Skillset Assessment," has initiated a two-part study, outlined below.

Part 1: Skills Assessment Questionnaire for the ATRIUM Service Providers.
A questionnaire was conducted between April and July 2024 and distributed via email to the contact points of the service providers whose services and tools were listed in the ATRIUM portfolio[6], as originally identified in the project description. Its primary aim was to collect detailed information about the 47 services and tools offered within the project, including their intended users, the skills required to use these services, the availability of training materials and potential barriers that may prevent users from accessing them.

We identified contact points for each service/tool. If a provider offered more than one service/tool, the contact point was invited to complete a separate form for each. As a result, we gathered data about 45 of the 47 listed services and tools. While the responses are still under analysis at the time of writing this report, they offer valuable preliminary insights into the potential target audiences for the ATRIUM Curriculum, summarised in the following sections.

Furthermore, the services and tools have been published as the ATRIUM service catalogue[7] on the project website[8].

[5] https://campus.dariah.eu/curriculum/the-elexis-curriculum (accessed 24 Sept 2024)
[6] Service portfolio: Internal list that details all the services offered by a service provider, including those in preparation, live and discontinued (FitSM-0 V3)
[7] Service catalogue: Customer-facing list of all live services offered along with relevant information about these services (FitSM-0 V3)
[8] https://atrium-research.eu/services/

Part 2: Skills Assessment Survey for the ATRIUM Researchers

The insights collected in the first questionnaire will serve as a basis for a survey, which aims to perform a skills gap analysis and assess the training needs of the researchers and other user groups (e.g., data stewards) using the ATRIUM services. This survey is scheduled to be launched between October 2024 and January 2025.

As already mentioned, of the 47 targeted services and tools, we received a total of 45 answers.[9] The full results will be detailed in Deliverable (D) 7.1 to be published in the second year of the project (2025). To provide context for this report, the preliminary results of the questionnaire conducted with service providers have been made available, and a summary is included below.

To identify the target audiences for each ATRIUM tool and service, Task 7.1 employed the controlled vocabulary for audience types from the SSHOC (Social Sciences & Humanities Open Cloud) Vocabularies library[10]. Service providers were asked in the questionnaire to specify which audiences they focus on. Figure 1 below presents the types of audiences targeted by ATRIUM services and tools.

The initial analysis from Task 7.1's skills assessment highlights that "Researchers" and "Students" are the most frequently served audiences and should be prioritised in the development of the ATRIUM Curriculum. However, the results also suggest that "Citizen Scientists" and the "Public" should be included in the proposed training paths, as nearly half of the service and software providers identified them as key audience groups. Additionally, "Data Creators," "Data Providers," and "Repositories" were noted as relevant audience types.

[9] Questionnaire responses collected information about the following ATRIUM services and tools: 1. 3DHOP, 2. AMCR Digital Archive, 3. Annotorious, 4. ARCHE, 5. ARIADNE 3M, 6. ARIADNE Data Management Plan - Tool and Template, 7. ARIADNE EpHEMERA, 8. ARIADNE Lab VRE, 9. ARIADNE Linked Open Data, 10. ARIADNE portal, 11. ARIADNE Visual Media Service, 12. ARIADNE Vocabulary Matching Tool, 13. CLARIN VLO, 14. CLST Language and Speech Tools, 15. DARIAH Campus, 16. Datasheet Editor, 17. Dendrochronology Entity Recognizer (English, Dutch, Swedish), 18. Digital Repository of Scientific Institutes, 19. eScriptorium, 20. FBC, 21. GATE, 22. GATE Cloud, 23. Geobrowser, 24. GoTriple, 25. Grobid, 26. Journals of the Polish Academy of Sciences, 27. LINDAT Translation, 28. Metrics service, 29. Multilingual NLP for Archaeological Reports Ariadne Infrastructure, 30. NameTag, 31. NEXUS, 32. OCR4all, 33. OpenLIME, 34. Recogito, 35. Research Spotlight, 36. SSH Open Marketplace, 37. SSH Vocabulary Commons, 38. Switchboard, 39. TEITOK, 40. Tesseract, 41. Transformations: A DARIAH Journal, 42. UDPipe, 43. Virtual Transcription Laboratory, 44. Vocabs services, 45. X3ML Engine.

[10] See https://vocabs.sshopencloud.eu/browse/sshoc-audience/en/index.

