*The **CREA**tion of the Department of Physical Chemistry of Biological Sys**TE**ms [CREATE]*

**666295 — CREATE — H2020-WIDESPREAD-2014-2015/H2020-WIDESPREAD-2014-2**

# Report on the draft plan of the use and dissemination of foreground

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**Level of dissemination: Public**

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## 1. Introduction

This document consists of a description of:

- means through which results of the CREATE project have been disseminated/exploited so far, and
- means of dissemination/exploitation that are planned in future.

The following dissemination activities were taken into account:

- CREATE website,
- presentations at the conferences,
- research publications,
- press notes,
- events,
- patenting and educational activities.

It also describes the way of disseminating knowledge among entrepreneurs by building an electronic database – Inventions & Researchers (ELAD+).

This document is a result of wider consultations hold with key actors of the CREATE project, incl.:

- ERA Chair holder, Professor Maciej WojtkowskI,
- Project Coordinator, Professor Robert Holyst,
- Project Manager, Agnieszka Tadrzak, M.Sc.,
- PSO members, Dr. Partycja Niton, and Dr. Monika Kuczynska-Wydorska, Aleksandra Kapuścińska-Bernatek,
- WP leaders, Anna Pawlus, M.Sc., Dr. Roman Luboradzki.

## 2. Dissemination of foreground – implemented

### 2.1 CREATE website

Under WP6 a **project webpage** (www.create.edu.pl) was designed and launched. The CREATE webpage contains current information related to the implementation of the project, incl. description of:

- the project objectives,
- individual work packages,
- structure of the new Department,
- the profile and achievements of the ERA Chair holder,
- profiles of researchers employed at the new Department,
- research infrastructure and equipment of the new lab,
- events related to the project implementation i.e. lectures, symposia, conferences, etc.

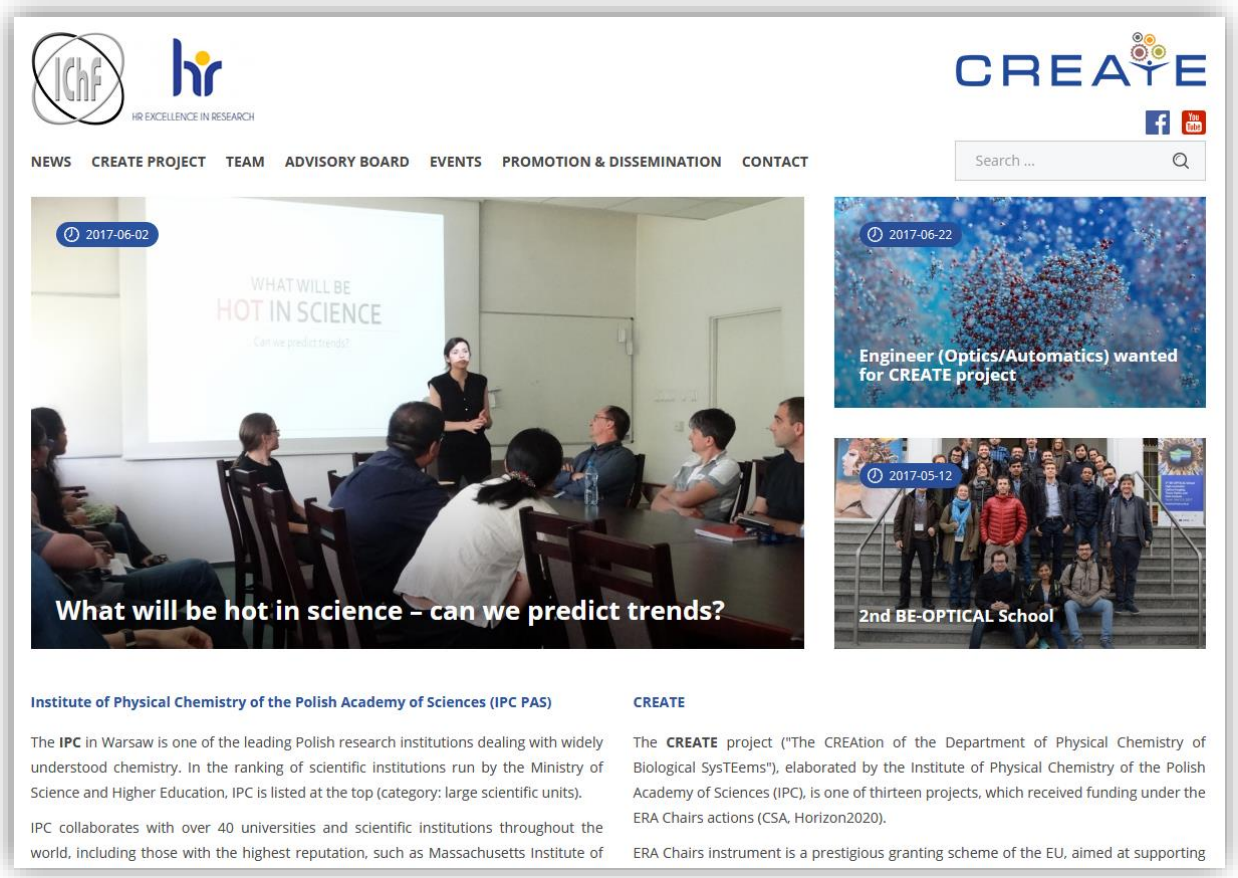
Besides, the project webpage contains the following clause: *"This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 666295."* The web-portal is active and frequently updated, using materials from events organized by the Institute, delivered lectures, and photos from these events. All reports having "PUBLIC" status are also placed on the webpage.

