PrismArch

Deliverable No D8.1

Project management and quality assurance plan

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Abstract	This deliverable contains: (i) the guidelines that will be followed by the consortium members to ensure high quality research, development and reporting; (ii) measures to be taken in case of detected or prognosticate quality flaws; (iii) a refined list of research and performance indicators for each activity that will be evaluated during quality monitoring; and (iv) quality assurance responsibilities in the Consortium.
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Copyright

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List of abbreviations and Acronyms

Abbreviation	Meaning
AB	Advisory Board
BIC	Bank Identifier Code
CA	Consortium Agreement
CFS	Cost Financial Statement
DR	Deliverable Responsible
EC	European Commission
GA	Grant Agreement
IBAN	International Bank Account Number
IP	Intellectual Property
IPR	Intellectual Property Rights
NDA	Non-Disclosure Agreement
PC	Project Coordinator
PM	Person-Month
PMB	Project Management Board
PTM	Project Technical Manager
R&I	Research and Innovation
SB	Supervisory Board
SBM	Supervisory Board Member
ToC	Table of Contents
QMR	Quarterly Management Report
WP	Work package
WPL	WP Leaders

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Executive Summary

The deliverable D8.1 constitutes a guideline for all the partners of the PrismArch project, providing information about the general project organisation, information management, financial planning, as well as reporting and quality-assessment procedures. Its goal is a) to define explicitly the project management operation according to the consortium and grant agreement; b) concretize basic information allowing the financial follow-up; and c) stabilize rules to ensure a high-quality implementation. Towards this goal, D8.1 deals with all practical aspects of the management of the project, namely: a) the project organization along with the allocation of responsibilities between partners for the different work packages and tasks, as well as b) the foreseen management bodies.

Additionally, it presents the typical management information related to the application of templates and numbering of deliverables as all participants are bound to use the same templates for the project documents. The document provides guidelines to partners about deliverables, presentations, internal documents etc. while it also describes the collaboration tools that have been set-up for internal communication, data and code sharing and content management. It provides an overview of the financial data and planning; the resources allocated to the tasks and related reporting financial rules; and finally, it sets-up the rules and procedures to achieve all project milestones and deliverables of high quality.

1. Introduction – Project Overview

The authoring process of an architectural project can be viewed as an iterative process where the designers alternate between decision making (e.g., selecting/placing the different materials and components) and previewing the result of their previous decisions so as to make new ones. Insufficient perception on the impact of their design choices may lead to badly-informed decisions and, in turn, to suboptimal design choices. On top of that, the design process in architectural projects is characterized by high complexity which also stems from the problem of “parallel worlds” (a term used to describe the fact that several disciplines - architects and a variety of engineers- coexist in an architectural project with distinct requirements and roles). However, it is only the “intersection”, by means of close collaboration, of these “parallel worlds” that can bring an architectural project to fruition. This “parallel world” aspect creates the necessity for an interdisciplinary tool capable of addressing the unique requirements of each discipline both individually and simultaneously, where all authors will be able to work on the same architectural project and perceive it in their own, different way that best suits their needs. This fact dictates a necessity for “prismatic decomposition” of the architectural project into components that meet the needs of individual disciplines. Similarly, there is also a need for “prismatic composition”, where individual designs, created separately, can be merged to form a unified architectural project.

In our days, the immersiveness offered through VR applications can promote the architectural design process. Enabling designers (e.g., architects and engineers) to immersively perceive and interact with the current status of their constructions and realize the consequences of their decisions, facilitates the design procedure. However, the functionality offered by the current VR-aided design environments is limited to presenting and enabling interaction with aesthetic elements lying solely within the visual spectrum. The “invisible” driving force that guides aesthetic design stems from functional requirements. It is only the advanced simulations (referring to data generation and their visual representation, e.g., visualization of heat diffusion or air flow in a building) that allow architects and engineers to realize and interact with the elements of their creations that lie beyond the limits of the visual spectrum. Therefore, the lack of embedded simulations within current VR applications constitutes them impractical and unappealing to various domains of the AEC industry, such as the structural and MEP engineers and sometimes even architects. The vision of PrismArch is to “intersect the parallel words” of the AEC industry into a common platform that will promote decision making and ultimately reshape the design process in architectural projects.

PrismArch aims to create a VR-aided design environment that will be able to host both architects and engineers towards a common goal, the effective realization of an architectural project. By supporting the major disciplines that are typically engaged in an architectural project - namely architects, structural and MEP engineers - PrismArch will enhance the overall decision-making process through an action and reaction paradigm. The dynamic collaboration that the PrismArch aims to offer, will allow them to iteratively co-decide, preview and evaluate the result of their decisions towards a joint optimal solution. Through advanced simulations embedded within the collaborative VR-aided design environment, superimposed with physical and functional characteristics, the designers will be able to experience in-real time not only how their decisions affect their own discipline but also the other disciplines and consequently the overall architectural project. The introduced AI-assisted design capabilities of PrismArch aim to take designers even closer to their common goal by suggesting scientifically sound design options with respect to quantitative evaluation criteria. Finally, the photorealistic representations of PrismArch will allow the designers to gain insights and obtain a visceral feeling of their creation way long before their actual construction through intuitive interfaces tailored to their individual needs and expertise. The principal objective of PrismArch is to achieve a “prismatic blend” between aesthetics, simulation models and meta-information that can be presented in a contextualized and comprehensive manner in VR in order to allow collaborative manipulation of the design and accurate assessment of new design decisions. This objective passes through intuitive interactions in a VR world with blended graphics across various types of simulation software that satisfies the needs of all types of designers in parallel.

PrismArch places emphasis on the effective synergy of multidisciplinary research domains, by including partners with different expertise and complementary competences. Namely, its consortium includes the following partners:

Table 1: PrismArch Consortium partners

Part No	Participant organisation name	Expertise / Role	Country
1 (Co)	CERTH	Project management and coordination, Virtual Reality Interfaces, Semantics analysis	GR
2	UOM	Development of Artificial Intelligence tools	UoM
3	ZHA	Use case scenarios and requirements for architectural design	UK
4	MINDESK	Development of VR-aided design environment for architecture, Business model, exploitation and IPR protection	IT
5	ETH	Cognitive evaluation of VR interfaces	SW
6	AKTII	Use case scenarios and requirements for structural engineering design	UK
7	SWECO	Use case scenarios and requirements for Mechanical, Electric and Plumping engineering design	UK

2. Project Organisation

The PrismArch consortium has been built in order to bring:

- Research and Innovation (R&I) expertise at several multi-disciplinary research and innovation fields (Architecture; 3D Graphics; Cognitive Science, Artificial Intelligence; Structural Engineering; Mechanical and Electronic Engineering);
- Capabilities in software architecture and integration;
- Expert knowledge and capabilities for interacting with Architects and Engineers as end-users to evaluate the developed technologies during the pilots;
- Industrial partners for commercial exploitation pathways (ZH, AKT, SWECO, MINDESK) and two academic partners with a track record in scientific dissemination and training (ETH, UOM);
- Management capabilities to respond to the need of Work packages (WPs) and overall project management (CERTH).

The expertise and capabilities of each participant as well as its involvement in the implementation of WPs are outlined in Table 2 and Figure 1 in detail.

