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PVsites

Prototype of web services platform - First version

Project report

CADCAMation, BEAR-iD, Tecnalia, Nobatek,

December 2016

Summary

This deliverable summarizes the current state for the PVSITES platform for webServices in its preliminary prototype version to date (M12) and its related exploitable results. It characterizes the distinctive functionalities, connections, maturity levels and steps needed to maximize exploitation, market uptake and commercialization. It is part of WP7 (BIPV software tool) and specifically of T7.1 “Development of BIPV software tool”.

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The present report was mainly prepared by PVSITES project partner CADCAMation, with additional contributions from BEAR-iD, NOBATEK, and TECNALIA. The report was originally submitted to the European Commission as Project Deliverable D7.3 in December 2016.

Disclaimer

About the PVSITES project

PVSITES is an international collaboration co-funded by the European Union under the Horizon 2020 Research and Innovation program. It originated from the realisation that although building-integrated photovoltaics (BIPV) should have a major role to play in the ongoing transition towards nearly zero energy buildings (nZEBs) in Europe, the technology in new constructions has not yet happened. The cause of this limited deployment can be summarised as a mismatch between the BIPV products on offer and prevailing market demands and regulations.

The main objective of the PVSITES project is therefore to drive BIPV technology to a large market deployment by demonstrating an ambitious portfolio of building integrated solar technologies and systems, giving a forceful, reliable answer to the market requirements identified by the industrial members of the consortium in their day-to-day activity.

Coordinated by project partner Tecnalia, the PVSITES consortium started work in January 2016 and will be active for 3.5 years, until June 2019. This document is part of a series of public reports summarising the consortium's activities and findings, available for download on the project's website at www.pvsites.eu.

The PVSITES consortium:

Tecnalia Research & Innovation	CTCV	FormatD2
Onyx Solar	Flisom	Vilogia
BEAR-iD	Cricursa	R2M Solution Research to Market
Nobatek	CEA	CADCAMation
Film Optics	Acciona Infraestructuras	WIP - Renewable Energies

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1 EXECUTIVE SUMMARY

1.1 Description of the deliverable content and purpose

This deliverable summarizes the current state for the PVSITES platform for webServices in its preliminary prototype version to date (M12) and its related exploitable results. It characterizes the distinctive functionalities, connections, maturity levels and steps needed to maximize exploitation, market uptake and commercialization. It is part of WP7 (BIPV software tool) and specifically of T7.1 “Development of BIPV software tool”. T7.1 activities will continue all along the project duration with the development of an enhanced version of the software, several web services through the platform and a pre-commercial version of the BIPV tool. They will be documented in four deliverables (D7.1-4). They run in parallel (from M06) to the research and development efforts to create BIPV virtual objects (3D, parametric and BIM ready), testing activities (real projects, real objects) and real data comparison to ensure readiness of market entry, while at the same time advising on the development routes to increase the strengths while limiting the weaknesses of the technical and economic models linked to digital simulation and prediction.

The deliverable content is all about SERVICES to USERS (called webServices), software specifications, users interfaces and development process (AGILE and SCRUM methodologies).

The description of the software itself is made through screenshots of the user interface and mind mapping graphs.

1.2 Relation with other activities in the project

Table 1.1depicts the main links of this deliverable to other activities (work packages, tasks, deliverables, etc.) within PVSITES project. The table should be considered along with the current document for further understanding of the deliverable contents and purpose.

Table 1.1: Relation between current deliverable and other activities in the project

Project activity	Relation with current deliverable
D7.2	D7.2 provides a standalone simulation tool for BIPV services developed with a SaaS strategy (SOA). The PVSITES simulator is able to dialog with the PVSITES online platform to perform 3D display for the scene, main outcomes from simulation, in line with the users needs (watch, check, share).
D1.13	Business models analysis provide further insight to our vision for the market needs and for the development of the related services

1.3 Reference material

Not applicable.

