Bloomen

Blockchains in the new era of participatory media experience

HORIZON 2020

762091 – BLOOMEN - H2020-ICT-2016-2
ICT-19-2017 Media and content convergence

D5.7 Overall evaluation report

Version:	1.0
Date:	31/08/2020
Authors:	ATC
Type:	Report
Dissemination level:	Public

Co-funded by the Horizon 2020 programme of the European Union

Table of Contents

1 Introduction

Bloomen ("Blockchains in the new era of participatory media experience") is an innovation action project funded by European Commission under Grant Agreement No. 762091. The consortium explored and researched how blockchain technology can be used to manage and track a variety of content, such as music, photos or WebTV offerings. Based on three specific media use cases the project defined an architecture and developed demonstrators and applications based on blockchain technologies. Through its use cases, the Bloomen project evaluated the tools that allow creators of content to participate in the world of digital communication in better, easier ways – ideally in combination with high levels of trust, security and fairness.

The content, media and creative domains of the three use cases involved many different types of stakeholders, including technologists and developers. Ranging from single artists to employed media creators and senior decision-makers, a key group for Bloomen were content creators, either as individuals or organisations. No matter whether large or small, these creators face many challenges when it comes to how digital content of any kind can be efficiently used, attributed and published for publication as well as monetisation. In this context, Bloomen use cases provided Blockchain solutions and informed about their potential use and impact, covering two aspects: Technical and business.

Here the similarities between the three use cases end, as the handling of music, photo and video are governed by very different aspects. For music, the resolution of claims is a very big challenge. For photos, it is the quest to get the right photo at the right time, beyond what is offered via photo wires and stock photo platforms. For video, a key aspect - beyond rights management - are novel options for distribution and monetization of such content, in the face of competition by video-on-demand platforms.

This evaluation report provides an overview of findings and especially how these findings were discovered, such as how the project and the three use cases interacted with potential users, what the feedback was and which conclusions can be drawn from the several evaluations.

1.1 About this deliverable

This deliverable is the outcome of the task T5.4 (Overall evaluation and pilots coordination) and will contain the overall evaluation of Bloomen through the three pilots (Music, Photo and WebTV).

All three use cases explore the use of blockchain in different areas: The Music use case looks into blockchain-driven music rights management, the Photo use case explores blockchain-driven asset management of photos and the WebTV use case is about streaming videos. Each use case focuses on different areas and facets of media

production and target groups, resulting in different approaches and business contexts.

D5.7 describes the final steps of pilot operations, realising an evaluation of the overall Bloomen system. It contains all the updates of the pilots from D5.2, D5.4 and D5.6.

1.2 Document Structure

The first section of D5.7 is a general introduction to the deliverable, presenting also the relationship with other deliverables of the Bloomen project. Section 2 presents the background of use cases' definition, along with the work done prior to the pilots' phases. The evaluation approach and methods are described in Section 3, while Section 4 presents a summary of the evaluation results presented in the other deliverables of WP5. Section 5 contains the results of the last six months of the projects concerning the use cases, while Section 6 summarises the results and Section 7 contains the conclusions.

1.3 Relationship with other deliverables

This document D5.7 has been produced at the end of the Bloomen project (M36). It is the outcome of T5.4 (*Overall evaluation and pilots coordination*) and it comes after the deliverables that report the status of Bloomen Use Cases. D5.1 (*Music industry use case - pilot operation management and evaluation – Initial report*), D5.3 (*News Media use case - pilot operation management and evaluation – Initial report*) and D5.5 (*WebTV use cases - pilot operation management and evaluation – Initial report*) were the first deliverables for every use case and were produced in M24. For every use case, they reported the overall pilot plan and testing approach. D5.2 (*Music industry use case - pilot operation management and evaluation - Final report*), D5.4 (*News Media use case - pilot operation management and evaluation - Final report*) and D5.6 (*WebTV use cases - pilot operation management and evaluation - Final report*) were the second version of this series of deliverables, reporting the status of the three use cases in relation to the work conducted in Tasks 5.1 (Music industry use case - pilot operation management and evaluation), 5.2 (News Media use case - pilot operation management and evaluation) and 5.3 (WebTV use case - pilot operation management and evaluation) respectively. D5.7 contains further important evaluation results and information about the three use cases.

Other related deliverables to this document are D2.1 (*Bloomen use cases and KPIs*) from Month 6 and D2.2 (*Bloomen Requirements Analysis*) from Month 10. The first deliverable D2.1 relating to Bloomen use cases contained visionary, detailed descriptions for all three Bloomen use cases in their respective business contexts and market environments. At this early point in the project, it was the goal to illustrate general and wider application and business opportunities for future products and services that relate to the Bloomen use cases. In comparison, the deliverable D2.2. focused on necessary technical requirements for building the Bloomen system.

2 Bloomen Pilots

2.1 Bloomen use cases: definition and design

Bloomen explored the usability of blockchain technologies with a focus on three use cases: Music, photos and video. Each of the use cases essentially belongs to a different area of media management. Music is a large market in itself, with multiple challenges regarding rights management, based on the disruption of the market towards digital streaming. Photos are an area of disruption, too, but the details are very different. The key goal of the Bloomen photo use case was to enable fair, reliable and trustable exchange of photos between creators (in this case, photographers) and media organisations. Finally, the video use case catered to the needs of TV stations like project partner Antenna to find alternatives to very large and dominating streaming platforms, such as being able to offer specific content based on new payment methods, enabled by blockchain.

Different industry needs guided the selection of three use cases: Bloomen Music, Bloomen Photo and Bloomen WebTV. After the initial definition, the three use case partners, in collaboration with the rest of the consortium, organized meetings or events, along with an initial use case related market research, in order to analyse the needs of the projects and design the respective use case. As a result, they provided a detailed use case description (D2.1), including business oriented summary and scenario, industry context, market situations and Bloomen opportunities. This information was further used in Bloomen architecture definition and technical requirements planning (documented in D2.2). D2.2 also included a first version of the pilots' operation plan, including, among others, a timing framework, evaluation KPIs, and risks and contingency plans. An overview of potential stakeholders was also presented, along with roles, motivations and workflows affected by blockchain based applications. Informal discussion with tentative stakeholders also took place in the first period of the project, with the aim of engaging them with Bloomen ideas in regards to the respective use case.

The rationale behind the selection of each use case definition can be found below:

Bloomen Music

The global music industry is presently estimated at over US $45 billion. Today, most digital music revenue is generated through online streaming services with performance in this sector projected to grow by 500% by 2030.

Streaming has returned the music industry to growth, with services now catering to over 1.3B listeners worldwide, including 350 million paying subscribers.
Platforms like Spotify, Apple Music, YouTube, Soundcloud and Pandora have ushered in a second digital music revolution – one that is creating value rather than destroying it like the piracy and unbundling that came before.

As the tools for content creation, distribution and promotion become more affordable and accessible to anyone, creative entrepreneurship thrives.

It's never been a better time for artists to get their music out and be discovered by new fans. You can form a band, write songs, record a few tracks, and get them online almost instantly, where they can be discovered by hundreds of millions of listeners around the world.

Yet, the music industry has historically suffered from inefficient and opaque business practices regarding the global rights administration and revenue management of intellectual property (IP).

With more than 40M independent creators producing, marketing, monetizing, and sharing their work online, protecting their copyrights, collecting and distributing royalties around the world is still slow, opaque, inefficient, and incredibly challenging.

Consequently, rights holders are left without the ability to capture the full revenue opportunity from the growth of streaming as they lack the basic mechanisms for global registration and direct licensing of their creative work in today's online economy.

Maximizing the value of IP presents a major challenge to the entire creative economy and Bloomen Music was designed to contribute to solving this challenge.

Bloomen Photo

Bloomen Photo focuses on acquisition and management of visual images, the key purpose being to explore how photographers and photo editors can overcome a number of barriers, short-comings and new challenges to the photo workflow.

On the one hand, the focus on single images makes the approach slightly simpler, on the other hand, each media type has its very own challenges. When it comes to photos, the market is overflowing, but many of the available photos lack the needed metadata. As a result, fees and payments for photographers remain the same. For the customers, mainly photo editors, the key option is to subscribe to photo agency feeds, which has its challenges, too. For example: If a topic or a region is not covered, there are no pictures and hardly a way to change this.

As a result, Bloomen Photo focused on two aspects: Working and developing with the technical features enabled by Blockchain technology, such as identity, rights and contracts management, metadata storage per image and, last but not least, the option for tokenized payments through user-to-user wallets.

Bloomen WebTV

Even after decades of developments in the digital sector, there is still a huge distinction between what and how things are done for television compared to online portals. The differences in budgets for the two types of media make interoperability almost impossible and hence, things are created from scratch for the internet.

WebTV portals remain to be just a basic mirror for the television companies that own them, without great expansions in the digital libraries or any possibilities of acquiring copyrighted content. The simple reason for this is that it is not very profitable for copyright agents to make deals with WebTV platforms, and, at the same time, it is a painful process for those WebTV platforms to prove that their audience might be low, hence they should be paying less for acquiring this copyrighted content.

This is the same case with television in small countries, where millions of people are missing out on big productions because their television networks simply lack the revenue/funds which would help them convince production companies that it would be worthwhile to partner with them.

Bloomen WebTV was designed to be the bridge over the gap between all types of media content copyright holders and broadcasters, by eliminating friction in collaboration, both at B2B and B2C levels. Bloomen WebTV demonstrated the use of the underlying Bloomen Blockchain Platform for achieving its long-term targets for copyright acquisition, protection and monetization of streaming services.

2.2 Technical background

During the first year of the project, a requirement engineering process was defined, including four phases (elicitation, analysis, validation and management), producing both specific use case requirements and generic technical requirements. ICCS, in collaboration with the other technical partners, examined Hyperledger Fabric hands-on with complementary Hyperledger projects such as Explorer & Composer by Exploiting new VMs for Hyperledger blockchain network simulation and Ethereum platform hands-on for actual micropayments: metamask extension, remix editor, token creation via ERC20 interface, ropsten testnet and others, and for copyright preservation: metamask extension, remix editor and others (SWOT presentation for Blockchain technologies (Eth, HL, MUL) in D2.2).

All three use case partners worked with the technical partners and provided extensive contributions to technical requirements. The Bloomen architecture was then defined, providing the basis for the use cases, satisfying requirements for decentralized, secure transaction, identity management & control, and data privacy and management. D2.3 (Initial Bloomen overall architecture), where a brief summary of the requirements analyzed in D2.2 was given together with their possible association with the architecture conception and design, was the main reference guide to feed with the appropriate specifications the development of the Bloomen use cases.

2.3 Defining CSFs and KPIs

At the beginning of the project each of the use cases defined specific KPIs and modified them, whenever necessary, while the demonstrators were evolving. These KPIs formed the basis of the scenarios of the three use cases and helped to move from theory to practice and to work details for all three pilots.

The Critical Success Factors (CSFs) were defined (D2.1) and further refined during pilots (D5.1-D5.6) to describe, from a qualitative point of view, the success of the Bloomen platform and the use cases' service offerings. A series of Key Performance Indicators (KPIs) had been defined, addressing the CSFs in a more quantitative way and providing a reference to validate technical performance and/or potential business success. A KPI was defined by one or more associated monitored metrics while success criteria were defined by a target or threshold value for the respective KPI value.

The related KPIs provided the means of monitoring Bloomen technical performance and business potential within iterative evaluation stages from the first prototype version to a more elaborate, tested minimal viable product at the end of the project.

3 Evaluation Approach and Methodologies

3.1 The Evaluation Framework

Throughout the Bloomen project, the evaluation process, conducted by the three use cases, followed an iterative approach and was organized in short cycles, each focusing on different aspects or different levels of progress for every use case, with the goal of continuously tracking the improvements to the use of blockchain technology over time. The technologies integrated in the Bloomen platform (WP3 and WP4) were tested and evaluated in real world use cases covering three different aspects of media experience.

The evaluation activities involved multiple user groups, depending on the specific needs of every use case, like content creators, musicians, photographers, CMOs, news and media agencies, media consumers etc.

In terms of timing, evaluation activities were organized in two main phases for every use case. Following the rationale of reporting, the first taking place the second year of the project and the second during the first six months of the third project year. We could say that, for all three use cases, a third phase, affected by Covid-19 measures and adapted to them, took place the last six months of the project in order to extract overall conclusions and test the system as this was adapted to the feedback of the two “official” phases.

