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Draft Plan for the Use and Dissemination of Foreground

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PP	Restricted to other programme participants (including the Commission Services)	
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ABSTRACT:

In the CHIC project, the dissemination activities play a key role in the promotion of the awareness as well as strong cooperation and exchange with research communities inside and outside of the EU. Thus, the main target of dissemination activities is to inform all relevant target groups about the project results and the positive impacts that these results might have for clinical, industrial and societal users as well as for the research community.

Those dissemination activities are complemented with the definition of the exploitation plans for the CHIC outputs. In particular, in this project phase, the IPR management strategy (exploitation of foreground and IPR ownership issues, software licensing strategy) and the expected exploitable projects outputs (clinical outputs, technological and software outputs, modelling outputs) have been finalised.

For each output, the resources needed to sustain its operation after the end of the project have been identified by the consortium together with a preliminary plan for sustainability and exploitation, which include identification of target users and expected time-to-market.

This document summarises the dissemination and exploitation CHIC outcomes for the third year of the project. There will be another update to this PUDF at the end of the CHIC project which will include the final exploitation plans for the CHIC results (D12.5 at M48).

KEYWORD LIST:

Dissemination, exploitation plans, sustainability, maintenance, IPR, communication

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[1] **R**=Report, **P**=Prototype, **D**=Demonstrator, **O**=Other

[2] **PU**=Public, **PP**=Restricted to other programme participants (including the Commission Services), **RE**=Restricted to a group specified by the consortium (including the Commission Services), **CO**=Confidential, only for members of the consortium (including the Commission Services)

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Contents

Executive Summary

During the CHIC project, dissemination activities are having a central role in order to foster the widespread awareness as well as strong cooperation and exchange with research communities inside and outside of the EU.

The wider dissemination activities embrace informing all relevant target groups about the project results and the implications that these results might have for clinical, industrial and societal users as well as for the research community. They also aim for increasing awareness among other target groups, namely "all stakeholders" in general, the scientific community, industry, clinical practice, and the public at large.

With the support of those dissemination activities, the definition of the plans for the exploitation of the CHIC outputs is one of the consortium focus. In particular, in this project phase, the IPR management strategy (exploitation of foreground and IPR ownership issues, software licensing strategy) and the expected exploitable projects outputs (clinical outputs, technological and software outputs, modelling outputs) have been finalised.

For each output, the resources needed to sustain the output after the end of the project have been identified together with a preliminary plan for sustainability and exploitation, which include identification of the target users and the expected time-to-market.

This document is a living document and, as part of the dissemination and exploitation activities, it will be updated and adapted according to the achieved technical and scientific results until the end of the project.

1 Introduction

1.1 Purpose of this document

This document is part of the WP12 activities whose objectives are:

- to coordinate the dissemination and exploitation of the CHIC outputs to target groups,
- to establish relationships and seek synergies with other projects or initiatives, and
- to coordinate training activities.

The previous deliverables D12.1, D12.2, and D12.3 had formed the basis for the activities that have been and will be performed in the following year by the consortium. The purpose of these documents is to provide the description of the CHIC dissemination plan and the tools needed to support their dissemination efforts together with a preliminary overview of the CHIC exploitable outputs and draft exploitation plans.

The present deliverable, as output of Tasks 12.1 (Dissemination activities) and 12.2 (Exploitation and IPR issues), aims at:

- providing an update on the carried out dissemination activities and a vision of the strategy the CHIC consortium is going to put in place in order to increase awareness and promote the use of its scientific and technical results to the major stakeholders in the last year of the project;
- reporting on the identified project outputs in terms of software components, and models (both hypo and hyper-models);
- reporting on the sustainability plans and exploitation activities, both at individual and at consortium level.

1.2 Structure of the Deliverable

The document is organised as follows:

- Section 2 provides an update of the CHIC dissemination plan and of the dissemination results already presented in D12.1 and D12.3;
- Section 3 provides the description of the expected exploitable project outputs: technological and software outputs, and modelling outputs together with their sustainability and exploitation plans;
- Section 4 reports on the exploitation plans for the CHIC platform as a whole;
- Section 5 provides the individual exploitation plans of the CHIC partners.

2 Dissemination

2.1 Dissemination plan update

A detailed dissemination plan was defined and presented in D12.1. In this section, we provide a summary of the main concepts associated to dissemination plan and updates occurred in the first three years of the project. The next section will report in summary the outcomes at PM36 of all the dissemination activities.

The overall target of the CHIC dissemination strategy is to spread awareness about the project outputs to specific target groups that are directly or indirectly involved in the cancer modelling and its clinical translation, as well as the VPH modelling community as a whole, since a number of the technologies developed within the project will be of general use for any biomedical research on cancer.

As described in D12.1, the definition of a specific communication model, like the one in CHIC, implies the identification of the main characteristics for each of the composing elements:

1- the information *source*, which produces the message,
2- the *content*, which encodes the message into signals,
3- the *channel*, to which signals are adapted for transmission,
4- the *receiver*, which 'decodes' (reconstructs) the message from the signal.

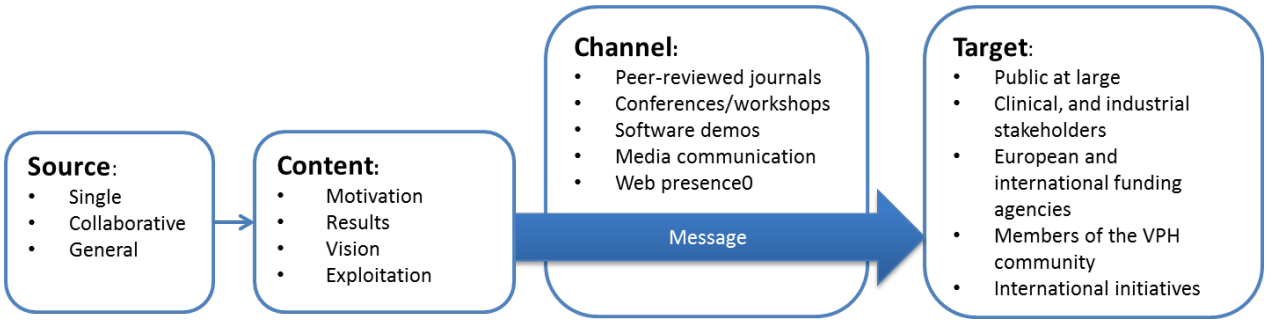


Figure 1: CHIC dissemination model overview

The *source* of all material, information, and results for dissemination purposes are the CHIC consortium members from all the technical/scientific WPs in the project. More precisely, we have classified the sources of dissemination into three types:

1. *Single*: the source is a single partner disseminating the results achieved by its institution;
2. *Collaborative*: the source is a group of partners working together in the same work package (WP) or jointly on specific research objectives;
3. *General*: the source is the all consortium.

Different *target* groups for dissemination activities were identified in the very early stages of the project, and they include stakeholders in research, scientific, clinical or industrial fields, who will be continuously informed about the intermediate and final results of the project. The identification of the target groups was based on the type and level of the involvement in the project (internal, connected, or external). For each of the groups, an analytical description is provided together with the stakeholders already identified as part of each group. Specific names and references have been added where contact has been already established. See Table 1 for all details.

Target group	Description	Stakeholders
Internal	It includes all institutions or associations, which are part of the CHIC project effort. Even if each of them has access to specific information and material, it is important to make sure that all the results and the activities of the project are well known. Awareness is important for cross-fertilization among WPs and partners' activities, increase synergies and capitalise on each other results. The specificity of the target and of the content (i.e. information with access restricted to the consortium) will require the use of specific channels (i.e. private mailing lists).	• CHIC consortium • Institutional observers (departments involved) • CHIC external advisory board: ○ David Ingram, Professor of Health Informatics and Director of the Centre for health Informatics and Multiprofessional Education, University College London ○ Metin Akay, Professor of Biomedical Engineering, University of Houston, Texas, USA and IEEE Press Series Editor for the IEEE Press Series in Biomedical Engineering, ○ Francoise Meunier, Director General of the European Organization for Research and Treatment of Cancer (EORTC) ○ Trachette Jackson, Professor of Mathematics at the University of Michigan, USA. Senior Editor of Cancer Research ○ Yuri Nikolsky, Chief Executive Officer GeneGo (a Thomson Reuters Company) ○ Roger Dale, Professor for Cancer Radiobiology, Department of Surgery and Cancer, Faculty of Medicine, Imperial College, London ○ Piotr Czauderna, Professor, Head of Surgery and Urology for Children and Adolescents, Medical University of Gdansk, Poland
Connected	It includes all stakeholders that might already have some connections with the CHIC activities but not actively be part of them. This group needs to access public information from CHIC but they can be provided with more technical and scientific details than the general public.	• EC community and related services • Media/journalist • Specialised media • Political stakeholders • Potential users • Related projects from the VPH: ○ p-medicine ○ VPH-Share ○ EUDAT2020 ○ dr Therapat ○ iManageCancer ○ MyHealthAvatar ○ VPH-PRISM ○ Go-Smart
External	This group is composed by stakeholders, who are completely external to the project activities. Some of these groups most probably have not heard of CHIC before or might not have any technical or domain specific background. They should receive general information on the project, written in an easily understandable way with more emphasis on the impact and the vision of the project than on its technical aspects.	• Individual researchers • Research institution or universities • Scientific communities or associations ○ National Cancer Institute, Division of Cancer Biology ○ European Clinical Research Infrastructures Network (ECRIN) ○ The European Platform for Patients Organisations Science & Industry (EPPOSI) ○ The Meg Jones Crain Cancer charity (brainstrust) ○ International Confederation of Childhood Cancer Patient Organisation ○ IEEE ○ VPH-Institute • Clinicians/Patients • Industries ○ Pharmaceuticals ○ Healthcare service providers ○ Others • Public at large

Table 1: CHIC target groups

The *content* of the message to be disseminated has been classified into four different categories:

a) *Motivation*: to inform the taxpayers and their representatives on how the CHIC project uses the money received and the impact its results might have on the citizens.

b) *Results*: with the scope to disseminate the fundamental research and scientific results of the CHIC project toward academic, industrial and clinical researchers so as to contribute to the collective knowledge building.

c) *Vision*: results of the CHIC project in a strategic development perspective toward clinical, industrial, and societal stakeholders. It takes place when the research results compose possible and plausible strategic scenarios that are worth to be known by key stakeholders in order to plan future developments and investments.

d) *Exploitation*: message aimed at driving an effective social, clinical and industrial exploitation of the project results so to be able to create a sustainability plan for the developed tools and services after the end of the project.

The *channels* used to convey the message to the target groups are different according not only to the target group but also to the type of information to be disseminated.