To make the project more visible – **logotype** of the project was designed and uploaded to the project webpage.

Besides, IPC Facebook profile and IPC YouTube channel are subsequently supplemented with relevant information related to the progress of the CREATE project.

The CREATE webpage is regularly updated and up to now 23 items of news have been published.

Up to this date the project webpage has been visited by **1,130** net surfers.




## 2.2 Presentations

The **CREATE project and major research results of the ERA Chair holder's team and collaborating synergetic teams** were distributed at Polish and international conferences, such as:

- **"*Spatiotemporal optical coherence phase manipulation*" and chaired the session "*Photonics and Plasmonics*"**, "*20th Slovak – Czech-Polish Optical Conference On Wave and Quantum Aspects of Contemporary Optics*", Slovakia, Jasná (5 – 9 Sept., 2016);
- **"*Air-puff swept – Source optical coherence tomography*"**, "*XXII Biennial Meeting of the International Society for Eye Research*" (ISER 2016), Japan, Tokyo (23 – 30 Sept., 2016);
- ***"Internet of Things. Building machine vision system supported by artificial intelligence"***, „*code::dive*", Poland, Wroclaw, (9 – 15 July, 2016);
- ***"Interferometric near-infrared spectroscopy (iNIRS) quantifies brain absorption, scattering, and blood flow index in vivo"**, Berlin Brain 2017, 28th International Symposium on Cerebral Blood Flow, Metabolism and Function*, Germany, Berlin (1 – 4 April, 2017);
- ***"Quantifying time-of-flight-resolved temporal dynamics of optical field scattered from the turbid media with interferometric near-infrared spectroscopy (iNIRS)"**, Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine XXI,* San Francisco, CA, USA, (28 Jan. – 2 Feb., 2017);

- ***„Characterization of flowing blood cells using a novel OCT technique: rigorous three-dimensional computational study",*** *Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine XXI,* San Francisco, CA, USA, (28 Jan. – 2 Feb., 2017);
- ***„Ultrasensitive detection of nanoparticles using Dual Optical Lock-In Microscopy",*** *Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine XXI,* San Francisco, CA, USA (28 Jan. – 2 Feb., 2017);
- ***"Ultrafast laser mode-locked using Nonlinear Polarization Evolution in Polarization Maintaining fibers",*** *CLEO Laser Science to Photonic Application conference,* San Jose, USA (13 -22 May, 2017);
- ***"Long-period fiber grating biosensor for the detection of bacteriophages",*** *5th International Conference on Bio-Sensing Technology (BITE2017),* Riva del Garda, Italy (5 - 11 May, 2017);
- ***"Bessel Beam OCM for analysis of Global Ischemia in Mouse Brain",*** *European Conference in Biomedical Optics,* Germany, Munich (25 – 29 June, 2017);
- ***"Image distortions removal by spatio-temporal optical coherence manipulation",*** *European Conference in Biomedical Optics,* Germany, Munich (25 – 29 June, 2017);
- ***"Rodent Model of Photothrombotic Ischemic Stroke Monitored with the Use of Extended Focus Optical Coherence Microscopy",*** *European Conference in Biomedical Optics,* Munich, Germany (25 – 29 June, 2017);
- ***"Noninvasive two-photon imaging of murine retina in vivo",*** *European Conference in Biomedical Optics,* Munich, Germany (25 – 29 June, 2017).