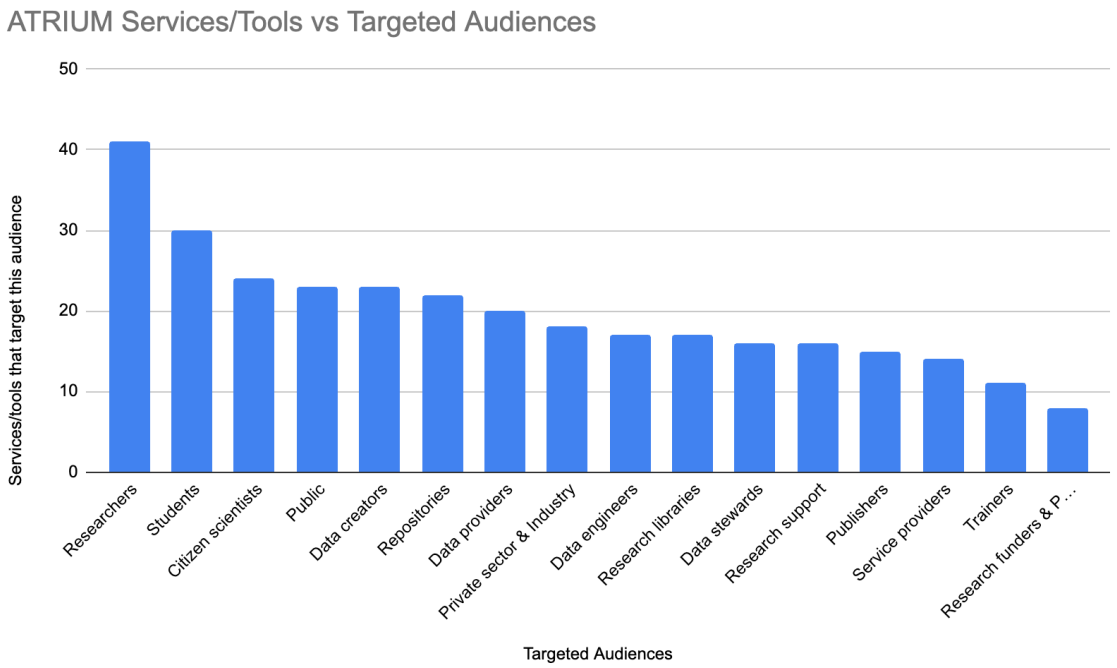

Figure 1. Targeted audiences for ATRIUM Services/Tools

While the audience categories from the SSHOC project used in this questionnaire are valuable for identifying the diverse groups that may benefit from ATRIUM services, it may not be practical to create tailored learning paths for every audience type. Instead, a more strategic approach is needed, focusing on key audience groups while ensuring flexibility to accommodate others. Additionally, it is important to recognize that the SSHOC target audience vocabulary defines user roles within the broader research ecosystem, without considering their specific academic disciplines or fields of study. This underscores the need for a cross-disciplinary approach in curriculum development.

Moreover, the proficiency levels of these target audiences must be factored in when designing learning paths. Audiences will likely range from beginners to advanced users, which will make the inclusion of clear prerequisites and progression paths a sine qua non for effective training.

2.3. Principles of Subject Selection

The subjects to be included in the ATRIUM Curriculum should be selected based on:

a. the skills gap analysis, which will be largely conducted as part of D7.1;
b. the current availability of training offerings both within the ATRIUM consortium and the wider ecosystem; and
c. the expertise and capacity of project partners in T7.3.

When selecting topics to be included in the curriculum, the following general principles should be followed:

1. **Relevance to the Target Audience**: The curriculum should address the most pressing needs and challenges faced by the target audiences identified in D7.1 (forthcoming) when using ATRIUM Tools and Services. Topics should be directly applicable to real-world scenarios and should equip learners with practical skills that can be immediately implemented in their work.
2. **Foundational and Advanced Topics**: The curriculum should offer a balance between foundational topics for beginners and advanced topics for experienced users. This ensures that the curriculum is accessible to a broad audience while also providing opportunities for advanced learning and professional development.
3. **Anchoring Tools in Digital Methods**: The users of ATRIUM Tools and Services should ideally acquire a conceptual understanding of the underlying principles and methodologies of open science and digital knowledge production, as well as hands-on experience with the particular ATRIUM tools that implement these methods. By integrating both, the curriculum ensures that learners are not only knowledgeable about why certain practices are important but also proficient in how to execute them. This balance helps bridge the gap between theory and practice, making the learning experience more robust and applicable to real-world scenarios.
4. **Survey-Driven Content**: Based on the survey results from D7.1, the curriculum should prioritise topics that respondents identified as high-need areas.
5. **Integration of Existing Resources**: The curriculum should avoid redundancy by incorporating and referencing existing high-quality resources. Where possible, existing resources should be integrated as external resources or described in 'pathfinders', guiding learners to external materials that complement the ATRIUM Curriculum. This approach ensures that learners are exposed to a wide range of perspectives and resources while maintaining the curriculum's coherence and focus.
6. **Cohesiveness and Progression**: The curriculum should be designed with a logical progression of topics, starting with basic concepts and gradually moving towards more complex subjects. This structure will help learners build a solid foundation before tackling more advanced material, ensuring a clear and coherent learning pathway.
7. **Flexibility and Modularity**: The ATRIUM Curriculum should be flexible and modular, allowing learners to engage with the material at their own pace and according to their specific needs. Courses should be self-contained, but also part of a broader learning journey that encourages learners to explore related topics and deepen their understanding of the subject matter.

2.4 Why DARIAH-Campus?

DARIAH-Campus is a core service of DARIAH-EU: a dedicated online training space which operates as both a hosting platform and a discovery framework, facilitating access to a wide array of training resources, including those hosted elsewhere within the broader digital humanities ecosystem.

While most users interact with DARIAH-Campus via a website[11], the platform itself is built on top of GitHub, the go-to collaborative platform where developers can store and manage their code, track changes and work together on projects. This means that all the training materials provided via DARIAH-Campus are open and versionable by design. Training content providers can draft, edit and improve what they publish without losing previously stored and/or published versions. In a similar fashion, members of the broader community can suggest updates to improve or amend existing resources. The versioning capabilities ensure that all iterations of content are preserved, promoting transparency and enabling users to track changes over time.

At the time of writing (August 2024), there are over 150 training resources catalogued or hosted on DARIAH-Campus. The site supports both text-based and video-based course materials. It also offers an innovative *captured event* format that brings together all the outputs of a face-to-face training event, such as a summer school or workshop, to enable asynchronous learning for non-attendees. In addition, it offers so-called *pathfinders*: contextualised reviews of existing training resources on a given topic from universities, projects and other research infrastructures.[12]

The inherently open nature of DARIAH-Campus ensures that the resources published there by the ATRIUM project will be easily findable, accessible, interoperable and reusable, in line with FAIR practices. The Persistent Identifiers (PIDs) attributed to all hosted resources, pathfinders and captured events support this sustainable approach. This approach consolidates DARIAH's overall commitment to Open Science, further demonstrated with the DARIAH-Campus Reuse Charter[13] that highlights the importance of reciprocity, interoperability, citability, openness, stewardship, and trustworthiness in learning materials.