A range of different dissemination channels and tools are being used to ensure the highest visibility of the project progress and its results. In general,

- Scientific and technical results are disseminated via peer-reviewed papers or specialised scientific conferences.
- For software results, apart from technological and scientific results above, demonstrations are organised both for specific groups of stakeholders in conjunction to bigger events (such as conferences) and the organisation of instructional courses on the developed infrastructure within major worldwide events will be evaluated for the last year of the project.
- General tools: the consortium will exploit a well-established set of dissemination processes, which includes web presence, media material preparation, and periodic newsletters.
- Web presence: a strong and highly visible web presence has been set up from the very beginning of the project.

The dissemination tools can be grouped according to the type of dissemination activities they are used for, as it is shown in the following table (Table 2).

Type of content	Channel	Examples	Target group
Motivation, Results, Vision, Exploitation	Oral	Presentation on external scientific conferences/exhibitions/ workshops, project conference, summer schools/ workshop/meeting/briefing, report, face-to-face communication	Connected, External
Results, Exploitation	Demo	Webinar, e-based consultancies, online video tutorials	Internal, Connected
Results, Vision, Exploitation	Print	Report, scientific article on peer-reviewed journals, set of promotional materials (fact sheet, flyer, leaflet, brochure, posters, roll outs), information package	Internal, Connected, External
Motivation, Results, Vision	Web content	Project website, links/presence to/in other websites, e-newsletter, mailing list, e-bulletin, e-form of a set of promotional materials, information database, test versions of CHIC tools and services on public website	Internal, Connected, External
Motivation, Vision	Media (generalist and specialised)	Press-release, interviews, panel discussion, project video	Connected, External

Table 2: Overview of CHIC dissemination tools and activities Type of activity

2.2 CHIC dissemination channels update

The general channels, to be used during the project in relationship to the target groups and type of content, have been presented already in D12.1. In this section, we provide information on the most relevant channels.

As part of the paper-based written communication, the general public is being addressed with promotional material that is part of the dissemination kit (D12.2) and that it is kept up to date periodically, while the technical and scientific results are be mostly presented in article and papers published on peer-reviewed journals (some of which are accessible via the CHIC public website[3]) and in news-entries on the CHIC website.

The CHIC partners have identified a number of clinical and research journals, which they are already targeting to publish the scientific outputs of the project. This list is by no means exhaustive as other opportunities might appear but it aims to provide an overview of the targets that have been identified for the scientific publications (Table 3). The journals are listed in alphabetical order and with the associated Impact Factor[4] to show the high impact of the dissemination activities carried out by the consortium.

Journal name	Impact factor (2015)
Acta Oncologica	2.9
Briefings in Bioinformatics	9.6
British Journal of Cancer	4.8
BMC Bioinformatics	2.5
BMC Medical Informatics and Decision Making	1.8
BMC Systems Biology	2.44
Bulletin of Mathematical Biology	1.3
Cancer	4.8
Cancer Research	9.3
Computers and Mathematics with Applications	1.6
European Urology	13.9
Future Generation Computer Systems	2.7
IEEE Journal of Biomedical and Health Informatics	1.4
Interface, A Journal of the Royal Society	3.9
International Journal for Multiscale Computational Engineering	0.7
International Journal of Radiation Oncology Biology Physics	4.5
Journal of Biomedical Informatics	2.1
Journal of Clinical Oncology	18.4
Journal of Computational Science	1.2
Journal of Mathematical Biology	1.8
Journal of Neuro-Oncology	3.0
Journal of Pathology	7.4
Journal of Theoretical Biology	2.1

[3] https://www.chic-vph.eu
[4] http://www.journal-database.com/

Klinische Pädiatrie	1.0
Lancet	45.2
La radiologia medica	1.3
Mathematical Biosciences	1.3
Medical Physics	2.6
Neoplasia	4.2
Pediatric Blood and Cancer	2.3
Philosophical Transanction of the Royal Society A	2.1
PLoS Computational Biology	4.6
PLoS One	3.2
Prostate	3.5
Radiotherapy and Oncology	4.3
Radiation Research	2.9
Strahlentherapie und Onkologie	2.9
Tumori	1.2
Urology	2.1

Table 3: List of peer-reviewed journals which might be selected for publishing the CHIC scientific results

The CHIC partners are also actively presenting the project results to the research and the clinical communities by participating in the most relevant conference (as reported in the next section on the first three years of activities).

A list of events of interest for the project partners has been defined.

- Annual Conference of Pediatric Oncology (SIOP: International Society of Pediatric Oncology)
- Bi-annual conference of German Society of Pediatric Oncology
- Annual meeting of the Society for Mathematical Biology (http://www.smb.org/meetings/annual.shtml)
- European Conference on Mathematical and Theoretical Biology, Atlanta (USA), June 30-July 3 2015 (http://math.gsu.edu/~smb/)
- Workshops associated with the MBI with emphasis on cancer and its environment
- Ohio State University, MBI Emphasis Year on Cancer and Its Environment 2014-2015 (http://mbi.osu.edu/2014-15/scientific2014-15.html)
- British Applied Mathematics Colloquium (annual applied maths meeting in UK)
- Annual meeting of the National Cancer Research Institute (UK-based meeting on cancer)
- Annual meeting of the American Association for Cancer Research
- International Conference on Computational Science
- European Complex Systems Conference
- European Association of Urology
- European Society for Radiotherapy and Oncology
- Annual International Conference of the IEEE Engineering in Medicine and Biology Society
- IEEE International Conference on BioInformatics and BioEngineering
- Symposium of Mechanisms and Models of Cancer (http://www.salk.edu/MechModels2013/index.php)
- European Cancer Congress
- International Conference and Exhibition on Biochemical and Molecular Engineering

2.3 Dissemination process update

As described above, the project stakeholders have been classified into three main target groups (internal, connected and external). For each of those groups, a special set of appropriate dissemination methods/tools and benefits from the dissemination activities have been already defined.

As the channels and target groups of the CHIC project are many, it has been decided for some of the partners to be responsible for guiding the specific dissemination (as reported in Table 4). This does not mean, however, that the other partners are excluded or not contributing to the dissemination project activities.

Target group	Stakeholders	Channel	Partner in charge
External	Political	Web content (website, newsletters) Paper (promo material)	USAAR, KULeuven, ICCS
External	General public	Web content (website, newsletters) Paper (promo material)	USAAR, KULeuven, ICCS
Connected	European Commission	Web content (website, newsletter) Paper (promo material)	Project Management team (Eurice, ICCS)
Connected	Institutional observers	Web content Paper Oral	All partners
Connected	Users	Oral (conferences and summer schools) Web content Paper	USAAR, KULeuven, BED, ICCS
External	VPH community	Oral Web content Paper	USFD, UCL, ICCS, FORTH, UOXF, CINECA, BED
External	Healthcare ICT	Oral Web content Paper	Philips, FORTH, UCL, BED, USFD, CUSTODIX, CINECA, BED, ICCS
External	Mathematical modelling	Oral Web content Paper	ICCS, UPENN, BED

Table 4: Main partners' responsibilities in the dissemination process

2.4 Dissemination results after year 3

In this section we report the lists of the events and contributions from the different partners for the third year of the project to three categories of channels (publications, workshop and conferences, and press/web activities).

Title	First author	Type of publication	Involved partners	Status	Year of publication	DOI or publication information
In silico profiling of activating mutations in cancer	Radhakrishnan R	Paper	UPENN	Submitted		Integrative Biology
Integrative functional assessment of ALK mutations for therapeutic stratification in neuroblastoma	Radhakrishnan R	Paper	UPENN	Submitted		Cancer cell
A multiscale hypermodel to predict the nephroblastoma response to preoperative chemotherapy	Graf N	Conference Proceedings	USAAR, ICCS	Accepted	2016	9th International Renal Tumor Biology Conference, Toronto, Ontario, Canada April 2-3, 2016.
A two-clones tumor model: Spontaneous growth and response to treatment	Stura I	Paper	UNITO	Published	2016	10.1016/j.mbs.2015.10.014
Computational Horizons In Cancer (CHIC): Developing Meta- and Hyper-Multiscale Models and Repositories for In Silico Oncology – Strategies, Systems and Results	Stamatakos G	Conference Proceedings	BED, CINECA, CUSTODIX, FORTH, ICCS, KU Leuven, LUH, PHILIPS, TEI-C, UBERN, UCL, UNITO, UOXF, UPENN, USAAR, USFD	Accepted	2016	International Conference and Exhibition on Pediatric Oncology, August 11-13, 2016 Toronto, Ontario, Canada
Differentiation resistance through altered retinoblastoma protein function in acute lymphoblastic leukemia: in silico modeling of the deregulations in the G1/S restriction point pathway	Ouzounoglou E	Paper	ICCS	Published	2016	10.1186/s12918-016-0264-5
Machine learning predictions of cancer driver mutations	Jordan EG	Conference Proceedings	UPENN	In press	2016	IEEE Proceedings of the 6th International Advanced Research Workshop on In-Silico Oncology and Cancer investigation

The Oncosimulator - Combining Clinically Driven and Clinically Oriented Multiscale Cancer Modeling with Information Technology in the In Silico Oncology Context	Stamatakos G	Conference Proceedings	ICCS	Accepted	2016	International Conference and Exhibition on Pediatric Oncology, August 11-13, 2016 Toronto, Ontario, Canada
A brief outline of the CHIC project	Stamatakos G	Conference Proceedings	ICCS	Published	2015	Minerva Urologica and Nefrologica, 67 (Suppl. 1), no. 1
An RBF-PSO Based Approach for Modeling Prostate Cancer	Perrachione E	Paper	UNITO	Published	2015	http://arxiv.org/abs/1601.05436
A simpler modified Gleason Score performs slightly better than the standard one	Gabriele D	Conference Proceedings	UNITO	Published	2015	10.1016/j.juro.2015.02.1703
Brain tumor immunotherapy: what have we learned so far?	Van Gool SW	Paper	KULEUVEN	Published	2015	10.3389/fonc.2015.00098
Circulating Serum miRNAs as Potential Biomarkers for Nephroblastoma	Ludwing N	Paper	USAAR	Published	2015	10.1002/pbc.25481
Copyright in Multiscale Cancer Modeling	Lishchuk IV	Conference Proceedings	LUH	Published	2015	The Fifth International Conference on Advanced Communications and Computation
Do radiotherapy techniques impact the outcome?	Gabriele E	Conference Proceedings	UNITO	Published	2015	Minerva Urologica and Nefrologica, 67 (Suppl. 1), no. 1
EUREKA-1 database: an epidemiological analysis	Gabriele D	Conference Proceedings	UNITO	Published	2015	Minerva Urologica and Nefrologica, 67 (Suppl. 1), no. 1
Exploring the competition between proliferative and invasive cancer phenotypes in a continuous spatial model	Tzamali E	Paper	FORTH	Published	2015	10.1371/journal.pone.0103191
Gleason Score and other variables	Gabriele D	Conference Proceedings	UNITO	Published	2015	Minerva Urologica and Nefrologica, 67 (Suppl. 1), no. 1
In Silico Neuro-Oncology: Brownian Motion-Based Mathematical Treatment as a Potential Platform for Modeling the Infiltration of Glioma Cells into Normal Brain Tissue	Antonopoulos M	Paper	ICCS	Published	2015	10.4137/CIN.S19341
In silico oncology and in silico medicine: from research to clinics and academia	Stamatakos G	Conference Proceedings	ICCS	Published	2015	Minerva Urologica and Nefrologica, 67 (Suppl. 1), no. 1