3.2 Types of Evaluation

Formative and Summative evaluation

Bloomen conducted both formative and summative evaluation. **Formative evaluation** is considered the main part of software evaluation and plays an important role in iterative system development ([1]). In general, formative evaluation goals are the improvement of software and design supporting aspects. The formative evaluation served to generate relevant feedback for the user acceptance and experience constructs, identify usability issues, collect change suggestions and update the user requirements. As an exploratory method, formative evaluation is conducted when a product is still in the preliminary stages of being defined and designed; hence why it is called “formative” ([2]).

As such, formative evaluation in Bloomen was conducted mostly during the first evaluation phase (M7-M24) for all the three use cases. The findings from the formative evaluation were used to further improve Bloomen applications and fed into the summative evaluation.

Summative evaluation, on the other hand, does not offer constructive information for changing the design of the system in a direct manner. It focuses more on describing how well a design performs, often compared to a benchmark or standard. Unlike formative evaluations, whose goal is to inform the design process, summative evaluations involve understanding the big picture and assessing the overall experience of a finished product, service, or software ([3]).

Bloomen's summative evaluation took place during the second evaluation phase (M25 onwards) having as an objective to assess the user oriented aspects of the use cases, such as the usability of the applications and user experience they offer.

3.3 Techniques of the Evaluation process

Evaluation techniques are evaluation activities that can be exactly defined in behavioural and organisational terms. Evaluation techniques can be categorized in a variety of ways, such as descriptive or predictive, behaviour-based or opinion-based, quantitative or qualitative, etc., although there exists no widely accepted typology of evaluation methods.

There are a variety of evaluation methods used in software products, each one with its own drawbacks and advantages. Although there is a plethora of comparative studies of evaluation methods in software systems in terms of effectivity, efficiency, or utility (e.g. [4], [5]), methodological problems and high variability when applying the techniques in practice have rendered comparative studies inconclusive. The decision of which evaluation technique(s) should be used has to be based on the concrete demands of the software development schedule, human-factor considerations, and cost-benefit issues.

The evaluation methods that are presented in the following subsections have been used during Bloomen by either all three use cases or by some of them, independently or complementary to each other to produce better results (e.g. usability testing was combined with questionnaires and/or interviews), depending on the scope, needs and focus of every use case and of the running phase.

The presented methods are the following:

- User questionnaires
- User interviews
- Usability testing
- Thinking aloud protocols
- Usability inspection by experts

3.3.1 User questionnaires

Questionnaires are a common evaluation method and are primarily used in the specification-, design-, or re-engineering phase, or as a means of system comparison (summative approach). They produce quantitative data and they are rather cost

effective, especially if they are done online. There are many different ready-to-use, standardized questionnaires assessing the usability or user experience of software products.

For Bloomen a user questionnaire was created and then was adapted to the needs of every use case. More details can be found at D5.1, D5.3 and D5.5 respectively.

3.3.2 User interviews

Oral or written interview techniques are commonly used to evaluate the user's opinion about software systems. The advantage of an interview in comparison with other methods is that an interview helps to obtain an insight into the user's opinion of the system, which cannot be gathered by observation alone. Interviews produce mainly qualitative data and their standardization degree is not very high.

In Bloomen, we used interviews to gather user feedback. Interviews were semi-structured and held in a flexible manner, so as to allow each individual user to express their thoughts on the application freely and according to their perception, professional capacity, work needs, and knowledge level. The focus was on detecting any difficulty in using the application, any cumbersome or time-consuming tasks.

3.3.3 Usability testing

Usability testing aims to collect empirical data, while observing representative end users using the product to perform realistic tasks. Usability testing is a research method rooted in classical experimental methodology. A range of tests can be conducted, from classical experiments using large sample sizes and complex test designs to more informal qualitative studies with only one participant; each testing approach has different objectives, as well as different time and resource requirements ([2]).

Bloomen employed more informal, less complex tests designed for quick turnaround of results. Moreover, usability testing was grounded to Bloomen's user needs and requirements, evaluated through Bloomen use cases.

An overview of the usability test process that was followed by the use case partners is presented below:

- Test objectives were formulated by the consortium partners. It was done by the use case partners in collaboration with the technical partners.
- A representative sample of end users was used, carefully chosen in order to represent the most important user groups.
- Users were given specific scenarios or tasks (designed and presented by the use case partners, taking into consideration the user requirements as formulated in D2.2) that they needed to complete during the testing.
- Whenever usability testing occurred during formative evaluation, the use case partner focused on gathering qualitative feedback and change suggestions. If

usability testing was done during summative evaluation, evaluation was geared towards quantifying the user's interaction with the application through KPIs.
- In some cases, once the user completed the given tasks, a questionnaire and/or interview followed to gather qualitative and quantitative feedback.

3.3.4 Thinking aloud protocols

The method of thinking aloud is used to discover cognitions, emotions, and perceptions of users, while they perform a task or solve a problem ([2]). The user is prompted to articulate what they think while going through the system. By using thinking-aloud techniques, the evaluator can obtain information about the whole user interface, while this type of evaluation is geared towards investigating the user's problem and decision behaviour while working with the system.

In Bloomen, the thinking aloud method was used during usability testing, where participants perform the tasks given to them while at the same time thinking aloud ([6]).

3.3.5 Usability inspection by experts

Usability inspection is carried out by experts, who are not directly involved in the development of the system. What is being evaluated is the whole user interface or some of its components. In the case of free expert inspection, the evaluator uses only a few general guidelines when inspecting the system, and, as such, the outcomes of the inspection strongly depend on the evaluator's perception and approach during the inspection. Another issue with the free expert inspection method is that the evaluator should be both a user and a task expert.

In Bloomen, expert inspection was used in the early stages of development to weed out early usability and interface issues. People working with the three use case partners served as expert evaluators, since they are both user and task experts.

3.4 The concept of a "Minimum Viable Product" (MVP)

Our initial approach for all the three use cases was to develop and evaluate an application based on the concept of a "Minimum Viable Product" (MVP) ([7]). To get there, all three Bloomen use cases adopted a method of "working backward", originally created by Amazon. The main features of this approach are described below, but extended description of how we used them, adapted to each use case and pilot phase can be found at D5.1-D5.6.

3.4.1 Minimum Viable Product

A minimum viable product (MVP) is a development technique in which a new product or website is developed with sufficient features to satisfy early adopters. The final,

complete set of features is only designed and developed after considering the feedback from the product's initial users.

A minimum viable product (MVP) is the most pared down version of a product that can still be released. An MVP has three key characteristics ([8]):

- It has enough value that people are willing to use it or buy it initially.
- It demonstrates enough future benefit to retain early adopters.
- It provides a feedback loop to guide future development.

3.4.2 Working Backwards to define MVP

The process adopted works backward from the customer experience, arguing that "great products and services come from deeply understanding the customer."([9]) Two key elements for such a development view are a "press release" and a short FAQ. With the press release, the goal is to describe a product or service "as if" they were being launched tomorrow. The effect of this exercise is that both project management/planning as well as developers will look at what will be developed from a user perspective: Is it logical? Does it fulfil a specific need? Would it be attractive to use the service or pay money for it in any way, even though an early service will lack some features, potentially?

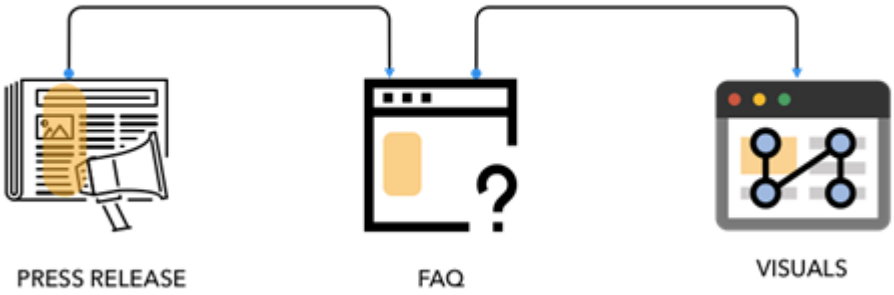


Figure 1: Working Backwards approach [10]

Here a brief description of how the "working backwards" approach can be utilized:

> "Amazon's approach to new product development is about working backwards from the customer. The product manager starts by writing a press release announcing the finished product. The press release is targeted at the end customer and contains information about the customer's problem, how current solutions are failing, and why the new product will address this problem. The press release itself is a gut-check for whether or not the product is worth building. If the team is not excited about reading it then the document needs to be revised or perhaps the idea should be revisited altogether. As the team begins development the press release serves as a guide for the team to reflect on and compare with what is being built."([11]).

> "Done correctly, working backwards is a huge amount of work. But it saves you even more work later. The Working Backwards Process is not designed to be easy, it is designed to save a huge amount of work on the backend, and to make sure we are building the right thing." - Jeff Bezos [12]

The process involves more than just writing a press release and FAQ. Another important element is the customer experience. As described by Werner Vogel, CTO of Amazon.com ([13]):

> **Define the customer experience:** Describe in precise detail the customer experience for the different things a customer might do with the product. For products with a user interface, we would build mock ups of each screen that the customer uses. For web services, we write use cases, including code snippets, which describe ways you can imagine people using the product. The goal here is to tell stories of how a customer is solving their problems using the product.

To get there, five questions are used to further describe the requirements ([14]):

- Who is the customer?
- What is the customer problem or opportunity?
- What is the most important customer benefit?
- How do you know what customers want?
- What does the customer experience look like?

These questions will be repeated in the evaluation section to give our approach a good structure. Quote: “Once we have gone through the process of creating the press release, faq, mockups, and user manuals, it is amazing how much clearer it is what you are planning to build.”[15]

3.4.3 Press Release (Working backwards)

Below is the initial version of the mock-up “press release” for every Bloomen use case. This text was updated and refined until the end of the project.

3.4.3.1 Bloomen Music

Streamlining the music rights management, globally

Bloomen releases a distributed blockchain-based platform that will contain an up-to-date picture of music copyrights for Collective Management Organisations to distribute royalties more efficiently than ever before.

Bloomen Music is an innovative solution that leverages the properties of blockchain technologies to overcome one of the biggest pain points of the music value chain: the management of copyright data. Any rightsholder of a musical composition or a master recording will be able to register their claims and dispute elegantly with other interested parties any conflict that may arise, instantly sharing the information in a secure, traceable and auditable platform that can be plugged in Collective Management Organisations' (CMOs) royalty distribution systems.

Whilst digital transformation has increased music consumption, distribution of royalties is still slow, expensive, inaccurate, inconsistent, incomplete and opaque, and the main inefficient bottleneck of the music industry. Some audits report that around 25% of royalties are not paid to artists and creators, and when royalties are paid, artists and creators receive only 10% of the initial amount. Part of the 90% overhead is due to the lack of intelligent solutions for copyright management.

Bloomen Music provides a solution that streamlines the whole process, from the declaration of ownership of rights to the instant distribution of up-to-date information to all stakeholders, including a mechanism to resolve claim conflicts between registered interested parties on a blockchain-powered platform that brings unprecedented improvements to current systems:

- Transparency: any interested party can be part of the system and check the status of their assets.
- Trust: nobody can tamper with the statements.
- Traceability: ability to check the claims an asset has received over time.
- Decentralisation: no single entity owns the database; crowd-sourced contribution.
- Conflict resolution: confluence in a single view of aggregated assets that allows conflict detection at early stages.
- Efficiency: disintermediation in an interoperable solution that shares the information across all stakeholders and integrates with their back offices.

"Music rights management has always been a rock in the shoe of the music industry. Globalisation, digital consumption and licensing fragmentation has accentuated a problem that is not only technical but also political and about governance. Stakeholders are still reluctant to open data to third parties. Bloomen Music opens the door to finally overcome those issues since it can operate efficiently in a context of distrust".
– Gonçal Calvo, Head of Innovation, BMAT (Spain).

BMAT has already tested the solution with the data from the right management platform they provide to CMOs from all around the World, and it is open for further pilots with other stakeholders.

"We have serious problems when we need to synchronise our copyright database with other CMOs. The fact that we don't share a common platform makes it really difficult for royalties to flow between societies. Bloomen Music is a paradigm shift that will

revolutionise the royalty distribution processes, lowering overheads and maximising revenues for our creators".
– Christoph Bergman, Deputy Head of Distribution Mechanicals, Online and International Royalties, AGAV (Germany)

Bloomen Music is available now for a limited number of test users. The next iteration of the platform will launch late 2019 and it will be available to CMOs of any size. If you want to participate, contact innovation@bmat.com.

