Project:

EVO-NANO

Grant Agreement (GA) No. 800983

"EVOLVABLE PLATFORM FOR PROGRAMMABLE NANOPARTICLE-BASED CANCER THERAPIES"

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Topic: FETOPEN-01-2016-2017
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D.4.2 Dissemination and Exploitation Plan

Deliverable factsheet

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Deliverable leader (Name|Organisation)	UNIVBRIS	**Editor(s)**	Sabine Hauert, Igor Balaz
Contribution of partners	Sabine Hauert (UoB) and Igor Balaz (UNSPF) wrote the document, all partners contributed facts.		
Final review and approval	All partners		
Keywords	Science communication, exploitation, commercialisation, training, data management		

Abstract	This task aims to create a Dissemination and Exploitation Plan. It highlights activities done to date by all partners in terms of online media, public engagement, scientific publications and presentations, industrial engagement, and translation. It outlines areas that are being considered for translation, and provides next steps to maximise EVONANO impact.

Document change history		
Date	**Authors**	**Description**
	Sabine Hauert	Initial version created
	All consortium partners	Final version

CONSORTIUM

	Name	Short Name	Country
1.	Univerzitet u Novom Sadu, Poljoprivredni fakultet Novi Sad	UNSPF	Serbia
2.	University of Bristol	UNIVBRIS	United Kingdom
3.	University of the West of England, Bristol	UWE BRISTOL	United Kingdom
4.	Abo Akademi	AAU	Finland
5.	Fundacion IMDEA Nanociencia	IMDEA NANO	Spain
6.	Prochimia Surfaces SP. ZO.O.	PCS	Poland
7.	Fundacio Hospital Universitari Vall D'Hebron – Institut de Recerca	VHIR	Spain

Table of Contents

List of Figures

N/A

List of tables

List of abbreviations

Abbreviation	Description
NP	Nanoparticle
eCS	evolvable Cancer Simulator
EAs	evolutionary algorithms

1 Description of task

This task aims to create a Dissemination and Exploitation Plan that ensures we complete the activities of section 2.3 of the proposal "Achieving impact".

In particular, WP4's dissemination, exploitation and communication strategy focuses communication efforts on both mass media (website, press releases, brochures, newsletters, newspapers, Twitter, Facebook) and interpersonal channels (open days, workshops) to raise interest in our target audience about topics addressed by the project (nanomedicine, advanced computation, cancer). The primary target audience will be health-/tech-savvy broader audience, talented students and scientist who could potentially join consortium institutions and potential investors.

Dissemination activities aim to establish critical mass and commitment from different stakeholders. Results from project activities will be disseminated to the widest possible community through various channels and instruments. External participation and knowledge sharing will be encouraged through networking activities and events aimed at increasing the impact potential and enriching the scientific and industry contribution to the project.

T.4.1 associated with this deliverable says:

Dissemination activities (UB, M01 – M36): In addition to publishing results in major scientific journals and presenting in key international conferences (see section 2.3a), we will:

Subtask 4.1.1 Establish mass media presence (UNIVBRIS, M01 – M36). Website, a blog, twitter, g+, Facebook. Research will be blogified, newly published material will be presented online in layperson terms. Blogs will be prepared by the students as part of their training. Two high-quality videos will be prepared at the start and end of the project along with project brochure/flyer. Students will be encouraged to prepare short videos (research pitches) about their work throughout the duration of their work. Our team has extensive knowhow here, having run camera stations at conferences, produced animations, and designed award winning videos (see http://hauertlab.com/outreach).

Task 4.2 associated with this deliverable says:

T4.2 Exploitation activities (UWE BRISTOL, M06– M36):

Subtask 4.2.1 Organize industry open days (UWE BRISTOL, M12-M36) that will be tailored toward both relevant industry representatives and decision-makers. Subtask 4.2.2 Organize short entrepreneurial course for project members (PCS, M24). Subtask 4.2.3 Define and launch translational strategy (PCS, M12 – M30).

2 Description of work and main achievements

We provide herein our plans and main achievements for "dissemination and exploitation of results", "communication activities".