Table 2: PrismArch partners' key capabilities

Partner	Specific Expertise and Capabilities	WPs with major roles
CERTH	Project management Social media analytics and trend detection XR technologies research and development System integration Pilot set-up and execution Dissemination activities Community engagement	WP4, WP5, WP6, WP7, WP8
UOM	AI algorithms for content creation AI assistive algorithms 3D Computer graphics and Gaming technologies Scientific publications	WP2, WP4, WP5, WP7
ZH	Architectural design Virtual Reality Use case requirements Dissemination and exploitation activities	WP1, WP2, WP4, WP6, WP7
MINDESK	VR tools in Architecture 3D Graphics Dissemination, marketing and exploitation activities	WP1, WP4, WP5, WP7
ETH	Evaluation of cognitive stress in software	WP1, WP3, WP6, WP7

	Pilots Evaluation Scientific dissemination	
AKT	Use case requirements as regards Structural Engineering Pilot Execution Dissemination and Exploitation activities	WP1, WP6, WP7
SWECO	Use case requirements as regards Mechanical and Electric Engineering Pilot Execution Dissemination and Exploitation activities	WP1, WP6, WP7

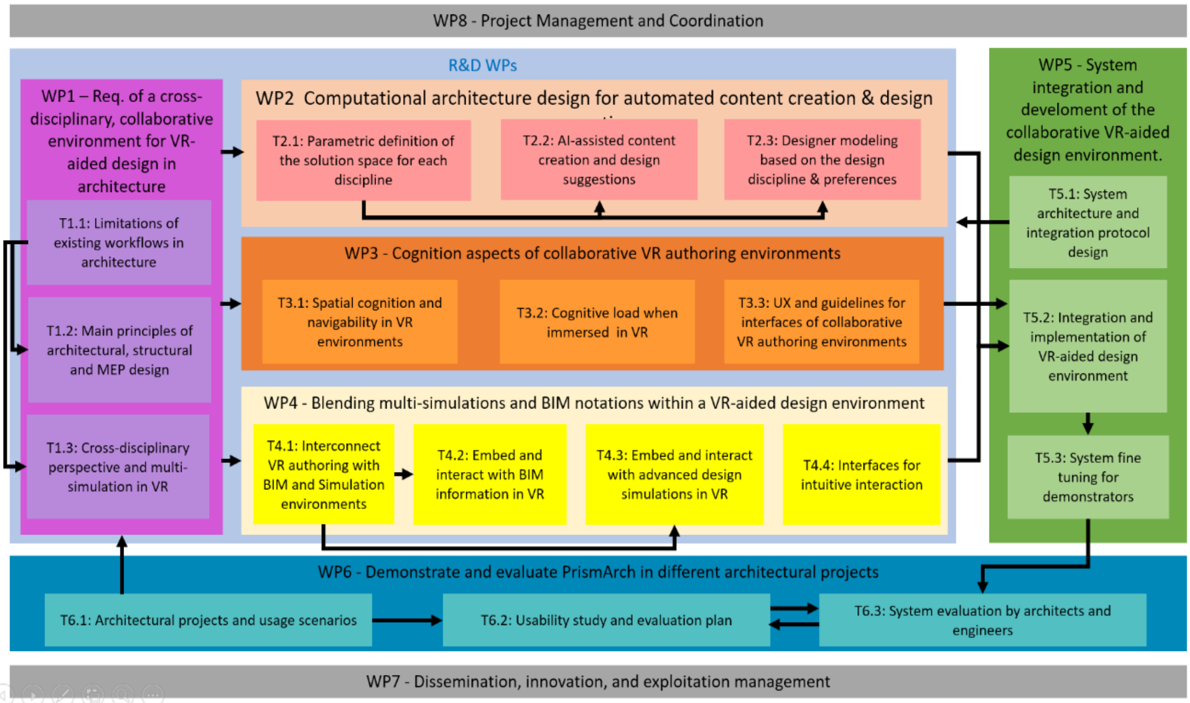

Figure 1: Work overview in PrismArch

All partners have signed a Consortium Agreement (CA) that specifies or supplements between the Consortium partners the provisions of the contract and its annexes.

Based on the requirements of PrismArch, several management entities / roles have been identified and their roles are detailed in the Grant Agreement:

- Project Coordinator (PC)
- Supervisory Board (SB)
- Scientific Manager (SM)
- Technical Manager (TM)
- Innovation Manager (IM)
- Architecture Design Manager (AD)
- Management Office (MO)

- Advisory Board (AB)
- WP Leaders (WPL)

2.1 Project Coordination

The coordination of the project, including both the administrative and technical/scientific coordination, will be performed by CERTH. Furthermore, the three pilots of the project will also have their own coordinating entities that will be in charge of managing the respective activities. More information is provided below.

Coordinator's address:

Centre for research and technology Hellas (CERTH)
Informatics and Telematics Institute
6th km Charilaou-Thermi Road
GR57001 Thermi-Thessaloniki
Greece

In Table 3, the main contact persons in administrative and technical affairs (Coordination Team) are listed:

Table 3: Administrative and technical affairs main contacts

Contact person	Telephone	Fax	Email Address	Responsibility
Dr. Ioannis Kompatsiaris	+30-2311-257774	+30-2310-474128	ikom@iti.gr	Project Coordinator (PC)
Dr. Dimitrios Ververidis	+30-2311-257784	+30-2310-474128	ververid@iti.gr	Project Technical Manager (TM)
Mrs. Maria Papadopoulou	+30-2311-257726	+30-2310-474128	marpap@iti.gr	Project Assistant in administration and financial issues

2.2 Supervisory Board (SB)

SB is a special committee to assess overall project progress and propose corrections to SB members, according to the project strategy. It is chaired by the PC and composed of the following additional members:

Table 4: SB members

Partner	Representative	Deputy
CERTH	Dr. Dimitrios Ververidis	Dr. Yiannis Kompatsiaris
UOM	Prof. George Yannakakis	Prof. Antonios Liapis
ZH	Mr. Helmut Kinzler	Mrs. Risa Tadauchi

MINDESK	Mr. Gabriele Sorrento	Mr. Vittorio Bava
ETH	Prof. Christoph Hölscher	Dr. Martin Brösamle
AKT	Mr. Edoardo Tibuzzi	Mr. Jeg Dudley
SWECO	Mr. Arun Selvaraj	Mr. Oussama Yousfi

2.3 Scientific Manager

The project's scientific and technological progress will be overseen by the SM. He will oversee (i) quality of project deliverables and publications; (ii) Scientific quality reporting to the PC and SB.

Prof. George Yannakakis (UOM)

2.4 Technical Manager

TM will oversee (i) compliance of developed software with project goals; (ii) integration progress throughout the project duration; (iii) reporting of technical quality to the PC and SB.

Dr. Dimitrios Ververidis (CERTH)

2.5 Innovation Manager

IM will: (i) investigate exploitation and innovation potential of project outcomes; (ii) examine IPR protection issues and develop a corresponding IPR protection plan; (iii) update the exploitation plan, for project technologies individually and as a whole; (iv) monitor partners' publications to avoid disclosure of confidential information or other sensitive data; (v) communicate creation of exploitation options and IPR protection issues to the PC and SB.

Mr. Edoardo Tibuzzi (AKT)

2.6 Architecture Design Manager

AD duties include: (i) Engagement of potential architects with the objectives and outcomes of PrismArch; (ii) Suggestions and architecture design proposal so as to communicate PrismArch ambition in more effective terms; (iii) Communicate the progress of the architectural aspects to the SB and PC.