3.4.3.2 Bloomen Photo

The goal for Bloomen Photo was to reach the status of an MVP (minimum viable product), presenting new options for the acquisition of photos. Currently the market for news photos is dominated by either photo wires from large agencies such as Reuters, Picture Alliance or AFP or - on the other side of the spectrum - stock photo platforms such as Getty Images. While collecting pictures on large platforms has benefits, the development has downsides, too.

The most important finding for Bloomen Photo in early evaluations was that photo editors face frequent challenges when they are in need of photos of a region, persons or topics that are not available through the platforms above. While big news events are usually covered, many facets and views for many countries are not easily available.

If this happens, most news organisations do not have any alternative - they need to find replacements, which usually leads to visually low quality of reporting. Even deep, insightful reporting might not be noticed, as the photos in the article are not a good fit.

This was our main finding from the first two rounds of evaluation in terms of market needs: Photos from large parts of Africa, recent photos of leading politicians in countries like Ghana, Mali or Tansania are almost impossible to get.

The simple solution would be to find photographers in such regions and work with them. But onboarding 50+, even 100+ photographers across Africa is not an option, at least not with traditional means of workflow management. Too many barriers make this impossible, starting with current photo databases, contracts, licenses and meta-data. Solving this problem has been the main focus of development work for the most recent period of work on Bloomen Photo, both from a technical and a business perspective.

As a result, the "press release" written for the D5.4 is still a good description of the goal for Bloomen Photo:

Headline

A fair exchange of the best photos for creators and media companies

Bloomen Photo aims to simplify and extend the collaboration between media companies and photographers for digital media. Bloomen Photos uses Blockchain technology to establish a trusted exchange. Further the use of “smart contracts” leads to simplified assignments and reliable, timely payment for work, even across borders. Key elements of the application are ease of use, trust, easy transfer of rights and metadata combined with swift - and finally - reliable payment for work.

Summary: Bloomen Photo helps to simplify the exchange of creative work - specifically photos - between media companies and creators. The focus is to enable sourcing photos for countries and topics not well covered by news wires. At the core Bloomen Photo offers a way to offer and buy creative content, based on smart contracts. One module allows for commissioning of assignments to creative contributors e.g. for a month or work or more.

Problem: Selling and buying of media assets is often a time consuming process, with many steps for everyone involved. For all creative work there is a need for clarification who can use it, for how long and how often. Metadata and copyrights need to be tracked in a complicated process, otherwise all kinds of headaches arise later. But the approaches from the past are not a good fit for the digital exchange of news and media items.

Solution: Bloomen Photo, one outcome of the Bloomen research project, now solves the problem by providing an easy workflow, secured by the use of Blockchain technologies. "This goes far beyond in comparison to what we could do with a traditional database: In Bloomen Photo we firstly create a basis for trusted exchange, through an identity check. We then enable a very quick selection and acquisition of media assets. To get there the application uses smart contracts. The pre-written contracts have a number of variables to ensure a quick resolution for copyrights. On this basis the application enables direct payments, faster and with less deductions than before", says Stratos Tzoannos, the Lead Developer of the project from Athens Technology Center (ATC).

Quote: Future versions of the application will further extend the smart contract features. "This is what large media organisations really look for", says Mirko Lorenz, a project manager working for Deutsche Welle. "The internal costs of contracting can be reduced significantly, leading to more options for the assignment of creative contributors, such as photographers, writers or video producers from all over the world."

Customer quote: Frank Ocean, an award winning US photographer working in Africa says: "I tested this and no other application ever enabled such a quick exchange of creative work versus payment". He says that in the past waiting for payment easily took weeks or months, often with deductions for the transfer by banks of up to 10% of the contract value. "For assignments of creative contributors this is the future", adds Miller.

Available now: Bloomen Photo is currently designed for usage by public broadcasters and can be tested any time. Opening the application of use by any media organisation is planned for mid-2020.

3.4.3.3 Bloomen WebTV

"Providing new economic and secure solutions for video streaming
Bloomen WebTV releases an open protocol for accessing audiovisual content.

Summary
Bloomen WebTV is an innovative solution for video producers. Studios, TV networks and independent producers can easily integrate Bloomen WebTV to their already established applications. By proving ownership of copyrighted content, producers can get access to the Bloomen web platform as well as create their own DAPP for the Bloomen Mobile Wallet and start monetizing their content in a transparent, auditable and low-cost environment.

Problem
Monetization of videos is a big issue for content providers, as nowadays they only have the option of creating their own platforms from scratch or join networks that either impose large fees or make the decisions on what the monetization model would be for them, such as how YouTube monetizes videos with ads.
Furthermore, centralization has proved to have harmful effects for all actors of the industry, such as when monopolistic practices are unavoidably imposed or when huge players often become the target of hackers.

Solution
The Bloomen WebTV Use Case is providing easy access to the Bloomen management platform for video producers to list their content and monetize it through smart contracts living on the Alastria blockchain network. These smart contracts are not only transparent and auditable since they live on a public blockchain, but also compliant with laws and regulations of the European Union since they involve a process of attributing payments to the tax authorities.
Additionally, Bloomen WebTV incorporates a personal mobile wallet for users, who can redeem Bloomen Tokens by purchasing top-up cards from the nearest store and use them for either accessing content or transfer it to their friends and family as a gift or allowance to enable them to access the video library provided by the consortium. QR codes are implemented to provide a good user experience not only for scanning the prepaid cards but also a PC Monitor or their living room TV so they can access copyrighted content.

"A peer-to-peer economy will reduce friction and eliminate intermediaries, so video producers and consumers will have direct digital communications, potentially disrupting the current centralized state-of-art. "
-Michalis Odysseos, Digital development manager, ANTENNA LTD (Cyprus).

"It looks like we might finally have the option of accessing any public sports event, without any geographical restrictions or monthly commitments, via a single app," said -

George Machattos, an avid football fan, who currently pays hundreds of Euros per month to be able to watch matches from different football leagues.

Bloomen WebTV is available now for a limited number of test users. The 2nd iteration of the platform will launch late 2019 and will be available for 250 users."

3.4.4 Frequently Asked Questions FAQ (Working backwards)

A mock FAQ was also part of the backwards methodology to help in the definition of the service/product in an early stage, while it was also used to clarify with the stakeholders and potential users the common questions that the solution poses.

Three different sets of FAQ were created, one for every use case (see D5.1, D5.3 and D5.5)

3.5 Evaluation methodology and schedule

Two main consecutive phases have been defined for Bloomen pilots, following the reporting schedule. The first phase started in M7 (start date of WP5) until M24, when the first set of deliverables (D5.1, D5.3, D5.5) were submitted. The second phase started in M25 and finished in M30 with the submission of the second set of deliverables (D5.2, D5.4, D5.6). Both phases have been further organised in smaller phases for a more effective evaluation. Many details have been defined in prior WPs, such as user types and key activities, as well as CSFs (Critical Success Factors) and KPIs for each specific use case. Most of this prior planning is published in D2.1 (Use Case Descriptions and KPIs), submitted in M6 (September 2017).

Moreover, in D2.1 a detailed scenario along with specific activities have been described for every use case. These activities have been further detailed and updated in D2.2 (Bloomen Requirements Analysis), delivered in M10, according to the initial feedback we had received during the first pilot phase. This important preparation for the evaluation was used as a basis and reference point in all future steps. The main activities had been broken down into specific steps, which were tested with users, providing robust guidance to avoid losing track of identified needs and requests. We could say that this was a checklist in the pilot operation and evaluation.

During the last six months of the project we extracted overall conclusions and concluded the tests that have been unfinished during the second phase of the pilots.

3.6 Ethical and regulatory considerations

The evaluation was aligned with the project's Ethics requirements, as described in detail in Deliverables D7.1 (POPD – Requirement No. 1), D1.1 (Initial Data

Management Plan) and D1.2 (Final Data Management Plan). The evaluation activities were carried out in accordance with the rules described in the recently implemented EU Data Protection Master Plan (GDPR).

3.6.1 Data protection

The processing of personal data generated by the evaluation process was carried out in compliance with the terms of the General Data Protection Regulation (GDPR), under the legal basis of 'a task carried out in the public interest'. Evaluation participants were informed about the data processing and asked for their consent, when engaging users in trials or interviews. Moreover, personal data were anonymized before they were included in any report. All datasets coming from the evaluation are stored with appropriate security restrictions in place.

3.6.2 Human participants

Evaluation activities need the direct involvement of human participants and as such special consideration was given with regards to adherence to ethics guidelines applying to human subjects research. No sensitive information (or Special Categories of data according to GDPR) was collected about the participants. All participants were recruited according to their established professional and/or personal involvement in activities that relate to Bloomen.
All the evaluation participants gave their consent, after having been informed about the Bloomen project and the evaluation, their involvement, the handling of their personal data, their rights, etc.

3.6.3 Transactions processes

Transaction processes were set up to be compliant with local and European tax regulations such as:

- Exchanging cryptocurrency with fiat money is exempt from the **Value Added Tax (VAT),** based on Judgement of an EU Court on 22/10/2015, C-264/14, DStR 2015, 2433.
- Exchange of cryptocurrency for the purposes of accessing a service is a taxable event for the platform. Especially for the pilot run by ANTENNA Limited and due to the nature of this innovative business model, ANTENNA filed documentation for an advance tax ruling via the Ministry of Finance in Cyprus.

More details for Ethical and Regulatory considerations can be found at the above-mentioned deliverables – D7.1, D1.1 and D1.2.

4 Evaluation overview until now

4.1 Bloomen Music

Summary of the work done so far

The initial and final reports of the pilot operation management and evaluation music industry use case, D5.1 and D5.2 respectively, together with the deliverables D2.1 and D2.2, which report the preliminary tasks to define the use case and requirements, contain all the context and details of the work carried out in Bloomen Music.

During the first year of the project, the efforts were focused on researching and understanding where blockchain technology could bring value and solutions to the music industry, defining a use case and system requirements. It was decided to design a system to deal with music rights management after having a deeper understanding of the properties and strengths of the technology and with the experience and knowledge of BMAT about the music value chain thanks to their work in daily operations with multiple stakeholders.

The second year was devoted to building, testing and evaluating a first version of the prototype, as the technological platform matured from its initial steps to executable demonstrators. In this phase, communication with external experts was crucial to understand what the most important questions were to focus on for further iterations, to improve the prototype and foresee technical threads and difficulties. With a more mature understanding of the scope of Bloomen Music, we were able to disseminate the work being done at the project to the music industry community to engage meaningful stakeholders for pilot tests.

In the third and last year of the project, the efforts were focused, on the one hand, on evolving the first version of the prototype thanks to the feedback received from the first tests and, on the other, to run Bloomen Music on a relevant realistic scenario engaging relevant stakeholders for a proof of concept. We experimented how the platform could serve the purposes of managing the copyrights for the private copying levy in Italy as an alternative to BMAT's current solution. The third year was also devoted to disseminating the work done through live demonstrations and presentations in events, publications and one-to-one conversations with relevant players in the music industry, while analysing exploitation opportunities and next steps after the project.

Demonstrator Features

Bloomen Music can be experienced through the Decentralized Rights Management app, which has been described in detail in the deliverables D3.3, D4.8 and D5.2. The solution allows an interested party to claim the rights of a musical asset, either a musical composition or a sound recording, being instantly shared with all the

participants of the Bloomen Music ecosystem. A smart contract-powered component allows any rights conflict on a given asset to be immediately detected and notified to the corresponding users, who can edit their claim to settle the dispute. The copyright information and its changes over time are stored in the shared ledger.

The main use case activities covered by Bloomen Music are:

Use Case	Title	Comment
UC-MUSIC-1	Register a user through a CMO	
UC-MUSIC-2	Register Sound Recording or Musical Work	off-chain
UC-MUSIC-3	Register Sound Recording or Musical Work in batches	off-chain
UC-MUSIC-4	Search assets	
UC-MUSIC-5	Edit core metadata of a musical asset	off-chain
UC-MUSIC-9	Claim rights over a musical asset	
UC-MUSIC-10	Claim rights over a musical asset in batch	improved in 3rd iteration
UC-MUSIC-11	Resolve claim conflicts	

Key Users

The deliverable D2.2, focused on the requirements analysis, contained a first definition of the users and stakeholders of Bloomen Music. In the initial report of the pilot, D5.1, we included the profile of the different types of stakeholders, the relation between them, and their role in the pilot, together with an analysis of the users considered in the first phase of the pilot. In the final report, D5.2, we mapped the stakeholder types with the user roles of the Bloomen Music solution, and added the users considered for the last phase of the pilot.