### 2.3 Publications

Some of **research results** of ERA Chair holder and his team on the border between chemistry/physics and biology/medicine were prepared for publication in peer-reviewed journals. It relates to:

- Ossowski P.; **Wojtkowski M.**; Munro P. *Classification of biological micro-objects using optical coherence tomography: in silico study*, BIOMEDICAL OPTICS EXPRESS, 2017 (status: accepted);
- Boer j.F.; Leitgeb R.; **Wojtkowski M.** *25 years of Optical Coherence Tomography: the paradigm shift in sensitivity and speed provided by Fourier Domain OCT*, BIOMEDICAL OPTICS EXPRESS, 2017 (status: accepted);
- **Borycki D.; Nowakowski M.**; Szulmowski M.; **Stremplewski P.; Wojtkowski M.** *Removing image distortions by spatio-temporal optical coherence manipulation*, OPTICA, 2017 (status: submitted).

All publications under the CREATE project were supplemented by the adequate acknowledgements to the CREATE projects.

### 2.4 Press notes

Press notes are an effective way to disseminate project's results and arousing interest of various target groups. So far, the following five press articles have been prepared and published at the project website, IPC website, Alpha Galileo website and on the facebook:

- *The European ERA Chair grant awaits a top academic,*

- *The best will establish a new Chair: The launch of the prestigious ERA Chair grant competition,*
- *Winner of the "Polish Nobel Prize" to create a new department at the IPC PAS,*
- *Inspiration needs new tools,*
- *IPC PAS starts cooperation with a leading university in China.*

The purpose of publishing the abovementioned articles was to:

- spread information on opening call for the position of the ERA Chair holder,
- promote the CREATE project,
- promote a candidate (namely: Professor Maciej Wojtkowski) selected for the position of the ERA Chair holder and
- spread information on the start of cooperation between IPC and State Key Laboratory of Medicinal Chemical Biology Nankai University in China. The cooperation is aimed at supporting interdisciplinary and international research at IPC.

### 2.5 Education activities

The following educational activities took place:

- **series of cyclical lectures on interdisciplinary emerging researches** – lectures addressed to IPC employees and PhD students:
  - *"Exploring Hydrated Electrons in Non-Conventional and Conventional Ways: From Alkali Metal Explosions to Non-Explosive Ways"* and *"People first, machines and buildings later"*

    **Professor Pavel Jungwirth**, *The Institute of Organic Chemistry and Biochemistry of the Czech Academy of Sciences*;
  - *"The Surging Tide of Scientific Research in China"*

    **Professor Luyuan Li,** *State Key Laboratory of Medicinal Chemical Biology, Nankai University, Tianjin, China.*

- **series of open lectures entitled "Innovation source" –** lectures addressed to IPC employees and PhD students:
  - **"***The Israeli start-ups' eco-system - How to commercialize technologies from the Academia"*

    **Sarai Kemp**, *CEO of Trendlines – Israeli company, offering commercialization services at the field of life science aimed at establishment of start-up companies;*
  - *"VSParticle: spin-off company of the Technical University Delft – Production of nanoparticle"*

    **Vincent Laban**, *CFO of VSParticle - a Dutch startup company from Delft University of Technology specialised in the development of nanoparticle generators.*

- **cycle of classes dedicated to Secondary Schools and High Schools students**: Within this cycle IPC organized 5 lessons hosting about 200 students. Except such topics as gas lows, sublimation, solubility etc. the stress was put on the low temperature influence on biological systems and food lyophilization to stress new IPC specialization (biology/medicine):
  - *„Gases, liquids, solids" with experiments and hands-on activities*
    **dr Roman Luboradzki**, *IPC.*

- **cycle of workshops and lectures within "University of young researchers"** – project dedicated to children from primary schools. Its aim was to combine chemistry, biology, physics and nanotechnology to show the beauty of science, challenges at the interface of different fields, and to encourage young audience to consider research career.

