Foundations of Trustworthy AI – Integrating Reasoning, Learning and Optimization
TAILOR
Grant Agreement Number 952215

Training platform populated with online training material: Report

Document type (nature)	Report
Deliverable No	D 9.4
Work package number(s)	WP9
Date	15/07/2024
Responsible Beneficiary	UNIVBRIS, ID #16
Author(s)	Miquel Perello Nieto and Peter Flach
Publicity level	Public
Short description	Deliverable D9.4 provides guidelines and how-tos for publishing online training material using state-of-the-art web authoring tools, as well as use-cases and demonstrators on topics in the area of Trustworthy AI.

History			
Revision	**Date**	**Modification**	**Author**
0.9	15/07/2024	First version	PF, MPN
1.0	22/07/2024	First revision following reviewer comments	PF, MPN

Document Review		
Reviewer	**Partner ID / Acronym**	**Date of report approval**
Umberto Straccia	ID #2, CNR	28 July 2024
Martina Bacaro	ID #10, UNIBO	05 September 2024

Table of Contents

Summary of the report

This report provides a brief description of deliverable D 9.4. The deliverable itself is hosted on a publicly available website, and extends Deliverable D 9.3 Training Platform – Beta [1]. In this report we describe context and motivations and give a brief overview of the roadmap website and its companion demonstrator website.

Organisation

The following people have been involved in the Deliverable:

Partner ID / Acronym	Name	Role
ID #16, UNIBRIS	Miquel Perello Nieto	Researcher
ID #16, UNIBRIS	Peter Flach	WP Lead
ID #43, UPV	Jose Hernandez-Orallo	WP partner

Description of the Deliverable

Context

Technology has moved far beyond the printing press, yet academic publishing is to a large extent still informed by the legacy format of printable documents. The growth of the World Wide Web is enabling the modernisation of teaching material which can be accessed from a large variety of devices. It also provides a platform for dynamic and interactive material that is automatically adjusted to the publishing medium. These new authoring and formatting tools give rise to new ways of working and publishing. For example, Jupyter Notebooks can be used in teaching, for self-study, as lab notebooks, for research collaborations, and in a host of other ways. But there are many other recent developments that open further avenues for authoring and publishing dynamic and interactive training material. Knowing about these

developments and opportunities helps academic writers to publish their training material in the best possible forms.

This deliverable has been prepared as part of Task 9.2 (Training Platform and Material) to help AI researchers embrace these new ways of publishing and the new modes of learning that they facilitate. When the TAILOR work programme was designed, Massive Open Online Courses (MOOCs) were the main vehicle for delivering high-impact online training material. Since then technology has developed at an extremely high pace, resulting in novel technologies including JupyterBook, Quarto and Reveal.js. We hence broadened Task 9.2[1] to include those state-of-the-art technologies, where diverse input formats (Latex, markdown, figures, code etc.) can be collated and delivered in a large range of output formats (web, print/screen PDF, notebooks, slide decks etc.).

We have developed a roadmap, documentation and use cases to help network partners embrace those technologies and develop high-impact training material covering the latest developments in Trustworthy AI, Learning, Optimisation, and Reasoning. The previous WP9 deliverable D 9.3 Training Platform – Beta [1] created the foundations of this deliverable by (1) highlighting some of the problems in the current publication workflows, (2) describing old and innovative publication paradigms, and (3) proposing a new publishing workflow to produce multiple output formats from a unique pool of input artifacts.

Authoring Online Training Material: A Roadmap and Demonstrators

Deliverable D9.4 is hosted on the website New Ways of Publishing: A Roadmap to Authoring Online Training Material[2,3] that provides guidelines, best practices and use case examples on how to publish online training material with state-of-the-art web publishing technologies including Jupyter Book, Quarto and Reveal.js. We provide an introduction to the publishing workflow, making a clear distinction between the authoring and formatting phases. We revisit the publishing paradigms explored in the previous deliverable D 9.3 [1] and add insights into modern publishing technologies. We also list the most modern and widely adopted platforms and technologies for authoring and formatting online material with special attention to multi-output formatting tools. We characterise the types of online content and give many examples to generate static, dynamic and interactive teaching material.