1.4 Abbreviation list

AEC: Architecture, Engineering and Construction

BIM: Building Information Modeling

BIPV: Building Integrated Photovoltaic

BoS: Balance-of-System

CMS: Content Management System

DoA: Description of Action

ER: Exploitation Results

nZEB: Nearly Zero Energy Buildings

PV: PhotoVoltaic

SaaS: Software as a Service

SOA: Service Oriented Architecture

SPEC: technical specification

UI: User Interface

US: User Story

2 INTRODUCTION & METHODOLOGY

Developing a web portal “from scratch” is a complex task, but possible today with the appropriate resources and a reasonable time frame. CADCAMation, as WP7 leader, will apply its strong experience in BIM software development and the web experience acquired during the development of Design For Energy Project (D4E; FP7 EC funded), in which technical and contextual relationship management has been experimented between standalone solutions, BIM server, components generator/configurator and virtual workspace able to provide customizable services.

The aim is now to create a specific PVSITES plugin ready to deal with a future extended BIPV platform of webServices. This plugin will focus on PVSITES methodologies and objects, connected to the PVSITES simulation tool (standalone solution, see D7.2). This plugin will specify and enhance the generic functionalities of the platform and generate dedicated results and reports, through web interfaces.

The specific objectives for the PVSITES webServices are the following:

• To implement an early version of web services model (M12, D7.3), inspired on the Business Model analysis (D1.13, M12);

- To generate a pre-commercial version of web services platform (M18, D7.4);
- Delivering e-catalogs containing PVSITES products in BIM format (M18, D7.5);
- To assess the software performance, generate associated documentation and international versions, “public release” (D7.6, M42)
- Training courses on the tool towards relevant stakeholders (M36 to 42, as part of WP9, D9.19)

2.1 Specifications

We use a slight and fast methodology to specify and develop the software in the same time: AGILE/SCRUM process:

1. First are the Users Stories (US): the experts express their wishes and the way they consider each functionality, each result and report;

2. The US are written and transmitted to the development manager, reviewed, discussed and validated;

3. The development team starts to code in the same time as every US manager translates his US into SPECIFICATIONS (Procedures>Documents>Recordings);

4. As the software is pushed forward through chronologic iterations, and versions, debugs and corrections are made, and the partners submit even new User Stories. The development process is live and never ends until the end of the project.