The universe of stakeholders can be divided between rights holders (music creators, their publishers, performers, music producers, and other interested parties), Collective Management Organizations (CMOs), which collect and distribute the royalties on behalf of their affiliated rightsholders, and music services companies like BMAT which help the former develop their work.

Bloomen Music is a solution targeted primarily to CMOs, to help them manage copyrights data in consortium. The end users of the application are CMO staff and their affiliated rights holders. For this reason, both the first and the final stages of the pilot revolved mainly around CMOs and their needs. They have a deep knowledge of what the current workflow of copyrights is like and what the main rocks and bottlenecks are at scale. In the initial phases of the pilot we engaged with 9 CMO representatives and we held conversations with other types of stakeholders, such as record labels, music publishers, or music services companies. The last stage of the pilot was focused on performing tests of the proposed solution and evaluating a proof of concept for a specific use case for a CMO. For that reason, we have been working

with them and the data managed for them by BMAT, while following up business and technical discussions with two other CMOs and a music service provider.

Evaluation Phases

In the initial report, D5.1, we included a plan describing the different phases that we were following to carry out the pilot of the music use case, which was updated in the final report, D5.2, to show the progress. Here is the final picture of the plan once we have reached the final steps of the pilot, focused on the last iteration of Phase 4 and Phase 5:

Phase 1: *Pre-pilot and initial evaluation of requirements*. *Completed*
BMAT validates and tests the first deliverable provided by the technical partners. BMAT defines the strategy to run all the pilot phases. Specific steps: BMAT and Worldline produce extensive descriptions of user roles and activities in D2.1 and D2.2. Worldline develops a first version as a demonstrator.

Phase 2: *Adaptation to pilot needs and user's requirements*. *Completed*
BMAT recruits stakeholders and provides feedback to technical partners from both stakeholders and their own technical experts about prototypes developed. Specific steps: ICCS/NTUA, Kendraio and ATC expand the demonstrator to address the feedback from users.

Phase 3: *CMOs/users set-up*. *Completed*
BMAT trains stakeholders involved to start running the pilot. Prototype is deployed and properly configured. Specific steps: BMAT prepares the environment to run the pilots, including the set-up of the users and the data needed for the tests.

Phase 4: *Pilot monitoring*. *Completed*
Users participate in the platform. BMAT monitors the execution of the pilot. BMAT gets feedback and collects data to measure the impact. Iteration on phases 2 to 4.

Phase 5: *Pilot evaluation*. *Completed*
Analysis of all feedback across phases and summary of collected data. Final strategic results analysis are presented in the final evaluation deliverable and the review of the project.

Key Users Activity

The deliverable D5.2 describes in detail the pilot operation within the use case scope for Bloomen Music, including the preparatory work, the set-up of the environment and the different tests being executed during the second phase of the pilot.

The approach to evaluate the solution offered by Bloomen has been to work on a proof of concept for the Italian collective management organization SIAE to help them deal

with the distribution of the private copying levy – a government-mandated scheme in which a special tax or levy is charged on purchases of recordable media. SIAE collects the money for this tax and needs to distribute it among the administrators of the rights holders, splitting it according to their market share in the media. BMAT services SIAE to help them estimate these market shares from two types of inputs: the usages of each song in the media and the ownership information of those songs. BMAT obtains the music usages from its music monitoring platforms, and loads the data into an ad-hoc system for copyright claiming called DIG-IT. This platform offers similar functionalities to those of Bloomen's Decentralized Rights Management application, but based on a traditional database system: the users can log in, search the repertoire, claim their ownership and solve the disputes on the system. Once the claiming period is closed, the market share can be calculated and SIAE can distribute the collected levy. In the case of DIG-IT, the users are the six collective management organisations that manage the Italian neighbouring rights' revenues.

For the pilot, the relevant parts of the processes in DIG-IT have been replicated on the Decentralized Rights Management app. In a nutshell, the key users activities in the platform, once the environment is set up, are:

- Search/browse the assets registered in the visible collections
- Register a claim for a selected asset
- Check the list of their claims registered in Bloomen Music, and their status
- Receive a notification when the system detects there is a conflict with claims from another member
- Update or delete a claim in order to fix an erroneous claim and resolved a dispute
- Register claims in bulk by uploading a CSV file

Evaluation Results So Far

The music use case final report D5.2 gathers the results of the iterative tests performed during the pilot. The tests have covered all aspects of the tool to gather feedback both on business and technical acceptance. Since the developments have been planned in periodic sprints, the software has been improving after each session of tests.

Bloomen Music aims to add efficiency to the value chain of the music royalties, focusing the efforts in the management of copyright data, which is at the basis of any operation that is done in the music business. First steps towards the validation of the approach taken for the music use case of the project, as detailed in the initial report, D5.1, seemed to indicate that Bloomen Music was on the right track. The interactions we were having with relevant actors of the music industry encouraged us to continue working in the same direction, and the stakeholders found the proposal reasonable and useful.

The tests run on the second stage of the pilot have allowed us to further develop the solution, by discovering which features were working as planned, which needed

improvements and which other features were missing and necessary to complete an MVP which could be run on production environments. The principles at the core of Bloomen Music have been validated, and SIAE, as the target of the pilot tests, has encouraged us to keep refining the platform to take it to a production-ready level so it can replace their current solution. As reported in the results of the pilot tests in D5.2, some key aspects need to be addressed, mainly in scalability and the support to perform complex queries on the data stored on the ledger. If we are able to give an answer to these demands, Bloomen Music has a promising future as a rights management platform, and it could be extended beyond the scope of DIG-IT to provide a single source of truth of music rights data for other stakeholders in the music value chain.

4.2 Bloomen Photo

Summary of the work done so far

The Bloomen Photo demonstrator has evolved based on user interactions throughout the project. The latest iteration enables the use of Blockchain features for the photo acquisition process, based on a one-to-one or one-to-many exchange between photographers (sellers) and photo editors (buyers). The extended features and concepts are based on the feedback from potential users from both sides.

The main and extended feature focus has increasingly shifted to enable a way to manage photo assignments. Here, we found a market need, not covered by the existing platforms. Essentially, it is about simplifying and streamlining options to order specific photos from photographers for a short term engagement, with all steps from onboarding to payment facilitated by Blockchain technology.

Based on contacts created through Bloomen Week there is an ongoing exchange whether another Blockchain-enabled photo platform will use the findings and concepts for photographer assignment for implementation. To this end, the partners in this use case are in ongoing discussions with other media companies and media organizations in order to assess and quantify the market volume for this niche area.

Overview of work done in the project.

The very initial description of the use case worked well to define the scope and goals of this use case:

> "*The News use case from Deutsche Welle: An acquisition and management tool for news picture content that aims to improve visual journalism and collaboration with external picture contributors*".

However, this goal can now be described and demonstrated in much greater detail, based on implemented Blockchain features.

Short overview of evaluation phases
The key question is: How has the demonstrator evolved in the final phase of the project, based on the three key phases?

Phase 1	First prototype version	D5.3 – M24
Phase 2	Second prototype version	D5.4 – M30
Phase 3	Third prototype version	D5.7 – M36

With extended details the three phases and the - current - phase of exploitation after the end of the project can be described as follows:

Phase	Status
Pre-pilot and initial evaluation of requirements: DW validates and tests the first deliverable provided by technical partners. DW and ATC, as the technical partner, define the strategy to run all the pilot phases. Specific steps: DW and ATC produced extensive descriptions of user roles and needs in D2.1 and D2.2.	**Completed**
Pilot Phase 1: Adaptation to pilot needs and user's requirements. DW recruits its stakeholders and provides initial feedback to technical partners from both stakeholders and their own technical experts about prototypes developed, related to key modules as pure demonstrators. It is the responsibility of ATC to provide these modules, based on technical requirements and in collaboration with the other Bloomen use cases/technical partners. Specific steps: development of workflows for the required solution by ATC and DW - in extension to the user roles - with visual overviews and a description of needed features. The features were then implemented step by step, during 2019.	**Completed**
Pilot 2: Pilot monitoring. Users participate in the platform. DW monitors the execution of the pilot. DW gets feedback and collects data to measure the impact. Iteration from phases 1 to 2. Specific steps included - as described in this deliverable – the conduction of tests by DW with key user groups.	**Completed**
Final Pilot Phase 3: Analysis of all feedback across phases and summary of collected data. **Final strategic results analysis will be presented in the final evaluation deliverable and the review of the project.** The key event here was the presentation of Bloomen Photo as part of Bloomen Week, along with two commercial start-ups to a sizable online audience.	**Completed**
Exploitation after end of project: Ongoing evaluation with a Blockchain photo start-up and media organisations as to the realization of concepts developed in Bloomen photo.	Ongoing

One-to-one observations, Bloomen Week - drivers of refinement of Photo use case

As described in D5.4, the plan for evaluation in the final phase (02-08/2020) of the project was to enter into an ongoing refinement process, driven by ongoing interactions with potential users. Interactions were numerous and included presentations to photo editors, sales and marketing, as well as technology innovation teams.

The highlight of this period for both development and evaluation was Bloomen Week in May 2020. Due to the pandemic a planned live event in Madrid had to be cancelled. As an alternative the team planned and conducted this virtual event in May 2020, which created a platform not only for the photo use case, but the entire project. The outcome of Bloomen Week, in terms of dissemination, has been extensively reported in a dedicated deliverable.

This communication was mainly driven by the finding that few people would expect Blockchain technology to be capable of simplifying the photo acquisition and management process. The notable change in this phase was that the use case partners could demonstrate the innovative aspects of Bloomen Photo with confidence that they would provide a solution. The barrier to adoption is the perceived early stage of Blockchain maturity.

This aspect will be examined in more depth in the dedicated findings chapters below. In addition, we will report on the business options for the Bloomen Photo demonstrator.

4.3 Bloomen WebTV

The WebTV pilot was designed and realized in order to incorporate business needs of the video streaming industry, enhance the efficiency of operations by eliminating intermediaries and added costs, introduce the advantages of using blockchain technology to content producers and listen to what stakeholders and especially end-users have to say about the Bloomen WebTV technology.

After the use case description (D2.1) and the requirements analysis (D2.2), ANTENNA along with the technical partners worked together and launched the first pilot of the Bloomen WebTV solution in February 2019 (M19).

During the first phase, Bloomen WebTV set up and provided access to key modules, as pure demonstrators, to a specific group of test users, who were defined as people ranging from various backgrounds, but mainly had operational involvement with TV and WebTV technologies, so as to maximize the amount of useful feedback from key stakeholders. These valuable insights were not only expected for testing the software but also to enhance the thinking-process for designing the functionality, as well as to assess the impact that such a solution would have in the market.

Moreover, during the first phase, the advantages of blockchain technology have enabled ANTENNA to expand the pilot's reach beyond the market actors (content providers and users), more specifically to the tax authorities in Cyprus, due to a specialized tax component incorporated into the pilot, so as to demonstrate the benefits of the smart contracts' technology at a governmental level.

At the end of the first phase a press release was created by ANTENNA to communicate the pilot scope, what problems have been addressed, what the benefits of the technology are and what functionality was incorporated.

The press release along with a detailed presentation of the first phase of Bloomen WebTV can be found in D5.5.

In M27 (November 2019), ANTENNA, in the framework of pilot second phase, launched the second pilot of Bloomen WebTV, taking into account the outcomes of the first phase.

Whereas the overall approach for the first pilot was to set up and provide access to key modules as pure demonstrators to a specific group of test users, who were defined as people ranging from various backgrounds, but mainly had operational involvement with TV and WebTV technologies, the second pilot focused on implementing the Bloomen tools in a real-world scenario.

This was a groundbreaking move where not only the solid technical tools developed by the Bloomen consortium needed to be adapted to be applicable to a live WebTV environment but also a lot of work and troubleshooting was to take place within the production team of ANTENNA, so as to integrate services offered by the Bloomen Wallet and the Bloomen Developer Portal.

This implementation was a test for three different parties. One was the Bloomen consortium, which had its tools and functionalities exposed through a live publisher to hundreds of users, another one is ANTENNA which deployed its digital department to integrate the solutions, as well as for the end-users who were introduced to a totally new way of transacting and viewing audiovisual content available on multiple devices.