Mr. Helmut Kinzler (ZH)

2.7 Management Office

MO will provide support for daily administrative and coordination issues. It will be situated in the premises of CERTH Information Technologies Institute (ITI), leveraging its long-standing experience in project management and coordination. The MO will: (i) undertake administrative communication between the project partners and the EC; (ii) carry out budget monitoring and transfer of funds to partners; (iii) oversee the timely preparation and submission of project reports, deliverables, cost statements; and (v) manage contract-related matters (contract amendments, Consortium Agreement, etc.). Work progress will be supervised and reported to the SB by WP leaders, who will be responsible for: (i) WP work organization and coordination; (ii) work progress in line with the project timeline; (iii) resolving issues related to delays or deviations which may arise; (iv) integrate partner inputs for reports and deliverables to be submitted to the PC and EC; (v) reaching each WP's goals and milestones on time; (vi) ensuring quality of WP results.

2.8 Advisory Board

An External Advisory Board (EAB) will provide feedback and inputs throughout the project evolution, particularly focusing on architecture design innovations, and market potential of the PrismArch solution. Thus, it will provide advice to the project partners on technical, design, exploitation and innovation aspects, and will take part in a few of the project meetings. PrismArch partners ZHVR, SWECO and AKT-II will rely on their extensive network for inviting industry experts interested in VR, architecture and generative digital design processes, to take part in the AB. The list of experts is provided in the following table. The list of experts will be updated according to the availability of the experts on the days of the meeting of PrismArch with the EAB.

Table 5. External Advisory Board of PrismArch

Name	Affiliation	Field of Expertise	Relevant WP
Dr. Georgios Artopoulos	The Cyprus Institute (CYI, STARC)	Immersive & Performative spaces, Virtual Environments, Urban Modelling & Simulation	WP3, WP4, WP5
Dr. Julian Togelius	New York University and modl.ai company	Procedural Content Generation, Evolutionary Algorithms	WP2
Prof. Michele Fiorentino	Politecnico di Bari, Italy	Collaborative VR Environments	WP4, WP5
Prof. Michael Weinstock	Founder and director of March Emergent Technologies and Design; Head of Research at the Architectural Association.	Emergent Technologies in design	WP1, WP6

2.9 WP Leaders

The WP Leaders will plan and implement the contents and timely consignment of the deliverables of their WPs, as defined in the project work plan, ensure the accomplishment of the technical objectives of the WPs, provide regularly reports, control the quality and the schedule of the work, and participate actively in meetings. The names of the WP Leaders can be found in Table 6.

Table 6: WP Leaders

Work package	Title	WP Leader
WP1	Requirements of a cross-disciplinary, collaborative environment for VR-aided design in architecture	Helmut Kinzler – ZH
WP2	Computational architecture design for automated content creation and design suggestions	George Yannakakis - UOM
WP3	Cognition aspects of collaborative VR-aided design environments	Christoph Hölscher – ETH
WP4	Blending multi-simulations and BIM notations within a VR-aided design environment	Panagiotis Migkotzidis – CERTH
WP5	System integration and development of the collaborative VR-aided design environment	Gabriele Sorrento – MINDESK
WP6	Demonstrate and evaluate PrismArch in different architectural projects	Arun Selvaraj – SWECO
WP7	Dissemination, exploitation and innovation management	Edoardo Tibuzzi – AKT
WP8	Project Management and Coordination	Dimitrios Ververidis – CERTH

2.10 Ethics Management

The PrismArch project involves collecting data from end-users (i.e., designers and engineers). Given the complexities of data protection legislation across Europe, a data protection policy in line with relevant EU, Horizon 2020, national and local policies for PrismArch will be agreed within the first 6 months of the project as part of WP8 in the management structure of the project, and explicitly as part of deliverable D8.2, which produces the data management plan. CERTH, as the beneficiary responsible for data management, will cooperate with technical and pilot partners to draft a detailed data management plan (D8.2) that will clearly identify how each dataset used or created by the project will be handled. CERTH will be responsible for closely monitoring the execution of the data management plan and ensuring that project partners handle project datasets appropriately. All Data Protection documentation will be centrally held by the project and will therefore be available for audit. Moreover, DPO Ioannis Chalinidis at CERTH, whose contact details will be shared to all data subjects that will be involved in the research according to Article 13 of GDPR, will act as the data manager officer of the project to ensure that data processing actions within PrismArch are in line with the law.

All Data Collection and Storage during the life of the project will be overseen by the project coordinator as well as the Innovation Manager and the Scientific and Technical Manager and, as such, all necessary European legislation and best practice will be adhered to in this area.

2.11 Management of the Foreground and Intellectual Property Rights (IPR)

The legal aspects of managing the Foreground and the generated IPRs have been defined in the already signed Consortium Agreement.

Regarding IPR, the Coordination team will further define, and execute an Intellectual Property Plan, in terms of the task T8.3 – Management of knowledge and intellectual properties, such that opportunities for gaining and exploiting patents are monitored, and to ensure that essential project know-how is protected. The plan, which will be recorded in D8.3 – IPR Plan, will include a task to evaluate all WPs for their expected patent applications and software copyrights, and will be revised on an annual basis. Partners in the consortium are committed to making the knowledge generated as freely available as possible when this does not conflict with specific exploitation plans.

In order to ensure a smooth execution of the project, the project partners agreed to grant each other royalty-free access rights to their Background and Foreground IP necessary for the execution of the project. Any details concerning the access rights to Background and Foreground IP for the duration of the project are detailed in the Consortium Agreement. Partners are also obliged to licence on fair and reasonable terms, any background which they own which is necessary for exploitation of the foreground IP developed in PrismArch.

2.12 Conflict Resolution

In order to address potential conflicts and disputes in a smooth manner, the Consortium Agreement details the procedure to be followed in those cases. Each project manager will be responsible for identifying possible disputes and informing the PC about them, who will subsequently carry out necessary discussions or meetings to address them. In the cases where the conflict cannot be resolved, the SB will vote on it and the majority's decision will be followed. Partners who are consistently underperforming will be excluded by a vote of unanimity minus one. If a conflict cannot be resolved in any of the aforementioned ways, appropriate provisions for conflict resolution from the CA will be resorted to. In order to ensure smooth realization of the project, even in the case of conflict or dispute, the PC and SB will use their negotiation skills to the highest degree in these procedures.

2.13 Consortium Meetings

Project meetings are important in order to make necessary decisions regarding the project implementation. The project meeting schedule is not predefined because the meeting frequency depends on the project needs. Therefore, the date and location of each meeting is decided during the previous one. Of course, except for plenary meetings, WP (or smaller group) meetings can be arranged if the WP leader or Task leader considers that this is necessary.

The following types of meetings are applicable in PrismArch:

Table 7: Meetings types

Type of meeting	Frequency	Purpose	Participants	Venue
Kick-off meeting	1	To launch the project and refine plans and arrangements for the initial implementation phase. Where appropriate, to meet and exchange non-confidential information with representatives of Support Projects	Consortium members	Virtual (due to COVID situation)
Plenary consortium meetings	Up to 4 per calendar year	To review progress and discuss any ongoing issues	Consortium members	Suitable project site or Virtual due to COVID situation
Review meeting	1 per reporting period	To evaluate intermediate and final results. To assess quality, impact and effectiveness of project work.	Co-ordinator and relevant WP leaders, Project Officer, Peer Reviewers	Brussels or suitable project site, to be decided in agreement with the Project Officer
Project Supervisory Board (SB) meeting	4 physical meetings per calendar year / Monthly Skype meetings	The SB has responsibility for monitoring the overall technical progress and direction of the project, the R&I performance of the project and monitor accomplishment of the technical & business objectives. It is also responsible for the resources used and the costs incurred, risk evaluation and watch for Ethical Assessment.	One person per partner organization	In connection with Consortium meetings
Advisory Board meeting	1 – 2 in the project duration	The AB will be informed on the project results and progress at regular intervals and will meet twice in the course of the project duration to provide suggestions with respect to the project strategic orientations, project research challenges, business and exploitation direction and project support of user needs.	Co-ordinator and relevant WP leaders, Advisory Board	In connection with Consortium meetings

Issues regarding governance structure, voting, agenda etc. can be found in the Consortium Agreement.