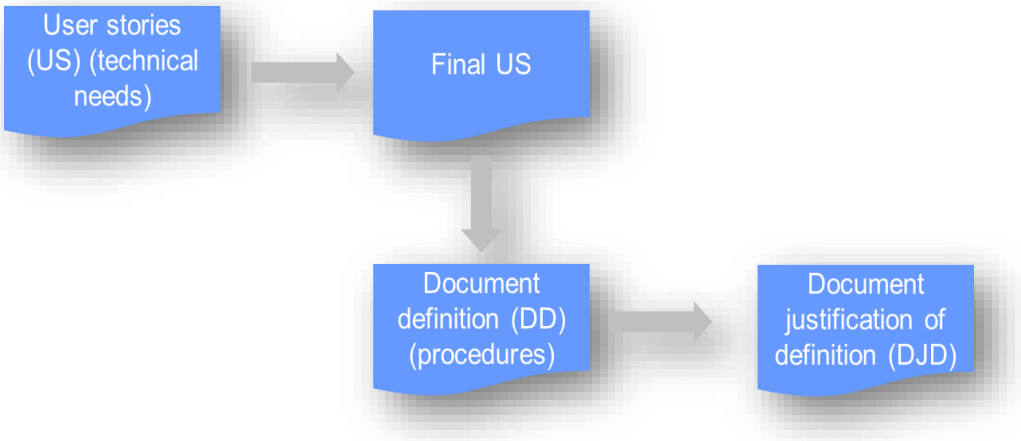

Figure 2.1: User Story process

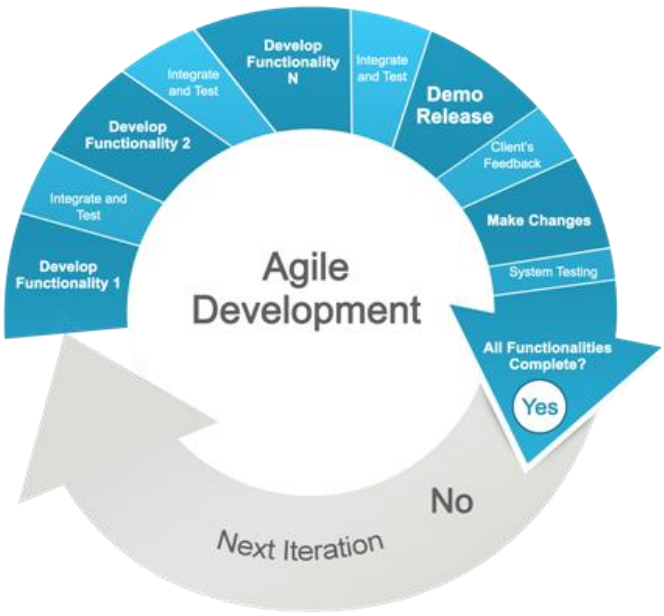

Figure 2.2: AGILE development

2.2 Software coding

The baseline for the coding work comes from the requirements definition, software design and the development of the models to be implemented in the software (US to documents). CADCAMation, will translate the information into the C++ language, JavaScript, webGL for dynamic 3D interfaces, and optimize the performance regarding the SaaS requirements.

Debugging and alpha testing (CADCAMation, BEAR, TECNALIA, NOBATEK)

As a key stage of software development, a rigorous testing process will be carried out for EACH VERSION, in order to check the compliance with the established requirements and the rest of features that are essential for the quality of the final service. Bugs within the code will be traced and corrected. Performance against requirements, as well as connection procedures, databases, and even support documentation, webinars, will be tested.

Internal Beta testing (every WP partner)

Partners with an “end-user” profile within the consortium will perform general beta testing. Every partner will provide feedback (report on beta testing) not only on results, but also on easiness-of-use and suggestions from improvement.

Since the BETA version, beta testing will be widely opened to every PVSITES internal users, to gather the most of the feedback possible and to start to work on realistic uses cases.

3 SPECIFICATIONS FOR THE SAAS PLATFORM (ALPHA VERSION, PRELIMINARY PROTOTYPE)

The following US are a summary of the preliminary list of User Stories and specifications and issues which are currently being developed and constitute the vision of the partners. Each US is assigned to a manager who is responsible for providing information and updates on the writing, defining the steps needed to reach full commitment with the development team and testing it eventually with selected experts. This AGILE process is managed and supported by CADCAMation.

Table 3.1: List of PVSITES Users Stories to specify the BIPV tool

#	TASK	User Story	US Manager
	T7.1.	2.1 General framework for the PVSITES platform	CADCAMATION
	T7.1.	2.2 Users management	CADCAMATION
	T7.1.	2.3 WEBSERVICE #1: online 3D viewer	CADCAMATION
	T7.1	2.4 WEBSERVICE #2: projects featuring	CADCAMATION

3.1 General framework for the PVSITES platform

In its ALPHA version, the PVSITES SaaS platform is designed as a traditional website.

Developer partner: CADCAMATION. Hosting company: GANDI. WEB Framework manager: WordPress® simple CMS.

Under the authority of CADCAMATION, the PVSITES platform allows the registered user to get access to FOUR (4) main menus:

MENU#1: PVSITES TOOLS. Access to the download center (PVSITES simulation tool), release notes, get technical documentation and get answers to FAQ

MENU#2: PVSITES PROJECTS. User's projects are listed and can only be seen by the user. Featuring user's projects is included as service

MENU#3: PVSITES PRODUCTS. Lists information data sheets about PVSITES products. Will plug the future BIMobjects into the PVSITES tool for simulation

MENU#4: PVSITES SERVICES. Embed every submenu dedicated to PVSITES specific webServices. In its ALPHA version, the platform integrates 2 first webServices: 3D viewer for PV installation layout, irradiance, and projects featuring. In the future versions, tutorials will be included, and other services following the writing and validation of next User Stories.