At the end of the second phase a second press release was created by ANTENNA to communicate the pilot scope, what problems have been addressed, what the benefits of the technology are and what functionality was incorporated.

The press release along with a detailed presentation of the second phase of Bloomen WebTV and an analytics overview given the data that was available on the end of the mobile wallet (Apple/Google stores) but also in terms of the blockchain usage (wallet balances) and the ANTENNA WebTV traffic through Google Analytics can be found in D5.6.

5 Final Steps of Evaluation

All three Bloomen use cases conducted the evaluation procedure as this was defined and decided in the previous deliverables. Both Bloomen Photo and Bloomen WebTV concluded the users' part during the second phase (until M30), so they present in this document some general conclusions regarding the use cases and their adoption by the users. On the other hand, Bloomen Music, due to its iterative approach within the proof of concept being carried out and to Covid-19 measures, extended its final part a couple of months more in order to be able to test a more mature version of the prototype, as reported in D5.2, so in this section we present the work done in the last steps of the pilot phase and general conclusions.

5.1 Bloomen Music

5.1.1 Pilot preparation

This section reports the work done in the last part of music use case pilot, on the basis of the results reported in the deliverable D5.2. The final stage of the pilot involves the execution of last iteration of Phase 4 and Phase 5 of the pilot plan:

Phase 4: *Pilot monitoring*. *Completed*
Users participate in the platform. BMAT monitors the execution of the pilot. BMAT gets feedback and collects data to measure the impact. Iteration on phases 2 to 4.

Phase 5: *Pilot evaluation*. *Completed*
Analysis of all feedback across phases and summary of collected data. Final strategic results analysis will be presented in the final evaluation deliverable and the review of the project.

The aim of the final stage was, then, firstly to run the last iteration of the tests with a new version of the Decentralized Rights Management app that includes improvements of the functionalities suggested by the analysis of the previous tests. Secondly, to analyze the outcomes of this last iteration to define the necessary steps to bring the platform to a commercial stage.

The conclusion after the previous tests indicated that the application needed improvement of some functionalities identified as key to demonstrate the solution in a realistic scenario. There were two main aspects to be fixed, with a certain relation between them: to improve the scalability to be able to manage a much bigger number of claims and to include a search and filtering functionality for the claims registered in the blockchain. In detail, the available version of the app could load, by then, a limited number of claims, on the order of hundreds, but we needed the solution to be able to handle the number of claims for the SIAE PoC we designed in our pilot, about tens of thousands of claims per user.

ICCS worked on the development of a new scalability module that would enable the bulk upload for a large number of claims and their data, requiring a new claim search and filtering component that would function and respond accordingly.

5.1.2 Evaluation procedure

The evaluation procedure in the final stage of the pilot follows the same schema of the previous iterations, described in D5.2. The agile methodology approach has allowed us to evaluate results regularly to add incremental improvements based on periodical reviews, also allowing us to fix issues at an early stage.

In the first iteration there have been improvements to support claim filtering for a small number of claims. In subsequent iterations the work has been focused on scaling up the number of supported claims and improving the software based on the feedback of the tests of the previous iteration.

The iterative evaluation has allowed us to add a number of new features and improvements to the Decentralized Rights Management app:

- Optimization of existing smart contract methods.
- Addition of new smart contract methods for improved integration of the back-end with the front-end application.
- Further improvement of the bulk claim upload by restructuring and optimizing its algorithm.
- Improvement of the CSV file upload towards time efficiency.
- Update of the incentive mechanism features and capabilities towards higher performance.
- Addition of pagination on the claims page in parallel with filter search functionality while using on-the-fly blockchain search of claims.
- Faster end-user interaction by optimizing various components and modules in detail.

5.1.3 Scope of final pilot tests

The scope of Bloomen Music has been largely described in the initial and final pilot reports, D5.1 and D5.2 respectively, which reflect the process of maturation of the concept and its evolution from a more abstract idea to a concrete scenario where the technologies and business propositions could be tested and validated. In that sense, the scope of the final pilot tests is a natural evolution of the work that has been done during the whole process, with a focus on identifying those aspects that need to be solved to transition from a demonstrator to an industry-ready MVP.

The definition of a proof of concept for the SIAE use case has given Bloomen Music a framework with constraints and business requirements. In particular, it has helped to set the test parameters and the working dataset and its size, using as a reference the volumes managed by DIG-IT, their current solution. The final pilot tests have been run

in a realistic scenario in order to evaluate the latest improvements and the suitability of Bloomen Music for the use case, and, finally, to consider the platform as a possible alternative to the current commercial solution to manage music copyright claims.

In parallel to the platform tests, and with the knowledge acquired within the project and the pilot execution, BMAT has engaged with relevant stakeholders in the music industry and the media sector to explore commercial proofs of concept, on the basis of the technologies of Bloomen and expanding its capabilities to cover other use cases.

5.1.4 Pilot Tests - Steps

The steps followed in the last phase of the pilot tests are the same as the ones needed for the tests performed during the previous stage. For a detailed description, more information can be found in the *Pilot Operation* section of D5.2, in particular the subsections *Preparing the Environment* and *Executing the Tests*.

The steps to prepare the environment have been replicated on the new version of the Decentralized Rights Management app: creation of the members and users, obtaining the working dataset, loading the working dataset and obtaining the rights claims. The platform has been tested with 1,5M sound recordings and different sets of claims ranging from the hundreds to the tens of thousands.

On the execution side, the efforts have been focused on testing the new functionalities, which tried to solve the limitations in the number of claims the application was able to handle, and the new search and filter feature to navigate through the claims registered.

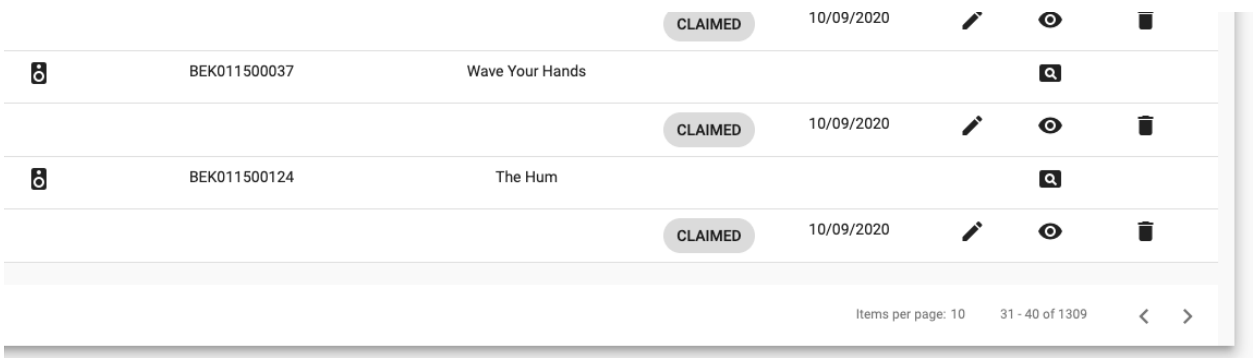


Figure 2: Now the app can manage thousands of claims, which can be navigated through the pagination

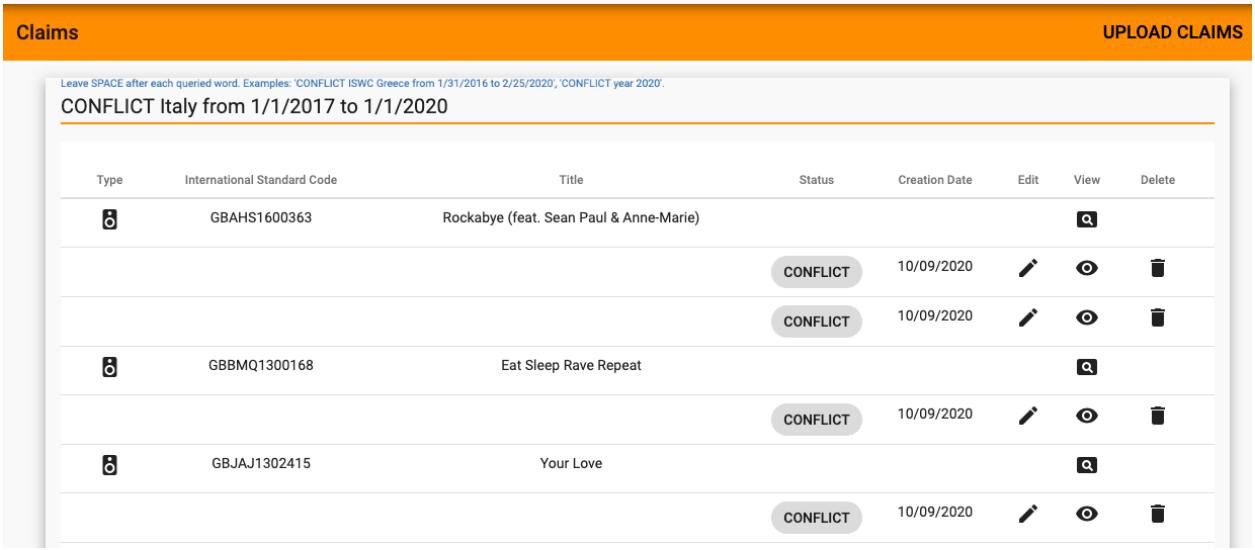


Figure 3: The app now features a search and filter module that allows users to query claims by different parameters

5.1.5 Outcomes and next steps

The improvements introduced in the last version of the Decentralized Rights Management app are key to operating the proof of concept. In terms of volume, the system can now handle tens of thousands of claims, which brings it closer to an industry use case. In terms of usability and user experience, the addition of a search and filter functionality, allows the user to explore the registered claims, performing complex queries which are necessary in the operation of such a system.

There are still, of course, features that a production-ready MVP would need to satisfy the operational requirements of a commercial solution, and which are not the object of research of this project, like a tool to export the data from the system, or a migration tool to avoid losing the information registered in system upgrades. A detailed analysis of other aspects of the solution can be found in D5.2 under the section *Results*.

From a business perspective, the latest technical improvements have helped confirm the conclusions drawn in the previous analysis. Such a blockchain-based rights management system is a good fit for a number of use cases in the music industry. The principles demonstrated in Bloomen Music can be applied to current solutions to add a series of characteristics that significantly change the way copyrights are managed today, bringing more trust and transparency.

The solution proposed at Bloomen Music has been exposed and summarized in a recently published scientific peer-reviewed paper ([16]):

> Kapsoulis, N.; Psychas, A.; Palaiokrassas, G.; Marinakis, A.; Litke, A.; Varvarigou, T.; Bouchlis, C.; Raouzaiou, A.; Calvo, G.; Escudero Subirana, J. Consortium Blockchain Smart Contracts for Musical Rights Governance in a Collective Management Organizations (CMOs) Use Case. *Future Internet* **2020**, *12*, 134.

The European Commission has already recognized the innovative value of Bloomen Music (and Bloomen Photo) through their Innovation Radar [17]. BMAT has been identified as 'Key Innovator' in the development of the innovations within the Bloomen project, which will open up new opportunities for BMAT to partner with business or academic organisations and trigger interest from potential customers or investors in BMAT innovations. In fact, BMAT has already started talking to several companies and research institutes to continue the work done at Bloomen towards a commercial state or explore new opportunities using the knowledge and experience acquired.

The Catalan Ministry of Digital Policies and Public Administration has recently contacted BMAT showing interest in the project and to feature Bloomen Music as a success story in Catalonia's Blockchain Observatory [18], an initiative aiming to map the local blockchain capacities within the Government's strategic digital agenda [19]. This recognition will help position the company in the domain and open new opportunities to continue the work done at Bloomen.

5.2 Bloomen Photo

5.2.1 Pilot preparation

For the final phase of evaluation and development of the Bloomen Photo pilot we focused on refinement, in order to find ways for possible exploitation and continuation of the work, after the end of the Bloomen project.

The positive feedback to the first evaluation rounds showed some agreement of possible users with the set-up of Bloomen Photo and the Blockchain-enabled features. But it did not solve the question how the application could possibly evolve into a market-ready, user-ready application.

Finding potential exploitation scenarios therefore became the main goal of the work done in 2020. This chapter reports about the work done since the D5.4, new features, analysis of results, comparisons with other photo platforms or projects using Blockchain technology for journalism, visuals and media assets.