Is there still a role for computed tomography and bone scintigraphy in prostate cancer staging? An analysis from the EUREKA-1 database	Gabriele D	Paper	UNITO	Published	2015	10.1007/s00345-015-1669-2
Modeling prostate cancer within CHIC	Stura I	Conference Proceedings	UNITO	Published	2015	Minerva Urologica and Nefrologica, 67 (Suppl. 1), no. 1
Personalized Medicine and the way to CHIC. A clinical perspective.	Graf N	Conference Proceedings	USAAR	Published	2015	Minerva Urologica and Nefrologica, 67 (Suppl. 1), no. 1
Predictive value of tertiary Gleason Score	Gabriele D	Paper	UNITO	Published	2015	10.1016/j.juro.2015.02.1699
Report from the study EUREKA-2 on prostate cancer patients treated by radical radiotherapy: first data analysis	Gabriele D	Conference Proceedings	UNITO	Published	2015	Minerva Urologica and Nefrologica, 67 (Suppl. 1), no. 1
The current role of CT and bone scintigraphy in prostate cancer staging	Oderda M	Conference Proceedings	UNITO	Published	2015	Minerva Urologica and Nefrologica, 67 (Suppl. 1), no. 1
The Standardized Histogram Shift of T2 Magnetic Resonance Image (MRI) Signal Intensities of Nephroblastoma Does Not Predict Histopathological Diagnostic Information	Muller S	Paper	USAAR, FORTH	Published	2015	10.4137/CIN.S19340
A Generalized Model of Tumor Growth and Response to Treatment using the PUN approach	Guiot C	Conference Proceedings	UNITO	Published	2014	VPH2014 proceedings
A Model of Tumor Growth Coupling a Cellular Biomodel with Biomechanical Simulations	Rikhtegar F	Conference Proceedings	ICCS, UBERN	Published	2014	10.1109/IARWISOCI.2014.7034638
A multicenter retrospective study on irradiated prostate cancer: preliminary report	Gabriele D	Conference Proceedings	UNITO	Published	2014	Anticancer research, 34:5
A two population model of cancer growth with fixed capacity	Stura I	Conference Proceedings	UNITO	Published	2014	10.1109/IARWISOCI.2014.7034636
Computational delineation of tyrosyl-substrate recognition and catalytic landscapes by the epidermal growth factor receptor	Yingting L	Paper	UPENN	Published	2014	10.1039/c3mb70620f

tyrosine kinase domain						
Computational Horizons In Cancer (CHIC): Developing Meta- and Hyper-Multiscale Models and Repositories for In Silico Oncology - a Brief Technical Outline of the Project	Stamatakos G	Conference Proceedings	BED, CINECA, CUSTODIX, FORTH, ICCS, KU Leuven, LUH, PHILIPS, TEI-C, UBERN, UCL, UNITO, UOXF, UPENN, USAAR, USFD	Published	2014	10.1109/IARWISOCI.2014.7034630
Defining the Free Energy Landscape of Curvature Inducing Proteins on Membrane Bilayers	Tourdot RW	Paper	UPENN	Published	2014	10.1103/PhysRevE.90.022717
Dendritic cell vaccination for glioblastoma multiforme: Clinical experience and future directions	Dejaegher J	Conference Proceedings	KULEUVEN	Published	2014	10.1109/IARWISOCI.2014.7034631
Dendritic cell vaccination for glioblastoma multiforme: review with focus on predictive factors for treatment response	Dejaegher J	Paper	KULEUVEN	Published	2014	10.2147/ITT.S40121
Enabling multiscale modeling in systems medicine	Wolkenhauer O	Paper	ICCS, UOXF	Published	2014	10.1186/gm538
High-throughput mutagenesis reveals functional determinants for DNA targeting by Activation-Induced Cytidine	Gajula KS	Paper	UPENN	Published	2014	10.1093/nar/gku689
Incorporating Data Protection in In Silico Research: A case of the CHIC project	Neri E	Conference Proceedings	CUSTODIX	Published	2014	10.1109/IARWISOCI.2014.7034643
Intellectual Property Rights Issues in Multiscale Cancer Modeling	Lishchuk I	Conference Proceedings	LUH	Published	2014	10.1109/IARWISOCI.2014.7034646
Legal and Ethical Aspects of In Silico Medicine	Nwankwo I	Conference Proceedings	LUH	Published	2014	10.1109/IARWISOCI.2014.7034647

Mesoscale computational studies of membrane bilayer remodeling by curvature-inducing proteins	Radhakrishnan R	Paper	UPENN	Published	2014	10.1016/j.physrep.2014.05.001
Multiscale Computational Models in Physical Systems Biology of Intracellular Trafficking	Tourdot RW	Paper	UPENN	Published	2014	10.1049/iet-syb.2013.0057
Patient-Specific Semi-supervised Learning for Postoperative Brain Tumor Segmentation	Meier R	Conference Proceedings	UBERN	Published	2014	10.1007/978-3-319-10404-1_89
Piedmont multicenter retrospective study on operated prostate cancer: first report	Gabriele D	Conference Proceedings	UNITO	Published	2014	Anticancer research 2014 : 34
The Technologically Integrated Oncosimulator: Combining Multiscale Cancer Modeling with Information Technology in the In Silico Oncology Context	Stamatakos G	Paper	FORTH, ICCS, TEI-C, USAAR	Published	2014	10.1109/JBHI.2013.2284276
The VPH hypermodelling framework for cancer multiscale models in the clinical practice	Tartarini D	Conference Proceedings	USFD	Published	2014	10.1109/IARWISOCI.2014.7034642
A Hybrid Model for Multimodal Brain Tumor Segmentation	Meier R	Conference Proceedings	UBERN	Published	2013	Miccai 2013 Workshop on Brain Tumor Segmentation
Computational Methodology for Mechanistic Profiling of Kinase Domain Mutations in Cancers	Radhakrishnan R	Conference Proceedings	UPENN	Published	2013	Proceedings of the IEEE, 5th International Advanced Research Workshop on In Silico Oncology and Cancer Investigatio
Functional tissue units and their primary tissue motifs in multi-scale physiology	de Bono B	Paper	UCL	Published	2013	10.1186/2041-1480-4-22
In Silico Oncology: Exploiting Clinical Studies to Clinically Adapt and Validate Multiscale Oncosimulators	Stamatakos G	Conference Proceedings	FORTH, ICCS, USAAR	Published	2013	10.1109/EMBC.2013.6610806

Molecular modeling of ErbB4/HER4 kinase in the context of the HER4 signaling network helps rationalize the effects of clinically identified HER4 somatic mutations on the cell phenotype	Telesco SE	Paper	UPENN	Published	2013	10.1002/biot.201300022
Multiscale Cancer Modeling and In Silico Oncology: Emerging Computational Frontiers in Basic and Translational Cancer Research	Stamatakos G	Paper	ICCS, UPENN, USAAR	Published	2013	10.4172/2155-9538.1000e114
The Virtual Skeleton Database - An open access repository for biomedical research and collaboration	Kistler M	Paper	UBERN	Published	2013	doi:10.2196/jmir.2930

Table 5: List of the CHIC publications

Title	Type	Main leader	Reference	Date
CHIC project featured in The Parliament Magazine	Online article	ICCS	http://www.vph-institute.org/news/chic-project-featured-in-the-parliament-magazine.html	2014
Computational Horizons in Cancer	Newspaper/Magazine Article	ICCS	http://viewer.zmags.com/publication/6eced2e8#/6eced2e8/36	2014
Grantee presentation to the Multiscale Modeling Consortium of the Inter Agency Modeling Group	Video	UPENN	https://www.youtube.com/watch?v=ttNG86de3ps	2014
Video introducing Physics Reports article in the author's own words	Video	UPENN	http://audioslides.elsevier.com/getvideo.aspx?doi=10.1016/j.physrep.2014.05.001	2014
CHIC general presentation	Web content	EURICE	http://chic-vph.eu/uploads/media/CHIC_general-presentation.pdf	2013
CHIC Flyer	Flyer	EURICE	http://chic-vph.eu/uploads/media/CHIC-flyer.pdf	2013
Article about the CHIC Kick-Off Meeting on the Eurice company website	Web content	EURICE	Optimising cancer treatment through in-silico oncology	2013
CHIC website	Web content	EURICE	Hrrp://www.chi-project.eu	2013
CHIC twitter account	Web content	CINECA	https://twitter.com/CHIC_project	
CHIC Facebook page	Web content	CINECA	https://www.facebook.com/CHIC-project-333884726816111/?ref=hl	
CHIC LinkedIn group	Web content	CINECA	https://www.linkedin.com/groups/8254222	
Complex Mathematics Against Cancer	Press release			
A Novel Cancer (Related) Project	Press release			
New Horizons in Cancer Treatment	Press release			

Table 6: List of the CHIC press activities and other media

Title	Type	Main participants	Event	Venue	Date
A multiscale hypermodel to predict the nephroblastoma response to preoperative chemotherapy	Oral presentation to a scientific event	ICCS, USAAR	International Conference and Exhibition on Pediatric Oncology	Toronto, Canada	11-13.08.2016
The CHIC Workshop	Workshop	ICCS, USAAR, UBERN, LUH, UPENN, FORTH	International Conference and Exhibition on Pediatric Oncology	Toronto, Canada	11-13.08.2016
CHIC-CDR -- a repository for managing multi-modality clinical data and its application to in-silico oncology	Oral presentation to a scientific event	UBERN	Presentation at the International Conference and Exhibition on pediatric Oncology	Toronto, Canada	11.08.2016
Mechanically coupled reaction-diffusion model of macroscopic brain tumour growth	Oral presentation to a scientific event	UBERN	Submitted to ESB 2016 conference	Lyon, France	10.07.2016
CHIC – A Multi-scale Modelling Platform for in-silico Oncology	Oral presentation to a scientific event	UBERN	Poster presentation at ICTR-PHE 2016	Geneva, Switzerland	19.02.2016
Estimating the tumor growth: a RBF-PSO based method	Oral presentation to a scientific event	UNITO		Turin, Italy	05.02.2016
The CHIC project for cancer clinical research	Oral presentation to a scientific event	USFD	Sheffield Cancer Research Day	Sheffield, UK	22-01.2016
Let it… Grow? No, Thanks! Math Applied to Tumors	Oral presentation to a wider public	UNITO	PhD days: PhD students talk about their researches to undergraduates	Turin, Italy	12.01.2016
How to predict the timing to relapse with a swarm	Oral presentation to a scientific event	UNITO		Turin, Italy	09.11.2015
Clinical Evaluation of a Fully-automatic Segmentation Method for Longitudinal Brain Tumor Volumetry	Publications	UBERN	Poster presentation at the "Tag der klinischen Forschung" of the Medical faculty of the University of Bern.	Bern, Swtizerland	04.11.2015
Parameter Learning for CRF-based Tissue Segmentation of Brain Tumors	Publications	UBERN	Contribution to MICCAI-BRATS Challenge 2015	Munich, Germany	04.10.2015
Organization of MICCAI BRATS Challenge 2015,	Organisation of Workshops	UBERN	Organization of Segmentation Challenge for Brain Tumor Segmentation within the framework of the MICCAI 2015 conference.	Munich, Germany	04.10.2015