[11] See https://campus.dariah.eu/
[12] See, for instance, https://campus.dariah.eu/resource/posts/dariah-pathfinder-to-data-management-best-practices-in-the-humanities.
[13] DARIAH-Campus Reuse Charter https://campus.dariah.eu/docs/reuse-charter (accessed 25 Sept 2024)

3 Open Science and FAIR

The principles of Open Science are not only an integral part of the ATRIUM methodology, but directly embedded into the missions of the four research infrastructures at the core of the project (DARIAH, ARIADNE, CLARIN, and OPERAS). As an infrastructural project, ATRIUM promotes:

- **Diamond Open Access publishing**: Making scholarly research outputs freely available online to anyone without financial, legal, or technical barriers.
- **Open data and data sharing**: Data that is freely available for anyone to access, use, modify, and share without restrictions.
- **Open source distribution**: Source code that is available to the public for inspection, modification, and distribution.

The commitment to Open Science is therefore also an integral part of the way ATRIUM wants to design and implement its pedagogical offerings within the project by facilitating the accessibility, transparency and reuse of the ATRIUM Curriculum.

3.1 FAIR-by-Design

Filiposka et al. (2023) observe that applying FAIR principles to training resources often occurs only after the resources have been produced, leading to wasted time in revisiting and revising materials. Instead, they advocate for a FAIR-by-Design approach, whereby "FAIR-ification is being implemented throughout all stages of the learning materials development process from the inception to the release for use" (Filiposka et al, 2023, p18).

The ATRIUM Curriculum, designed to equip learners with the skills needed to use ATRIUM Tools and Services, should adopt the 'FAIR-by-Design' approach to maximise its impact and efficiency. By integrating FAIR principles from the outset, the Curriculum ensures that its resources are easily findable, accessible, interoperable, and reusable. This proactive strategy not only enhances the quality and usability of the materials but also facilitates collaboration and knowledge sharing among educators and learners. Implementing FAIR principles during the initial development stages prevents the need for extensive revisions later, saving time and resources. Moreover, it supports the scalability and adaptability of the curriculum, allowing it to be tailored to diverse educational contexts and evolving technological landscapes. Ultimately, a 'FAIR-by-Design' ATRIUM Curriculum fosters an inclusive and sustainable learning

environment, aligning with contemporary educational standards and promoting lifelong learning.

The proposed Fair-by-Design methodology suggests the following criteria are required for FAIR learning resources, called *objects* within this list (taken from Filiposka et al, 2023, p26-27):

- FAIR learning objects are digital;
- FAIR learning objects contain learning content and information on tools and implementation resources;
- FAIR learning objects have an explicit learning objective;
- FAIR learning objects tend to be, but are not necessarily, small or granular in nature;
- FAIR learning objects tend to be, but are not necessarily, disassociated from context;
- FAIR learning objects are stored in a repository;
- FAIR learning objects are described using a metadata specification;
- FAIR learning objects are findable through searching a catalogue;
- FAIR learning objects are interoperable in that they can be used in multiple learning environments;
- FAIR learning objects are reusable by both other instructors and learners;
- FAIR learning objects can be repurposed for different learning contexts;
- FAIR learning objects are composable into aggregates.

3.2 The FAIR-by-Design Checklist

In a checklist of actions to ensure 'FAIR-by-Design', the Skills4EOSC (Skills for the European Open Science Commons) project[14] recommends the following steps (adapted from Filiposka et al. 2023, p76):

1. **Understand the FAIR principles**: An understanding of the FAIR principles includes understanding how they relate to metadata schema and controlled vocabularies, PIDs, data and collections in repositories, as well as issues relating to intellectual property rights, copyright, licences and attribution.

[14] https://www.skills4eosc.eu/

2. **Define the learning goals**: To do this, one should pay attention to the target audience, and set clear learning objectives accordingly. Microcredentials[15], prerequisites and other requirements should also be defined.
3. **Find existing materials**: There is no point in re-inventing the wheel, so the ATRIUM project should try to re-use existing training materials (where licensing allows) from the learning platforms of the ATRIUM service providers and from trusted Open Education Resource (OER) repositories and projects such as PARTHENOS[16], DESIR[17], and SSHOC[18].
4. **Design the structure**: Existing materials can be combined with new materials to create new knowledge, while ensuring licensing compatibility.
5. **Create the content**: Select a format for both drafting and publishing the resource that is suitable for the content, define the hierarchical metadata and then build in opportunities to periodically conduct quality assurance checks. In the particular case of the ATRIUM Curriculum, we will use the formats and metadata requirements established by DARIAH-Campus.
6. **Publish the materials**: Materials should be published on a trusted sustainable learning platform (in the case of ATRIUM, this will be DARIAH-Campus) with PIDs to ensure sustainability and longevity.
7. **Increase visibility**: Materials should be listed in OER catalogues that are relevant to their target audiences, defining the access and reuse rules and also giving accurate attribution to their creators. A feedback loop should be established to allow users to submit alterations either for correction or improvement.
8. **Quality check**: In line with requirements in step 5, a quality assurance check should be conducted, ideally by an external examiner, to determine if the materials are ready for publication and to address any issues that may be identified.
9. **Verify fairness**: While FAIRness has ideally been built into the training materials by design, it is a good idea to check that the resources are findable, accessible, interoperable and can be reused without issue according to licensing.
10. **Improvement**: Having reviewed any feedback on the materials, it is desirable to collaborate and co-create materials with the target audiences while identifying goals for improvement.

[15] For an explanation of 'microcredentials' from a European context, visit: https://education.ec.europa.eu/education-levels/higher-education/micro-credentials (accessed 25 Sept 2024)
[16] PARTHENOS Training Suite: https://training.parthenos-project.eu/ (accessed 25 Sept 2024)
[17] DESIR Training resources on DARIAH-Campus: https://campus.dariah.eu/source/desir/page/1 (accessed 25 Sept 2024)
[18] SSH Open Cloud project training: https://sshopencloud.eu/training (accessed 25 Sept 2024)

Within the context of DARIAH-Campus, the prescribed platform for training resources resulting from the ATRIUM project, the design is such that learning resources can be any size, and therefore easily reusable and interoperable as part of a wider curriculum.