As a brief look back: Based on the findings in the first two evaluation rounds, Bloomen Photo entered into a development sprint between September 2019 and February 2020. From February to August we performed ongoing one-to-one discussions with single experts or groups inside DW and other media organisations. In this period, many relevant aspects for the workflow as a whole have been added to the demonstrator. Further, the understanding of market needs and demands improved further.

Highlights of the period are:

- Bloomen Photo (and Bloomen Music) were recognized by the EU H2020 Innovation Radar [20].

- The success of Bloomen Week as a virtual event, enabling us to show Bloomen Photo side-by-side and in comparison with commercial applications (Photochain.io, Copytrack).
- As of August 2020 there are ongoing exchanges with Photochain.io to potentially realise the assignment workflow in their platform.

5.2.2 Evaluation Procedure

In the period from February to August 2020 Bloomen Photo entered into a phase with the key goal of further refinement, both in terms of technical features and business concepts.

Focus on Assignment Workflow and Public Service Media

Based on the finding that a novel photo solution would initially only be relevant to a very specific group of users, we focused on presenting the solution to a select group of potential users.

The main feature, which was presented on top of the (many) benefits of Blockchain, was the “Assignment Workflow”. We talked about the option to onboard up to 50 or even more photographers and the option to assign them specific projects. This option - economical, direct ordering of pictures needed - would add a new option, beyond photo wire services for news or stock photo platforms.
Furthermore, we focused on building contacts with photo editors of European Public Service media. Firstly, Deutsche Welle has many ties and contacts here, secondly it seemed more feasible to start in the non-commercial, public service sector. In case of successful implementation, extension to other types of media companies and even other types of media assets (short video sequences or news video, short audio recordings or interviews) would be possible.

In essence we aimed to show features and options to photo editors of international public service media, such as Deutsche Welle, France Media Monde, Swiss Info and BBC. Another organisation in focus was the EBU (European Broadcasting Union).

5.2.3 Scope of final pilot tests

The final phase for evaluation of Bloomen Photos aimed to refine the understanding of exploitation options, based on the demonstrator, which tested well in previous phases and received positive feedback.

However, a finding of the evaluation was that the knowledge about Blockchain options and the trust in this technology is low, due to the nascent status of Blockchain as a platform. The situation can be partially compared to the early days of cloud computing, where many doubts and issues had to be overcome.

The scope of the final pilot tests, presentations and one-to-one observations was to find aspects that would make the core model of Bloomen Photo more attractive and to find enough market demand to fund the creation of the assignment workflow in a market platform. Another, equally important aspect was an assessment of the potential market size - whether there is any expectation of a fast growing, quickly adopted market or whether current barriers call for a different market approach.

In summary, the final phase of Bloomen pilot operation and evaluation focused on refinement, with the goal of finding potential exploitation options after the end of the Bloomen Project.

5.2.4 Pilot Tests - Steps

We presented the Bloomen Photo demonstrator to a number of different groups, in different contexts, almost like a business pitch. In this phase, the main question we asked was not about which features should be in the demonstrator, but whether this concept would already be mature enough to be used by the different groups. Here, specifically, the findings showed that a number of considerable barriers to adoption exist.

An example: All photographers said they would welcome a new, easier payment option for work done. But at the same time there is no widely available infrastructure for digital payments yet. Blockchain tokens and wallets could fill this void. Technically, it can be demonstrated as a simple and trustable system. But before funds acquired could be paid out into local currencies tax authorities would have to support and trust such systems. Further, it must be considered that an unregulated flow of money could quickly be adopted for money laundering and other criminal activities. Only with an institutional connection and interfaces a Blockchain-based global payment system with low transaction costs can be expected. This is a current blocker for adoption.

Bloomen Photo evaluation in this phase proceeded in multiple small steps. These included one-to-one exchanges with legal and financial departments in DW. Here the project learned about the extensive administrative work to be done for each employment or assignment of a journalist, photographer or video producer. Today such set-ups are usually handled using email, Word and or other traditional tools, but no integrated systems. As a result, local taxes must be considered, contracts need to be exchanged, licenses need to be agreed upon. All this could - theoretically - be integrated in a Blockchain platform, but more work needs to be done to get there. Long term licence documentation, direct payment, direct assignment options - each of these potential features received positive feedback, but in very early market maturity.

A general observation was that participants of presentations reported that the case of Bloomen Photo appealed to them, not only because of the handling of photos, but in a more general sense as fair, logical and forward-looking. Furthermore, they expressed views that, “for the first time”, they understood why and how Blockchain technology

could be useful, beyond crypto currencies. A lot of information needed to be provided and discussed as to the mainly negative image of crypto exchanges.

Bloomen Week in this context served as a key moment in the evaluation process. On the specific Photo Day, the first of a week of virtual presentations, Bloomen Photo was presented side-by-side with solutions from Copytrack and Photochain, both commercial start-ups, using Blockchain for different photo use cases.

Photochain.io was the most comparable to Bloomen Photo - though the platform aims to be kind of a white-label photo exchange, with lower transaction fees for sales of photos than established platforms. Photochain started operation only in February 2020 and is therefore in an early stage of development. As a result of several exchanges with the CEO of the company, the concept of assignments is currently being evaluated as a possible addition for the platform.

5.2.5 Bloomen Photo in Comparison

This section will briefly compare Bloomen Photo to other solutions and competing approaches, which is helpful to illustrate the USP of the demonstrator. Furthermore, there had been a review recommendation to integrate this check for the evaluation.
Our key learning from the observation of the market is Blockchain technology by itself has not fulfilled hopes of a quick market transformation. While broad platforms have failed to take off, approaches solving a problem first and using Blockchain as an underlying technology second did do better. To illustrate, we compiled a short list of companies using Blockchain for photo management.

Change of market outlook for Blockchain start-ups: In 2018 the option to do an ICO (Initial Coin Offering) seemed like a fast way to first acquire funds, then develop and launch new platforms. The concepts of these platforms covered a wide range of ideas, new social networks to payment for interactions with advertising. Most failed, some technology was taken over by larger platforms, such as Spotify.

But one has to consider the failures, primarily. Despite much enthusiasm in 2018 Blockchain technology has not had the effects hoped for in media asset management or as an accelerator of new media models, so far [21]. During the entire Bloomen project the Photo use case maintained a long watchlist of media-related blockchain ventures, views have reiterated, many have stopped operation or pivoted from the initial plans. The total list included 65 different ventures [22]. Below are selected examples.

Sendergram, an early Blockchain enabled photo/creative material exchange launched as early as 2018, but has since then not made significant changes to the homepage. Bloomen Photo had several exchanges with the founder, based in Los Angeles [23].

Kodak.One: The platform with a big name started in 2018, the Kodak brand was licensed for this platform by a German start-up [24]. What was initiated as large photo exchange has since pivoted to “after-licensing”, meaning that Kodak. One offers

photographers to help find uses of their photos without license, then enforcing payment. The model is very similar or the same as what is offered by Copytrack.

Civil, a platform aiming for a new model for local journalism failed with an ICO due to the complexity of the process. The platform started to shut down in 2020 [25].

Brave Browser: The general idea of funding journalism through direct payments did not iterate so far. Brave, a new browser with options to "pay" users for interaction with advertising has so far not gained significant market share [26].
Blocknify, a start-up we interviewed in 2019, which offers new solutions for Blockchain-enabled contracts, did not evolve further and was not able to widen the list of clients [27].

Value through niche solutions

TruePic is a photo and video verification service. It is not primarily offered to media companies, but to industries dependent on photos and documentation, such as car insurance. TruePic ensures that a photo taken of a car damage can be verified to be taken as claimed. The company has received considerable press coverage as to its ability to detect deep-fakes, which are considered a challenge in many sectors relevant for businesses and society. TruePic was invited to present its solution as part of Bloomen Week, but had to decline the invitation due to lack of time.

News Provenance Project: This project, initiated by The New York Times in collaboration with IBM, aims to enable a view on the context of visuals, as a way to separate truth from fake. The idea is that metadata about a picture (when it was taken, in what context, by whom) are made available to readers in order to verify that the picture is correct. Bloomen Photo was presented to the team of the News Provenance Project in June 2020.

Blockchain Photo Platforms

As of mid-2020 only two larger photo platforms using Blockchain can be identified: YouPic and Photochain. YouPic was invited to Bloomen Week, too, but did not participate.

Both platforms see themselves as a new way for photographers to present and sell their work, with the platform providing services for presentation, smart contracting, metadata and payment options. The challenge for such platforms, though, is to reach a level of depth of the offerings to generate income. All photo platforms must go through a long phase of building both an offering of photos and finding buyers, which takes time.

Conclusion: Assignment Workflow as market opener

The process of establishing new and better photo platforms could be accelerated by unique features and benefits - this is the core idea of the assignment workflow - to clearly make it easier to offer and buy exactly the photos needed, not just browse through millions of photos and maybe finding the one that fits a certain task.

As to the end of Bloomen, the Bloomen Photo demonstrator is currently used to solve the problem of direct photographers assignments only for Public Service Media companies.

5.3 Bloomen WebTV

In addition to the WebTV pilot evaluation, as analyzed in the use case final report D5.6, for the purposes of the overall pilot evaluation report, it was stated that some further analysis, based on feedback provided by the end-users of the solution, would be done.

As reflected in D5.6, the solution was publicly available on the website of ANTENNA, ant1.com.cy. To participate, users had to fill an online form which only asked for their email address, which would be used to send free prepaid cards that provided users with tokens that could be used for accessing exclusive content, before it would air on ANT1 Television.

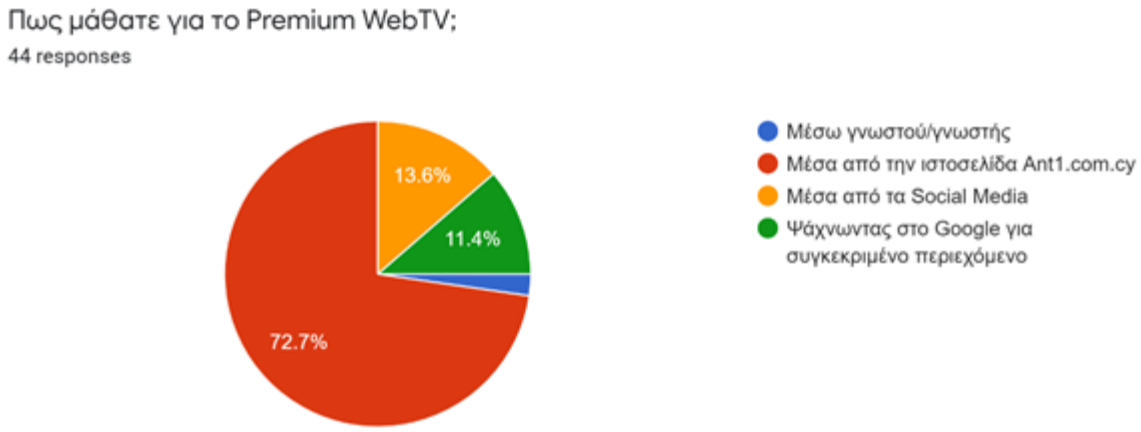
Apart from the prepaid cards, users received another email in July 2020, when the live solution reached its end-of-life. As a reminder, a total of 541 people had initially signed up for testing the solution. Out of this number of people that we reached to at the end of the pilot, , 119 people opened the email regarding the request for feedback, and 47 people actually clicked on the link to provide their feedback, according to the professional email marketing platform Mailchimp.

Figure 4: Mailchimp statistics regarding users feedback on the second iteration of the Bloomen WebTV pilot.

Furthermore, the campaign was also shared on ANTENNA's social media channels, targeting users who have previously accessed the Pilot Webpage, through the Facebook tracking pixel that the company installed on its website.