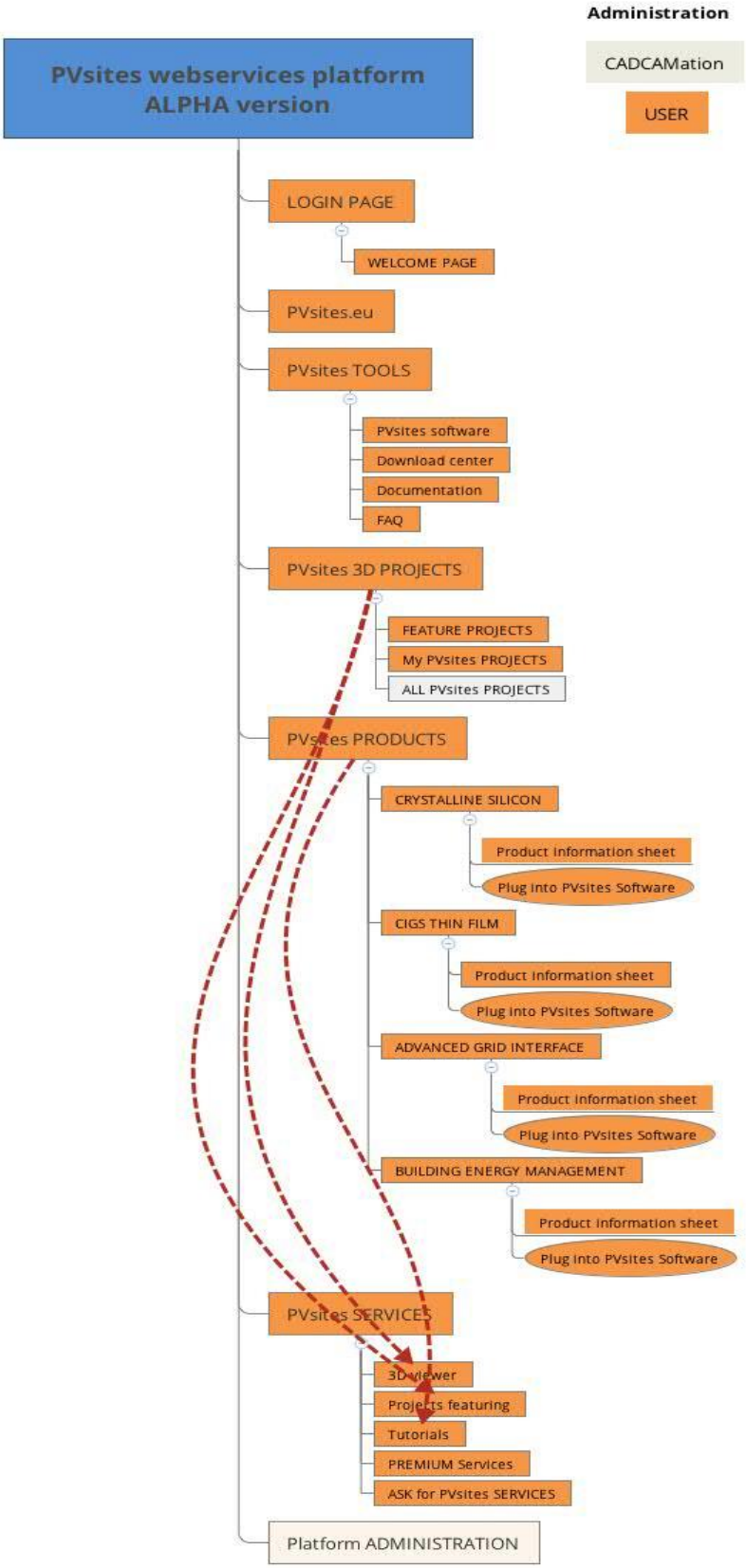

Figure 3.1: PVSITES platform's global framework

3.2 Users management

A User of the PVSITES webServices can be, among professionals in the AEC industry:

- An architect
- An engineer
- An assessor
- An owner
- A student, PhD, a teacher
- A manufacturer
- An installer

Each one of the categories of users must have its specific configuration “user profile” in order to get the most appropriate set of services.

The categories specifications will be developed as soon as the business modeling (WP1) will give outputs to WP7.

In its ALPHA version, the PVSITES SaaS platform embeds 4 levels of profile, linked with the WPs agents’ profiles:

LEVEL#1: Registered User. No user category distinction at this time;

LEVEL#2: Commercial Administrator. Allows access to business model developers (text + picture edit);

LEVEL#3: Technical Administrator. Allows access to business model developers (text + picture edit);

LEVEL#4: Webmaster (CADCAMation)