Munich					
Data Mining in Cancer	Oral presentation to a scientific event	USAAR	Invited keynode lecture about data mining in cancer related to p-medicine and CHIC, ECCO Congress	Vienna, Austria	29.09.2015
A RBF-based PSO approach for modeling prostate cancer	Oral presentation to a scientific event	UNITO		Rhodes, Greece	28.09.2015
In silico clinical trials: the future of biomedical product testing	Oral presentation to a wider public	USFD	XXXIV Annual School of the Italian National Bioengineering Group "Approcci ingegneristici per lo sviluppo di metodiche alternative alla sperimentazione in vivo" Bressanone, -ed Magistral Lecture: "In silico clinical trials: the future of biomedical product testing	Bressanone, Italy	21.09.2015
Copyright in Hyper-Model	Oral presentation to a scientific event	LUH		Göttingen, Germany	16.09.2015
Predictive immune modeling in malignant gliomas.	Oral presentation to a scientific event	KU Leuven	Presentation by Dr. Joost Dejaegher at a KU Leuven Research Seminar.	Leuven, Belgium	09.09.2015
UK Royal Academy of Medicine, invited talk: "The Digital Patient".	Oral presentation to a scientific event	USFD	UK Royal Academy of Medicine, invited talk: "The Digital Patient".	London, UK	09.07.2015
in silico clinical trials: reduce, refine and partially replace human experimentation	Oral presentation to a wider public	USFD	21st Congress of the European Society of Biomechanics, Prague Invited Perspective talk: "in silico clinical trials: reduce, refine and partially replace human experimentation".	Prague, Czech Republic	05.07.2015
Copyright in Multiscale Cancer Modeling	Oral presentation to a scientific event	LUH	INFOCOMP 2015, 21-26 June, Brussels,http://www.thinkmind.org/index.php?view=article&articleid=infocomp_2015_5_30_60076	Brussels, Belgium	25.06.2015
Copyright in multiscale cancer modeling	Publications	LUH	The Fifth International Conference on Advanced Communications and Computation	Brussels, Belgium	21.06.2015
Biological Simulation – from simple cells to multiscale frameworks	Oral presentation to a wider public	USFD	Invited seminar: Computational Biology Series, University of Oxford	Oxford, UK	09.06.2015
Avicenna research roadmap: the challenges ahead"	Oral presentation to a scientific event	USFD	Avicenna action event 5, Barcelona Closing plenary talk: "Avicenna research roadmap: the challenges ahead".	Barcelona, Spain	05.06.2015
Recent developments in in silico Medicine: the impact on the medical device industry	Oral presentation to a wider public	USFD	Medtronic Corp. Minneapolis,. Invited talk to the technical staff: "Recent developments in in silico Medicine: the impact on the medical device industry".	Minneapolis USA	21.05.2015
In silico clinical trials: The Avicenna Roadmap	Oral presentation to a scientific event	USFD	BMES/FDA Frontiers in Medical Devices Conference: Innovations in Modeling and Simulation. Silver Spring (MD), USA, 18-20 May 2015. Keynote presentation: 'In silico clinical	USA	18.05.2015

			trials: The Avicenna Roadmap".		
CHIC Computational Horizons in Cancer	Posters	USFD	Dr Tartarini, DC Walker and K duan present a poster about CHIC project, its aims and the Hypermodelling Framework	Sheffield, UK	07.05.2015
Welcome and closing remarks. Insigneo institute 2015 Showcase	Exhibitions	USFD	Insigneo institute 2015 Showcase	Sheffield, UK	07.05.2015
Brain tumor immunotherapy, what have we learned so far?	Oral presentation to a scientific event	KU Leuven	Presentation by Prof. Van Gool at "24th GPHO Arbeitstagung Experimentelle Neuroonkologie" organised by Prof. Bernhard Erdlenbruch, at Minden, Germany	Minden, Germany	24.04.2015
Copyright in software on the Internet	Oral presentation to a scientific event	LUH	ISLACO 2015	St. Petersburg, Russia	16.04.2015
Immuntherapie	Oral presentation to a scientific event	KU Leuven	Presentation by Prof. Van Gool at the "Trends in der pädiatrischen Onkologie" organised by Prof. Michael Grotzer at Hörsaal Kinderspital Zürich	Zürich, Switzerland	08.04.2015
Prostate carcinoma: reports from Eureka studies (CHIC project)	Conference	UNITO, CINECA, ICCS, USAAR	Prostate carcinoma: reports from Eureka studies congress	Candiolo, Turin, Italy	28.03. 2015
Personalized Medicine and the way to CHIC. A clinical perspective.	Oral presentation to a scientific event	USAAR	Graf N: Personalized Medicine and the way to CHIC. A clinical perspective. Minerva Urol Nefrol 67 (Suppl 1): 45, 2015	Turin, Italy	28.03.2015
Brain of the Week	Oral presentation to a wider public	UBERN		Bern, Swtizerland	20.03.2015
Data Protection and Clinical Data in Pediatric Research and Treatment	Video lecture	LUH	International Childhood Cancer Awareness Day Event in the European Parliament	Brussels, Belgium	03.02.15
Data Protection and Data Security: A Lawyer's View on Personal Clinical Information	Winter School	LUH	Fourth Winter School Ethics and Neuroscience, Bernstein Center for Computational Neuroscience Berlin, Berlin School of Mind and Brain	Berlin, Germany	23.02.2015
Threats of Data Protection Regulation	General Assembly	LUH	ENCCA General Assembly	Brussels, Belgium	16.01.2015
Rechtsfragen der personalisierten Medizin	Oral presentation to a wider public	LUH	Paul Fritsche Stiftung, Universität des Saarlands	Homburg, Germany	29.01.2015
6 th International Advanced Research Workshop on In Silico Oncology and Cancer Investigation –	Workshop	USFD	Daniele Tartarini from USFD team discussed with WP6 partners the adoption of a Hypermodelling language and the technical solutions to decouple tightly coupled models	Athens, Greece	02.11.2014

The CHIC Project Workshop					
The VPH Hypermodelling Framework for Cancer Multiscale Models in the Clinical Practice	Conference	USFD	Oral Presentations about The CHIC Hypermodelling Framework in Cancer Research	Athens, Greece	02.11.2014
Incorporating Data Protection in In Silico Research: A case of CHIC	Conference	CUSTODIX	Elias Neri Presented "Incorporating Data Protection in In Silico Research: A case of CHIC" at the "6 th International Advanced Research Workshop on In Silico Oncology and Cancer Investigation"	Athens, Greece	03.11.2014
Dendritic Cell Vaccination for Glioblastoma Multiforme	Conference	KU Leuven	Skype-presentation by Prof. Van Gool to the "6th International Advanced Research Workshop on In Silico Oncology and Cancer Investigation (IARWISOCI) - The CHIC Project Worskhop"	Athens, Greece	04.11.2014
Providing a Network of Trust in Processing Health Data for Research	Conference	LUH	23rd EICAR Annual Conference	Frankfurt, Germany	17-18.11.2014
Providing a Network of Trust in Processing Health Data for Research	Conference	CUSTODIX	23rd EICAR ANNUAL CONFERENCE Trust and Transparency in IT Security	Frankfurt, Germany	18.11.2014
Dendritic cell therapy in brain cancer	Conference	KU Leuven	Presentation by Prof. Van Gool at the "VII congresso nacional associacao portuguesa neuro oncologia" organised by Associacao portuguesa neuro oncologia	Lisbon, Portugal	21.11.2014
Towards the mathematical principles of the natural philosophy of living matter: In Silico Oncology/ In Silico Medicine	Workshop	ICCS	6th IARWISOCI –The CHIC Project Workshop	Athens, Greece	3-4.11.2014
Computational Horizons in Cancer: Developing Meta- and Hyper-Multiscale Models and Repositories for In-Silico Oncology – A Brief Technical Outline of the project	Workshop	ICCS, USAAR, KULeuven, BED, USFD, FORTH, LUH, UPENN, UOXF, UNITO, UBERN, Custodix, PHILIPS, UCL, CINECA, TEI-C	6th IARWISOCI –The CHIC Project Workshop	Athens, Greece	3-4.11.2014
A Modular Semantic Infrastructure Layout for the Management of Hypermodel-Pertinent Metadata in the Context of In Silico Oncology	Workshop	ICCS	6th IARWISOCI –The CHIC Project Workshop	Athens, Greece	3-4.11. 2014

Modelling Glioblastoma Growth and Inhomogeneous Tumour Invasion with Explicitly Numerically Treated Neumann Boundary Conditions	Workshop	ICCS	6th IARWISOCI –The CHIC Project Workshop	Athens, Greece	3-4.11.2014
A Brownian Motion Based Mathematical Analysis as a Potential Basis for Modelling the Extent of Infiltration of Glioma Cells into the Surrounding Normal Brain Tissue	Workshop	ICCS	6th IARWISOCI –The CHIC Project Workshop	Athens, Greece	3-4.11.2014
Legal and ethical aspects of in silico based medicine	Workshop	LUH	6th IARWISOCI –The CHIC Project Workshop	Athens, Greece	3-4.11.2014
IPR issues in multiscale modelling	Workshop	LUH	6th IARWISOCI –The CHIC Project Workshop	Athens, Greece	3-4.11.2014
Multiscale modelling of cancer	Conference	ICCS	VPH2014	Trondheim, Norway	11.09.2014
In silico Neuro-Oncology: Simulating glioma growth and inhomogeneous invasion under explicitly treated Neumann boundary conditions	Conference	ICCS	VPH2014	Trondheim, Norway	11.09.2014
A Generalized Model of Tumor Growth and Response to Treatment using the PUN approach	Conference	UNITO	VPH2014	Trondheim, Norway	111.09.2014
The VPH Hypermodelling Framework for cancer research	Conference	USFD, CINECA	VPH2014	Trondheim, Norway	11.09.2014
The Importance of Data Sharing and Data Protection'	Conference	LUH	SIOPE-ENCCA conference 2014	Brussels, Belgium	18.09.2014
Keynote lecture on Data Protection Reform	Conference	LUH	Leopoldina Symposium „Keimbahnmutationen bei krebskranken Kindern“	Freiburg, Germany	26.09.2014
Cancer cell patterns emerging from agent based	Summer School	FORTH	Spatiotemporal modelling and simulation of biology systems: Biology in Cyber Space	Dresden, Germany	02-09.08.2014