- **other popular science events:**

  - **Institute took part in the Ilia State University Science Picnic - one-day open air event** that aims to present science in a fun and accessible way for audience of every age and every field. It was organized in Tbilisi Georgia on the 24th Sept., 2016. In the event participated more than 15 000 visitors. Among others, IPC presented experiments on the boarder of biology, chemistry and physics – e.g. devoted to natural antibiotics, and they influence on bacteria.

  - **Cooperation with Children University Foundation** – the oldest and the largest children's university in Poland. Two of our PhD students, Kinga Matuła and Artur Ruszczak provided series of meetings/workshops about microbiological laboratory, bacteria, viruses, nanoparticles and microfluidics. Students at age around 11 performed several experiments and as a final result they design new materials based on nanoparticles that possess unique antibacterial activity. In particular the following classes were organized:

    ***"The nanoworld. At the junction of nanotechnology and the world of the living cells"*** (lecturer: Kinga Matuła). Classes were dedicated to school children (23 participants). The following topics were addressed: microworld, what does the microbiology do and how to work in the lab/ the world of bacteria / bacteriophage / nanoworld (i.e. nanotechnology and nanoparticles). Classes took place between Nov., 2016 – Jan., 2017.

    ***"Medicine of the XXI century"*** (lecturer: Artur Ruszczak). Classes were dedicated to school children (25 participants). The following topics were addressed: how to replace the great machines small chip?/ how to close the drug in capsule? / how to sell your idea to investors? / what is the paper test? / what is a microfluidic device? Classes took place between the 8th Oct. – the 3rd Dec., 2016.

### 2.6 Others

IPC has already launched the new webpage dedicated to companies (i.e. www.ichfdlafirm.pl, eng. "*IPC for Companies*"). The webpage is available in Polish and English language version. The webpage contains an extensive offer for companies – i.e.:

- consulting and research
- IPR (incl. patents for sale)
- measurement services.

The aim of this website is to ease access of companies to IPC offer and stimulate knowledge exchange.

## 3. Dissemination of foreground – planned

### 3.1 Publications

As a result of CREATE project 20 articles in the field of physical chemistry of biological systems will be published. These articles will be prepared not only by the employees of the new Department, but also synergetic research groups (closely collaborating with the ERA Chair holder). To enhance number of reached stakeholders , the articles will be published in open access (green or brown).

The following journals were selected as particularly relevant for the communication of the CREATE project:

- Biomedical Optics Express,
- Optics Letters,
- Optica,
- Optics Express.

Among others, the following topics are planned to be researched and prepared for publication:

- Fast method of multiple scattering noise suppression in turbid media;
- Correlation-gating improves ballistic imaging in highly scattering media;
- Two photon murine retina imaging in vivo;
- Interfacial Generation of Carbanion, the key step of PTC reaction, directly observed by Second Harmonic Generation;
- Application of state of the art OCT for heart investigations;
- Optical Coherence Microscopy supported by Supervised Machine Learning for automatic image classification;
- Correlation-gating quantifies ballistic light from dynamic media in transmission mode;
- Multimodal optical microscopy for probing dynamics and evolution of biological objects
- Optical lock-in for photothermal effect imaging;
- High speed full field OCT with speckle noise suppression;
- Two photon absorption measurement with phase-sensitive, all-optical detection.

Publications will consist of the clause in the acknowledgements section:

*"This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 666295",*

or other form of reference to the CREATE project – in case other research funding supports a given project.

### 3.2 Patent applications

In the course of the project at least **two patent applications** referring to the new specialization of IPC will be prepared. IPC will strive to obtain patent protection of inventions/solutions which may enrich collaboration with business.

Similar to other results of the CREATE project, patent applications will consist of the following clause in the acknowledgements section:

*"This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 666295".*

### 3.3 Conferences & lab visits

Under the CREATE project IPC plans to disseminate project results through participation in conferences specified below. Topics of the participated events will be coherent with studies of ERA Chair holder and his team (from the department of "Physical Chemistry of Biological Systems"):

- V Polish Optical Conference, Poland, Gniezno, 2 – 6 July, 2017,
- Polish Physics Congress, Poland, Wroclaw, 10 – 15 Sept., 2017,
- SPIE Photonics West, Moscone West, San Francisco, USA, 27 Jan. - 1 Feb., 2018,
- ARVO, Honolulu, Hawaii, 29 Apr. – 3 May, 2018,
- European Conferences on Biomedical Optics (ECBO), 2019,
- code::dive, 2018,
- OSA BIOMED, 2018.