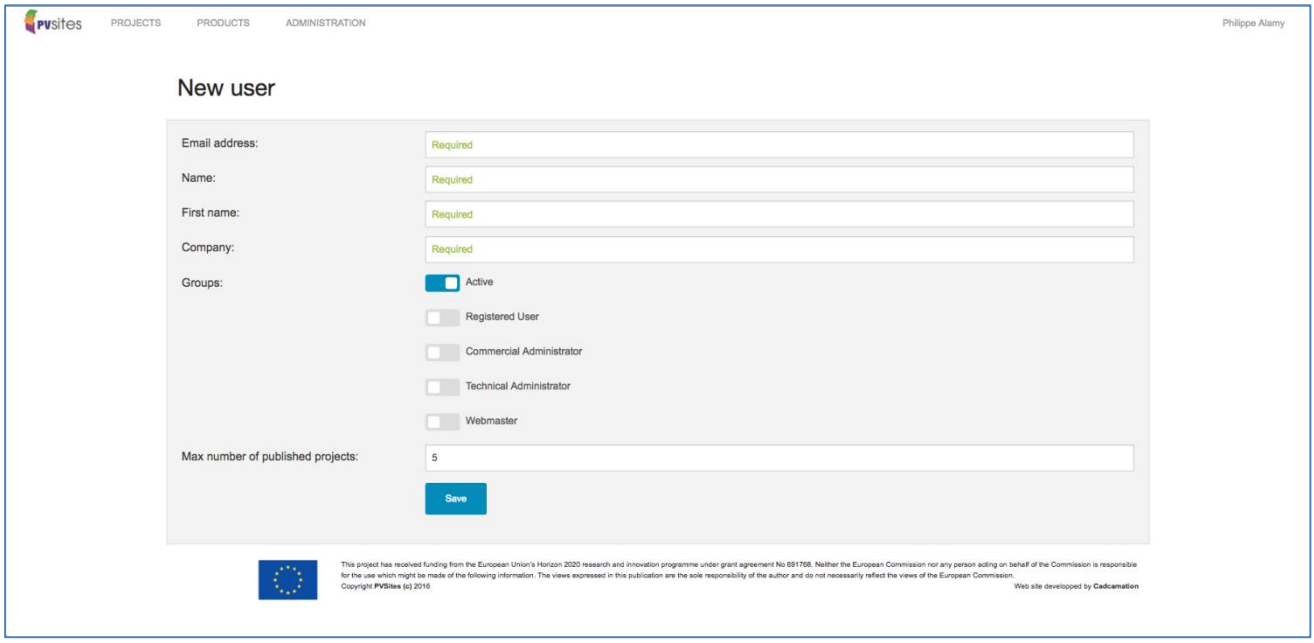

Figure 3.2: Users administration page

3.3 WEBSERVICE #1: 3D online viewer

In its ALPHA version, the PVSITES SaaS platform offers a performing real time 3D viewer, 100% webService.

The technology used is webGL (Web Graphic Library) for rendering every PVSITES 3D scenes issues from the PVSITES simulator.

The online viewer enables the user to navigate into the scene with equal performance and functionalities than in the standalone simulator. Thus, the UI specification will stick to US 1.14 “User Interface”.

Further than navigation, the 3D online viewer allows IRRADIANCE display all over the scene. Total irradiance is uploaded from the PVSITES simulator, and becomes a webService into the platform, without any disruption for the user.