Also, regular WP-level telcos will take place in a monthly basis, and, whenever is needed, phone conferences between project or WP members will take place. These phone conferences will be performed in order to discuss and resolve issues when communication through other means is not adequate.

3. Information Management

3.1 Instant Messaging Tool

In order to collaborate in an efficient and effective manner, upon agreement with all partners, a slack workspace has been set up for the project. In the workspace, several channels have been created so as to better structure the discussions. More specifically, a channel for each WP, a general, a management and a legal/admin have been set up. With slack, communication and exchange of knowledge between consortium members is fast and arising issues are solved quickly facilitating agile development.

3.2 Data repository

In order to be able to share files within the consortium, a Google Drive folder has been set up. Inside the folder, a Work Packages folder with one subfolder for each WP have been created so as to share internally deliverables and relevant documents for each WP. In addition, a data repository folder has been set up to share data such as architectural and engineering projects. Furthermore, folders for sharing data with respect to the project meetings, participation in events, communication kit, literature, templates and meetings have been created. Finally, in the Google Drive folder there is information about project administrative issues such as contract documents, contact details, the mailing list etc. Furthermore, the documents for project reporting (Section 5.2) will be shared/collaboratively edited through this folder.

3.3 Code repository

In order to have a central point for code development and gathering, a GitLab code repository has been set up[1]. This will facilitate agile development of the project software and continuous integration of the various models.

[1] PrismArch code repository in Gitlab, URL: https://gitlab.com/prismarch

3.4 Document Templates

In order to achieve uniformity in the presentation of PrismArch results, the Coordination team has provided separate templates for each type of document (deliverables, agenda and presentations). The following templates are available in the project wiki:

- Template for document deliverables in MS Word
- Template for MS PowerPoint presentations
- Template for meeting agenda in MS Word

Templates for reporting (periodic/financial) will be added later, when needed.

3.5 File naming and numbering

All created files should be uploaded to the Data repository. Although they will be structured within the sub-folders, it would be useful to follow rules regarding their naming.

This way the document retrieval would be much easier since its content could be identified directly from its file name without having to download and open them.

In order to avoid mailboxes overload, the documents should not be distributed via email but they should be uploaded to the Data repository and then the list (or the related partners) should be notified via email (including the URL of the uploaded document).

In general, each document name consists of fields describing its attributes. These fields are: <Document type> <document category> <Date> <version> <partner name> and <description>.

3.6 Actions and open issues logging and management

Keeping track of actions and open issues logging is a very important procedure and their continuous update is significant. For that reason, a Google Sheet has been set up to allow each partner to track their actions open issues.

During the Consortium meetings minutes are kept online using a Google Docs collaborative document. After the meeting, the action points from all sessions are recorded. Afterwards, the meeting action points are ported to shared Google Drive folder under "Communications" subfolder.

3.7 Mailing list

A mailing list has been set up to facilitate the communication between all consortium members. The mailing list (PrismArch@iti.gr) is a closed list, i.e. only its member email accounts can send and receive emails from the list.

Additionally, also 8 WP lists have been specified such as wp1-prismarch@iti.gr , wp2-prismarch@iti.gr etc. that allow for internal communication across the partners that involved in each WP.

4. Financial Plan

4.1 Overall Budget – Prepayment – Guarantee Funds

According to the EC Grant Agreement (GA) nr. 952002, the maximum financial contribution of the Union to the PrismArch project shall be € 1.928.062,50.

A pre-financing of 1,446,046 € has been paid to the coordinator who has distributed it to the beneficiaries. By signing the accession form, all partners have agreed that the amount of 96,403.14 € representing 5% of the maximum financial contribution is transferred in their name to the Guarantee Fund. However, beneficiaries are deemed to have received the full pre-financing referred to in the first indent and will have to justify it in accordance with the grant agreement. The overall budget table is presented in Table 8.

Table 8: Global budget overview

Partner	*Total Funding*	*Guarantee fund*	*Prefinancing*
1. CERTH	418,750.00 €	20,937.50 €	314,062.50 €
2. UOM	327,500.00 €	16,375.00 €	245,625.00 €
3. ZAHA HADID	242,812.50 €	12,140.63 €	182,109.38 €
4. MINDESK	280,875.00 €	14,043.75 €	210,656.25 €
5. ETH Zurich	268,750.00 €	13,437.50 €	201,562.50 €
6. AKT II Limited	194,687.50 €	9,734.38 €	146,015.63 €
7. SWECO UK LTD	194,687.50 €	9,734.38 €	146,015.63 €
TOTAL	***1,928,062.50 €***	***96,403.14 €***	***1,446,046.89 €***

The detailed partner budget tables are available in the Grant Agreement (p.234), available on the participant portal[2]. The maximum EC contribution of EUR 1.928.062,50 cannot be exceeded. Even if the eligible costs of the project happen to be higher than planned, no additional funding will be possible.

The breakdown table in 8 is an estimate, the transfer of budget between activities and beneficiaries could be allowed without the need for a grant amendment; a condition for this is that the work be carried out as foreseen in Grant Agreement; however, to avoid later disagreement on the interpretation, the coordinator will verify with the Project Officer in the Commission.

4.2 Partners Form C and Cost Financial Statement (CFS)

Linked with the periodic report (cf. Section 6.1), the partners have to declare periodically their expenses on the SYGMA tool through the Participant Web portal.

The coordinator will provide in due time precise instructions and deadlines.

[2] https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/myarea/projects

A Cost Financial Statement (CFS) is mandatory for the final claim in the form of reimbursement of costs for beneficiaries whose the overall amount of the EU contribution is equal or superior to EUR 325,000. The CFS for the respective partner is submitted along with the project final financial report.

This certificate must be submitted following the template provided in Annex 5 and Annex 6 of the GA. This model is compulsory. The templates can be found in the following links:

- http://ec.europa.eu/research/participants/data/ref/h2020/gm/reporting/h2020-tpl-annex5-cfs_en.odt
- http://ec.europa.eu/research/participants/data/ref/h2020/gm/reporting/h2020-tpl-annex6-comuc_en.odt

The CFS must certify all eligible costs and is itself considered as an eligible cost.

5. Reporting process

Templates will be provided by WP8 for all requested reporting.

Answers to questions related to reporting and financial issues are to be found under following link:

http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf

5.1 Periodic Report

As defined in Article 20 of the GA, the project is bound to submit the following reports within 60 days following the end of each reporting period.

PrismArch is divided into reporting periods of the following duration:

- P1: from month 1 to month 12, i.e. from 01 November 2020 till 30 October 2021
- P2: from month 13 to month 24 i.e. from 01 November 2021 till 30 October 2022

The **Periodic report comprises of**:

- An overview, including a publishable summary of the progress of work towards the objectives of the project, including achievements and attainment of any milestones and deliverables identified in the Grant Agreement.
- An explanation of the use of the resources,
- A Financial Statement accompanied, when appropriate, by audit certificates.

5.2 Final report

In addition to the Periodic report, the consortium shall submit a final report to the Commission within 60 days after the end of the project.