3.3 Use of External Sources

As already mentioned in section 2.3 above, it does not make sense to recreate training resources that are already publicly available elsewhere. For this reason, it may occasionally be necessary to draw the learner's attention to a resource external to ATRIUM. Where this is necessary, external resources should be openly accessible and available on sustainable platforms, such as institutional repositories and sites with Digital Object Identifiers (DOIs).

Linking to external content such as interactive Jupyter Notebooks on proprietary services such as Google Colab is not recommended, as these services are often removed with little warning and are not guaranteed to be sustainable. If external services must be used within the training resource, these should ideally be from a trusted and sustainable third-party platform.

4 Pedagogic Principles

4.1 General Principles

The ATRIUM Curriculum should be centred around a set of pedagogical principles ensuring that the training resources developed within the project are effective and engaging for learners. These principles include:

- **Learner-Centred Design**: Resources should be developed with a focus on the needs and experiences of the learners, providing clear objectives and outcomes.
- **Active Learning**: Materials should encourage active participation and engagement, using interactive elements such as multiple-choice quizzes and practical exercises to enhance understanding and retention.
- **Inclusivity**: Training resources should be designed to be inclusive, catering to diverse learning styles and backgrounds.
- **Assessment and Feedback**: Resources should include mechanisms for assessment and feedback, allowing learners to gauge their progress and instructors to improve the materials continuously.

4.2 Learning Objectives vs. Learning Outcomes

Learning objectives and learning outcomes are both integral components of the educational process, but they serve different purposes and have distinct characteristics:

- **Learning objectives** are specific statements detailing the intended goals of a course or learning activity. They describe what the authors of the training resource aim to teach or what topics the students are expected to cover in a given course.
- **Learning outcomes** are statements that describe what students are expected to know, understand, and be able to do after completing a learning activity or course. They reflect the end results of the educational process.

Every ATRIUM course on DARIAH-Campus should include both the overall learning objectives and the specific learning outcomes. The learning objectives are described in the first, introductory paragraph of each course. In comparison, the learning outcomes are written in a separate section, following the introductory paragraph, and should be written using bullet points.

The following table provides examples that help to distinguish between objectives and outcomes:

Table 2. Distinguishing between Learning Objectives and Learning Outcomes

	Objectives	Outcomes
Purpose	Statements that define the expected goal overall	Statements that reflect what the learner will be able to do as a result of completing the course
What do they define?	What the instructor wants (to cover)	What the student gets (to be able to do)
Structure	May include verbs such as: introduce, cover, discuss, explore, study, present, etc.	May include verbs such as: identify, distinguish, understand, recognise, use (a tool or a method), implement, demonstrate, categorise, compare, differentiate, apply, evaluate, create, etc.

Example	The goal of this course is to provide a basic introduction to e.g. dictionaries, their structure, and ways in which dictionaries evolved over time.	Upon completion of this course, students will be able to: - appreciate the complexity of the dictionary genre and its history; - analyse the structure of a dictionary entry; - categorise dictionaries based on their content and/or target audience; - understand the role played by the medium in which the dictionary is compiled and consumed.

Example from the ELEXIS Curriculum:[19]

Course

Introduction to Dictionaries

Learning objectives

The goal of this course is to introduce a brief history of dictionaries as tools for the organisation of knowledge about words and their meanings, and to analyse different ways of understanding and classifying the dictionary genre. In order to do so, the course will cover the constituent parts of a dictionary (megastructure, macrostructure, microstructure and mediostructure) as well as different kinds of dictionary typologies, including those based on source and target languages (monolingual, bilingual, multilingual); types of language(s) and topic(s) covered (general language, encyclopaedic, terminological); medium (print and electronic); semantic structure (onomasiological vs. semasiological dictionaries); and target audience (literate adults, language learners, language professionals)".

Learning outcomes

Upon completion of this course, students will be able to:

- *appreciate the complexity of the dictionary genre and its history*
- *analyse the structure of a dictionary entry*
- *categorise dictionaries based on their content and/or target audience*
- *understand the role played by the medium in which the dictionary is compiled and consumed.*

[19] The ELEXIS Curriculum in full can be found at https://campus.dariah.eu/curriculum/the-elexis-curriculum (accessed 25 Sept 2024)

4.3 Prerequisites

Prerequisites are vital in setting a clear baseline for what learners need to know to successfully engage with and comprehend the course material. By specifying the necessary prior knowledge and skills, the curriculum helps prevent frustration and disengagement that can occur when learners are unprepared for the complexity of the content.

For instance, a course on the Use of Linked Data in Archaeology might require learners to have a solid understanding of basic metadata concepts and be familiar with web technologies such as HTML and XML. Without this foundational knowledge, learners might struggle with the more advanced topics covered in the course, leading to a diminished learning experience.

Each course published as part of the ATRIUM Curriculum should therefore include a section on prerequisites, both in relation to the learners' background (for instance, basic or advanced information and communications technology skills, familiarity with Natural Language Processing (NLP) methods, or Java programming) and, when relevant, in relation to other courses in the ATRIUM Curriculum. This structured approach should allow learners to build on their knowledge incrementally, reinforcing their understanding as they progress through the curriculum.

By clearly defining prerequisites, the ATRIUM Curriculum should set learners up for success, ensuring they can fully engage with the material, achieve the intended learning outcomes, and progress confidently through the curriculum. This approach will not only enhance individual courses but also strengthen the overall structure and coherence of the ATRIUM Curriculum.

4.4 Quality Assurance

All resources will be created and/or curated by experts within the ATRIUM project, under the guidance of members of Work Package 7, led by OPERAS, with considerable input from other leading practitioners and scholars from DARIAH, OEAW, PSNC, CLARIN, PRISMA, Net7, IBL PAN, BCDH, FOXCUB, INRIA and AUEB. This work will be further supported by other work packages within the project as they develop services and gain an understanding of their audiences.