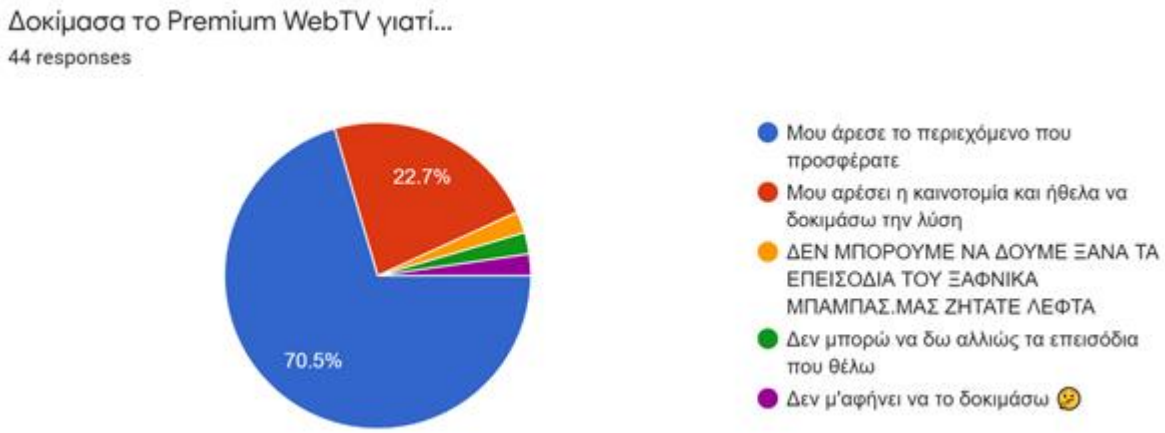
Overall, there were a total of 44 finalized responses on the Google Form, which was designed to be easy and fast to respond to. Because this evaluation procedure was designed to be complementary to the evaluation in the use case final report, only 6 questions were asked to the participants. The form was written in Greek, as the core audience of ANTENNA has Greek as their native language. We analyze their responses as follows:

Question 1: How did you find out about Premium WebTV?



Here we asked a basic question, for the purposes of finding out where participants found out about the solution. 72% of the respondents found out about it through the official website of the company. Notably, 11.4% discovered the solution through Google Search, when searching about the specific type of content that was offered in the platform. This is a first hint that the type of content (exclusive TV Series) was itself a driver for people to test the solution.

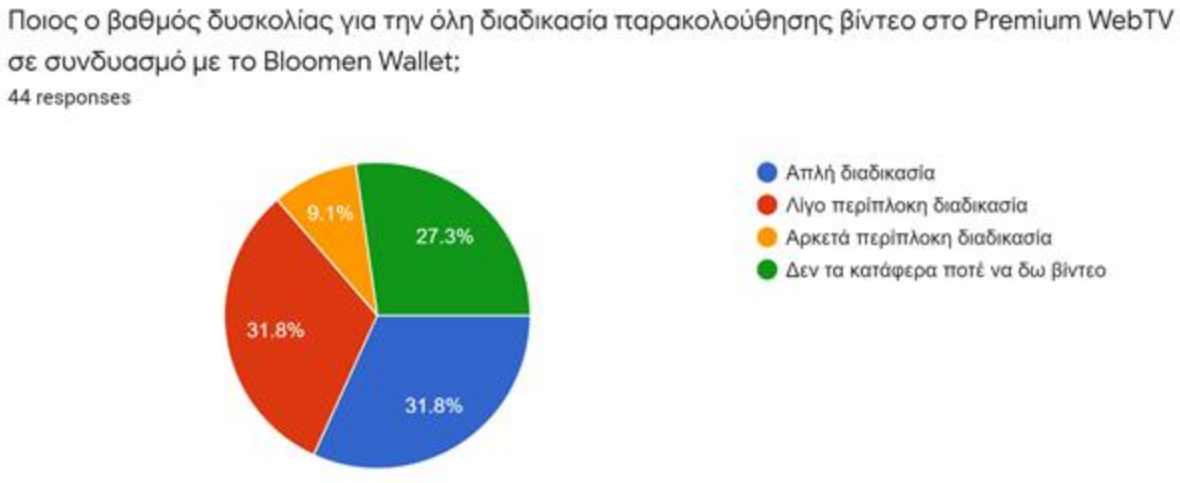
Question 2: I tried Premium WebTV because…



Here we ask why users opted to try the solution. Following our previous findings, a dominant 70.5% of the respondents stated that they wanted to see the specific type of content that was offered. This is something that the company forecasted in previous Bloomen documents but also during plenary meetings of the consortium, as

its experience in the Television industry shows that people are willing to “tune in”, mainly when they know that good content will be available. Also very interestingly, 22.7% of the respondents stated “I like innovation and I wanted to try this solution”. So here we were happy to find out that around 1 in 5 people really wanted to see how this works, rather than just do it mechanically to see the content that is available.

Question 3: How difficult was it to watch video on Premium WebTV, when it also comes to the usage of the Bloomen Wallet?



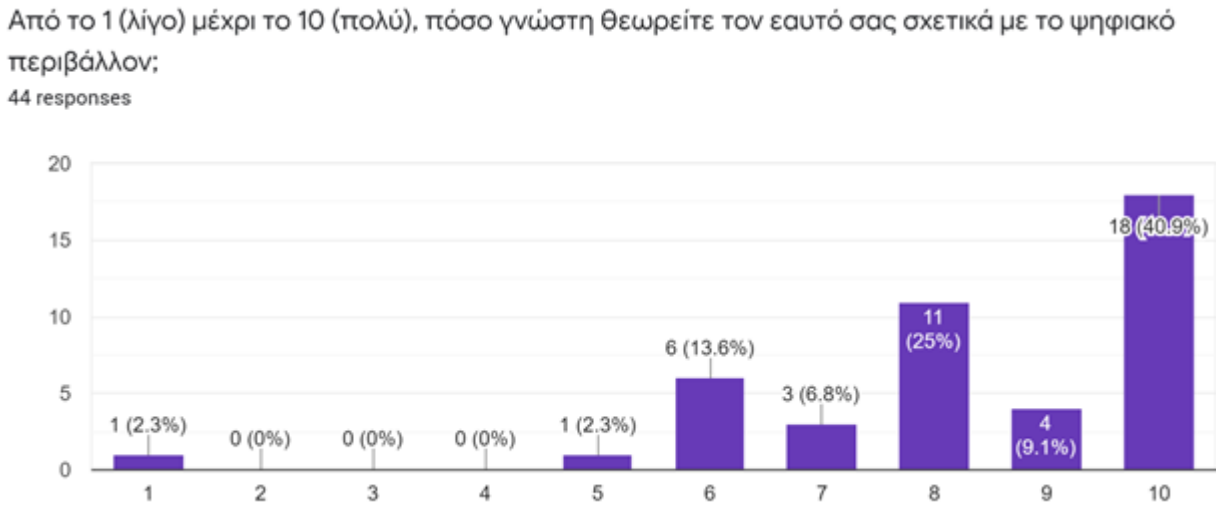
In this question, we wanted to see the level of difficulty users would face when testing the solution. As described in previous documents, this was an interesting thing to observe, as users of ANT1.com.cy, who are predominantly people familiar with the traditional format of Television, might not have high digital literacy skills.

We were happy to see that 31.8% of the total respondents found the procedure to be “simple”. This shows that the consortium’s strategy around reaching average end-users, which primarily stated that the user experience of the solutions should be on a high level but also the fact that the end-users did not have to know anything about the underlying technologies, was relatively successful.

Additionally, we had 31.8% of the users stating that the procedure was somewhat difficult to follow, which is understandable given that they had to use a mobile wallet to provide permissions to PC Monitors, tablets and TV sets to watch content.

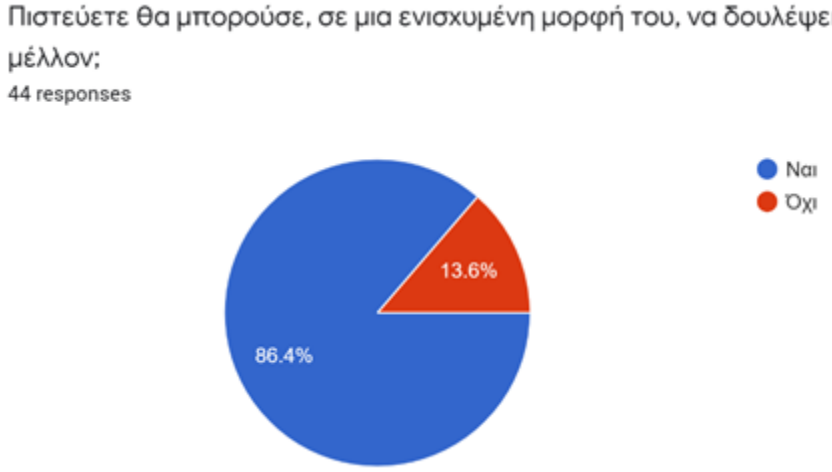
At the same time though, we had 9.1% stating that the procedure was significantly complicated and 27.3% stating that they never managed to watch content. This is a critical evaluation point that shows that user experience has a lot of road to cover for such a solution to thrive. A factor for this could be some of the bugs that users were facing in the beginning of the live phase. These bugs might have been resolved but it wouldn’t mean that these users would be returning to give the solution another try.

Question 4: From between 1 (little) to 10 (a lot), how digitally literate you consider yourself?



This question was asked to see if the users have digital literacy, so as to realize if, in the case of people not being able to use the solution, one reason could be that they typically face problems with technology and digital tools. A 75% stated that they think their digital literacy levels are between 8-10 in the scale, which could be an overestimation of each individual's digital capabilities and understanding. Nonetheless, it shows that there is a lot of room for improvement for such a solution to properly go live.

Question 5: Do you believe that an enhanced version of this solution could work in the future?



In this section, we wanted to find out what users think of the exploitability of this solution. While many users were disappointed or found it hard to use the tools, we were delighted to see that 86.4% stated "Yes". This paints a positive picture for the work done through the Bloomen WebTV use case, as users seem to believe that this new environment could be something that they could work with.

Finally, we also asked users to provide some further feedback (medium-form answer) if they would like to. Out of the 44 respondents, 16 people provided valuable feedback.

Some examples are as follows:

A. I would like to see more series like these.
B. Very nice experience. A bit complicated. I would also like to watch more content.
C. I would like to see mobile support.
D. I didn't manage to watch anything.
E. A fantastic solution and very helpful for viewers that would like to "sync" with the TV Channel, even without the use of the traditional TV Set.

Overall, it was interesting to see all the responses, which are largely in par with the evaluation done in D5.6. The human feedback was aligned with the reporting that came out of the digital solutions that were put in place, such as Google Analytics and Alastria usage statistics, and combined, provided significant evaluation points that could push the use case tools to be more suitable and comprehensible for a potential live enterprise beta or final version.

5.4 Technical Evaluation

The formulation of the final Bloomen overall architecture as in the corresponding deliverable ("D2.4 – Final Bloomen overall architecture") is again verified as the appropriate and optimal one supporting the dissimilar schemas of the three use cases.

Each of the use cases adopts blockchain related components for its smart contracts implementations while it uses integration mechanisms to communicate with the higher levels of its application. Thus, the Blockchain Layer of the architecture is obviously formed in all three use cases, while it is not necessary that all of the use cases are employing all four modules of the Layer (namely, Tokenization, Smart Contracts, Distributed Apps and Assets & Devices), as seen in "D2.4 – Final Bloomen overall architecture" Architectural Traceability of each use case.

Furthermore, all of the three use cases contain similar and diverse mechanisms that handle the front end requests in order to transform and actuate them in the back end of their corresponding pilot application. In this sense, the Middleware Layer of the Final Bloomen Architecture is verified as an essential structural level of each use case, while the Architectural Traceability schemas in the corresponding architecture deliverable (D2.4) determine in detail the modules that are used in common or not by each use case. Moreover, all three use cases maintain the high level components and interfaces responsible for immediate user interactions. Thus, similar to previous layers, the Application Layer of the final Bloomen overall architecture is also observed as a necessary structural level for each of the three use cases, while further details are clarified in the corresponding use cases Architectural Traceability schemas (D2.4).

Finally, the only module of the Final Bloomen Architecture that is not used directly by the three use cases is the Anonymous Personalization Module. However, it is maintained in a separate demonstration that integrates with the Music Pilot.

6 General Presentation of Results

6.1 Business Value

An important aspect of all Bloomen pilots was to validate the use of blockchain in the area of creative work from a business point of view. To do so, all the use cases have, during the evaluation, checked if their solution is addressing and solving the problem of the respective industry more efficiently than other solutions.

Every industry (music, news media and WebTV) has its own needs and limitations, which were located and analysed throughout the project and presented in the deliverables of WP5 (e.g. a blockchain-based tool would overcome the lack of trust and transparency between agents of the music value chain).

All three use case partners have identified several contexts in which a blockchain-based solution, especially the solutions proposed by Bloomen, would be a perfect fit, since the properties of the blockchain layer of Bloomen system are very powerful and can easily be adopted by the creative industry, as a stand-alone platform or integrated as a module of an existing system.