The final report shall comprise of:

- A final publishable summary report covering results, conclusions and socioeconomic impact of the project.
- A report covering the wider societal implications of the project, including gender equality actions, ethical issues, efforts to involve other actors and spread awareness as well as the plan for the use and dissemination of foreground.

As a reminder, the initial agreement on Resources to be allocated to PrismArch are summarised in Table 9 and will serve as reference in all reporting matters.

Table 9: Partners PM resources allocation

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	Total PMs per Participant
1. CERTH	0	0	3	**22**	14	3	4	**10**	56
2. UOM	0	**22**	3	**0**	8	3	3	1	40
3. ZHVR	**15**	3	2	6	6	**10**	4	1	47
4. MINDESK	0	0	**3**	16	**18**	3	5	1	46
5. ETH	0	0	**17**	0	4	4	2	1	28
6. AKT	10	3	2	2	5	8	**6**	1	37
7. SWECO	7	3	2	6	5	10	3	1	37
Total PMs	32	31	32	52	60	41	27	16	**291**

6. Quality follow-up

Quality shall not only be addressed for the Reports and Deliverables but also for the Project process itself, for the Requirements, Prototypes, Demonstrations and Others.

The SB has the overall responsibility to set the quality policy and to ensure the follow-up but each partner has its own responsibility in this matter for instance with regards to the deadlines respect. So, Quality Insurance is the joint responsibility of all partners and will be applied at all levels of the project's activities.

The management and quality processes shall be submitted to periodical reviewing to ensure the work performed complies with the rules defined in D8.1, including IPR management and results dissemination.

Activities and results that would adversely affect the achievement of the project objectives will be identified, evaluated and corrective actions will be undertaken, using the methodology described in Section 6.4.

The SB monitors and controls expenses, resources and schedules versus plans (i.e. technical and financial annexes to the EC Grant Agreement). This is done through the reporting process (Periodic reports).

Root causes for deviations, be it shortages or excesses, in costs, resources, defined rules, roles and schedules shall be identified, recorded and used as input for continual improvement. Possible impacts of schedule changes on the budget and resources of the project and on the quality of the product should be determined. All these procedures are based upon Consensus decision-making procedures; eventual conflict should be solved following the process described in the Consortium Agreement.

6.1 Deliverable Procedure

In order to ensure the timely production and the high quality of the deliverables, all deliverables will be internally reviewed. Some of them may be reviewed externally as well.

The following process will apply:

- A Deliverable Responsible (DR) is namely designated by the TM; Partners responsible for deliverable are already defined in the Grant Agreement document for the PrismArch project.
- The DR will define the potential contributors (with help of SB if needed).
- The DR and the contributors will agree upon the Table of Content (ToC).
- The DR and the contributors will agree upon the tasks each contributor will take care of.
- The DR and the contributors will agree upon a provisional calendar, based on the following rules.
    - Alpha version (first draft including TOC for receiving contributions)
        - 2 months before official deadline
        - Communicated to all partners involved in authoring, WP Leader and TM
    - Beta version (ready for internal review)
        - 3 weeks before the official deadline
        - Communicated to internal reviewers, WP Leader and TM
        - Internal review to be provided within 1 week
    - Final version, reviewed and revised – 1 week before official deadline
        - Communicated to PTM. PTM sends it to whole consortium for any last changes
        - TM submits the deliverable to the Commission
- The contributions will be made by contributors (deadlines being under the responsibility of DR and Contributors) with respect to the provisional calendar.
- The integration of the several contributions is made under the responsibility of the DR.
- A distribution of the draft version is done to contributors for agreement.
- Then it is distributed to PTM and to the reviewer(s) (at least 3 weeks before the deadline).
- The DR will integrate the different requested remarks/revisions.

- The DR will distribute the revised deliverable to all contributors and the consortium for their final agreement (at least 1 week before the deadline).
- The TM will have the responsibility to send the electronic Version to the EC Project Officer via the online system.

Internal reviewers (the consortium partner of them) have already been allocated for all deliverables in the project, ensuring that they are not directly implicated in the preparation of deliverable. The selection was made so that all deliverables are reviewed by at least one reviewer and that all consortium partners have similar effort in the reviewing process. The allocation of the reviewers can be seen in the following table.

Table 10: Allocation of reviewers for the deliverables.
A higher resolution table can be found in https://prismarch-h2020.eu/deliverables/

#	Name	Title	WP name	Responsible	Type	Diss Level	Due date	Due date2	Reviewer	Submission date
1	D7.1	Project Communication Kit	7	AKT	R	PU	31-Jan-21	M3	CERTH	Pending
2	D8.1	Project management and quality assurance plan	8	CERTH	R	PU	31-Jan-21	M3	ZH	Pending
3	D1.1	Report on current limitations of AEC software tools, leading to user and functional requirements of PrismArch	1	ZHVR	R	PU	28-Feb-21	M4	ETH, CERTH	Pending
4	D9.1	H- Requirement No. 1	9	CERTH	ETHICS	CO	30-Apr-21	M6	ETH	Pending
5	D9.2	POPD - Requirement No. 2	9	CERTH	ETHICS	CO	30-Apr-21	M6	ETH	Pending
6	D8.2	Data management plan	8	CERTH	Open Research Data Pilot	PU	30-Apr-21	M6	UOM, MINDESK	Pending
7	D2.1	Initial version of parametric design space	2	UOM	OTHER	PU	30-May-21	M7	SWECO, AKT, ZH	Pending
8	D3.1	Report of cognitive issues in VR-aided design environments and usability guidelines	2	ETH	R	PU	30-May-21	M7	ZH, CERTH	Pending
9	D4.1	Two-way communication protocol for interconnecting PrismArch with BIM/CAE-Simulation software	4	MINDESK	OTHER	CO	30-May-21	M7	CERTH, ZH	Pending
10	D5.1	First version of architectural design and integration protocol	5	MINDESK	R	PU	30-May-21	M7	ZH, AKT	Pending
11	D6.1	Usage scenarios specification	6	ZHVR	R	PU	30-May-21	M7	SWECO, AKT	Pending
12	D7.2	Dissemination and communication plan	7	AKT	R	PU	30-May-21	M7	MINDESK	Pending
13	D1.2	Elaborated report of cross-discipline principles-rules-constraints, and interfaces definition for cross-disciplinary and multi-simulation perspectives in VR	1	AKT	R	PU	30-Aug-21	M10	ETH, CERTH	Pending
14	D2.2	Integration-ready version of AI algorithms to traverse the parametric solution space	2	UOM	OTHER	PU	30-Oct-21	M12	CERTH	Pending
15	D3.2	Initial report on UX and usability guidelines in VR-aided design environments	3	ETH	R	PU	30-Oct-21	M12	UOM, MINDESK	Pending
16	D4.2	First version of the interfaces and interconnections allowing to interact with BIM and multi-simulation information in VR	4	CERTH	OTHER	CO	30-Oct-21	M12	MINDESK	Pending
17	D7.3	Market analysis and exploitation plan	7	MINDESK	R	PU	30-Oct-21	M12	AKT	Pending
18	D7.4	Engagement strategies: plan and material	7	CERTH	R	PU	30-Oct-21	M12	SWECO	Pending
19	D8.3	IPR Plan	8	CERTH	R	PU	30-Oct-21	M12	MINDESK	Pending
20	D5.2	First prototype of the VR-aided design platform	5	MINDESK	OTHER	CO	30-Dec-21	M14	CERTH	Pending
21	D6.2	Report on evaluation plan and usability study	6	SWECO	R	PU	30-Dec-21	M14	ETH	Pending
22	D6.3	Report on testing and evaluating the PrismArch platform	6	SWECO	R	PU	30-Feb-2022	M16	UOM	Pending
23	D1.3	Final version of the report on principles-rules-constraints and interfaces definition for cross-disciplinary and multi-simulation perspectives in VR	1	ZHVR	R	PU	30-Apr-22	M18	CERTH	Pending
24	D7.5	Dissemination and communication plan	7	AKT	R	PU	30-Apr-22	M18	SWECO	Pending
25	D2.3	Final revised version of parametric space of design, algorithms for AI assisted editing/design in VR, and algorithms for designer modeling	2	UOM	OTHER	PU	30-Jun-22	M20	CERTH	Pending
26	D3.3	Final report on UX and usability guidelines in VR-aided design environments	3	ETH	R	PU	30-Jun-22	M20	ZH	Pending
27	D4.3	Final version of the interfaces and interconnections allowing to interact with BIM and multi-simulation information in VR	4	CERTH	OTHER	CO	30-Jun-22	M20	MINDESK	Pending
28	D5.3	Final version of architectural design and integration protocol	5	MINDESK	R	PU	30-Jun-22	M20	UOM	Pending
29	D6.4	Report on evaluation plan and usability study	6	SWECO	R	PU	30-Aug-22	M22	ETH	Pending
30	D5.4	Final prototype of the VR-aided design platform	5	CERTH	OTHER	CO	30-Aug-22	M22	MINDESK	Pending
31	D6.5	Report on testing and evaluating the PrismArch platform	6	SWECO	R	PU	30-Oct-22	M24	AKT	Pending
32	D7.6	Market analysis and exploitation plan	7	MINDESK	R	PU	30-Oct-22	M24	ZH	Pending
33	D8.4	Public final activity report and final self-assessment	8	CERTH	R	PU	30-Oct-22	M24	ZH	Pending

