



# REPORT ON ACCESSIBILITY PILOT PROJECTS

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## Introduction

This report synthesizes the APACE pilot projects, in which accessibility experts and publishing partners collaborated to remediate complex e-book samples and to surface practical improvements to production workflows.

The primary goal of these six pilot projects was to experiment with new methods for producing and distributing accessible (complex) e-books. With new forms of collaboration between publishers, accessibility experts and specialized organizations in the production of accessible complex publications, it aimed to test the opportunities offered by the adoption of solutions. For some cases, the pilot projects represented the first or one of the first exchanges on accessibility on a national level, in others an occasion to delve into complex aspects not yet addressed.

As a secondary objective, the project would also generate valuable input for the APACE project's Meet Ups and Ask the Expert sessions, particularly concerning the challenges and opportunities involved in accessible publishing.

Methodologically, each pilot selected representative complex elements from a publisher's title, conducted an assessment with automatic tools and a manual check to see if it complied to the international standards of accessibility, such as WCAG 2.2 and EPUB Accessibility 1.1. Then, the publisher and accessibility experts applied targeted remediation in collaboration and re-validated the results – documenting both the before and after state and technical findings.

To understand the organizational system of publishers, the pilots also recorded publisher workflows via structured interviews focusing on current practice, planned transitions toward Born Accessible, and roles, tools, and checks across strategy, content creation, production, quality assurance (QA), and distribution. The goal of this was to get more insight into the publisher's workflow in order to guide the publisher into a more accessible way of publishing, but also for the accessibility expert to better understand publishers' knowledge and needs. In response to recurring pain points identified in APACE activities and interviews, particular emphasis was placed on non-text content and image description, which many publishers find most challenging.

From the conducted assessments of the selected publications, the most frequent accessibility failures are distilled and turned into actionable best practices and tools for this report, from general production guidance to topic-specific recommendations.

All the pilots were designed as a qualitative study to yield actionable insight - not statistical measurement - and to feed learnings into APACE convenings and guidance. The portfolio intentionally spans different formats and different market segments (from fiction to academic and



children's publishing) to reflect the diversity of accessibility challenges typically encountered in practice.

## 1. Original timeline

The pilot projects followed a clearly defined sequence of steps designed to ensure meaningful collaboration between accessibility experts and publishing partners. Below is the phased timeline we originally had in mind for the pilot projects.

The pilot projects would take place in two cycles, the first one starting in 2024 and the second one in 2025. The timeline below shows how these cycles would go down:

### **Month 1 – Preparation and Partner Matching**

- Selection and confirmation of a national publisher.
- Kick off the pilot project in a (digital) meeting with the participating publisher.
- Sharing preferred publication formats and thematic focus areas.

### **Month 2 – Publication Selection and Testing**

- Selection of one or more complex-layout publications.
- Agreement with publisher on specific complex elements to address (e.g., semantic tagging, reading order, image descriptions).
- Assessment of the selected publication and report about the accessibility of the publication.

### **Month 3 – Exchange between publishers and accessibility experts**

- Share of information and description of insights on the respective workflows and production tools already in place.
- Mapping of potential new tools and technological solutions to be incorporated.
- Initial remediation of selected publication.
- Evaluation of the pilot with the participating publisher.

### **After both cycles**

- Design and test of new production workflows and refinement of production workflows based on test feedback.
- Test of newly produced accessible publications with end-users, including readers with print impairments.
- Finalization of pilot results and documentation, including best practices and guidelines, to be shared on the European Accessibility Directory (EAD) and during APACE events.

The original timeline of three months per pilot project did not end up being feasible. More time needed to be allocated for the publisher, to plan the interview, but also for the specialized organization to conduct a proper accessibility check, to remediate the sample and to provide training



and/or tools to the publisher. The pilot projects continued for approximately five months per pilot. Since this was already experienced in the first cycle, it was decided to start the second cycle earlier than originally planned, to be able to allocate enough time for a proper pilot. On top of this time-related change, a few changes were made in the methodology of the pilot projects, as will be further explained in Chapter 2. Care was taken to ensure that these changes did not compromise the overall goal of the pilot project.

## **2. Methodology**

The project was initiated by drafting guidance for the partners, intended as a framework to support the setup of the pilot and to clarify which activities should be undertaken. While each pilot has its own specific focus, the overall approach remains the same, as does the process of gathering insights from publishers. This consistency was essential to ensure comparability.

### **2.1 Initiation and publisher engagement**

At the outset, each APACE partner identifies a national publisher whose portfolio includes complex e-books likely to contain accessibility challenges. This was done in order to create entry points for embedding accessibility within publishing, particularly in areas where it has not yet been incorporated. The primary objective was not merely to identify challenges as such, but rather to determine where further progress can be made and how we can learn from one another in this process. Partners should seek mutual agreement and offer anonymity to the publisher, to ensure them that everything they would share in the pilot projects is treated confidentially and would not be published with explicit attribution, so that this does not become a reason for a publisher to refrain from participating. For the same reason, it is also clarified that all provided materials will solely be used within the scope of the pilot. Once a publisher is engaged, a kick-off meeting is scheduled.