Dissemination and exploitation of results

Dissemination and exploitation activity	Timeline	Work done to date
Data management tools for dissemination	M12 (select data management tools)	**GitHub** has been adopted to share EVONANO software. The code is currently in development, but will be made open source with every publication. **Zenodo** has been adopted to share datasets generated (e.g. Physicell models). **Google Docs** has been adopted to share internal documents. See data management plan delivered in D.5.2.
Entrepreneurial education training	M03 (Commercial exploitation training for PCS and UNSPF) M06/12/18/24/30 (Exploitation session at bi-annual EVONANO meeting led by PCS) M24 (3 members of the EVONANO team will participate in translational training)	Piotr Barski (PCS) and Igor Balaz (UNSPF) have attended several 2-day workshops for FET researchers, interested in exploring commercialisation potential of their research. Key findings were disseminated at the EVONANO weekly meetings.

IP consideration helpdesk	M12/18/24/30	PCS has set up a living document in google drive to keep track of IP opportunities that are assessed at the bi-annual EVONANO meetings.
Industry Open Days	M24 (industry days hosted at each university to engage with potential stakeholders)	PCS Nanomaterials leader Agnieszka Lindstaedt presented EVONANO at NANOSMAT 2019.
Translation strategy and spin-outs	M30 (Engage with Technology Transfer Offices to spin-out a company).	No spin-outs have been formed yet.
Product development	Throughout	Involvement from PCS ensures that discovered NPs are readily part of their product pipeline. In that respect, EVONANO is continuously developing new potential products.

Table 1: Dissemination and Exploitation Activities

Communication activities

Dissemination and exploitation activity	Timeline	Work done to date
Website	M02 (launch) M02-M36 (continuous updates of website content, blogs, tweets, and videos)	The website and social media channels have been launched (see D.4.1 for details). Since then, we have posted 10 blog posts (http://evonano.eu/blog/), 177 tweets (https://twitter.com/evo_nano), and 12 youtube videos (https://www.youtube.com/channel/UCC00P4u_UlljAdBduSInY0Q/videos).
Science communication training	M01 (crash-course in science communication) M06 (video project pitch)	Sabine Hauert (UnivBris) has delivered a crash-course in science communication at the kick-off meeting, and has mentored EVONANO staff in video pitching present on YouTube.

	M18/24/30/36 (update video pitches) M24 (science communication crash-course 2)	
Mainstream media	M01-M36 Mainstream interviews. Cross-posting EVONANO blog posts.	VHIR Press release: http://www.cibbim.eu/a-new-european-project-awarded-to-the-cibbim-nanomedicine-of-the-vhir-converts-the-vall-dhebron-campus-into-the-health-institution-with-the-most-active-research-projects-in-nanomedicine-of-europe/ IMDEA NANO Press release: http://nanociencia.imdea.org/home-en/news/item/new-eu-fet-open-project-evo-nano MIT Press release (work with UNIVBRIS) - crossposted to many online media: http://news.mit.edu/2019/nanoparticles-magnetic-robots-0426
Engagement activities	M01-M36 Presentations and demonstrations to the general public and kids.	IMDEA NANO: Sergio Davila presented: What is an organ on chip" European Researchers Night 27th September 2019 at IMDEA Nanoscience. Audience: secondary and pre university science students http://nanociencia.imdea.org/home-en/workshops/ern19 Practical tutorials by Sergio Dávila, Jean Cacheux and Isabel Rodríguez http://nanociencia.imdea.org/home-en/workshops/ern19 UNIVBRIS: S. Hauert "Swarm engineering across scales" Hello Tomorrow, FR, 2019 S. Hauert "Swarm engineering across scales" Santa Fe Institute Community Lectures, USA, 2019 S. Hauert "Swarm engineering across scales" Talking Digital, UK, 2019 S. Hauert "Swarm engineering across scales" - Rutherford Appleton Laboratory public lecture, UK 2019 S. Hauert "Swarm engineering across scales" -