movement					
Nomination to Best Msc thesis work – Automatic Multimodal Brain Tumor Segmentation	Conference	UBERN	SSBE 2014 Annual Meeting	Zurich, Switzerland	27-28.08.2014
Patient-specific Semi-supervised Learning for Postoperative Brain Tumor Segmentation	Summer School	UBERN	Medical Imaging Summer School (MISS) 2014	Favignana, Italy	28.07.2014
A Two-Clones Model of Tumor Growth and its Response to Treatment	Conference	UNITO	MPDS14 Conference	Turin, Italy	29.08.2014
Invited lecture: What is the role of in silico modelling and simulation to help translate pre-clinical data into the design of human clinical trials	Conference	UPENN	Tumor Models Summit	Boston, USA	21-23.07.2014
In Silico Oncology: A generic platform for clinically driven and oriented cancer hypermodeling. The Hypermodel Based Oncosimulator	Conference	ICCS	7th World Congress of Biomechanics	Boston, USA	6-11.07.2014
Computational Challenges in Multiscale Modelling	Conference (Podium discussion)	USFD	7th World Congress of Biomechanics	Boston, USA	6-11.07.2014
Data collection for models validation: application to prostate cancer - clinical aspects	Conference	UNITO	IEEE-EMBS International Conferences on Biomedical and Health Informatics (BHI)	Valencia, Spain	1-4.06.2014
Immunotherapy for malignant glioma: preclinical research and clinical experience	Conference	KU Leuven	Presentation by Prof. Van Gool at the "Internal lab meeting seeking for collaboration on oncolytic virus research" organised by Prof. Alan Melcher, Medical Oncology, at Leeds, UK	Leeds, UK	16.06.2014
Piedmont multicenter retrospective study on operated prostate cancer: first report	Congress/conference	UNITO	24th Annual Meeting of the Italian Society of Uro-Oncology (SIUro)	Bologna, Italy	22-24.06.2014

Data modeling and simulations. Do they pave the way to personalized medicine?	Workshop	USAAR	SIB/Systems X.ch Summer School	Kandersteg, Switzerland	22-27.06.2014
ApiNATOMY: The Generation of Interactive CircuitBoard Views of Complex Physiology Knowledge	Conference	UCL	4th International Conference on Complex Systems and Applications (ICCSA 2014)	Le Havre, France	23-26.06.2014
Immunotherapy for relapsed malignant glioma in children	Conference	KU Leuven	Presentation by Prof. Van Gool at the ISPNO conference at Singapore	Singapor	28.06.2014
Presentation of the CHIC project on a special leaflet	Showcase event	USFD	Insigneo Institute first anniversary showcase event1	Sheffield, UK	08.05.2014
Poster presentation of CHIC	Showcase event	USFD	Insigneo Institute first anniversary showcase event1	Sheffield, UK	08.05.2014
Immunotherapy for malignant glioma: preclinical research and clinical research	Conference	KU Leuven	Presentation by Prof. Van Gool at the conference "Oncobiology - genes and tumoral microenvironment" at the Medical Sciences Faculty, Nova University, organised by Prof. José Luis Passos Coelho and Prof. Doutora Ana Felix, at Lisbon, Portugal	Lisbon, Portugal	09.05.2014
Participation in training event	Workshop	CINECA, USFD	VPHHF development training	Bologna, Italy	11-16.05.2014
Computational medicine: Current and Future prospects	Conference	FORTH	eHealth Forum 2014	Athens, Greece	12-14.05.2014
Data Protection reform	Invited Lecture	LUH	Datenschutzforum	Berlin, Germany	15.05.2014
Participation in Training School	Workshop	UNITO	ESTRO School of Radiotherapy and Oncology: Basic Clinical Radiobiology	Istanbul, Turkey	25-29.05.2014
IT Challenges for innovative Clinical Trials	Workshop	USAAR	IT workshop on tools/services for clinical trials	Düsseldorf, Germany	26-27.05.2014
Immunotherapy for malignant glioma: preclinical research and clinical research	Conference	KU Leuven	Presentation by Prof. Van Gool at the 30th National Congress of Neurosurgery, organised by the Portuguese Neurosurgical Society by Dr. Miguel Casimiro, at Lisbon, Portugal	Lisbon, Portugal	30.05.2014
Data protection issues in ehealth projects	Conference	LUH	EHR4CR First European Hospital Conference	Brussels, Belgium	09.04.14
Presentation of the CHIC project	Workshop	USFD	Collaborations Workshop 2014 (CW14) - software in your reproducible research	Oxford, UK	26.04.14
Immunotherapy for children and adults with malignant glioma: the Leuven experience	Conference	KU Leuven	Presentation by Prof. Van Gool at the Johannes Wesling Klinikum Minden, 23th GPHO Arbeitstagung Experimentelle Neuroonkologie, organised by Prof. Bernhard Erdlenbruch, at Minden, Germany	Minden, Germany	26.04.2014

Innovations in Healthcare Industry Open Day	Workshop	USFD	Presentation of the CHIC project at the “Innovations in Healthcare Industry Open Day”.	Sheffield, UK	06.03.2014
Immuntherapie bei Hirntumoren des Kindes- und Jugendalters	Conference	KU Leuven	Presentation by Prof. Van Gool at "HIT-TAGUNG", organised by Prof. Gudrun Fleisschack, Pediatric oncology, University Essen.	Essen, Germany	28.03.2014
Long-term survival data in patients with glioblastoma and relapsed malignant glioma after tumor vaccination: is the paradigm slowly shifting?	Conference	KU Leuven	Presented on 'Annual scientific meeting of the Belgian Society of Neurosurgery' by Dr. Joost Dejaegher.	Brussels, Belgium	29.03.2014
An update of immunotherapy translational research program at KU Leuven	Conference	KU Leuven	Presentation by Prof. Van Gool on the conference "8 Rostock symposium on tumor immunology in pediatrics" organised by Carl-Friedrich Classen, Pediatric oncology, University Rostock.	Rostock, Germany	14.02.2014
Immunotherapy for brain tumors: an update	Conference	KU Leuven	Presentation by Prof. Van Gool at "SIOPE-BTG High grade glioma working group meeting", organised by Christof Kramm, Pediatric oncology, University of Göttingen	Göttingen, Germany	27.02.2014
Computational Methods in Cancer Research	Workshop	USFD	Computational Methods in Cancer Research Workshop	Sheffield, UK	10.10.2013
11 th HGG-IMMUNO-Meeting	Conference	KU Leuven	The HGG-IMMUNO-Meeting is an annual meeting where international research groups and clinicians who perform experimental and clinical research on immunotherapy are invited to share knowledge and experiences.	Leuven, Belgium	21.10.2013
Brain Tumor Segmentation Challenge, MICCAI 2013, Nagoya, Japan	One-day challenge	UBERN	One-day challenge where algorithms for brain tumor segmentation are evaluated and compared. Out of 10 teams, UBERN obtained second place in this competition.	Nagoya, Japan	22.09.2013

Table 7: List of the CHIC workshops and conferences

3 Exploitable CHIC outputs

The CHIC partners have been asked to revise the list of exploitable outputs identified and reported in D12.3 according to the most recent the technical and scientific achievements of the project.

A total of 22 exploitable outputs have been defined by the CHIC partners of which:

- 14 technological/software components,
- 7 models (including both hypo and hyper-models, and
- The CHIC platform as a whole.

For each of the exploitable outputs it is provided in this section: a short description, the foreground owners and type, the target users, the expected time to market, the TRL evolution over the project lifespan, the needs in terms of sustainability, licence issues, sustainability and exploitation paths.

3.1 Technological/software components

3.1.1 Private cloud infrastructure

Description: In the context of the CHIC project, a private cloud infrastructure has been deployed to provide computational resources for the implementation of the CHIC technological platform. The infrastructure is already fully operational with CHIC partners using it to deploy services and running hyper-models.

Reference document: D5.3

Target users: Technical partners (individual users or whole institutions) in need of computational resources mainly in academic context (private cloud).

Time to market: In terms of technological readiness the infrastructure is market ready, as it is already operational. In order to be exploited in commercial terms, the infrastructure lacks a business plan, in billing, usage policies, user support and marketing planning. We could estimate roughly 1 year as time to market.

Owners: FORTH

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
4	8	9

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
5 high-end servers and 1 plain network switch	Ubuntu 14.04 LTS Openstack	0.50 FTE (Maintenance, User support, Upgrade, Security, etc.)	N/A	N/A

IPR/licence: N/A

Impact

The impact of the cloud infrastructure has already been acknowledged, both to the research and to the commercial environment, due to the functionality that it offers. FORTH expects that it will enhance the productivity of the group, it will provide better utilization of the available computational resources, and it will provide ground for possible collaboration with other groups in future research projects.

Sustainability plan

The private cloud infrastructure has been built by harnessing, in a great extent, already available resources. On this ground, the cloud infrastructure is expected to provide a return on investment since it will diminish operational costs that were already present.

Exploitation plan

The private cloud infrastructure can be exploited in various ways, due to the diverse functionalities that it offers. It provides the basis for transforming FORTH's own data centre facilities, which constitutes an already ongoing exploitation plan. It can be utilized in future research projects, since there is a trend in moving applications and services in the cloud (Software as a Service) as well as utilization of its computational and storage capabilities in big data computing in the biomedical domain. It can also be exploited as a service, both in the research and academic context, or for commercial purposes, via a spin-off company targeting to niche markets.

3.1.2 Model/tool repository

Description: The model/tool repository can store models, including hypomodels, hypermodels and tools, being developed or to be developed by the CHIC modelling partners as well as the broader cancer modelling community.

Reference document: D8.1, D8.2, D8.3

Target users: Basic scientists, modellers, research clinicians

Time to market: In approximately 2 years from March 2016

Owners: ICCS

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
1	4	5

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 VM (x64), 16GB RAM	ubuntu, python 2,7, mysql, django, django rest framework, jquery framework, dm.xmlsec.binding security library	1.0 FTE	N/A	django, mysql, dm.xmlsec.binding security library

IPR/licence: Proprietary

Impact

- A high impact on the physiological, pathological and medical research software infrastructure is expected due to both the complexity of the problems addressed and the advanced multipurpose functionalities of the components and systems being developed.
- Technologies being developed and/or integrated within the framework of the CHIC project are expected to boost the European biomedical software industry and contribute to its leading role in the emergent in silico oncology and in silico medicine domain.

Sustainability plan

The sustainability goal for model repository is to be always available and updated in order to satisfy the specifications and the new requirements from stakeholders.

ICCS has developed the necessary steps and strategies in order to accomplish the sustainability goal. More specifically, ICCS has identified the necessary resources (hardware, software, time, people) that are needed in order for the repository to be maintained.

Furthermore ICCS will develop milestones in order to track the progress of the repository after the end of the project.

Exploitation plan

The exploitation plan for model repository is to be used as a free software service. In particular, it

- Can be exploited as a source of various software components for the development of Clinical Decision Support (CDS) systems.
- Can be exploited as a trustable and convenient storage and model handling environment for additional cancer models. Additionally, the repositories could be extended in order to accommodate other disease or physiological models.