### **2.2 Pilot kick-off and project alignment**

During the kick-off meeting, both parties define expectations, roles, and timelines. They also determine which publishing professionals will be involved and who will serve as the primary point of contact. Collaboration methods are agreed upon, and the publisher is briefed on the criteria for selecting complex content samples. The publisher is then requested to deliver a complete e-book file in a supported format (such as EPUB2, EPUB3, or PDF) and to identify areas potentially requiring accessibility remediation.

### **2.3 Selection of complex accessibility samples**

In accordance with the new timeline, it was decided that the partner and publisher collaboratively select representative complex samples from the provided e-book - these may, for example, include mathematical formulas, complex images, tables, or other non-trivial content components. Each sample must be accompanied by contextual placement within the publication, especially when visuals are involved, to ensure meaningful remediation.

The goal within the pilot projects was having different formats and representatives from different publishing market segments (fiction, non-fiction, educational, academic and professional, children's

book) to take into consideration the complexity and diversity of the publications.

Specific categories of e-books are expected to have various (complex) accessibility issues. In order to broadly get more insights in the production of accessible, complex e-books, the goal was to get a diverse set of publications that the different partners would research in their pilot project. For this reason, the pilot aimed to cover six categories selected from the following seven complex categories. These categories were selected from the categories formulated by EDitEUR<sup>1</sup>, the international group coordinating development of the standards infrastructure for electronic commerce in the book, e-book, audiobook and serials sectors.

- The Arts
- Mathematics and Science
- Earth Sciences, Geography, Environment, Planning
- Technology, Engineering, Agriculture, Industrial processes
- Computing and Information Technology
- Graphic novels, Comic books, Manga, Cartoons
- Children's, Teenage and Educational

Once the publication was chosen, a suitable excerpt of the publication had to be chosen, which would feature the right complexity. To be able to decide what counts as a complex e-book and what particular elements in the e-book could serve as a case study for the pilot, the criteria in [Appendix 1](#) were used.

The pilot projects succeeded to gather a highly diverse group of publications, varying from fiction to non-fiction and from children's books to academic books. In [Chapter 3](#), an overview can be found of which publications, which formats and which complex elements were covered in the different pilot projects. However, eventually it was a deliberate decision not to focus on covering six categories of the above per se but focus more on what publishers were actually struggling with. This was decided mostly because in the first round of pilot projects, the accessibility issues found in the publications turned out to be of the same nature, i.e. image descriptions. Additionally, in the initial survey of the APACE project, during different events of the APACE project, as well as in the interviews with publishers (see for further information on this paragraph 3.2), it was also found that one of the main things publishers struggle most with is accessible images and image description. Therefore, it seemed more insightful and more useful to put more focus on those topics, rather than focussing on covering all the categories. Even though covering the six categories was not the main focus

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<sup>1</sup> For all the thema categories formulated by EDitEUR, see: [Thema Subject Categories](#)

anymore, still four of the six categories, i.e. The Arts, Mathematics and Science, Graphic novels, Children's, Teenage and Educational, were represented in the pilot projects.

## 2.4 Accessibility review and remediation

Once selected, each publication undergoes an initial accessibility assessment using relevant tools such as EPUBCheck, ACE Smart, VeraPDF, or PDFix. Since with automatic tools, it is only possible to detect at maximum 30% of the issues, the automatic testing is supplemented with an elaborate manual check, which is done by accessibility experts. In the assessment, the publications are checked to what extent they comply with international standards and legislative requirements in the field of accessibility, such as WCAG 2.2<sup>2</sup> and EPUB Accessibility 1.1<sup>3</sup>.

Findings are documented and a copy of the original (non-accessible) sample is saved. The APACE partner then creates – together with the publisher – a remediated, accessible version of the sample. The parties agree on the subject, and the publisher applies the knowledge based on the findings related to the complex elements. This can be in the form of tips and advice on how to make non-accessible elements in their publication (more) accessible, but also training can be provided if this is needed to remediate. After a new version is available, it is validated again for compliance. A technical report summarizing both pre- and post-remediation findings is prepared and shared with the publisher.

## 2.5 Workflow documentation and interview

To enable participation without risking withdrawal due to overload, an interview-based approach was adopted to elicit and document the workflow. This approach minimized the publisher's time commitment while still yielding substantive insight into the production process.

An expert from the publishing house is interviewed to describe the current content production and distribution workflow, with particular emphasis on accessibility and metadata handling. Although a full mapping of the workflow using new tools exceeds the project scope, insights gathered during the interview will inform potential areas for process enhancement. The interview focused on mapping a publisher's end-to-end workflow and tools for producing accessible e-books - covering strategy, content creation, production, QA, and distribution. It was structured around the present workflow, the transition toward Born Accessible publishing (including planned changes and new tools), and the desired future state for the publisher. Special attention was given to roles and responsibilities and to

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<sup>2</sup> <https://www.w3.org/TR/WCAG22/>

<sup>3</sup> <https://www.w3.org/TR/epub-a11y-11/>

complex accessibility issues such as semantic tagging, reading order for complex layouts, image descriptions, and accessibility metadata.