		University of Liverpool public lecture,UK 2019
Presentations to the scientific community	M01-M36 Presentations to the public.	UNIVBRIS: N. Shatil, S. McCormick, S. Hauert, Inauguration of the Max Planck-Bristol Centre for Minimal Biology. S. Hauert “Swarm engineering across scales“ Cambridge 2019 S. Hauert “Swarm engineering across scales” - Rutherford Appleton Laboratory, 2019 S. Hauert “Swarm engineering across scales” - Serpentine Gallery, UK, 2019 S. Hauert “Swarm engineering across scales” - GW4 Nanomedicine Network, UK, 2019 S. Hauert “Swarm engineering across scales” - Biorobotics workshop, Denmark, 2019 S. Hauert “Nanomedicine for early detection” - CRUK meeting, UK, 2019 Team presented EVONANO at the inauguration of the Max Planck-Bristol Centre for Minimal Biology, 27-03-19. N. Shatil “Improving nanomedicine using computer simulations” Emergence Conference, York 2019 N. Shatil “Improving nanomedicine using computer simulations” Translational Medicine Workshop, UK, 2019 N. Shatil “Improving nanomedicine using computer simulations” GW4 Cohort IV introductory Week, UK, 2019 N. Shatil “Improving nanomedicine using computer simulations” Agent Based Modelling in Synthetic Biology, UK 2019 N. Shatil - Discussed EVONANO project at AI in Healthcare Workshop, UK, 2019 N. Shatil - Discussed EVONANO project at Policy for Researchers Workshop, UK, 2019 UWE BRISTOL: Dr. Tsompanas presented an introduction on EVONANO project and work done within WP2, at a meeting of the Computer Science Research Centre, UWE on 5th June 2019. Prof. Adamatzky discussed EVONANO project in the context of fluid and excitation propagation at his invited talks at `Novel neuromorphic hardware’ (Loughborough, 2019), and`Liquid computer’ BTC Colloquium (Durham, 2019). UNSPF:

		M. Kovacevic, I. Balaz "Computational Platform for Targeting Cancer Stem Cells with Nanoparticles", International School of Nanomedicine (2019), Ettore Majorana Foundation and Center for Scientific Culture, Erice, Italy M. Kovacevic, I. Balaz "Computer-assisted design of nanomedicine drug-delivery systems", Nano2Clinic Training School (2019), Trieste, Italy AAU: EVONANO was presented during the department research day of Åbo Akademi University on the 12th of December 2018. The project was also presented in June 2018 at the annual Symposium of Computer Science in Finland. IMDEA NANO: Poster-Tumour Microenvironment on Chip for Nanomedicine Development by Sergio Dávila, Jean Cacheux and Isabel Rodríguez . At the 9th early stage research workshop IMDEA Nanoscience 26-27th June 20 19 at IMDEA Nanoscience.
Scientific Publications	M01-M36 EVONANO results in conferences and journals.	UWE BRISTOL: Preen, R. J., Bull, L., & Adamatzky, A. (2019). Towards an evolvable cancer treatment simulator. BioSystems, 182, 1-7 UNIVBRIS: Trail Formation using Large Swarms of Minimal Robots. P. Molins, S. Hauert, SAC, 946-952, 2019 VHIR: Gener P, Rafael D, Seras-Franzoso J, Perez A, Pindado LA, Casas G, Arango D, Fernández Y, Díaz-Riascos ZV, Abasolo I, Schwartz S Jr.Pivotal Role of AKT2 during Dynamic Phenotypic Change of Breast Cancer Stem Cells. Cancers (Basel). 2019 Jul 26;11 UNIVBRIS & UNSPF N. Shatil, M. Kovacevic, I. Balaz, S. Hauert. In Silico Modelling of Cancer Nanomedicine, Across Scales and Transport Barriers. Submitted to Nature Nanotechnology.

Table 2: Communication Activities

2.1 Approval procedure for dissemination activities

Project dissemination activities are governed by art. 29.1 of the GA:

"A beneficiary that intends to disseminate its results must give advance notice to the other beneficiaries of - unless agreed otherwise - at least 45 days, together with sufficient information on the results it will disseminate. Any other beneficiary may object within - unless agreed otherwise - 30 days of receiving notification, if it can show that its legitimate interests in relation to the results or background would be significantly harmed. In such cases, the dissemination may not take place unless appropriate steps are taken to safeguard these legitimate interests."

Therefore, if the objecting Party's legitimate academic or commercial interests in relation to the Results or background could be significantly harmed, the Party has to send written objection to the Coordinator with precise request for necessary modifications. The involved Parties shall discuss how to overcome the justified grounds for the objection on a timely basis and the objecting Party shall not unreasonably continue the opposition if appropriate measures are taken following the discussion.

The objecting Party can request a publication delay of not more than 90 calendar days from the time it raises such an objection. After 90 calendar days the publication is permitted, provided that Confidential Information of the objecting Party has been removed from the Publication as indicated by the objecting Party.

According to art. 29.2 of the GA each beneficiary must ensure open access to all peer-reviewed scientific publications relating to its results.