3.1.3 In silico trial repository

Description: The in silico trial repository is used for the persistent storage of the simulation scenarios and the in silico predictions.

Reference document: D8.1, D8.2, D8.3

Target users: Clinicians, basic scientists, modellers

Time to market: In approximately 2 Years from March 2016

Owners: ICCS

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
1	4	6

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 VM (x64), 16GB RAM	ubuntu, python 2,7, mysql, django, django rest framework, jquery framework, dm.xmlsec.binding security library	1.0 FTE	N/A	django, mysql, dm.xmlsec.binding security library

IPR/licence: Proprietary

Impact

- A high impact on the physiological, pathological and medical research software infrastructure is expected due to both the complexity of the problems addressed and the advanced multipurpose functionalities of the components and systems being developed.
- Technologies being developed and/or integrated within the framework of the CHIC project are expected to boost the European biomedical software industry and contribute to its leading role in the emergent in silico oncology and in silico medicine domain.

Sustainability plan

The sustainability goal for in silico trial repository is to be always available and updated in order to satisfy the specifications and the new requirements from stakeholders. ICCS has developed the necessary steps and strategies in order to accomplish the sustainability goal. More specifically, ICCS has identified the necessary resources (hardware, software, time, people) that are needed in order for the repository to be maintained. Furthermore ICCS will develop milestones in order to track the progress of the repository after the end of the project.

Exploitation plan

The exploitation plan for in silico trial repository is to be used as a free software service. Because of the sensitivity of the data (processing of clinical data), the content of the in silico trial repository cannot be exposed to everyone before or after the end of the project.

ICCS will ensure that storage of new simulations, experiments and trials (input - output files and metadata of the experiments) and browsing of the content of the in silico trial repository will be allowed only to limited people, based on the protection of patient confidentiality and the legal constraints. Taking into account the aforementioned restrictions, ICCS will ensure that in silico trial repository will be a free service used by the clinicians and the modellers to inspect the outcome of the simulations in order to evaluate and validate the models.

3.1.4 Clinical data repository

Description: The data provided by the clinical partners (healthy-related clinical data) are stored in the clinical data repository. This database system was built as a research collaboration tool where the all the CHIC partners can search relevant datasets to conduct their research. The system allows storing structured information on the patients, links to relevant datasets, which enable researchers to browse, organize and share their data with their peers. Although developed in the CHIC context, the software framework is generic and could be used in various contexts where storage of clinical information is required.

Reference document: D8.1, D8.2, D8.3

Target users: Clinicians, biomedical engineers

Time to market: 24 months

Owners: UBERN

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
3	4	6

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 server or 1 VM and storage space for the data	ASP.NET MVC / Web API / Razor Entity Framework SimpleITK ReCaptcha Fuseki dotNetRDF Newtonsoft JSON VDS.Common jQuery Bootstrap Statismo HDF5DotNet ClearCanvas (exchangable)	0.1 FTE (Maintenance) 0.1 FTE (Bug Fixes)	N/A	N/A

IPR/licence: Commercial. A non-profit foundation (the SiCAS foundation) holds the rights of the system, ensures its maintenance and controls its exploitation.

Impact

The concepts underlying the clinical data repository aim at enabling exchange and re-usability of the data. Each datasets is stored as an object and is semantic linked with related datasets present in the systems. Semantic annotations are implemented to enable effective querying of the database, which is expected to allow efficient re-use of dataset collected and accelerate research and innovations, even in research application that differ from the primary goal of the data collections. This flexibility especially important with ever increasing need for data associated with the rapid growth of machine learning techniques in various areas of biomedical engineering.

Sustainability plan

Foundation of a platform to provide/sell know-how and services in biomedical engineering. From an organisational perspective, the development and maintenance of this database system will be supported in the future by a non-profit foundation. The foundation name Si-CAS is based in Delémont (Switzerland) aims at becoming a support platform providing know-how and services in biomedical engineering. One of the core competences is linked to medical image analysis and modelling, including statistical shape modelling as well as data sharing infrastructure.

Exploitation plan

Provide services around storage and exchange of medical data in a research environment. Hosting shared benchmark data for medical image analysis. Custom-made deployments.

Several exploitation options will be investigated for the clinical data repository. The first direction is to exploit the system as a collaboration tool for clinical trials performed at different locations. The benefit for clinician involved in collaborative research projects is that they have better control on what they share and with whom. Additionally, the dataset does not leave the hospital/data provider before being reviewed and anonymized.

Another exploitation option is the development of centralized repository for medical images. Statistical shape analysis techniques are very popular in the medical imaging community and results can be transferred to companies active in implant design or imaging. A large data collection of medical images would major issue of the techniques, which is the very large number of dataset required to build a valid model. This constrain is even more critical when pathological situations are concerned. In the same direction, this platform could be used to propose open challenges such as image segmentation competition. On one hand open challenge stimulates research by providing a common set of data to compare new developments with existing benchmarks. In addition, proposing challenges is a great way to attract researcher, process available data and promote the system.

3.1.5 Data Upload Tool

Description: The Data Upload Tool with embedded CATS engine described below can be used by a source/hospital to pseudonymise a data file (first round) and upload it through CATS (responsible for the second round) into the CHIC clinical data repository. Currently CSV and DICOM are supported. Other file formats can be added as needed. The big advantage of the Data Upload Tool compared to the CATS Upload Client is the graphical user interface through which data files can be reviewed before uploading them. This allows the data source to verify whether a file is pseudonymised correctly.

Reference document: D2.5

Target users: Clinicians, Clinical Trial Managers, Data Curators

Time to market: 1 year

Owners: FORTH

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
1	2	6

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 desktop computer	Java	0.05 FTE (Maintenance) 0.05 FTE (Bug Fixes)	CHIC Security infrastructure and data repository	N/A

IPR/licence: opensource, Apache 2

Impact

Despite its narrow set of objectives (pseudonymizing and uploading data sets) this tool aims to be valuable for the CHIC partners and end users. Outside of the CHIC project its impact will likely be limited, depending on its repurpose as a general upload tool in other research infrastructures.

Sustainability plan

The data upload tool will be maintained after the end of the project by the adaptation and reuse in follow-up projects.

Exploitation plan

Due to the dependencies on the security framework and the rest of the CHIC architectural components this tool cannot be exploited as is in isolation. Nevertheless, the majority of the end user visible functionality and its usability features can be repackaged and distributed separately, following an open source software development model.

3.1.6 Pseudonymisation tools

Description: The pseudonymisation tools, CATS (Custodix Anonymisation Tool Services), is a set of tools and services responsible for the de-identification of data files. It consists of the CATS Engine, CATS Privacy Profile Store, CATS Data Upload Interfaces, CATS Upload Client and CATS Server. The CATS Engine de-identifies a data file based on a set of pre-configured transformation rules (privacy profiles). The privacy profiles that need to be executed on a data file are matched based on the data file's mime type and schema. The CATS Engine can currently process XML, CSV, DICOM, CEL, plain text, PDF and WORD documents. Other data formats can be added as needed through engine extensions.

Reference document: D4.3.1 and D4.3.2

Target users: Data nurses

Time to market: Currently on the market via a commercial spin-off. Improvements through European Research efforts will gradually make the commercial spin-off.

Owners: CUSTODIX

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
5	7	9

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 server or VM	Java 7	0.05 (Maintenance & Upgrades) 0.1 FTE (User Support)	CHIC Security infrastructure and data repository	N/A

IPR/licence: Commercial

Impact

Data de-identification and approval is today still a difficult and time-consuming task. The pseudonymisation tools aim to make this process easier and allow, once a processing flow has been set-up and approved, batch processing of follow-up data exports.

Sustainability plan

The pseudonymisation tools of Custodix are supported through various commercial projects and can be reused in follow-up projects.

Exploitation plan

The Custodix pseudonymisation tools are exploited as various solutions to solve privacy issues such as data de-identification to pseudonym management.

CATS is a long term Custodix product. In parallel to the research versions commercial grade spin-offs of CATS are exploited and continuously maintained.

3.1.7 Hypermodelling framework – VPH-HF

Description: the software framework (VPH-HF) to orchestrate the execution of hypermodels. It interacts with the components of the other partners to provide in a secure cloud-based infrastructure a set of user-friendly services for clinicians through a web interface: clinical data analysis/visualisation tools, clinical model/data repositories with semantic annotation and search functions, hypermodelling editor to compose new hypermodels to answer specific clinical questions on patient data or to generate new in silico trials.

Reference document: D7.2 and upcoming D7.4

Target users: Biomedical research, wider research community in general

Time to market: Immediately after the end of the project

Owners: USFD, CINECA

Foreground type: Joint

Technology Readiness Level		
at M0	at M36	at M48
3	4	6

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 server or 1 VM	Unix /Linux OS preferred Django and Django REST framework Celery Taverna MUSCLE Bootstrap JQuery public IP	0.05 FTE (Maintenance) 0.05 FTE (Bug Fixes)	N/A	Taverna MUSCLE

IPR/licence: opensource, Apache 2

Impact

The software framework VPH-HF is delivered to support the orchestration and execution of hypermodels that process patient clinical data. It is embedding cutting edge research methodologies that aim to change the current technical standard. The underlying principle is that the research outcomes have to create value for the society, the SMEs and ultimately the patients and taxpayer. Therefore VPH-HF will be released under a Apache2 license with open source code to be European software for the Europeans. This philosophy guarantees from one side a stronger commitment to deliver high quality software engineering products that can set the standard for good practices in computational science. On the other side European citizens and SMEs can freely access the source code of VPH-HF as a learning reference or a starting point to extend and provide more software services. In both cases the impact in European society will be substantial as translational knowledge and exploitable product. The aim is to build a substantial academic computational science community around VPH-HF such that its maintenance and extension will be the result of a self-supported collective interest and effort – this would be an interesting innovative measure of success. Furthermore VPH-HF is developed following the best practices in computational science reproducibility and releasing it open source will provide a concrete example in this direction.

Sustainability plan

The release of the hypermodelling framework as open source will allow the software to be maintained by the community itself: anyone with an interest in using the code will be motivated to keep it updated and solve technical issues that might arise in the future.

Exploitation plan

VPH-HF will become an open source product. It will be released following the best practices in computational science and engineering development with emphasis on reproducibility. A public online Web service (e.g. Github.com) is used to host VPH-HF source code and provides the necessary tools for concurrent versioning systems, collaborative software development, continuous integration, user communications and bug reporting. Documentation and installation packages will be provided and released to the public to enable free test of the VPH-HF.

Joint owners USFD and CINECA, both plan to exploit VPH-HF in their respective institutions in other research projects and for internal use. This will guarantee the maintenance and support of the software code immediately after the end of the CHIC project until external users will start to collaborate to the open source maintenance.