## **2.6 Evaluation and final reporting**

Following remediation and workflow assessment, the results are shared and discussed with the publisher. Any issues, needs, or insights identified during the process are documented. This feedback contributed directly to the broader APACE initiative, particularly the Ask the Expert sessions. The final step of each pilot project includes an evaluation of both the pilot outcome and the collaborative process with the participating publisher. This evaluation also focused on what could be the next steps accessibility wise.

## **2.7 Testing**

After the pilot projects are done, the publications were tested again by accessibility experts and, whenever feasible, with persons with print impairments or experts of digital publishing. In the testing of the publications, it was once again proven that tools like ACE and others are very good tools to start with, but they are not enough. A manual check, done by an accessibility expert, is needed to thoroughly test a publication for compliance with guidelines. Additional testing with end-users can be also useful to test the publication for usability.

The original plan covered a testing phase with end-users for all pilot projects. In practice, this was not feasible for a few reasons.

First of all, a well-designed testing with end-users could be an entire project on its own in terms of time and effort. The time span of the pilot projects was too short to find the right end-users to test the publications. A lot of the publications were very complex because of graphs, complex math formulas or a particular language. This meant we had to find end-users that could comprehend the complex graphs in order to be able to profoundly test their accessibility. It was questionable what the testing would cover, accessibility or skillset/comprehension of the tester.

Because only a single excerpt of each publication would be used for end-user testing, which focused on a particular complex element, the evidence would be insufficient to support well-founded conclusions for the entire publication. A more rigorous and comprehensive evaluation would be required to yield results of meaningful value. This may be pursued in further research, with an emphasis on end-users.

Furthermore, in some of the remediated publications, only one of the challenging aspects was focused on. It was already known that other factors, out of scope in the remediation, would (still) be inaccessible for end-users and therefore testing would not work the way it was initially planned.

To obtain an initial sense of the issues that might arise when testing a remediated publication, a single pilot publication was selected for evaluation, where the tester received specific instructions to focus solely on the ability to read (and not the content). The book was tested using different screen readers and different reading applications. This resulted in the following insights:

- Overall, the usability of the publication was good.
- The text reading functionality was supported across all combinations of screen readers and reading applications.
- Some screen readers were able to read mathematical formulas successfully, but not all. This can also depend on the version of the screen reader or reading application used or on the combination of screen reader with reading application used.
- For mathematical equations, this sometimes could result in the screen reader skipping over the mathematical equations or displaying a message that interaction with mathematical elements is not supported.
- Image descriptions were consistently read aloud correctly by all screen readers.

## **2.8 Finalization of pilot results and documentation**

Sharing the results of the different pilots on the EAD and during different APACE events was one of the aims of the project. During the following events, insights and results of the pilot projects were shared.

First, during the Meet-Up held at the Bologna Children's Book Fair in March 2025, which focused on image descriptions, some partners were able to share in the discussion about the results of their pilot projects. Since many publishers that were present were having struggles with adding alt-text or image descriptions in their publications, the results of some of the pilot projects gave important insights.

Following the Bologna Meet-Up, an Ask the Expert session within this cycle was designated for disseminating insights on improving the accessibility of data visualizations in publications. Conducted in May 2025, the session was informed by findings from a pilot project, as discussed further in the best practices section of this document.

Lastly, during the European Accessibility Summer School in Fiesole in June 2025, two of the pilot projects have been highlighted, and insights from these projects were shared. From one of the pilot projects, not only the specialized organization but also a representative from the publishing house were present to share their experience and showcase the project.

This report on the pilot projects, containing guidelines and best practices for all publishers, will be shared on the EAD as reference work.

### 3. The pilot projects

Six national pilot projects have been carried out to test innovative methods for the production and distribution of accessible e-books. The following section provides an overview of these initiatives, which form the basis of the findings presented in this document.

<b>Publication Language</b>	<b>Subject Area</b>	<b>Aim</b>	<b>Format</b>	<b>Target Audience Level</b>
<i>Bulgarian</i>	<i>Graphic children's books</i>	<i>To explore ways to make children's books with lots of images more accessible, by adding audio and image descriptions.</i>	<i>PDF</i>	<i>Children</i>
<i>Italian/English</i>	<i>Gen-AI created alt-texts</i>	<i>To test different AI models to see which can be the most useful for adding text alternatives to images in schoolbooks and to what extent</i>	<i>EPUB3</i>	<i>Students, Middle and Secondary school</i>
<i>English</i>	<i>Accessible data visualizations</i>	<i>To check for the accessibility of data visualizations in terms of color contrast, color for conveying information, etc., in university publications and to enhance the overall quality of images with this and create guidelines on how to do this efficiently.</i>	<i>PDF</i>	<i>Adults, higher education</i>
<i>Lithuanian</i>	<i>Image descriptions</i>	<i>To collaborate with and train the editorial department in making their own, sufficient image descriptions and help with structuring their EPUBS in a better, semantical way.</i>	<i>EPUB3</i>	<i>Adults, higher education</i>
<i>Dutch</i>	<i>MathML</i>	<i>To make publications containing a lot of complex formulas more accessible by using MathML and ChemML for the formulas and exploring ways in</i>	<i>PDF</i>	<i>Adults, higher education</i>