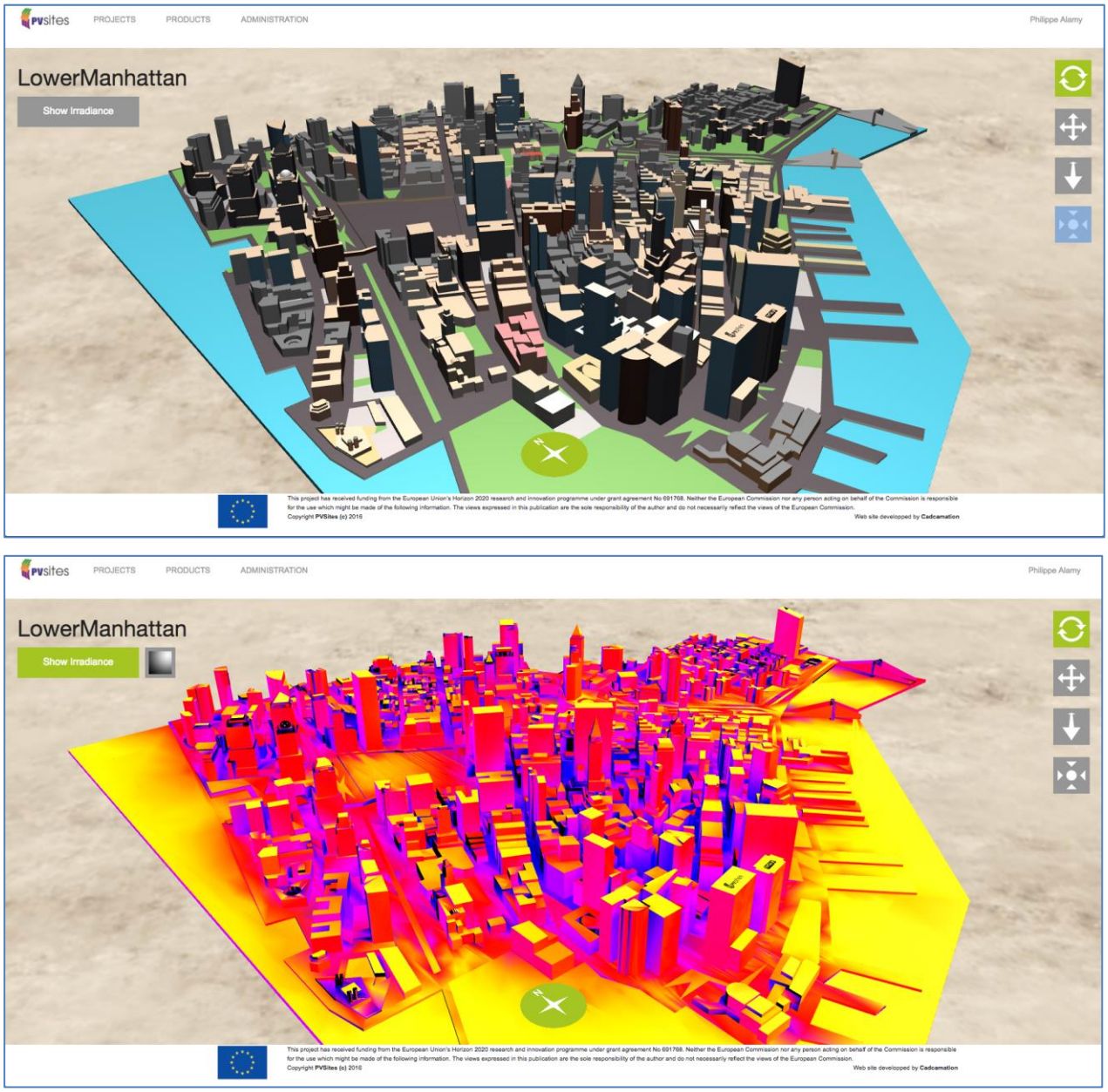

Figure 3.3: 3D online viewer – Irradiance display

3.4 WEBSERVICE #2: Projects featuring

In its ALPHA version, the PVSITES SaaS platform offers to users the possibility to publish their projects.

The process is the following:

1. From the PVSITES simulation tool, the user uploads the project to the webserver (1 click). The model has already been converted from any CAD or BIM source; WebGL technologies run from this point using json conversion and formatting for 3D geometry;
2. The project features are uploaded to the PVSITES web platform: 3D mesh, irradiance and PV system layout;
3. Coming soon (end of Dec, 2016): the main results panel will be uploaded as well (key figures);
4. From any web browser (Google Chrome, Mozilla Firefox, Microsoft Explorer, Apple Safari), the user is able to manage the publication of his/her projects and even feature some of them in the “FEATURE PROJECTS” section.

This is the first step to a comprehensive set of marketing and commercial support based on “publish” and “share” projects and PVSITES products.

More US will come as soon as the business modeling (WP1) will give further outputs to WP7.