3.1.8 DrEye

Description: Dr Eye is a flexible and easy-to-use DICOM viewer and editor for quick and precise identification and delineation of tumors in medical images. Its design is clinically driven and it is a result of FORTH's long involvement in European projects, initially developed in the context of Contra Cancrum, then in TUMOR, p-medicine, and now in CHIC.

Reference document: D2.5 and D5.1.1

Target users: Clinicians, bioinformaticians, mathematical modellers and computational biologists with the need to view or segment medical images. The application can be used in other research communities in need of a medical viewer as a part of their workflow.

Time to market: The application is "market ready" and is already being used in several research facilities around Europe as a part of their workflow as a research tool, with a dual licensing plan. The application is offered as "Free for usage" by any user which downloads it (through the application website) but with no dedicated support plan, and as part of the tools (with support plan) offered by the Center for eHealth Applications and Services (CEHA) of FORTH. CEHA develops and deploys IT software for the healthcare sector providing integrated and qualitative tools and solutions.

Owners: FORTH

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
5	8	9

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 workstation	Windows OS version 8.0+ with .net framework 4+ installed	0.05 FTE (Maintenance) 0.05 FTE (Bug Fixes)	N/A	N/A

IPR/licence: proprietary code (closed source), open access application (free binary)

Impact

Due to its wide field of usage and its proven extensibility, DrEye continues its successful path in the communities of radiologists and imaging medical experts. With the updates that will implement in the context of the CHIC project and the extension of its communication functionalities with the clinical trial system of CHIC, its profile will become even more appealing to the stakeholders.

Sustainability plan

The sustainability plan for DrEye is based on FORTH's own resources and the participation of FORTH in relevant subsequent research projects. As Dr Eye is already in use by some health providers (in Greece, Germany, etc) FORTH provides its support to the application, maintaining its existing user base.

Exploitation plan

The exploitation plans for the Dr Eye application, include its possible involvement in future European projects, in the academic environment as a training tool and by health providers specialized with medical imaging. The application is already being used as a research tool in several points in Europe.

3.1.9 Hypermodelling editor

Description: The hypermodelling editor is the infrastructure that allows computational biologists and other domain experts to design the multiscale, multimodel hypermodels in a graphical and user friendly way. This is thus a user-friendly environment for the construction of syntactically and semantically valid, multiscale hypermodels. Its target end-users, therefore, consist of mathematical modellers, computational biologists, clinicians, and other research communities and stakeholders.

Reference document: D5.1.1

Target users: mathematical modellers, computational biologists, clinicians, and other research communities and stakeholders

Time to market: 1 year

Owners: FORTH

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
1	3	5

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 server or 1 VM	Unix /Linux OS preferred Java	0.05 FTE (Maintenance) 0.05 FTE (Bug Fixes)	CHIC Model and metadata repositories	N/A

IPR/licence: opensource, Apache 2

Impact

The Hypermodelling Editor is expected to have a positive impact on the computational modelling community and its activities. The Editor is expected to be of great value as a user friendly, web based graphical environment for supporting the researcher in the full cycle of experimentation/exploration, design, publication, execution and monitoring of complex integrative computational models.

Sustainability plan

The support for the continuation of the development of the Hypermodelling Editor will largely come from own resources and the participation of FORTH is relevant subsequent research projects. The provision of the Editor as an open source software provides opportunities for its sustainability, assuming that the critical mass of the user community contributing to its development (i.e. by submitting ideas, bug reports, fixes, etc.) has been gathered.

Exploitation plan

The hypermodelling editor is the user-friendly environment for the construction of syntactically and semantically valid, multiscale hypermodels. Its target end-users therefore consist of mathematical modellers, computational biologists, clinicians, and other research communities and stakeholders. To engage these communities and strengthen the collaboration, the Editor will be offered as open

source software but also in a "software as a service" (SaaS) delivery model. The involvement of key end users and relevant communities is crucial in order to get feedback and guarantee the Editor's sustainability so dissemination of its objectives and features will be pursued through publications, involvement in future research projects, and demonstrations in suitable workshops and conferences.

3.1.10 Pre-processing tool

Description: Tool to convert labelled metaimages to an alternative metaimage with isotropic grid spacing, defined by the user, and with a custom amount of space around it, that is also user defined.

Reference document: D2.5 and D5.1.1.

Target users: Clinicians and all users, who are the stakeholders of the CHIC applications, who utilize the pre-processing tool.

Time to market: As this application is mostly important for other components of the CHIC project, this tool probably will not be exploited as is in isolation. Therefore, it will only be released in the market as a package with other CHIC tools, which make use of it. The release plan (=time to market) is determined by the maturity and readiness of the other tools.

Owners: FORTH

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
1	3	6

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 workstation	Python with numpy (alternatively anaconda python distribution can be used) and SImpleITK in any OS	0.05 FTE (maintenance) 0.05 FTE (Bug Fixes)	N/A	SimpleITK (which has an Apache 2.0 license. This allows unrestricted use, including use in commercial products)

IPR/licence: N/A

Impact

The pre-processing tool has its own important key role at the CHIC platform, as it is the mediator, which converts the input data (medical images and segmentations) to an Oncosimulator accessible format and allows its proper initialization. It is a behind the scenes tool that, although of great importance, it is transparent to the end user. Therefore the pre-processing tool has great impact, which is limited only to the CHIC platform users, but it is invisible as a separate tool.

Sustainability plan

The pre-processing tool will be maintained after the end of the project by the adaptation and reuse in follow-up projects.

Exploitation plan

As this tool is mostly important and in use by other components of the CHIC platform, it will probably not be exploited in isolation. This does not anyway preclude its exploitation in follow-up projects.

3.1.11 Semantic/metadata services

Description: These are web-services for hypermodel annotation. The three main systems are:

- OWLKB, a semantic reasoning engine, which allows semantically sophisticated queries over a background knowledgebase, including real-time creation of so-called "composite terms" (for example, if the background knowledgebase has terms for "blood" and "aorta", but not "blood in aorta", OWLKB can be used to generate a semantically-meaningful term for "blood in aorta" from the two constituent terms).
- LOLS, or Local Ontology Lookup Service, a lightweight server/API for translating between International Resource Identifier (IRI) and human-readable label. This tool allows quick lookup of ontology terms based on human-friendly search strings, and conversely. Its API is designed for easy integration into other partners' projects.
- RDFStore, a template system to facilitate queries over bulk CHIC metadata. RDFStore acts as an intermediary in front of a 3rd-party triplestore. It allows SPARQL-experts to create templates using SPARQL (a query language for linked metadata) once, and then those templates can be used by the end-user indefinitely, without the end-user having to know anything about SPARQL.

Reference document: D7.2 and upcoming D7.4

Target users: biomedical researchers

Time to market: ready after the end of the project

Owners: UCL

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
2	3	4

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 server or 1 VM and storage space for the data	Virtuoso, OWL API, neo4j, node.js, three.js	0.25FTE (Maintenance, Optimisation, Bug Fixes)	N/A	N/A

IPR/licence: Free

Impact

CHIC is optimistic that the semantic metadata best-practices it has committed itself to will have a significant impact on medical research in general. We hope CHIC will prove the utility of having its data so interoperable and reasoner-friendly and thereby provide a precedent for future projects.

Sustainability plan

RICORDO is inherently sustainable/maintainable because of the way it constructs its core knowledgebase from open source ontologies. These open source ontologies are maintained by

experts in their respective fields, and only a minimum of effort is needed to incorporate these ontology updates into the RICORDO instance running on CHIC hardware (in practice, it is not even necessary to incorporate such updates immediately on their release: regular updates every couple months or so should be more than adequate, based on the already mature status of the reference ontologies in question).

Co-operation on the foundation of a platform to provide/sell know-how and services in biomedical engineering, in particular to contribute to the data sharing infrastructure.

Exploitation plan

Provide services around storage and exchange of medical data in a research environment, and custom-made deployments.

UCL's RICORDO systems have been designed with well-documented APIs intended to ease usage in other partners' software packages. Other CHIC partners can exploit this work by using the APIs to seamlessly integrate sophisticated semantic/metadata operations into their own software. By adopting semantic best practices, CHIC ensures high interoperability of its metadata, as well as making its metadata compatible with all kinds of automated reasoning / knowledge discovery software.

3.1.12 Security Tools and Services

Description: A suite of tools and services responsible for the 3A's aspect of security (authentication, authorisation and auditing).

Authentication and identity management components are:

a) The Identity and Access Management Site (IAM) is responsible for user enrolment and management. IAM allows (virtual) organisations, attributes and roles to be assigned to users. These are then used through access rules defined in the authorisation policies to give the user access to restricted resources.
b) The Identity Provider (IdP) is responsible for the authentication of users who access CHIC services through a browser. It provides identity assertions, which identify the user, to all CHIC Web Sites.
c) The Secure Token Service (STS) is responsible for the authentication of users who access CHIC Web Services (through a non-browser client). It provides identity assertions to all CHIC Web Services.

Authorisation components:

d) The Policy Decision Point (PDP) is the entity which takes authorisation decisions. A PDP accepts authorisation requests.
e) The Policy Administration Point (PAP) is the endpoint responsible for managing policies. The PAP provides the PDP with all policies required to produce an authorisation decision. The PAP has management services through which authorisation policies can be defined.
f) The Policy Information Point (PIP) provides the PDP with the needed information (attributes) to take an authorisation decision. Most resource and subject attributes are already provided through an authorisation request. If the PDP needs an attribute that was not provided, this can be obtained through the PIP.
g) A Policy Enforcement Point (PEP) is a component which integrates the authorisation services with application code. The PEP is responsible for creating the authorisation request and sends it to the PDP.

2) Audit Service

3) Security gateway/proxy

4) Integration modules and extensions

a) Various integration modules are available within CHIC to integrate JAVA, PHP and .NET applications into the security
b) Extensions (e.g. Liferay).

Reference document: D5.2.1 and D5.2.2

Target users: System integrators

Time to market: Currently on the market through a commercial spin-off. Improvements through European Research efforts will gradually make the commercial spin-off.

Owners: CUSTODIX

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
5	7	9

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
3 VM's	Java 7	0.05 (Maintenance & Upgrades) 0.1 FTE (User Support)	N/A	N/A

IPR/licence: Commercial. As open standards are used, each individual component can be easily replaced by a Free Open Source product.

Impact

The CHIC Security Tools and Services try to solve some of the today difficulties and gaps in security implementations and setup. Many good security standards exist today such as SAML and OpenID connect. Although more and more applications start to embrace and implement those standards, many legacy applications still exist (requiring eg. username/password authentication) with no support for those standards. For this purpose the CHIC Security Tools and Services provide a security proxy allowing legacy applications to be integrated into modern SSO security solutions based on SAML or OpenId Connect. With the croxy SSO solutions can be deployed compatible with and integrating legacy applications.

Sustainability plan

The CHIC security components are tightly connected to the CHIC platform. The sustainability plan of the security components is thus tightly connected with the sustainability plan of the CHIC platform as a whole.

Exploitation plan

The CHIC security components are exploited by Custodix as one shop security solution including identity management, authentication, authorisation and auditing.