		<i>collaboration with the publisher to incorporate this in their workflow.</i>		
<i>German</i>	<i>Language tagging in novels</i>	<i>To make a multi-language novel more accessible by enhancing the file structure semantically in which different languages are tagged accordingly.</i>	<i>EPUB3</i>	<i>Adults</i>

*Table 1. Content covered in the different pilot projects*

## 4. The importance of collaboration

### 4.1 Insights in current production workflow and tools

During the interviews of the different pilot projects, a lot of meaningful information on the workflows of publishers was gathered. Listed below are a few cross-publisher insights that were abstracted from the individual cases:

- **Ownership and roles.** Accessibility work is typically anchored in existing editorial/production roles, who coordinate workflow adjustments and checks. Accessibility is not yet a culture in a lot of publishing houses. Specialized organizations are sometimes engaged for training and targeted support where in-house capacity is limited. Time and budget constraints may prevent publishers from obtaining the assistance they require.
- **Upstream structuring.** Two dominant upstream models recur in publishing houses:
  1. A lot of publishers use coded Word templates and/or Adobe InDesign in their current workflow of creating EPUBs.
  2. XML/HTML first pipelines that export to XHTML/EPUB (and print), supporting fine-grained semantics.
- **Formats and distribution.** In the interviews there was a focus on EPUBs and digital PDFs. A few countries barely publish in EPUB. However, EPUB is the default digital format where accessibility is prioritised. Still PDFs persist, especially where skills for EPUB are still scarce.
- **Alt-text and non-text content.** Image description is a cross-cutting bottleneck, as will be further explained in paragraph 3.2. This is particularly the case for image-dense or educational titles. Publishers are trying to industrialise this with AI-assisted, human-in-the-loop workflows that extract images with context, generate drafts, then apply editorial review. There are still a lot of struggles among most publishers concerning using the right GAI system and using the right prompt to get better results that need less human interference.
- **Vendor management.** Publishers formalise accessibility requirements for suppliers (for example semantic tagging, HTML tables instead of image tables, linking alt-text, adding metadata) and negotiate scope/cost accordingly.
- **Quality Assurance.** QA is layered. EPUBCheck/ACE is used for automated validation to international standards and requirements, rule-based XML checks (Schematron) are used for XML based workflows, and manual checks with screen readers and for inspecting code are used as well. Extensive manual checks are labour-intensive and therefore not always done by each publisher but only testing with tools is not enough. Many accessibility issues can be easily overlooked when only tested automatically. Accessibility experts are available to help with extensive manual testing of publications.

- **Accessibility metadata and alignment.** The publishers usually add EPUB Accessibility 1.1 / WCAG 2.1 metadata to packages and work to align EPUB and ONIX so sales channels neither over- nor understate features. In some publishing houses, metadata practice remains fragmented.

## 4.2 Identification of major accessibility struggles

Across the interviews, some publishers report recurring structural barriers that keep them from publishing Born Accessible publications. Among these barriers are limited in-house expertise with EPUB and inclusive design, entrenched PDF first habits, resistance to workflow change due to lack of time and higher production costs, alongside fragmented or immature sector practices such as non-standardized metadata locally. The backlist also proved to be a pain point.

Some of the publishers, especially those already further ahead in publishing accessible, have expressed the desire to have the ability to test their publications more thoroughly to see what more could be improved. Research and development, together with a stricter collaboration with accessibility experts, could help publishers improve the compliance of their publications to international guidelines and requirements. Lack of time and money, despite recognizing its value, is slowing down the process.

Major content-level struggles will be further explained in chapter 4, based on what was found in the accessibility reports. During the interviews, these struggles were also discussed. Struggles that were mentioned center on producing high-quality alternative text at scale for image-heavy works; this requires subject knowledge, age-appropriate language, tight linkage to surrounding pedagogy, and sustained human review even when AI is used to draft descriptions. For scholarly titles, the least accessible elements are non-photographic images and data visualizations, where common WCAG failures include reliance on color alone, insufficient (non-text) contrast, images of text, low resolution, and unsuitable chart types, often necessitating long descriptions and, at times, trade-offs with disciplinary conventions or rights constraints. Technical and QA pain points include multilingual/language tagging (not fully covered by automated checks), complex mathematics and symbols, tables supplied as images, and difficulty building realistic screen reader test rigs - issues that automated validators only partially address.

Downstream, accurate accessibility metadata and its alignment between EPUB and ONIX - and inconsistent display by retail platforms - remain unsettled, compounding discoverability and disclosure challenges.