Another important aspect for the business value of Bloomen is whether test users would recommend this approach. In all three use cases, the users found the application really interesting and addressing the needs of the respective industry and said they would recommend the application to colleagues (or to other viewers, in the case of Bloomen WebTV).

6.2 User Motivation

Different types of users in the area of Creative Industry can use the Bloomen platform. From simple end-users (e.g. viewers for Bloomen WebTV) or professionals and experts (e.g. CMOs for Bloomen Music, photographers and media industry for Bloomen Photo), all of them should be convinced of the benefits of the use of the Bloomen platform.

While the three use cases of the Bloomen project share strong common requirements regarding the unique identification and correct management of digital assets rights, the target users of every use case present important specificities. This is why we followed a customized approach in order for the final service to be relevant for all possible future users, with functionalities fully adapted to the possible users of each use case.

All the functionalities we adopted derived from the analysis of user requirements of every use case, in combination with the feedback we received from the pilots. As a result, the Bloomen project offers a platform with modules accessible by all three use

cases and each use case uses the necessary modules, offering adapted functionalities to their users, while maintaining strong performance (strong common platform and shared services).

6.3 Critical Success Factors and KPIs

Following review recommendations, use case partners re-assessed their previously defined Critical Success Factors (CSFs) and the related Key Performance Indicators (KPIs) with regard to their relevance and measurability and adapted the evaluation procedure towards their assessment.

The definition of CSFs and KPIs helped to define the use cases. In the Photo use case, for example, the key CSFs were narrowed down from a wide approach in the very beginning to few and essential CSFs in the very end. The key CSF for the Photo use case evolved to be the cost of onboarding 50+ photographers and creating an one-to-one exchange, based on specific assignments. All other approaches - auctions, seller- or buyer-oriented models, seem to not adequately help in the current (early) adoption phase for Blockchain in media management, at this time.

The results are presented in D5.2, D5.4, D5.6 for Bloomen Music, Bloomen Photo and Bloomen WebTV respectively, where they were assessed directly, through the different use case activities defined in D2.1 or through the collection of quantitative and qualitative results.

6.4 Evaluation of Blockchain technology through Bloomen use cases

Bloomen, through the three use cases, offered a tailored solution for copyrights management in media experience, taking into account the common basis, but also the important differences in users' needs. Bloomen enabled the media and music industry to explore a new technology like the blockchain and its potential for building new business models and/or new revenue streams. Through the three use cases, it is shown that the use of blockchain can disrupt media transactions, contracts, and trust. This new way can enable unique and innovative synergies among content creators, distributors, and consumers. Verification of content copyrights, IPR clearing and payment are some of the features that were developed and tested through the use cases. Through the use of blockchain technology, the costs of distribution and royalty collection can be reduced, while the users can offer or obtain the content that they want and are willing to be paid/pay for.

6.4.1 Shortcomings and Barriers

Blockchain is still a new technology with multiple versions, so it is natural there is mistrust from potential users. In all three use cases, several reservations were expressed by all the groups of users. They ought to be sure it is secure, safe, addressing their needs and fitting their goals. All the three use case leaders are well

known in their fields, so the adoption of this new technology by them functioned as a guarantee for potential users.

We should also mention an important barrier presented in two out of three use cases, related to payment procedure (Bloomen Music does not include any payment procedures). Users are concerned about the security of payments, the smoothness of the payment process and if this is translated into real money. The concept is still quite uncommon in the general public, so both professionals and general users participating in the use cases were concerned about it.

7 Conclusion

D5.7 summarised the work done in WP5, that is extensively described in the other deliverables of WP5 (D5.1 and D5.2 for Bloomen Music, D5.3 and D5.4 for Bloomen Photo and D5.5 and D5.6 for Bloomen WebTV), while it also presents the evaluation procedures and outputs of the last period of the project.

The large majority of results and comments are highly encouraging and fully support the current business and technical direction of Bloomen. There were countless qualitative comments describing advantages and benefits, suggestions for improvements or additions, and important aspects of related administrative workflows. Shortcomings and barriers have also been highlighted. All this information is very valuable for the general uptake of blockchain technology in the media experience, while important learnings are derived for the specific domain of every use case.

7.1 Learnings from Bloomen

Learnings from Music Use Case:

The Bloomen project has, both for BMAT and for the rest of partners of the consortium signified, a vast source of knowledge about blockchain technology, which, we believe, will be crucial in the development of the media industry, and in particular the music industry in the coming years.

It has been an opportunity for BMAT to understand, explore, research, develop and test a technology that has been evolving throughout the three years the project has lasted. For the other partners, Bloomen has allowed them to learn about the workings of the music industry, its complexities and idiosyncrasies, a mandatory prerequisite for developing meaningful solutions that address the right issues in a realistic approach.

The music industry faces problems that have been dragging on for a long time. While it is undergoing massive growth, the copyright industry has been slow to adapt to the technology and business process changes, and its legacy practices are impeding it from thriving at the speed of digital. At the root of the challenges the copyright industry is facing, there is the fact that no efficient and modern infrastructure exists to support the growth of the IP Rights industry in the 21st century. As a result of its inherent properties, blockchain was quickly identified as an enabling technology and an opportunity to ease some of the music industry's problems.

Throughout these three years, Bloomen transitioned from the hype – when blockchain was presented in forums and media as a solution for every pain in the sector – to the hope – where a more mature understanding of the capabilities and limitations of the technology has led to the proposition of promising applications. The majority of proposed solutions have a focus either on streamlining royalty distribution or copyright management. Bloomen Music has explored the path of easing the

management of music copyrights, always listening to the needs of the industry stakeholders to identify their main challenges. Bloomen Music is not the end station of this journey but a door that gives us access to the technologies that are the basis of the solutions of the future that will make the creators be fairly compensated.

Learnings from Photo Use Case:

The three-year research enabled by Bloomen as one of the first large explorations into Blockchain technology yielded a number of insights. The most important perspective opened up is that Blockchain technology could lead to more inclusion, fair dealing between single individuals in contrast to the currently common exchange through large and growing platforms. This is not out of hostility to platforms per se, but based on a criticism of platforms as new middlemen. Fully matured Blockchain technology would result in more direct, fairer marketplaces for media assets.

The concept of “fair” should be understood describing market exchanges where both sides - seller and buyer - have gain and benefit, in contrast to platforms where one group or even a single institution gains the most.

The internet and the WWW promised to disrupt the market set-ups where long entrenched middlemen would take the bulk of profits, which was the case specifically in music and - in similar ways - for movie distribution, TV content and video. Today, new platforms have formed, YouTube, Netflix, Facebook or the Google and Apple app stores are current examples. All of these, mostly US-based, platforms disrupted markets and, over time, create new demand and new income opportunities for the creative industries. Not always, and not for all levels of content popularity, the income generated through the new platforms for the industry as a whole and the individual creatives is considerably lower than the previous, analog set-up. Blockchain, enabling a direct, trusted exchange, could potentially change this. The push here should be for inclusion of the many, not the few and for the distribution of income with low fees, aiming to avoid dominance of one or just a few platforms.

For photos, specifically, this could lead to better, deeper, more correct reporting. Further, photos archived with Blockchain features could be verified for context much more easily. The Provenance Project by IBM and The New York Times, which we interacted with, shows that the current development in this area is in very early stages.

Another, even more important aspect is the creation of markets for many, specifically in the media asset market. Currently, the abundance of content available through marketplaces and stock photo platforms provides a market driven by quantity. In the long run, though, we would assume that the quality of media items, the quality of information and the reliability of data and content must move into focus.

Learnings from WebTV Use Case:

The Bloomen WebTV use case could have been a project on its own, since the video streaming industry, at its current boom in the markets, has much more to benefit from

incorporating blockchain technology. Bloomen, as a consortium, made a good start, enabling an environment where copyright owners can communicate and transact on a peer-to-peer basis. Other potential features such as secure, decentralized video hosting, advanced encryption of streaming playback, enhanced private key handling and content monetization in terms of security offerings, are just some of the many other aspects that were identified and could be improved with distributed ledger technologies.

After the mass launch of the WebTV pilot and by having approximately 100 users testing the tools developed within the Bloomen project, a lot of useful data has been generated for both assessing the WebTV use case processes and acting as insights for the development of an exploitation plan.

The Bloomen WebTV evaluation from industry stakeholders, video experts as well as from the end users, proved to be crucial as feedback for the consortium partners, particularly the technical partners who took this data into consideration for changing and optimizing the processes behind the use case.

At the same time, significant business and technical challenges were tackled successfully, in the efforts to provide a production-level, integrated solution that involved not only technical and business planning within the consortium, but also partly outside as the use case partner, ANTENNA, deployed a technical team to implement these open source solutions within the framework of its digital assets.

Significant experience in the potential incorporation of blockchain technology for securing, managing and distributing audiovisual content was gained in the framework of the Bloomen project. The open source solutions that were created within the Bloomen project, are making future considerations and exploitation plans easier for all content producers, distributors, copyright owners and solutions architects.

References

[1] L. Guzman, A. M. Vollmer, M. Ciolkowski and M. Gillmann, "Formative Evaluation of a Tool for Managing Software Quality," 2017 ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM), Toronto, ON, 2017, pp. 297-306,
[2] Rubin, J., & Chisnell, D. (2008). Handbook Of Usability Testing 2nd Ed. In Handbook Of Usability Testing 2nd Ed.
[3] Guzmán L., Oriol M., Rodríguez P., Franch X., Jedlitschka A., Oivo M. (2017) How Can Quality Awareness Support Rapid Software Development? – A Research Preview. In: Grünbacher P., Perini A. (eds) Requirements Engineering: Foundation for Software Quality. REFSQ 2017. Lecture Notes in Computer Science, vol 10153. Springer, Cham.
[4] Seixas BV, Smith N, Mitton C. The qualitative descriptive approach in international comparative studies: using online qualitative surveys. Int J Health Policy Manag. 2018;7(9):778–781.
[5] Judita Narkunienė, Aurelija Ulbinaitė. Comparative analysis of company performance evaluation methods. Entrepreneurship and Sustainability Issues, Entrepreneurship and Sustainability Center, 2018, 6 (1), pp.125-138.
[6] Riihiaho, Sirpa. "Usability testing." The Wiley Handbook of Human Computer Interaction. John Wiley & Sons Ltd., 2017. 255-275.
[7] https://en.wikipedia.org/wiki/Minimum_viable_product
[8] https://www.techopedia.com/definition/27809/minimum-viable-product-mvp
[9] https://www.slideshare.net/AmazonWebServices/working-backwards-from-the-customer
[10] https://www.linkedin.com/pulse/working-backwards-amazons-culture-innovation-my-notes-satish-madhira/
[11] https://www.product-frameworks.com/Amazon-Product-Management.html
[12] https://www.linkedin.com/pulse/working-backwards-amazons-culture-innovation-my-notes-satish-madhira/
[13] https://www.allthingsdistributed.com/2006/11/working_backwards.html
[14] https://www.linkedin.com/pulse/working-backwards-amazons-culture-innovation-my-notes-satish-madhira/
[15] https://www.allthingsdistributed.com/2006/11/working_backwards.html
[16] Future Internet | Free Full-Text | Consortium Blockchain - MDPI." https://www.mdpi.com/1999-5903/12/8/134.
[17] https://ec.europa.eu/digital-single-market/en/innovation-radar
[18] Casos d'èxit. Departament de Polítiques Digitals i " http://politiquesdigitals.gencat.cat/ca/tic/estrategia-blockchain/casos-dexit/.
[19] Blockchain Strategy of Catalonia - Gencat.cat." http://politiquesdigitals.gencat.cat/en/tic/estrategia-blockchain/.
[20] https://ec.europa.eu/digital-single-market/en/innovation-radar
[21] https://pdnonline.com/gear/the-promise-and-pitfalls-of-photography-on-the-blockchain/
[22] http://bloomen.io/introducing-60-blockchain-platforms-companies-and-projects-aimed-to-manage-creative-content/
[23] https://www.sendergram.com
[24] https://en.wikipedia.org/wiki/KodakCoin#cite_note-18
[25] https://www.poynter.org/business-work/2020/r-i-p-civil-lessons-from-a-failed-startup/
[26] https://brave.com/brave-reaches-8-million-monthly-active-users-and-delivers-nearly-400-privacy-preserving-ad-campaigns/
[27] https://blocknify.com/index.html