For some strategic deliverables, the decision to submit to external reviewers (chosen outside the project) can be taken by SB with the written agreement of partners (at least by email) upon the reviewers' name. If requested even by one partner, a non-disclosure Agreement (NDA) will be signed.

6.2 Prototype/Software Procedure

The main objectives of applying quality control and insurance procedures are as follows:

- Minimize the risk of project overrun
- Satisfaction of requirements, which are expected from the project software tools

The development lifecycle is depicted in Figure 2.

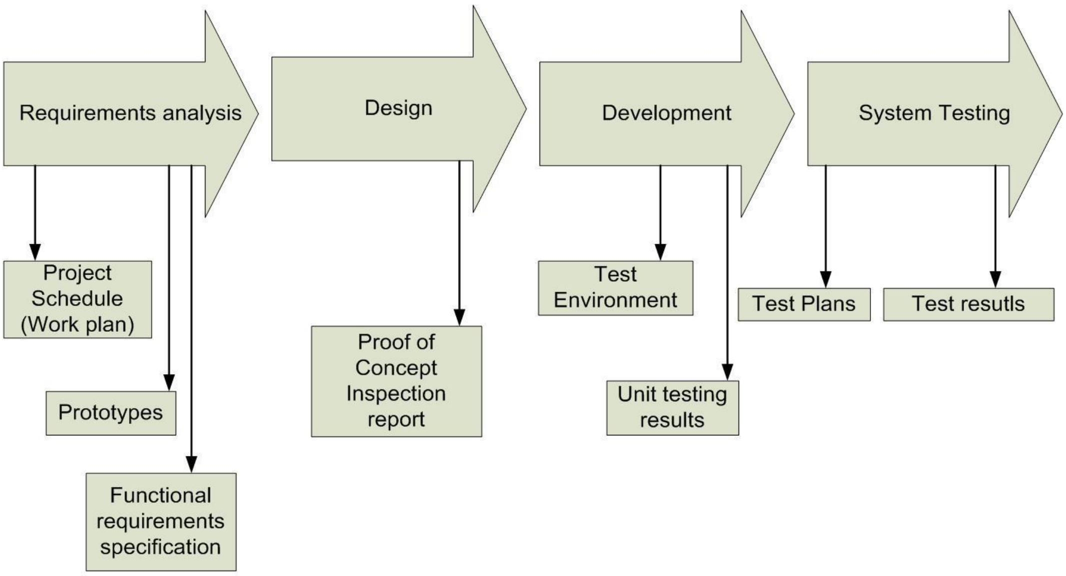

Figure 2: Development lifecycle

In the coming sections, we will introduce the various mechanisms that work toward software quality assurance and control.

In every project step, all deviations from the previous phases must be traced; when this situation arises the change impact should be assessed. Impacts can include cost, schedules and risk. The process for managing the change will involve the following steps:

- Assess impact
- Design and agree to a solution
- Estimate the cost of the solution
- Update and re-issue the affected documentation
- Actions related to proposed changes.

6.2.1 Requirements analysis

Understanding the requirements (T1.1) is the first and most critical step of any software development. Key to being able to deliver benefits with software is to be clear of the objectives. Each requirement can be placed in the context of a project objective (e.g. increased efficiency) and can be prioritized accordingly.

6.2.2 Prototyping

In order to clarify the requirements, it is possible to perform rapid-prototyping. A prototype is a partial implementation of the system build and is used to help understand the requirement. This approach is effective because early interaction with the system, and provide comments/feedback without developing the final product.

6.2.3 Scenario analysis

A scenario is a sequence of actions, performed by a system that yields a result of value to a user. In other words, a scenario describes a sequence of interactions that helps the user accomplish something. Each identified scenario defines needed behaviours of the system from the perspective a particular class of user. Therefore, the technique is very beneficial and useful in eliciting system requirements and representing these in a form easily understood by all. In order to guarantee the quality of the final products the following internal documents will be generated:

- Functional requirements specification
- Scenario diagrams (Use cases)
- Requirements catalogue with corresponding priorities.

6.2.4 Design

An initial high-level design will be produced as early as the start of the particular task or work package that involves the software development process. This provides a useful tool for understanding the scope of the requirement and estimating the development. During the design phase of the project (or work package/task activity) an accurate high-level design diagram will be produced. This diagram will be reviewed by the selected reviewers and evaluated against key requirement identified in the requirement analysis phase. The design diagram possibly includes database, visual interface, screen flow diagrams and other design related information. The software design also identifies the key decisions regarding the structure and approach to coding the solution. For instance, any reuse of existing software objects is identified at this stage. The detail design phase follows the high-level design in which the detailed aspects of the software (e.g. object structure and classes to be used in the coding) are defined. The following internal deliverables will be produced in this phase:

- UML diagrams
- Software design document
- Review report.

6.2.5 Development

Based on the requirements and design document, the suitable development environment(s) and related tools will be identified. Furthermore, some common practices like naming conventions, coding guidelines, commenting will be considered as the coding standards. In order to ensure the functionalities of the codes, unit testing will be performed during the development phase. The testing completed by the developer(s) during the build process is referred to as Unit Testing. In practice this can include a variety of different techniques and testing methods but is often testing the lowest level in an incremental fashion. During many software development projects a key requirement may change during the project. This can be for many possible reasons (e.g. a change in initial assumptions).

6.2.6 Testing

We refer to the testing carried out independently of the developer(s) following the build (development) as System Testing. The integration testing is always carried out. But a variety of different testing methods and techniques may be appropriate. Testing the whole system in operation when the entire solution is linked together is known as Integration testing. In addition, the testing is completed from the perspective of the requirements analysis and the objectives. This often produces quite different errors to Unit Testing. In a large project it is important to ensure testing is through a complete process as well as ensuring a resolution to each identified problem is produced. Performance testing is used to identify poor performance under certain conditions. For instance, certain conditions can produce a poor database response if not catered for in the database build. The internal deliverables of this phase are:

- Test environment specification
- System testing plan – test cases
- System test result.