Before resources are made publicly available, learning and training resources will be subject to a reviewing stage, internally within the WP7 membership. It may also be

necessary to add a second reviewing phase, soliciting feedback from experts external to the ATRIUM project, depending on the scope and intended audience of the resource.

Wherever possible, resources should support hybrid-learning practices, including 'Flipped Classroom' approaches, and asynchronous self-directed learning. Where face-to-face in-person training is required, the *Captured Event* option available on DARIAH-Campus should be used to ensure the relevant and pertinent information is presented *post hoc* in a structured and easy-to-follow format to support asynchronous self-directed delivery.

5 The Style Guide

5.1 Why do we need a style guide?

Establishing and following the style guide for the ATRIUM Curriculum is important as a way of ensuring:

- **Clarity and Conciseness**: Content should be written clearly and concisely, avoiding jargon and complex language.
- **Visual Consistency**: Resources should adhere to a uniform visual style, including guidelines for fonts, use of colours, and layout.
- **Content Structure**: Materials should follow a structured format, with clear headings, subheadings, and sections to facilitate easy navigation.
- **Citation and Attribution**: Proper citation and attribution practices should be followed to acknowledge the contributions of others and maintain academic integrity.

As mentioned, DARIAH-Campus is currently managed using a content management system (CMS) that sits on top of a GitHub publishing framework. This allows for version control, and also for editing via both direct Git access, and the CMS. The full instructions and user guide for how to edit and publish resources on DARIAH Campus can be found on the DARIAH-Campus 'Documentation' pages[20], and therefore will not be reproduced here.

The use of the CMS already provides a level of consistency across the resources hosted on DARIAH-Campus in terms of the overall structure, required metadata elements and visual uniformity (utilising pre-chosen fonts, colours and design elements which maintain a cohesive visual style across all materials). However, authors may still need additional instructions to ensure the highest quality and usability of the resources,

[20] https://campus.dariah.eu/docs/about

especially in terms of the writing style (tone, language and clarity, spelling conventions, etc.) and accessibility.

5.2 General House Style

This section covers the general house style across the entire DARIAH-Campus platform. Specificities of the different resource types are dealt with separately below.

An example of a Hosted Resource[21] in the DARIAH-Campus House Style is also available for reference.

5.2.1 Authors, Contributors and Editors

Authors are a required field for all resources. However, if the resource requires a distinction between the different types of contribution to the creation of a resource, there is also the option of using the 'contributing authors' and 'editors' fields as appropriate. Do note, Authors and Contributing Authors are listed together in the automated citation in the order in which they are entered into the CMS. Editors are listed separately. An example of this can be seen below:

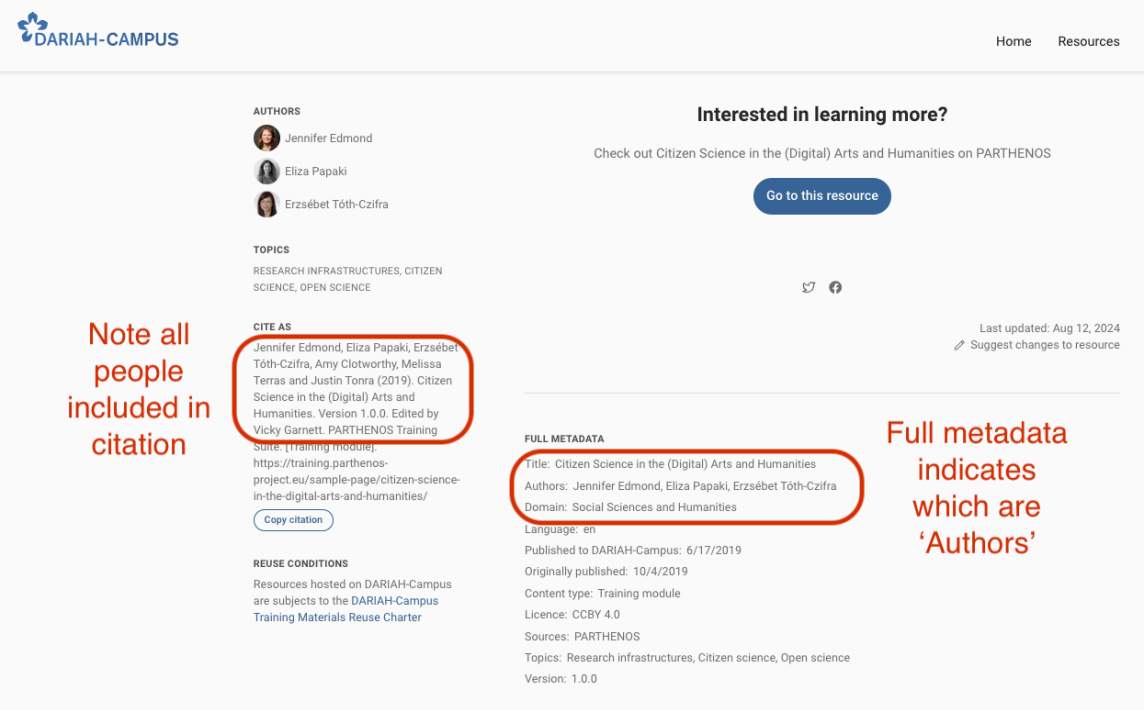

Figure 2. Demo of citations in DARIAH-Campus

[21] Example Hosted Resource on DARIAH-Campus https://dariah-campus-kdv14sh59-dariah.vercel.app/resource/posts/this-is-an-example-of-a-hosted-resource (accessed 25 Sept 2024)

All authors must be accompanied with a profile photo. This should be in a 1:1 (square) dimension, in either JPEG or PNG format, and no smaller than 150 x 150 pixels (approx 17KB in file size), no larger than 500 x 500 pixels (approx 300KB file size).