2.2 Acknowledgement and disclaimer procedure

All communication and publications made by the EVO-NANO partners about the project, including conferences, or any type of information and promotional materials, must acknowledge the contribution received from the European Commission under Grant Agreement no. 800983. All communications and publications therefore bear the following clause, and display the EU emblem:

"This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 800983".

3 Exploitation Plan

The main objective of the exploitation strategy is to turn project outcomes into benefits for partners and the Consortium while helping project partners launch new activities and businesses.

This exploitation plan identifies how the project partners envisage their implementations, deliverables and other project outputs may be exploited, either by themselves or by others. During the project lifetime the Exploitation Plan will be updated.

In the table below a preliminary list of exploitable results, their description, owners and key applications are reported

Expected Results	**Description**	**Owner(s)**	**Key applications**	**Time horizon**	**Exploitation Path**
EVO-NANO Computational platform	Computational platform for AI powered creation and testing of effect of nanoparticles on tumors.	EVO-NANO consortium members. Will be specified by the Joint Ownership Agreement.	Tumor modeling, pre-clinical design of novel NP-based anti-cancer treatments.	2 years	Market analysis, exact product definition (define minimum viable product, constraints, regulatory compliance), patenting.
Novel DDS	Drug delivery systems, based on AuNPs that are efficient against Cancer stem cells.	EVO-NANO consortium members. Will be specified by the Joint Ownership Agreement.	Clinical tumour treatment.	1-3 years for pre-clinical characterization	patenting

Novel microfluidic devices		EVO-NANO consortium members. Will be specified by the Joint Ownership Agreement.	In vitro analysis of pharmacokinetic and pharmacodynamics of NPs.	1-2 years	patenting

Table 3: Exploitation plan

Since building an effective commercialisation strategy and searching for investors needs to be based on realistic data that prove the value for potential investors, we will apply the following steps for each of expected exploitable results:

- define possible value propositions that can stem out of EVO-NANO project's results;
- define targeting strategies for different groups of investors;
- define possible revenue models applicable to our project results;
- compare these plans with obtained project results, specifically:
    - Initial and mid-term eCS implementation and testing (D.1.2 and D.1.3) (M22)
    - Simulation results for different tumor aspects (D.2.1 and D.2.2) (M22)
    - First in vitro validation results (D.3.3) (M20)

In the second half of the project we will organize short entrepreneurial course with all Consortium members (M24), where we will present proposals for exploitation strategy and start project-wide discussion that will lead to preparing Deliverable D.4.5 - Translation Strategy Plan (M36).

3.1 IPR management

The EVO-NANO Consortium Agreement follows the standard rules as outlined in the DESCA (Development of a Simplified Consortium Agreement) model for Horizon 2020. This defines the main approach regarding the ownership, protection and access to key knowledge like IPR and data. This approach will allow

EVO-NANO to collectively and individually pursue market opportunities arising from the project's results. The rules we will follow are:

- "Background" i.e. partners' pre-existing know-how, while remaining the sole property of their owners, will be made available to other partners when needed for the project implementation;

- "Results" i.e. knowledge and products developed through the project, will be owned by the partners who have directly contributed to its creation. In case of joint ownership, a separate contract will be drawn up and signed by the co-owners to determine the rights and obligations, and settle the IP management and exploitation rules;

Partners who own knowledge suitable for patenting will be encouraged to fill in applications for patents or a similar form of protection and shall supply details of applications to the other consortium partners.

4 Deviations from the workplan

None, we are on track to complete promised dissemination and exploitation activities.

5 Performance of the partners

Performance of the partners is described in tables 1, and 2 by clearly outlining which partner contributed which item.

6 Conclusions

This document presents dissemination and exploitation efforts to date, as well as future plans for the entire EVONANO project. In just 10 months, EVONANO has produced a high-quality website, 10 blog posts (http://evonano.eu/blog/), 177 tweets (https://twitter.com/evo_nano), and 12 youtube videos (https://www.youtube.com/channel/UCC00P4u_UlljAdBduSInY0Q/videos). Results were presented at over 25 scientific and public venues,. 3 new areas have been noted as having potential for translation including the EVONANO computational platform, novel DDSs, and microfluidic devices. Members have received training in both science communication and some have participated in translational workshops. Recently, the consortium submitted a review to Nature Nanotechnology, showing the desire to publish high-impact results. Scientific publications have been produced in fields ranging from evolutionary computation, to in vivo validation of nanomedicines. In the future, we will be increasing our dissemination and exploitation efforts as new results are published.

6 References

All references have been added in table 2.