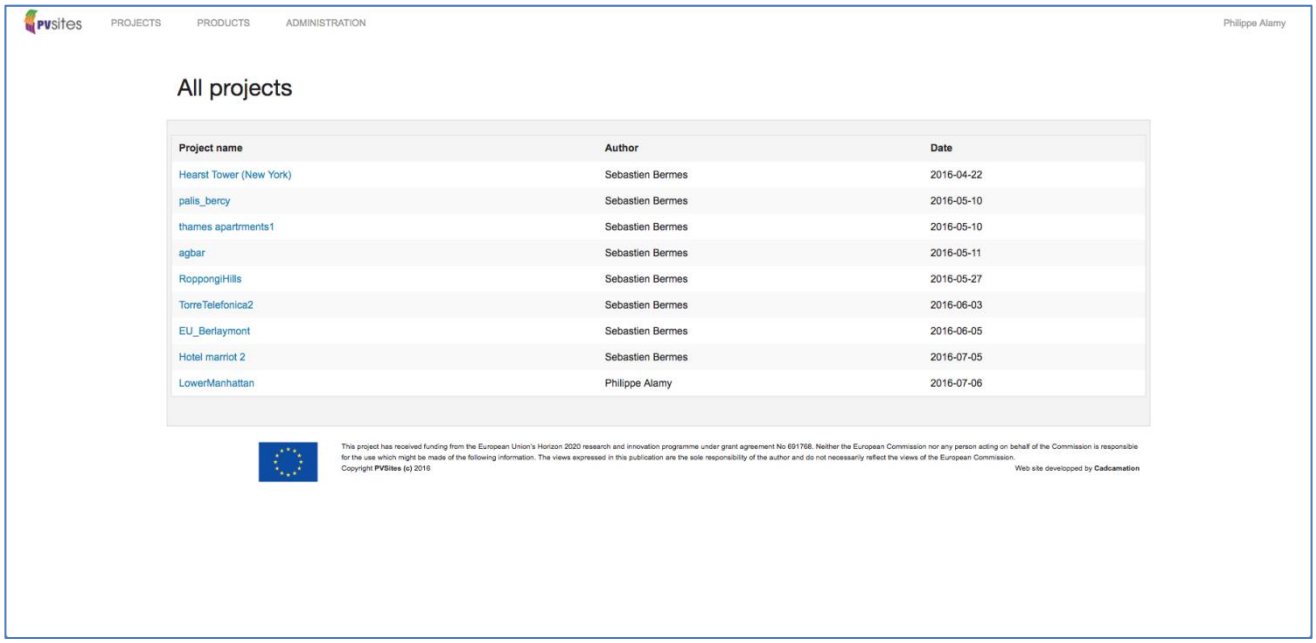

Figure 3.4: Projects publication on line

4 RESULTS – OVERVIEW OF THE PROTOTYPE

In the following table, for each US introduced above, more details are presented to establish the statement of the development of the current version of the webServices platform and guarantee a better visibility to the PVSITES consortium. Specifically, for each US we describe the innovative features under development, or already completed.

4.1 US and development statement (alpha version)

Table 4.1: Expanded view of the US registration list as " ER table" for the software use before next task

#	TASK	User Story	US Manager	Completed features (ALPHA version)	Under development or expected (next version)
	T7.1.	2.1 General framework for the PVSITES platform	CADCAMATION	Early prototype Separate platform	PVSITES Plugin into extended BIPV platform + connections to other projects (D4E)
	T7.1.	2.2 Users management	CADCAMATION	Internal users management	Users configuration by category Private workspace Freemium business model
	T7.1.	2.3 WEBSERVICE #1: online 3D viewer	CADCAMATION	3D real time display Irradiance Key figures	Dashboard configurator Layers/filters for BIM data
	T7.1.	2.4 WEBSERVICE #2: projects featuring	CADCAMATION	Upload from the PVSITES simulation tool Publish (private/feature)	Losses due to inverters Glazing defaults

5 CONCLUSIONS

This deliverable reports the development framework of the BIPV webServices platform, illustrates its graphical interfaces and makes a statement for the very early alpha prototype.

First User Stories are identified and developed, and we expect more US WP1 as the business model will be implemented in WP1 and the software is entering into its beta test phase and the rest of the consortium will be able to challenge it, as soon as the specific PVSITES products will be able to be integrated as BIMobjects.

The main objective now is to continue on improving the quality of the graphical UI, specifying, developing and validating the PVSITES webServices from the SaaS platform as soon as we will be able to deal with BIM compatibility and eCatalogs experimentation for the manufacturers.

6 REFERENCES

[1] IEA PVPS Task 7: Photovoltaic power systems in the built environment

[2] WEBGL: Khronos Group