5.2.2 Titles

To a large extent, the capitalisation of titles of resources follows the APA style guide quite closely. That is:

"In title case, major words are capitalized, and most minor words are lowercase. In sentence case, most major and minor words are lowercase (proper nouns are an exception in that they are always capitalized).

- Major words: Nouns, verbs (including linking verbs), adjectives, adverbs, pronouns, and all words of four letters or more are considered major words.
- Minor words: Short (i.e., three letters or fewer) conjunctions, short prepositions, and all articles are considered minor words." (APA 7th Edition[22])

5.2.3 Language and Standard Language Use

Currently all resources are in English. DARIAH-Campus is agnostic as to which standard form of English that can be used (e.g. British English, American English, Indian English, etc.). However, it is important to be consistent throughout a single resource. Exceptions to this are when quoting from a source that uses a different standard form, such as if one is using British English throughout a resource, but quote from a resource that uses American English spelling.

To help to identify the differences between British forms of English and American English standards, the 'Eleven Writing' blog offers a comprehensive guide[23].

5.2.4 Heading Hierarchies

It is important to ensure that the hierarchies of headings remain consistent to enable better accessibility and support screen-reading technologies.

[22] APA 7th Edition, taken from https://apastyle.apa.org/style-grammar-guidelines/capitalization/title-case 8th April 2024
[23] The Ultimate Guide to Writing in British English vs American English: https://www.elevenwriting.com/blog/british-english-vs-american-english#american-vs-british-english-usage-and-vocabulary (accessed 25 Sept 2024)

For that reason, the titles of all resources from the 'Heading 1' position. When adding additional headings to the content, they should therefore start with 'Heading 2' and be structured in subsequent sub-headings accordingly.

Typical 'Heading 2' items include:

- Introduction
- Learning Outcomes
- Any subsequent section headings (sub-headings continue the hierarchy structure with heading 3 or 4).

Ideally, no subheading should go below 'Heading 4'. If 'Heading 5' or lower has been used, consider whether that information can be merged into a 'Heading 4' or higher paragraph.

5.2.5 Images and Tables

Images can be added to any resource on DARIAH-Campus. The standard width of the DARIAH-Campus content column is 800 pixels. Images are automatically aligned left, therefore any images smaller than 800 pixels will either be sized-up, or aligned to the left.

All images must be accompanied by 'alt text' to enable greater accessibility (see 'Accessibility' section below), and a caption. When captioning images or figures, the caption should appear below the item.

Tables should include a heading row, with the text formatted in bold. The text within the table should be formatted as the same font size as the surrounding normal text, or one size smaller if there is difficulty fitting it in. It should not go more than one size smaller, though, to ensure readability. When captioning tables, the caption should appear above the item.

5.2.6 References and Citation Styles

DARIAH-Campus itself uses the DataCite metadata model for citing training resources on the platform. This offers a simple and transparent method for citing different types of research outputs.

The typical citation format recommended by DataCite is:

> Creator (PublicationYear). Title. Version. Publisher. ResourceType. Identifier

However, there is currently not a citation language style (.cls) file available for the DataCite citation style that can be used with citation management software. This means that, while ATRIUM wishes to support and indeed encourages the accurate citation of data, ideally with DataCite, we recommend the use of the American Psychology Association (APA 7th edition[24]) style *within* the curriculum itself. The citation format for APA 7th Edition is similar to that used by DataCite. An example of this is as follows:

> Filiposka, S., Green, D., Mishev, A., Kjorveziroski, V., Corleto, A., Napolitano, E., Paolini, G., Di Giorgio, S., Janik, J., Schirru, L., Gingold, A., Hadrossek, C., Souyioultzoglou, I., Leister, C., Pavone, G., Sharma, S., Mendez Rodriguez, E. M., & Lazzeri, E. (2023). *D2.2 Methodology for FAIR-by-Design Training Materials* (1.4). Zenodo. Report. https://doi.org/10.5281/zenodo.8305540

5.2.7 Use of URLs and Other Hyperlinks Within the Text

If referring to another website or webpage within the content of a resource, it is best to include that website as a hyperlink within the text, and then reference it below in a 'Further Reading' section.

Persistent identifiers are preferred wherever possible, to ensure that information is retrievable on a long-term basis.

5.3 Hosted Resources and Pathfinders

Hosted resources refer to the resources that are published directly on DARIAH-Campus. Likewise, pathfinders are also hosted directly on Campus and follow a similar format. While external resources are simply presented as contextualised catalogue entries, the hosted resource option allows for more options in formatting and content, including quiz options, a table of contents[25] (recommended for longer training resources), and call-out notices to highlight important information.

The typical structure of a hosted resource on DARIAH-Campus is as follows:

- Brief introduction to the course;
- Preparatory notes, e.g. information about any sample data, tools or software that must be downloaded or accessed before beginning the resource;
- Prerequisites;

[24] APA Style: Style and Grammar Guidelines https://apastyle.apa.org/style-grammar-guidelines (accessed 25 Sept 2024)
[25] This can be added by toggling 'on' in the Content Management System.

- Learning Outcomes (this should be 'Heading 2');
- Section 1 Heading (use 'Heading 2);
    - Section 1 Introduction;
    - Sub-heading 1.... (structure continues as desired).

5.4 Captured Events

The *Captured Events* feature in DARIAH-Campus enables the gathering of typically ephemeral materials associated with training events, and draws them together to allow self-directed learners to follow along with the lectures and exercises presented. Furthermore, it is possible to cite the event, including specific presentations from that event.