### 4.3 Collaboration among publishers and accessibility experts

Besides workflow and accessibility struggles, in the pilot interviews was also discussed how publishers and specialized organizations and accessibility experts could collaborate more to foster Born Accessible publications. In all pilot projects, it was clear that specialized organizations and publishing associations play a crucial role in educating the publishing community about upcoming changes and providing detailed guidance. Without these organizations at hand, it is possible that some publishers would have remained unaware of the exact implications the European Accessibility Act (EAA) has for e-book publishers.

Moreover, the knowledge available at specialized organizations is seen as highly valuable by publishers. A lot of publishers would greatly appreciate the opportunity to participate in training sessions, but it is challenging for publishers to allocate staff time and resources to attend such training. Especially in countries where a lot of publishers are still very much at the beginning of their accessibility journey, the desire for training and collaboration with accessibility experts to get a head start were indicated.

Lastly, methodological support and recommendations for drafting documents, such as accessibility policies, are also seen as valuable.

### 4.4 Next steps

Next steps vary substantially across publishers, largely reflecting each organization's current stage in the transition to producing Born Accessible publications. Those at the outset necessarily prioritize different actions than those further along. Across the interviews, the following cross-cutting steps were scheduled, planned, or aspirational:

- **Accessibility as a culture.** With the EAA now in force, organizations increasingly underscore the importance of accessible publishing. Although many steps have already been taken, publishers acknowledge that meaningful accessibility also depends on a broader cultural shift among employees. Accordingly, organization-wide buy-in is essential: responsibility does not rest with editorial alone. Durable progress will be realized only when all parts of the supply chain, from customer service to executive management, assume their respective roles. This starts with getting the management team on board, to make time and resources available for accessibility.
- **Build skills and guidance at source.** Publishers are training editorial and design staff (with scheduled courses for layout designers) and creating or adopting guidelines for accessibility so issues are identified and fixed earlier in the workflow. Several rely on targeted training from accessibility experts or collaboration with accessibility experts.

- **Formalize requirements for vendors and partners.** Publishers are introducing accessibility as a contractual requirement and issuing concrete production directives to suppliers, such as semantic tagging, converting image-tables to HTML, linking alt-text, and delivering accessibility metadata.
- **Scale alt-text production with human-in-the-loop AI.** Active pilots and tools are being tried out to generate alternative texts or image descriptions with artificial intelligence at scale, followed by editorial review.
- **Modernize tooling and formats.** Workflows are shifting away from PDF-first. Some market segments are addressing known format gaps (like postponing SVG adoption until EPUB/InDesign handling improves) and standardizing practices such as replacing image-tables with real tables and adding captions and audio description in media, but this shift is not the case in most market segments.
- **Strengthen quality assurance.** Publishers are expanding QA beyond automated validators, seeking feedback where feasible from end-users or from accessibility experts, and involving accessibility experts and people with impairments in review cycles. Collaborating with a specialized organization for people with print impairments can sometimes help with arranging end-user feedback.
- **Tighten accessibility metadata and its display.** Publishers are aligning accessibility information between EPUB packages and ONIX, adding accessibility metadata to new titles and (eventually) backlists (for example via bulk updates to platforms), and starting to deliver them to aggregators and online bookstores requiring to display the information to end-users.
- **Sustain expert partnerships.** Many plans continued collaboration with accessibility expert organizations focusing on complex STEM/health content, advanced training, and auditing of titles in production.

## 5. Key findings accessibility checks

In Chapter 3 the most difficult aspects in the production of accessible publications are discussed. As mentioned, automated accessibility testing tools detect no more than 30% of all issues and cannot assess all the requirements of EPUB Accessibility and WCAG because some criteria require human judgment, context understanding and accessibility expertise. Therefore, next to the interview, one challenging publication, in collaboration with the publisher, was selected to undergo an elaborate accessibility assessment. This was done using as first basic step automatic tools such as EPUBCheck, ACE Smart, VeraPDF, or PDFix. These automatic checks were then supplemented with an elaborate, expert manual check. On each of these assessments, a report was made. The aim of these accessibility checks was to identify the accessibility issues in different complex publications and find solutions to solve them. The most important key findings from these reports are listed below.

- **Non-text content not accessible.** In almost all reports, a lot of non-text content issues came up. For example, many images lack meaningful alternative text. Also, text is sometimes embedded in images (including equations and tables), which prevent assistive technologies from conveying the information. Several reports explicitly flag failures for WCAG criteria 1.1.1. Non-text Content and 1.4.5. Images of Text.
- **Insufficient visual contrast and reliance on colour.** Headings or graphic elements often fall below required contrast ratio, and charts frequently rely on colour alone. In these instances, WCAG criteria 1.4.1, 1.4.3 and 1.4.11 are failed. If guidelines are violated in this instance, users with low vision and/or colour-vision deficiencies will be hindered.
- **Weak semantic structure and reading order.** Headings are mis-tagged or treated as plain paragraphs. Elements like lists and quotations also lack appropriate semantics. Often seen are layout tables being used for positioning. This disrupts reading order for screen reader users. This practice causes a failure of WCAG criteria 1.3.1 and 1.3.2. It is recommended to only use tables for data, not layout. Furthermore, foreign language passages are not consistently marked at the inline level, violating WCAG criterion 3.1.2. This prevents screen readers from pronouncing content in the right way.
- **Metadata.** Some files lacked essential metadata, such as a descriptive document/page title and accessibility metadata, which impairs navigation and discoverability.
- **Fixed-layout PDFs.** Some publications are still fixed-layout PDFs. These commonly struggle with reflow and scalable text, violating WCAG criteria 1.4.10 and 1.4.4. This makes it difficult to adapt to small screens or to enlarge text and still maintain a logical reading sequence.