Finally, we describe two particular use cases detailing the process of using those technologies to create online teaching material from anew or by adapting existing material in a legacy format. The online courses produced by these use cases are hosted on a companion demonstrator website. The two courses are Introduction to Optimal Decision Making[4] and Classifier Calibration[5]. Both courses provide transparency in decision processes (Trustworthy AI (WP3)), they are general probabilistic tools that can be applied in logic and neural architectures (Unifying Paradigms (WP4)), and they can facilitate automatic

[1] This was formally approved as part of the Amendment of June 1, 2023.
[2] https://tailor-uob.github.io/new_ways_of_publishing
[3] We considered alternatives to Github as part of this work; these are discussed in a later section.
[4] https://tailor-uob.github.io/training-material/cha_odm/odm.html
[5] https://tailor-uob.github.io/training-material/cha_wahcc/wahcc.html

decision-making processes (Acting (WP5)). Both courses include video recordings, one of them recorded in UPV's MOOC studio and the second one in a home environment.

GitHub alternatives

This deliverable explores state-of-the-art platforms for authoring and publishing online training material using JupyterBook and Quarto. At this moment GitHub is the only version-controlled environment that fully integrates with those platforms free of charge. We explored alternatives for GitHub listed at european-alternatives.eu. The only free hosted alternative with sufficient functionality is provided by the non-profit organisation Codeberg e.V, based in Berlin, Germany.

We ported both the roadmap and training materials from GitHub to Codeberg, retaining as much functionality as possible; they can be accessed here:

- The Codeberg version of the roadmap[6] (JupyterBook)
- The Codeberg version of the training material[7] (Quarto)

However, they lack the following functionalities, in decreasing order of importance:

1. GitHub actions to automate the update and publishing process[8];
2. integration with Binder and Thebe which both allow running interactive code online;
3. providing links to edit pages, reporting issues and bugs[9].

Continuous Integration and Delivery (CI/CD) is a software engineering approach that is particularly important for online publishing. While GitHub provides a state-of-the-art solution through GitHub actions, the lack of this facility on Codeberg is currently a serious limitation that prevents us from fully endorsing it as a viable platform for developing online training material.

[6] https://tailor-uob.codeberg.page/new-ways-of-publishing/
[7] https://tailor-uob.codeberg.page/training-material/
[8] Quarto supports Netlify to automate the publishing of online material but Netifly does not support Codeberg https://answers.netlify.com/t/support-for-codeberg-and-self-hosted-gittea-and-gitlab-instances-on-a-starter-plan/25035
[9] Quarto open issue to "Allow to use other Git hosts for "GitHub Links" https://github.com/quarto-dev/quarto-cli/issues/5301

Appendix: Dissemination events

When working on this deliverable we organised two workshops at the University of Bristol to increase engagement and test our proposals. The first workshop was called New Ways of Academic Publishing[10] and explored the use of these tools to facilitate the visibility of the attendees' research outcomes and ideas. This included use cases of technologies, and discussions around best practices to simplify the publication workflow and maximise outreach. The second Quarto Hands-on Workshop[11] provided a hands-on introduction to the Quarto platform.

References

[1] Kacper Sokol and Peter Flach. Training platform – Beta report. Technical Report, Foundations of Trustworthy AI – Integrating Reasoning, Learning and Optimization (TAILOR), 2021. URL: https://tailor-network.eu/wp-content/uploads/2021/11/Extended-Deliverable-9.3-Report-v1.1.pdf .

[10] https://intelligentsystemslaboratory.github.io/nwoap_workshop/
[11] https://intelligentsystemslaboratory.github.io/quarto_workshop/