The captured event format allows for the following format-types:

- Lecture and presentation videos (via YouTube, Nakala, or Vimeo);
- Event photos (via Flickr);
- Speaker biographies;
- Preparatory notes;
- Organisational Team Information (for citation purposes);
- Acknowledgments of Funding;
- Presentation slides (via an external trusted repository, e.g. HAL or Zenodo);
- Handouts (via an external trusted repository, e.g. HAL or Zenodo);
- Exercises.

5.4.1 Required Structure for Captured Events

The structure for Captured Events can vary according to each event, however the basic required information is as follows:

- Event Title;
- Event Subtitle;
- Event Date;
- Authors / organisers (all authors or organisers are required to have a profile photo; see note 5.2.1 above);
- Brief abstract to describe the event;
- Learning outcomes;
- Preparatory Notes;
- Session Titles;
- Session Descriptions;

- Individual Session content:
    - Video (via YouTube, Nakala or Vimeo);
    - Presentation Slides (via e.g. Zenodo);
    - Handouts (via e.g. Zenodo);
- Session Speaker Biographies;
- Session Speaker Profile Photos.

5.5 Accessibility

Accessibility should be a key consideration in the production of training materials so that all users, regardless of their ability, can fully engage with and benefit from the resources provided. By incorporating accessibility principles from the outset, training materials are more likely to be used by people with diverse needs, including those with visual, auditory, cognitive, or motor impairments. This approach not only broadens the reach of the training materials but also aligns with inclusive education practices, promoting equal access to knowledge and learning opportunities. The ATRIUM project therefore emphasises the importance of designing content that is compatible with assistive technologies, structured in a clear and user-friendly way, and available in formats which accommodate different learning preferences.

5.5.1 Tips for Writing Web Content

Page titles, headings, subheadings and paragraph
For each web page, provide a short title that describes the page content and distinguishes it from other pages. Put the unique and most relevant information first; for example, put the name of the page before the name of the organisation. For pages that are part of a multi-step process, include the current step in the page title.

Use short headings to group related paragraphs and clearly describe the sections. Good headings provide an outline of the content.

Use whitespace and proximity to make relationships between content more apparent. Style headings to group content, reduce clutter, and make it easier to scan and understand.

It is recommended to use a Sans Serif font, size of 14 points for normal text (paragraph) and a line spacing (leading) is at least space-and-a-half within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing. Text is not justified (aligned to both the left and the right margins).

Customizable text (controlled by the code)
Some users need to be able to change the way text is displayed so that they can read the text. This includes changing the size, spacing, font, colour, and other text properties. When users change these properties, no information or functionality should be lost, and the text should re-flow so users don't have to scroll horizontally to read sentences. Text customisation is more than the zoom functionality, which only changes the text size. For this to work, content must be properly designed and coded so that it can adapt to different customisation settings. This includes using relative rather than absolute units for the size of fonts, controls, and other objects. Applications should use the operating system and web browser text settings. Websites and applications could also provide information to help users change their settings. Web browsers and other web tools need to provide users with text customisation functionality.

Meaningful link text
Write link text so that it describes the content of the link target. Avoid using ambiguous link text, such as 'click here' or 'read more'. Indicate relevant information about the link target, such as document type and size, for example, 'Proposal Documents (RTF, 20MB)'.

Text alternatives for non-text content
For audio-only content, such as a podcast, provide a transcript. For audio and visual content, such as training videos, also provide captions. The audio and captions should be in the same language. Include in the transcripts and captions the spoken information and sounds that are important for understanding the content, for example, 'door creaks'. For video transcripts, also include a description of the important visual content, for example 'John leaves the room'.

Alternative text (alt-text) for images
Ensure that alternative text for images is added to all informational and functional images.

All images should include 'alt text' to assist screen readers. Alt Text describes the image in a visual way. This is particularly important where the image directly relates to the information given in the main body text. An example could be in the case of social history studies where a group of people is shown, and the author wants to discuss the diversity or lack thereof within a certain part of society. It would therefore be important to describe the group of people according to relevant demographics or other social variables, such as gender, ethnic background, ability. Furthermore, it may be useful to

describe the various positionings of people, e.g. who is standing and who is sitting; who is standing at the front of the image compared with those at the back.

Alt text is desirable but not necessary when the image is purely for decoration, and doesn't hold any informational or contextual value to the body text. An example here might be if there is a border put around the text, or it is a background image.

Provide clear instructions
Ensure that instructions, guidance, and error messages are clear, easy to understand, and avoid unnecessarily technical language. Describe input requirements, such as date formats.

Keep content clear and concise
Use simple language and formatting, as appropriate for the context:

- Write in short, clear sentences and paragraphs.
- Avoid using unnecessarily complex words and phrases.
- Expand acronyms on first use. For example, Web Content Accessibility Guidelines (WCAG).
- Consider providing a glossary for terms readers may not know.
- Use list formatting as appropriate.
- Consider using images, illustrations, video, audio, and symbols to help clarify meaning.

5.5.2 Tips for designing

Contrast between foreground and background
Foreground text needs to have sufficient contrast[26] with background colours. This includes text on images, background gradients, buttons, and other elements. This does not apply for logos, or incidental text, such as text that happens to be in a photograph.

Background images can be those that are designed to sit either behind text, or another image. It is important, therefore, to ensure that the background image does not impede the readability or visibility of the image in front of it. For this reason, any images that are set to have text added over the top must be as low contrast as possible. This enables the text to stand out. This is particularly important on resources such as the *captured event*, where a background image sits in a frame with text overlaid on top.

Be mindful of red/green and blue/yellow colour blindness. This is where an individual is unable to distinguish between one of these two pairs of colours: that is a person with

[26] A useful tool for contrast check: https://snook.ca//technical/colour_contrast/colour.html

red/green colour blindness is unable to distinguish between red and green, likewise for a person with blue/yellow colour blindness trying to distinguish between blue and yellow. Be sure not to sit these colours on top of or next to one another if there is a need to distinguish between them, e.g. red text on a green background or a graph with yellow and blue datasets.