After the accessibility checks were completed, the publisher and the accessibility expert sat together to take a look at the issues identified in the reports and worked together to remediate the more



complex elements that did not comply to the guidelines yet. In collaboration, they managed to realise a more accessible version of the publication. Recognizing that other publishers may face similar challenges, the subsequent chapter sets out general best practices derived from these issues. Other publishers are also encouraged to collaborate with accessibility experts to assess their own publications more thoroughly.

## **6. Best practices**

### **6.1 General best practices and tools**

Some general best practices that can be used in every production process to create a more accessible publication are listed in separate subparagraphs below. Besides these general best practices, in paragraphs 5.2 to 5.6, there are some tips, tools and advice about specific challenging aspects that were found in the pilot projects and that may be of use for more publishers.

#### ***6.1.1 Accessibility ownership and roles***

In many publishing houses, responsibility for accessibility rests with only one or a few individuals. To achieve Born Accessible publications, organization-wide buy-in is essential across the production chain and within management. When responsibility is shared and each function fulfills its role, producing accessible content becomes markedly easier and more sustainable.

#### ***6.1.2 Training***

In the creation of any publication, accessibility considerations ought to be embedded from the start to preclude the need for post-production remediation. Training for editorial staff should encompass checks for color contrast, logical reading order, semantic layout, appropriate labels and text alternatives.

#### ***6.1.3 Assessment by accessibility experts***

To gain a clear understanding as a publisher of how accessible a publication is, it is always possible to have it assessed by an accessibility expert. Following the assessment, the publisher receives a report that outlines the extent to which the publication complies with international guidelines. In addition, the publisher is provided with feedback and guidance to enhance the accessibility of the publication, in close collaboration with the accessibility expert.

An effective way to implement this on a national level, while also enabling smaller publishers to benefit from collaboration with accessibility experts, is to integrate accessibility as a criterion in a book prize. Many countries present a book award each year to the best title. Typically, this process involves the selection of a longlist, followed by a shortlist, before a winner is chosen. To promote accessibility at the source within publishing houses, it would be a valuable idea to include accessibility as a factor in this award, in collaboration with a specialist organization from the respective country.

If a book is placed on the longlist or shortlist, it should undergo an accessibility assessment, and only books that meet sufficient accessibility standards should remain eligible to win the prize. After all, the best book is the one that can be read by everyone.

Publishers must therefore ensure the accessibility of their publications to be considered for the award. Through the accessibility reports, they gain insight into areas where their publications fall short, which they can then remediate. This external incentive will ultimately lead to more accessible publications. For (small) publishers this stimulates and pushes accessible publications forward, since it is tested.

#### **6.1.4 Tools**

Tools can play an important role in both the production process and in QA. However, it is essential to recognize that tools cannot resolve every issue. Human involvement remains necessary to manually verify and validate the output generated by these tools.

During the pilot interviews, publishers referred to a range of tools that supported them in either the production process or QA. A selection of the most frequently mentioned tools is provided in [Appendix 2](#). This list is not exhaustive.

It is also important to emphasize that not all accessibility requirements can be checked by automated tools. Certain criteria demand human judgement or contextual interpretation. Therefore, establishing an internal team of accessibility experts or collaborating with external organizations specializing in accessibility is indispensable for ensuring an effective QA program.

## **6.2 Semantic structure and language tagging**

A weak semantic structure can cause great problems for an accessible reading experience. First and foremost, it is important to keep semantics, instead of appearance, at the center. This means to use structural HTML elements that convey meaning: logical heading levels (<h1>–<h6>) with a consistent hierarchy and list structures with <ul>/<ol>/<li> for word lists. If tables are used, these should only represent data. Mark tables up semantically with header cells and associations, which makes them easier to navigate through. Tables should never be used for layout purposes only.

Furthermore, more specific tagging elements include marking emphasis rather than purely visual styling, encode quotations with <blockquote> and resolve ambiguous “styled text”. If typographic treatments (for example colored or enlarged first sentences) function as headings, tag them as such; if not, still apply an appropriate semantic, so screen readers convey their significance.

Specifically for language tagging, it is important to declare language in all the right places. Set the primary language in the file and include `xml:lang` there; in every XHTML content document, add a `lang` attribute on the root `<html>` element. For maximum assistive-technology compatibility, use both `lang` *and* `xml:lang` when authoring XHTML. Also pay attention to mark foreign language passages inline. Any word, phrase or section in a different language must be wrapped in an inline element carrying the appropriate `lang` attribute; visual styling alone is insufficient. This is to ensure that screen readers can pronounce words in the right way.