6.3 Risk Analysis

Risks are about events that, when triggered, cause problems. Risk sources may be internal or external to the system that is the target of risk management. For instance: a source can exist in the activities of a given WP and can generate a risk in another WP in which the risk will be managed. In that case, the risk source can be considered as external.

The identification of risks will originate from a “top-down” or “bottom up” approach as shown in Figure 3. In the “top-down” approach, the Project Coordinator will check the potential risks during each plenary meeting and conference call; in the “bottom-up” approach, each project member can notify a risk during WP meetings, which will be collected by the WP Leader who will inform the Project Coordinator.

Risks need to be quantified in two dimensions. The impact of the risk needs to be assessed. The probability of the risk occurs needs also to be assessed. Once the risk is clearly identified and assessed, the relevant mitigation strategy will be determined during a SB meeting. The identified risk will be added in the project Risk Management Table (Table 11) with corresponding contingency plan, according to the issues identified. The initial table, as foreseen in the Grant Agreement, is defining clear solutions for the identified risks. This risk table will be updated based at least on a semi-annual and annual report timeline.

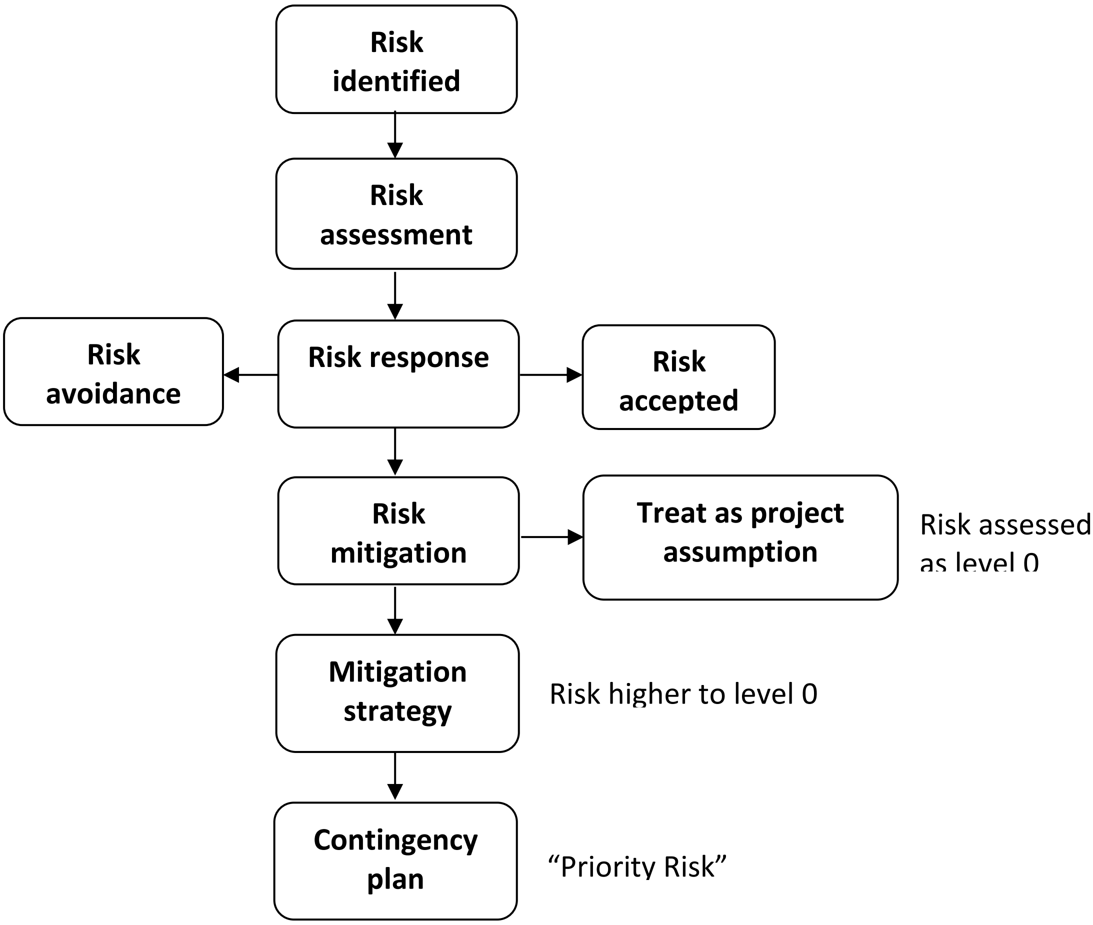

Figure 3: Risk identification process.

Table 11: Risk Table

Risk (likelihood: Low/Medium/High)	WP(s)	Proposed risk-mitigation measures
The requirements of all different experts involved in the execution of an architectural project, are too divergent to meet their fulfillment in the same VR-aided design platform (Probability: Medium; Impact: Medium)	WP1	PrismArch foresees the support of architectural designers, structural and MEP engineers, as the type of experts with the most divergent requirements for bringing an architectural project into fruition. If supporting the full range of their requirements proves infeasible, we will consider versions of PrismArch with bilateral support (i.e. Architects and Structural engineers, Architects and MEP engineers).
PrismArch becomes highly customized for Architects, Structural and MEP engineers ruling out all other design and engineering disciplines involved in project construction. (Probability: High; Impact: Low)	WP1	PrismArch supports architectural designers, structural engineers and MEP engineers as the core types of expertise required in architectural projects. However, as part of our integration approach we have made provisions for an API allowing the extension of PrismArch to support other disciplines in the future, e.g. electromagnetic, acoustics, etc.

Quality-diversity evolutionary approaches take too much computation time for real-time suggestions (Probability: High; Impact: Low)	WP2	Faster evolutionary approaches such as constrained novelty search can be used for real-time suggestions. Alternatively, QD evolution can produce many suggestions before runtime starts and then select among pre-generated suggestions in real-time. AI algorithms can be offered as a TCP REST API service from UOM as it already has the equipment and the know-how to implement them.
AI algorithms may require too much data to train on (Probability: Medium; Impact: Low)	WP2	More data-efficient algorithms can be used for deriving AI based suggestions and designer models, i.e. statistical models and linear models (Liapis2012). Parametric space will be exploited (T2.1)
The cognition load required to operate PrismArch in its cross-disciplinary and multi-simulation mode proves unbearable for the end-users of our system. (Probability: Low; Impact: High)	WP3	With the onboarding of a partner specialized in cognitive science (ETH) and the provision of a WP studying this issue (WP3), PrismArch has placed particular attention on this topic. Nevertheless, even if despite the cognition-based optimizations obtained from WP3, the platform's interfaces are still overloading the users, we will consider offering operation modes of different cognitive burden (e.g. switching off features related to the simultaneous visualization of multiple simulations).
Problems in the interconnection between Graphic Engines and CAE/ BIM software. (Prob: Medium; Impact: High)	WP4	If a component can not be integrated to a Graphic Engine using UDP Live Link, a number of alternative technical strategies has already been laid out like the integration through a web TCP REST API or directly with DirectX12. MINDESK and AKT poses already the skills for the interconnection.
Failure of Technical integration (Prob: Low; Impact: High)	WP5	The consortium includes reliable partners with precedent experience who have already successfully delivered similar technologies. Clear inter-play between WPs and tasks, as well as appropriate monitoring practices have been designed, in order to promote integration from the very beginning of the project. Given that developments will build upon MINDESK's existing solution and interconnect through a common Graphics Engine platform such as Unreal, this risk is minimized. Nevertheless, if this risk is still materialized we will consider to undertake technical integration at a bilateral level (i.e. integrate with architectural design only CAE-generated simulations for structural engineering, or CAE-generated simulations for MEP engineering).
The two architectural projects that have been used to serve as demonstrators are not representative of the actual needs and complexity faced in real-world projects (Prob: Low; Impact: Medium)	WP6	ZHVR, AKT and SWECO are already collaborating in architectural projects with commercial clients. These projects have been used as inspiration for the DUCs described in Section 1.3.3 of the Grant Agreement. Moreover, the experts involved in PrismArch (see Section 4 of the Grant Agreement) are pioneering the transition of their companies from 2D-based design, into design procedures that have 3D, advanced