Don't use colour alone to convey information

While colour can be useful to convey information, colour should not be the only way information is conveyed. When using colour to differentiate elements, also provide additional identification that does not rely on colour perception. For example, use an asterisk in addition to colour to indicate required form fields, and use labels to distinguish areas on graphs.

Interactive elements

Provide distinct styles for interactive elements, such as links and buttons, to make them easy to identify. For example, change the appearance of links on mouse hover, keyboard focus, and touch-screen activation. Ensure that styles and naming for interactive elements are used consistently throughout the website.

Identifiable feedback

Provide feedback for interactions, such as confirming form submission, alerting the user when something goes wrong, or notifying the user of changes on the page. Instructions should be easy to identify. Important feedback that requires user action should be presented in a prominent style.

Remember different viewport sizes

Consider how page information is presented in different sized viewports, such as mobile phones or zoomed browser windows. Position and presentation of main elements, such as header and navigation can be changed to make best use of the space. Ensure that text size and line width are set to maximise readability and legibility. Plus:

- When users resize text up to 400% or change text spacing, no information is lost
- Text reflows in small windows ("viewports") and when users make the text larger

Include image and media alternatives

Provide a place in your design for alternatives for images and media. For example, you might need:

- Visible links to transcripts of audio
- Visible links to audio described versions of videos
- Text along with icons and graphical buttons
- Captions and descriptions for tables or complex graphs

Text alternatives convey the purpose of an image or function to provide an equivalent user experience. For instance, an appropriate text alternative for a search button would be "search" rather than "magnifying lens".

Other general tips about designing

- Images of text are resizable, replaced with actual text, or **avoided where possible**
- Users can pause, stop, or adjust the volume of audio that is played on a website
- Background audio is low or can be turned off, to avoid interference or distraction
- The Mississippi State University National Research and Training Center on Blindness and Low Vision offers online recommendations to improve accessibility for users with blindness or low vision[27]

5.5.3 Formatting self-assessment tools i.e. quizzes

DARIAH-Campus has a built-in tool for self-assessment, offering a quiz format that allows for responses to a multiple choice question. When creating quizzes for people who are blind or have low vision, be aware that the assistive technology software, the version of that software, the specific web browser, and the version of that web browser may all play a part in the participant's survey experience. For example, there are several commonly used screen readers (e.g. JAWS, NVDA, VoiceOver). Each screen reader interacts differently with web content which can result in a different quiz experience. Survey participants who use older versions of screen readers may experience difficulties with online surveys that people with newer versions do not experience.

General recommendations

- Use headings if that option is available. This is helpful for screen reader users.
- Question numbers are recommended to assist with navigation.
- If you allow a limited range of responses to a question (e.g. a whole number between 0 and 50), clearly indicate that in the question.
- If questions allow multiple answers, adding text like "Select all that apply" as part of the question is helpful.
- If responses are required for certain questions, indicate that in the question.
- Label all buttons (e.g. "Next" instead of ">>"). If moving back (to previous pages) is an option, it may be helpful to let the participant know that in the opening instructions of the survey, in addition to labelling the button.
- Add alt text to any images used.
- Avoid using video if possible.

[27] Mississippi State University National Research and Training Center on Blindness and Low Vision: https://blind.msstate.edu (accessed 25 Sept 2024)

- Pilot test your quiz with people who use the assistive technology(ies) of your target group. Even if you follow all accessibility recommendations, pilot testing is needed to uncover any accessibility or usability problems with your survey.

Know your question type
The conventional quiz questions, which typically include radio buttons or select boxes, are relatively straightforward to design with accessibility in mind. However, more sophisticated interactive questions present a greater challenge. Utilising the following six question types for accessible surveys is a recommended approach:

- drop-down menus,
- single select,
- multiple select,
- grids,
- numeric entry boxes, and
- text boxes.

These options are not only simple and efficient but also familiar to most respondents, making them an effective choice for collecting data.

5.5.4 Testing

Besides working with a third-party testing firm, here are some free tools useful for testing purpose:

- Firefox and Chrome have web inspector tools that will display the HTML code of your survey pages
- W3C Markup Validation Service will test the basics of each survey page to ensure you have "robustly compatible code"
- NVDA (NonVisual Desktop Access) is a free screen reader you can use to test how a blind or vision impaired person would navigate through your survey
- Many browsers and desktop applications offer colour contrast checkers, re-sizeable text, and high contrast mode for WCAG compliance testing tasks
- Keyboard navigation—that is, answering your survey without ever touching your mouse—will also help identify gaps and errors in the code behind what you see on a screen
- Wave accessibility evaluation tool: (Browser Plugin) http://wave.webaim.org/
- Validation tool http://validator.w3.org/
- Colour contrast checker http://webaim.org/resources/contrastchecker/

6 Conclusion

With these *Guidelines for Producing the ATRIUM Curriculum*, our primary aim was to create a practical point of reference that would guide the development of training activities within the ATRIUM project. However, as a comprehensive overview of the key principles for developing high-quality educational resources, these *Guidelines* may also offer valuable information to other initiatives focused on training development, especially in the context of research infrastructures. By grounding the future ATRIUM Curriculum in a thorough skills gap analysis, leveraging the expertise of project partners, and considering existing training materials, the ATRIUM training offering should fill critical knowledge gaps and foster skill development among users of research infrastructures. In addition, the integration of FAIR principles and accessibility needs should ensure from the outset that the materials are not only reusable and interoperable but also inclusive for all learners. Finally, by adhering to these *Guidelines*, the ATRIUM project should deliver a curriculum that is both impactful and sustainable, supporting the growth of skills and knowledge in a rapidly evolving digital research landscape.

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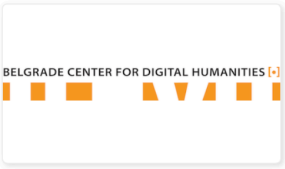
Consortium

Research Infrastructures

Beneficiaries



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