Extra important on this topic is to verify beyond automation. As already mentioned in paragraph 3.1, it is necessary to complement EPUB Check/ACE outcomes with testing by an accessibility expert, as not all language/semantics issues are caught automatically.

These tips and best practices do not constitute a complete list. However, these are some great starting points to keep in mind when creating a file, in order for it to have a good semantic structure, especially focused on productions with multiple languages.

### **6.3 Complex formulas**

A lot of complex math and science books contain formulas which provide difficulties for accessibility. Complex formulas are challenging primarily because they have dense, symbol-heavy content that often includes diacritics and other special characters. A correct and accessible way to process these formulas is with MathML. Many publishers, however, use InDesign and in some workflows, they are still edited in PDF rather than in a structured, semantic source - making proper tagging and remediation difficult at scale. A further complication is quality assurance: to make sure the formula is accessible, when converted into EPUB, math content requires code-level checks beyond automated validation.

To make complex formulas accessible, produce them as MathML (and ChemML) inside EPUB (not as images) and include MathML among the publication's declared accessibility features; then verify with tools such as ACE by DAISY and targeted, code-level review. Avoid rendering equations as images of text, in line with WCAG guidance to prefer real text over images wherever possible. Structured HTML/XML pipelines can preserve math semantically and allow productions to be exported to EPUB and platforms consistently.

In newer versions of InDesign, it is also possible to add MathML to your InDesign file. This makes it easier to process complex formulas in an accessible way without a need for an entirely different, XML-based production workflow. Current versions of Adobe InDesign include a Math Expressions feature that lets you insert MathML directly and edit it via a dedicated panel.

## 6.4 Alt-texts (and AI)

Many of the publishers struggled with providing alternative text for non-text content in their publications. One of the pilot projects focused on training the editorial department on how to write sufficient alt-texts and image descriptions.

Another pilot focused on how to manage this with artificial intelligence. The Alt-GPT research project was developed within the Doctoral Program in Cultural Heritage Sciences, curriculum in "Publishing and Innovation: Contents, Processes, Technologies" at the University of Rome - Tor Vergata<sup>4</sup>: six diverse digital educational publications were selected to serve as test rounds. An automated scripted was run on the file to only extract the images and their context (text before and after the image, any caption). A GAI system then automatically generated alternative descriptions for the images. A comprehensive analysis of the visual contents within each publication was conducted. This process carried the following main objectives:

- differentiate between decorative imagery that does not require an alt-text and images that convey critical educational information and require alt-text;
- identify and select specific case studies from the pool of the identified relevant images within each publication for targeted validation of the Alt-GPT methodology.

A comprehensive quality evaluation framework was established to systematically assess the effectiveness of hundreds of AI-generated alt-texts and determine the scope of necessary editorial intervention in post-production process.

The evaluation findings underscore the considerable potential of GAI tools as strategic resources for addressing the inherent complexity of accessible digital content creation. These results suggest that GAI technologies can effectively streamline accessibility workflows while maintaining quality standards appropriate for educational publishing.

However, successful implementation requires acknowledging the critical role of publisher oversight in maintaining content quality and educational appropriateness. The publisher retains fundamental responsibility for establishing systematic evaluation protocols and implementing comprehensive post-processing procedures. This human-centered approach ensures that automated efficiency gains do not compromise the accuracy that educational content demands.

The Alt-GPT semi-automated framework therefore represents a balance between technological capability and editorial control, enabling publishers to scale accessibility production while preserving the QA processes essential for educational materials. This approach allows publishers to meet

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<sup>4</sup> [https://phd.uniroma2.it/web/\\_nD1067\\_EN.aspx](https://phd.uniroma2.it/web/_nD1067_EN.aspx)

growing accessibility requirements more efficiently while maintaining the rigorous standards their educational mission requires.

## 6.5 Accessible data visualizations

Still quite often image accessibility seems to start and end with textual descriptions of the images (WCAG 1.1.1): who should write them, how they should be approached, can AI be used to create them? These are important questions that every EAA compliant publisher must solve. However, if image accessibility is only considered from the perspective of users who cannot see the images and rely on text, an important part of visual presentations and multiple WCAG criteria get overlooked. Decent quality, correct use of color, good contrasts and mindfully chosen diagrams ensure that non-photograph images are accessible for persons with low vision, color blindness, perception disorders or just anyone who reads an e-book from a small screen of a mobile device.

In order to make these data visualizations accessible, it is important to check all non-text content for these WCAG success criteria:

- **Use of color (WCAG 1.4.1 AA):** Data visualizations in which color is used as the only visual means to convey information, e.g. to separate different parts of a diagram. Also part of this category are instances, where color is used to convey information, but the meaning remains unclear or ambiguous.
- **Contrast (WCAG 1.4.3 AA):** Insufficient contrast between the text and background within an image
- **Non-text Contrast (WCAG 1.4.11 AA):** Insufficient contrast between adjacent colors in graphical objects such as diagrams
- **Images of Text (WCAG 1.4.5 AA):** Text is presented as an image instead of real text or a table is presented as an image instead of an actual table.