The exemplary forthcoming lab visits are presented below:

- ICFO – The Institute of Photonic Sciences (medical optics group of prof. T. Durduran)UC Davis – Neurophotonics Lab (group of Prof. V. Srinivasan),
- University of Lubeck – prof. Huber department,
- Max Planck Institute for self-organization and dynamics in Goettingen,
- IMO Instituto de microcirugia ocular – Barcelona,
- University of Glasgow,
- SWRU - DEPARTMENT OF PHARMACOLOGY - multiphoton imaging laboratory.

### 3.4 Events

**a. Scientific symposia**

Under the CREATE project, IPC plans to organize 3 scientific symposiums (1 a year) (some with an option of integration part) aimed at:

- an increase of visibility of IPC, the ERA Chair holder, and his team,
- showing research excellence,
- setting up relations, and
- dissemination of knowledge gained during the CREATE project.

Each event is planned for 40 – 50 participants.

**b. Interdisciplinary Conference**

Among dissemination activities organized by the CREATE team members will be an interdisciplinary conference - "Where biology meets physical chemistry and business". It will be addressed to researchers (from IPC and other research entities), enterprises (preferably, industry and financial sector), and policy-makers.

The event is planned for 50-70 participants. Some of the conference sessions will be used to disseminate knowledge (research results and the project itself) gained as a result of the CREATE project implementation.

**c. Cyclical lectures**

It is planned to organize (16) open lectures linked with consultancy delivered by reputable scientists invited by ERA Chair holder. The ERA Chair holder plans to invite scientists capable of studying interdisciplinary issues – in particular:

- Ori Katz , Principal Investigator of the Department of Applied Physics, Weitzmann Instiute Izrael;

- Professor Benjamin Judkiewitz, Principal Investigator of Bioimaging and Neurophotonics lab, University of Berlin;
- Professor James. G. Fujimoto, the Research Laboratory of Electronics (RLE) and Department of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology (MIT);
- Wonshik Choi, Associate Professor at the Department of Physics, Korea University and Associate Director at IBS Center for Molecular Spectroscopy and Dynamics;
- Carlos Drummond, Centre de Recherche Paul Pascal.

**d. CREATE Lectures "Innovation source"**

Dissemination through lectures delivered by industry representatives, preferably from companies conducting own R&D or open to science. Events will be opened for IPC researchers and PhD students. Additionally, it will provide us with the opportunity to establish relations and cooperation with industry.

Topics of the lectures will include:

- the formation start-ups,
- science-business relationships,
- use of knowledge to further development of cooperation with business,
- current trends in science for use in industry.

The target is to organize 16 lectures.

In the near future we are going to invite:

- Eric A. Swanson (*Director; Member of the Nominating and Corporate Governance Committee)* from Acacia Communications, Inc.
- Szymon Ruta, Financial Director, Scope Fluidics.

### 3.5 Press notes

To ensure the most efficient use and dissemination of the CREATE project results, issuing of press notes will be continued. They will be transmitted to the audience through: the project and IPC website, Alpha Galileo website, and the facebook. The press notes will present e.g. scientific achievements of the IPC and, in particular, scientific achievements of newly established Department.

Wide dissemination of press notes will increase the visibility of the CREATE project as well as the Institute of Physical Chemistry PAS.

### 3.6 Open days/popular science lectures

Use and dissemination of the foreground also presumes organization of local events i.e. Open Days at IPC. These events will be addressed to general public, in particular school children, and students. During Open Days newly equipped laboratory will be opened for local guests as well as short lectures, shows and laboratory demonstrations will be given. Some demonstrations will be organized and/or performed by the ERA Chair holder's team members.

The scenario of forthcoming classes (the first will be held on 25$^{th}$ Sept., 2017) dedicated to school children include:

Working title **"*How physicist and chemist look at life - what for a biologist needs physicochemistry?*"**. The class will focus on how a physicist and a chemist observe and research biological systems (and other complex systems). The class will have general and popular character but still will stay in line with research topics developed by the new Department of Physical Chemistry of Biological Systems.

The classes will also be available for the audience during the "Festival of Science" (yearly cyclical event since 1997) which takes place in Warsaw.

To continue the abovementioned popular science lectures series, IPC will apply in the next edition of the **grant under granting scheme "University of a young researcher"** (Ministry of Science and Higher Education). The main goal of this program is popularization of science and research among children and youth aged 6 – 16. Interdisciplinary approach to science with many references to Professor Wojtkowski's research will be demonstrated.