		simulations and VR at their core. However, even if despite its very low probability this risk is materialized, we will re-define the scope and ambition of our DUCs, as part of T6.1 that has been designed for this purpose.
AEC experts do not consider VR-aided design better than on-screen methods and are reluctant to change the current way of doing business (Prob: Low; Impact: High)	WP7	Taking advantage of the momentum in AEC industry to shift towards VR-aided design and through the dissemination and communication activities described in Section 2.2 of the Grant Agreement, we expect to smooth the process of change management. However, if it turns out that the AEC industry is still not mature enough to fully adopt VR, we will turn into design markets with higher level of maturity in VR adoption such as game level design.
Managerial and operational risks		
Architects, structural engineers, and MEP engineers can not travel multiple times from UK to ETH facilities in Switzerland to perform cognitive stress tests for the experiments of WP3 (Probability: High; Impact: Medium).	WP3	Remote experiments modules will be designed by ETH with the help of MINDESK and CERTH partners that are experienced in software development in order to allow all disciplines to perform the experiments at their facilities.
During the project, coronavirus affects the use of VR glasses for more than one user (Probability: High; Impact: Medium)	WP3, WP4, WP5, WP6	We will set two specific persons per partner that will be allowed to wear the VR glasses and we will buy for each person a dedicated VR headset.

6.4 Key Performance Indicators - KPIs

Various KPIs have been set in PrismArch in order to ensure the achievement of intermediate goals. In Table 12, the Key Performance Indicators (KPIs) per activity and the expected target values are summarized.

Table 12: Key Performance Indicators per activity

Objective	Activity	Key Performance Indicators	Target Value
RO1	RA1.1	Number of designers-engineers for each of the 3 disciplines (Architects, structural engineers, MEP engineers) involved in requirements analysis; Number of architectural projects supported;	At least 5 users per each of the 3 disciplines; 2 architectural projects, namely Company and Residential buildings (see Section 1.3.3 of the Grant Agreement).
	RA1.2	Principles, rules and constraints to support per each of the 3 disciplines.	For each of the 3 disciplines support at least 10 principles, 200 rules, 2000 constraints. If BIM information is ported in the algorithms of AI efficiently, these numbers will not be difficult to be achieved and even go further.

	RA1.3	Mockups that represent the envisioned interfaces for discipline specific design and conflict resolving among disciplines	5 mockups per each of the 3 disciplines about the design needs in VR and conflicts often occur among disciplines that can be solved in VR.
RO2	RA2.1	Dimensions for exploring the parameters, fitness functions, constraints, and diversity measures.	At least 2 dimensions should be identified per each of the 3 disciplines, and following KPIs of RA1.2 a total of (at least) 10 fitness functions, constraints and/or diversity measures per each of the 3 disciplines.
	RA2.2	Algorithms for generating content by exploring the parameter space of RA2.1	At least 3 algorithms will be tested for the above dimensions, performing constrained optimization, constrained divergent search, and constrained quality-diversity search.
	RA2.3	Designer models for the types of designers or individual designers.	At least 3 designer models, one per discipline.
RO3	RA3.1	Number of participants, Number of different displayed settings	At least 60 (20 for each discipline), At least 20 per participant
	RA3.2	Number of participants, Levels of information that will be examined	At least 60 (20 for each discipline), At least 10 distinct levels of information
	RA3.3	Comprehensiveness of specifications (guidelines) provided to technology developers	Applicable usability and usefulness guidelines covering all scenarios developed with the other RAs.
RO4	RA4.1	Interconnection achieved between graphic engine software to CAD/BIM/CAE software. Semantics ontologies that allow CAD/BIM data to be interconnected with graphic engine.	Connectivity achieved between: Unreal or DX12 graphic engine and BIM; Unreal/DX12 graphic engine and Revit; Unreal/DX12 graphic engine and Sofistik-Solidworks. The data-rate achieved from Sofistik-Solidworks to the Graphic Engine should support 3D models matching between CAE simulation 4D models and 3D models in Unreal. Satisfy at least 75% of qualitative ontology evaluation metrics (Established ontology evaluation metrics derived from Ontology Summit 2013). Achieve at least 5% over the baseline for quantitative ontology evaluation indicators.
	RA4.2	Visualization widgets and panels in VR receiving information from BIM; Visualization widgets allowing to send information to BIM	> 10 types of widgets to receive information from BIM; > 10 types of widgets to send information to BIM;
	RA4.3	Simulation results blended with 3D models in VR; Control simulation software via VR;	Support blending of: Structural simulation under stress; Environmental simulation (Heating - cooling); Examine the possibility to support wifi and 5G network signal strength simulation; Support parameters control of the aforementioned simulations.
	RA4.4	Realistic graphics implementation; Hand gesture interfaces adaptation;	Ensure realistic material reflections without frame lagging in multi-playing collaboration mode; Hand gestures operations equivalent

			to handheld controllers or a pertinent subset thereof.
TO1	TA1.1	Approval of documentation designs, system flexibility, interoperability of interfaces	Approval from all partners about the feasibility of the plan
	TA1.2	Integration of each component CAD/BIM/CAE Simulations/VR Graphic Engine/Semantics into a single platform;	Ensure that the 5 components are integrated into the platform, i.e. Revit, BIM 360, Sofistik-Solidworks, Graphic Engine/a Proper Ontology for BIM;
	TA1.3	Perform remote usability tests with ZHVR, SWECO, AKT; Performance based: %of crashes, %of times application is not responding, loading time	> 5 usability remote tests per type of designer; Comments about user friendliness, immersiveness, ease of understanding the VR environment; Max 2%, 5%, 5 sec
UO1	UA1.1	Accuracy, reliability, conciseness, Comprehensiveness of the description demonstrations and usage scenarios	2 demonstrations (Company and Residential buildings) that can reflect the 3 types of users (architects, MEP engineers, structural engineers) needs per demonstration case; accurate usage scenarios that can reveal all VR usage aspects.
	UA1.2	Number of evaluation metrics; Number of user questionnaires prepared.	>10 evaluation metrics and eye-gazing statistics; 3 questionnaires for each of the 3 designer-engineering types of users
	UA1.3	Number of designers-engineers involved in demonstrations; Training workshops per demonstration; User friendliness; Usability; Decrease of cognitive stress levels through eye-tracking results; increase of self-reported satisfaction levels; increase of self-reported productivity improvement.	≥10 users evaluations for each discipline (architects, MEP engineers, structural engineers); ≥3 in a 5-point Likert scale for questionnaires; positive-negative comments; amount of time gazed at VR widgets-spots through eye-tracking; positive interviews.