Naturally, some things to consider next to these criteria are the overall image quality and resolution (the images should be clear and not pixelated or contain very small text). Furthermore, the chosen type of visualization must be suitable for the type of data.

## 6.6 Enhancing children's books for children with a visual or auditory impairment

One of the pilot projects examined how to make very illustrative children's books more accessible. Audio books are not included in the EAA requirements, and the synchronization is required only if the



e-book already includes an audio track of the whole text, so it is important to state that this was not a necessity, but a great addition to the book.

The participating organization was at an early stage, they had not yet adopted EPUB, and they were collaborating with a specialized organization for the first time. Looking for ways to improve accessibility of their books within reason and within their current workflow, the pilot project identified that the publisher made use of QR codes linking music to their stories.

These QR codes were then used to not only include music, but also image descriptions and full audio renditions of the text, thereby improving the reading experience for children with disabilities.

## Conclusion

This report has documented a pragmatic, collaborative approach to making complex e-books accessible: partners and publishers co-selected difficult excerpts like formulas, complex images and tables, performed tool-assisted and manual checks, remediated samples, and mapped workflows through structured interviews – all within a deliberately diverse title set. The synthesis highlights recurring barriers and concentrates findings on non-text content, contrast and color reliance, semantic structure and language tagging, and downstream metadata alignment. At the end of the report, these complex elements have been translated into best practices.

Operationally, despite wide variation in workflows and differing levels of maturity in accessible publishing, publishers are progressing in broadly similar directions: formalizing supplier requirements, adding alt-text with human-in-the-loop AI to productions, sometimes modernizing toward XML/HTML-first pipelines, strengthening QA beyond automated validators, and tightening EPUB-ONIX accessibility metadata.

A critical next horizon is robust end-user research. While a dedicated end-user phase was not part of every project, one pilot test already exposed meaningful differences across screen reader/reading-system combinations. Also, multiple publishers expressed desire to have publications tested, both by accessibility experts but also by end-users, including readers with print impairments. Future work should therefore include multi-title, multi-genre studies with representative users, executed across a defined matrix of platforms and assistive technologies, with specific interest in common complex areas such as reading order, formula exploration, image-description usefulness, and navigation. Investments in research and development are crucial for this, as well as initiatives that foresee collaboration of accessibility experts and publishers are crucial. These pilot projects represent a solid ground to build on for further initiatives and programs, both nationally and internationally.

Taken together, pilot projects provided not only a successful way of collaborations between national publishers and specialized organizations, and taking steps toward more accessible publications together, but also provided a grounded roadmap: what tends to break, how to fix it, and where to focus next so that accessibility moves from isolated remediation to an embedded, verifiable production capability.

## Appendix 1: criteria for complex e-books

This appendix presents the criteria used in the pilot projects to determine the complexity of an e-book. The sources for this list of criteria were MacMillan Learning, Benetech, ABELab, and Fondazione LIA.

Content Elements	Layout	Semantics
foreign language(s)	textboxes/sidebars	intricate structure navigation
special characters	column layout (with varied text box styles)	
math, chemical, or other scientific languages	page layout (e.g. floating boxes and boxed content)	
music or poetry	glossaries, indexes, bibliographies	
Tables	Appendix	
(un)ordered (nested) lists		
Footnotes		
images		
Links		
synchronization of text and audio		
audio content (N/A in almost all ebooks)		
video content (N/A in almost all ebooks)		

Table 2. Criteria for complex e-books.

## Appendix 2: List of tools

A selection of tips and tools mentioned during the interviews conducted in the pilot projects, which may support the production process, is provided below. This list is not exhaustive.

- **Adobe Premiere.** This tool auto-generates subtitle files using AI. It is important to note that manual verification by editors is needed, but the tool can help to get started.
- **SpeechLab.** This can be used to translate English audio into subtitles in another language, expanding language accessibility.
- **Adobe Bridge.** In Adobe Bridge alt-text can be added as metadata, making them reusable in both PDFs and EPUBs.
- **Color Contrast Analyser.** This application helps to ensure robust color and contrast for QA. Meet contrast ratios of at least 4.5:1 for text and background and 3:1 for graphical controls.
- **Coded templates.** If the workflow is still based on Word files during content creation, it's generally advised to use coded Word files and templates. By having less freedom in the structure and design, things are less likely to go wrong in, for example, semantic formatting or reading order. This makes it easier to generate an accessible EPUB.

To evaluate the accessibility of an EPUB prior to publication, the following tools may be used. This list is of course not exhaustive, and these tools are, as explained before, not enough for thorough QA, but it highlights several valuable tools to help you get started. In addition to these tools, a manual check, done by an accessibility expert, is a necessity.

- **ACE by Daisy.** This tool can be a start for checking production for compliance. However, it can only partially check a publication and can find no more than 30% of all the issues in a publication.
- **Bookshelf (Vitalsource).** With this tool, together with screen readers, it can be tested if content is read by screen readers in a semantically correct way.
- **Sigil.** This tool can be used for manual correction and inspection of EPUB files, especially for validating complex structures like MathML in the publication.