### 3.7 Participation in fairs, brokerage events, presentation of the project and ELAD+

Dissemination of foreground at fairs, informational, brokerage events and international conferences. At least 3 events will be targeted, exemplary: TECHNICON Industrial Technology, Science and Innovation Fair in Gdansk, International Fair (presentation of ELAD data base, inventions and newest scientific achievements, establishing cooperation with potential partners), or ESOF Conference (presentation of the project and ELAD+ database, establishing cooperation with potential partners).

### 3.8 Promotional films ("Scientific Chairs")

To maximize the visibility of newly established ERA Chair – Department of Physical Chemistry of Biological Systems – short films (within the cycle "Scientific CHAIRS") containing interviews on simple subjects with key actors of the CREATE project will be prepared.

We will start with a series of "*10 questions to…*". The idea behind it is to show what a person does at work, and in an everyday life. The film will be prepared in English and/or in Polish with English subtitles. Questions will appear on the screen. A spectator will read the questions and the interviewed person will respond to them subsequently. The whole film not exceeding 5 minutes, will be widespread on social media, and IPC & CREATE project webpage. The first interviewed person will be the ERA Chair holder.

After the project is completed, the interviews will be combined into one film presenting the scientific potential on the ERA Chiar holder's research group, which will be disseminated on DVD.

### 3.9 ELAD+

Under IPC previous project "Noblesse" the Electronic Laboratory Equipment Database (ELAD) was developed. ELAD is an open-access database, consisting of specification of IPC research infrastructure. ELAD was designed to set up cooperation with enterprises, looking for scientific partner. Under the CREATE project ELAD was linked with the "IPC for Companies" webpage. Additionally, searching machine for patent rights was added (filters: offer no., title, key words, summary). The patent database has been regularly updated.

Consistent with the recommendation of the ERA Chair holder – a "Researchers" (ELAD+) module consisting of a brief specification of research topics studied by an individual IPC researcher (and

preferably – a photo of a person if consent granted) will be added to the "IPC for Companies" webpage. The aim is to ease access to IPC researchers to enterprises, institutions, authorities & investors.

The free of charge on-line access and the planned promotion of the ELAD+ in the research and industrial environment will allow to promote research potential among potential investors and establish cooperation with respectable research entities and companies. Moreover ELAD/ELAD+ will:

- support integration of IPC community with stakeholders,
- reinforce establishment of collaboration with key research entities and business partners,
- support process of technology commercialization and projects results dissemination.

### 3.10 Promotional materials

Under the dissemination activities it is also presumed to prepare promotional materials, such as: flyers, brochures, stands, notebooks, few types of gadgets (e.g. pens, calendars).

All materials will be personalized depending on specifics of the audience (a researcher, a potential research and business partner, a politician). The abovementioned materials will be widely disseminated during organized events (open lectures, open days, symposia, conference, business meetings). All promotional materials will be marked with the logotype of the project (if the size of promotional material is sufficient, the source of funding would be also indicated).

### 3.11 Upgrade of the CREATE webpage

The CREATE webpage will be regularly updated and upgraded with new functionalities consistent with needs of IPC stakeholders (public institutions, companies, authorities & investors).

### 3.12 New technology

The general scope of the studies developed by the new Department is coherent with national SMART specialization, in particular:

- Health / KIS 1. Medical engineering technologies, including medical biotechnologies
- Health / KIS 2. Diagnosis and treatment of civilization diseases and personalized medicine.

It is also in line with priority disciplines for Mazovia Voivodeship – chemistry and medicine as areas of the greatest potential for further business development in the region, and bio- and nanotechnology as leading technologies.

The demand for research in this discipline and their validity was proved by granting to prof. Wojtkowski two prestigious granting funds "Team-tech" – *"Two photon vision and two photon eye imaging (2x2 PhotonVis)"* and Maestro – *"Removal of image distortions by Spatio-Temporal Optical Coherence manipulation"*. The results of both projects will be widely disseminated in form of publications with open access, patents and lectures at international conferences. The adequate acknowledgements to the CREATE projects will be added.

This plan will be regularly updated, in particular – in line with recommendations of the ERA Chair holder, Professor Maciej Wojtkowski, and sent to the Project Officer.