3.1.13 CRAF

Description: The Clinical Research Application Framework (CRAF) is a software platform installed at the clinical side that supports the clinicians in using the hypermodels built and deployed in the CHIC environment for clinical research purposes. Therefore it makes use of the CHIC infrastructure for

running these hypermodels and it comprises a suite of tools for data management (e.g. for uploading new patient data) and visualization (e.g. for the presentation of the results of the simulations).

Reference document: D2.5

Target users: Clinicians, Medical Researchers

Time to market: 2 years

Owners: FORTH

Foreground type: Individual

Technology Readiness Level		
at M0	at M36	at M48
0	2	6

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 desktop computer	Java	0.05 FTE (maintenance) 0.05 FTE (Bug Fixes)	Almost the whole CHIC platform: CHIC Security infrastructure, model and data repositories, execution framework	N/A

IPR/licence: opensource, Apache 2

Impact

The CRAF application aims to bridge the gap between the modelling work done in the CHIC platform and the clinical research and every day spractice that takes place in the health delivery environment (e.g. hospitals). CRAF effectively supports a unified and simple user experience and provides a “CHIC-in-a-box” abstraction for the clinicians to use in clinical research performed in their premises. To this end, its user interface is designed to be simple and smooth by hiding the complexity of the CHIC platform while, at the same time, demonstrating its full potential for clinical research and empowering the clinician to use the underlying technologies for the benefit of the cancer patient. At the same time, CRAF coordinates the functionality of other CHIC components that are also highly important for the clinicians to gain access to the CHIC services, such as the Data Upload tool for uploading patient data to the CHIC cloud, and the Visualization and image processing tools (e.g. DrEye). This is a great challenge, both because of the technical requirements and the dependence on the production of really clinically relevant hypermodels in the CHIC project, but we expect it to have a strong impact in the community of clinicians and medical experts.

Sustainability plan

The sustainability of CRAF depends on the sustainability plans of the whole platform, due to its many interactions with it. FORTH will make sure that its core components are maintained and possibly reused in subsequent projects but due to its nature there's no guarantee that CRAF as a whole will be fully functional unless the rest of the CHIC platform is also in place.

Exploitation plan

Due to the dependencies on the security framework and the rest of the CHIC architectural components this tool cannot be exploited as is in isolation.

3.1.14 CHIC portal

Description: The web-based end-user CHIC front-end that combines several CHIC services into one portal.

Reference document: D10.1

Target users: All the users of the CHIC platform (modellers, clinicians, researchers).

Time to market: This tool is usable only within the wider CHIC platform in collaboration with other CHIC tools, thus we foresee a market ready product only if the whole CHIC platform reaches the maturity level for market exploitation. We estimate roughly 2 years.

Owners: CHIC consortium

Foreground type: Joint

Technology Readiness Level		
at M0	at M36	at M48
0	4	6

Sustainability needs/requirements

HW	SW	Personnel for maintenance and support (FTE per year)	Internal dependencies (with other CHIC components)	External dependencies
1 server or 1 VM	Linux OS, Apache web server, Tomcat application server, Liferay portal framework, public IP	0.05 FTE (maintenance)	Most of the CHIC technical components (Clinical Data Repository, security framework services, Model Repository, InSilico Trial Repository, Hypermodel execution framework, Hypermodel editor)	N/A

IPR/licence: Free

Impact

The CHIC Portal is the web front-end of the CHIC platform, so the impact of the portal is tightly connected with the impact of the CHIC platform as a whole.

Sustainability plan

The CHIC Portal is the web front-end of the CHIC platform, so the sustainability plan of the Portal is tightly connected with the sustainability plan of the CHIC platform as a whole.

Exploitation plan

The CHIC Portal is the web front-end of the CHIC platform, it depends on most of the CHIC technical components and constitutes a joint effort of the CHIC technical partners. Consequently, the

exploitation plan of the Portal is directly connected with the exploitation plan of the CHIC platform as a whole in the research, education or industrial domain.

3.2 Modelling outputs

A considerable number of component models (-o-models), hyper-models and hyper-modelling strategies developed by the CHIC modelling partners are to be provided for reuse by both the CHIC and the extra-CHIC cancer modelling community. Each modelling entity includes a formal description, the corresponding executable, as well as useful additional information.

The three major CHIC hyper-model demonstrators to be provided to the wider research community are the following: 1) the lung cancer hyper-model-based Oncosimulator, 2) the nephroblastoma hyper-model-based Oncosimulator, and 3) the glioblastoma hyper-model-based Oncosimulator. All these hyper-models are based on multiscale and multilevel mechanistic models of tumour growth and response to treatment. Additional statistical models are being developed for the glioblastoma Oncosimulator. Further models (including hypo- and hyper-models) addressing other cancer types such as prostate cancer and colon cancer, as well as other treatment and treatment combinations, are being developed and will also be made usable by the wider community.

This table summarises the status of the current hypo-models/hyper-models; more might be developed in the next year and ready for exploitation at the end of the project.

Model name	Description	Owner(s)	Type of Foreground	TRL at M0	TRL at M36	TRL at M48
Glioblastoma multimodeller hyper-model	Tumour growth and response to treatment	ICCS, …(due to the machine learning nature of this hyper-model the eventual additional owners will be determined in time)	Composite	1	2	4/5
Glioblastoma oncosimulator (mechanistic and statistical versions)	Tumour growth and response to treatment	ICCS	Individual	2	4	5
Lung cancer multimodeller hyper-model	Tumour growth and response to treatment	ICCS, UBERN, UOXF, FORTH, UPENN	Composite	1	3	4/5
Lung cancer oncosimulator	Tumour growth and response to treatment	ICCS	Individual	2	4	5

Nephroblastoma Metabolic model	A sub-cellular model of cancer metabolism that utilizes genomic information and nutrient availability to predict the metabolic capabilities of cancer cells including proliferation.	FORTH	Individual	1	3	4
Nephroblastoma multimodeller hyper-model	Tumour growth and response to treatment	ICCS, UBERN, UOXF, FORTH, UPENN	Composite	1	3	4/5
Nephroblastoma oncosimulator	Tumour growth and response to chemotherapy treatment	ICCS	Individual	2	4	4/5

Impact

- Models being developed and/or integrated within the framework of the CHIC project are expected to boost the European biomedical software industry.
- Due to the vast scientific, technological and clinical scope and depth of the CHIC project a great impact on the academic educational procedure is expected in the form of (post) graduate courses, laboratory classes, as well as the shaping and advancement of new scientific domains such as in silico oncology and in silico medicine is expected.
- Further details can be found in D6.2.1

Sustainability

All models and hyper-models will be stored in the CHIC model repository, a copy of which will physically reside in ICCS-NTUA/FORTH. The responsible partners will take care to sustain and curate model beyond the end of CHIC lifetime and provide access to the broader community.

Exploitation

- Hypo-models and hyper-models can be exploited as a model source for the development of Clinical Decision Support (CDS) systems, following the necessary clinical adaptation, validation and certification processes. Following the strict prospective clinical validation, models are expected to serve as a clinical support system in order to individualize the treatment scheme and schedule for each given patient, based on their own multiscale data (imaging, histological, molecular, clinical, etc.).
- Generic research exploitation: The models are to be also used as a platform for in silico experimentation in the generic biological and clinical research context (basic science exploitation). In this exploitation track, numerous in vitro and animal testing experiments are expected to be replaced with less laboratory demanding and life-friendlier in silico experiments like those provided by CHIC. Certain hypo-models related to cancer can also be used in order to construct hyper-models for physiological and pathological mechanisms encountered in physiology and pathology outside the domain of cancer.

- Educational exploitation: Apart from components of patient individualized decision support systems and generic research platforms, the models could also be used as educational tool in the context of academic education (basic science, technology and medical education), general public education (patient's and/or parents' education, citizen's education and health literacy), industry education (education from an industrial perspective), politician education, epistemological, philosophical and social sciences education.

4 The CHIC platform as a whole

Description: The whole CHIC platform is a suite of tools, services and secure infrastructure that will support accessibility and reusability of VPH mathematical and computational hypermodels for the modelling of tumours treatments.

Reference document: CHIC deliverables

Target users: Clinicians, basic scientists, modellers, technology experts

Time to market: In approximately 3 years regarding the basic science and technology use. However the clinical utilization of the entire system will be possible after the successful completion of specially designed prospective clinical trials.

Owners: CHIC consortium

Foreground type: Composite

Technology Readiness Level		
at M0	at M36	at M48
1	3	5

Sustainability needs/requirements

HW	**SW**	**Personnel for maintenance and support (FTE per year)**
Cloud infrastructure 1 VM (Linux/Unix OS, Ubuntu 14.04 LTS) 1 desktop computer (Windows OS 8.0+) Disk for data storage	.net framework 4+ Apache web server ASP.NET MVC / Web API / Razor Bootstrap Celery ClearCanvas Django Django rest framework Dm.xmlsec.binding security library dotNetRDF Entity Framework Fuseki HDF5DotNet Java 7 jQuery Liferay portal framework MUSCLE Mysql Neo4j Newtonsoft JSON Node.js numpy Openstack OWL API Public IP Python 2.7 ReCaptcha SimpleITK	3.3 FTE for maintenance 0.4 FTE for bug fixes 0.2 FTE for user support

	Statismo Taverna Three.js Tomcat application server VDS.Common Virtuoso	

4.1 Sustainability plan

All partners will take care to sustain and update CHIC platform beyond the end of CHIC lifetime and provide access to the broader community.

Following lengthy discussions in collaboration with several partner projects of CHIC, such as p-medicine and My Health Avatar, the scenario of establishing an independent organization for the sustainability of the outcome of several related EC-funded projects, called StaRC (Study Trial and Research Centre), proposed by USAAR (Prof. N. Graf) and supported by several partners appears to be a realistic sustenance channel. Such an entity could ensure the working order and usability of the major outcomes of the CHIC project. A thorough investigation of the various aspects of this scenario is to take place during the last year of the CHIC project.

4.2 Exploitation plan

4.2.1 Clinical exploitation

Following the strict prospective clinical validation, CHIC platform is expected to serve as a clinical support system in order to individualize the treatment scheme and schedule for each given patient, based on their own multiscale data (imaging, histological, molecular, clinical, etc.).

The potential impact of the clinical exploitation can be relevant. Adequately clinically adapted, validated and certified versions of the models (hypo- and hyper-models) and the corresponding clinical decision support systems (CDS) could result in extension of life expectancy of cancer patients, a better quality of life, and decrease of the associated financial and societal burden.

Several channels can be used to achieve the best clinical acceptance and exploitation:

- Advertising ObTiMA via STaRC. STaRC will be a legal entity founded under p-medicine and will serve as an exploitation channel of results coming from CHIC
- Writing papers in peer-reviewed scientific journals
- Sharing experience with tools developed in CHIC with other departments of the university
- Presentation (oral, poster) in scientific meetings
- When approved, implementation in new clinical trials

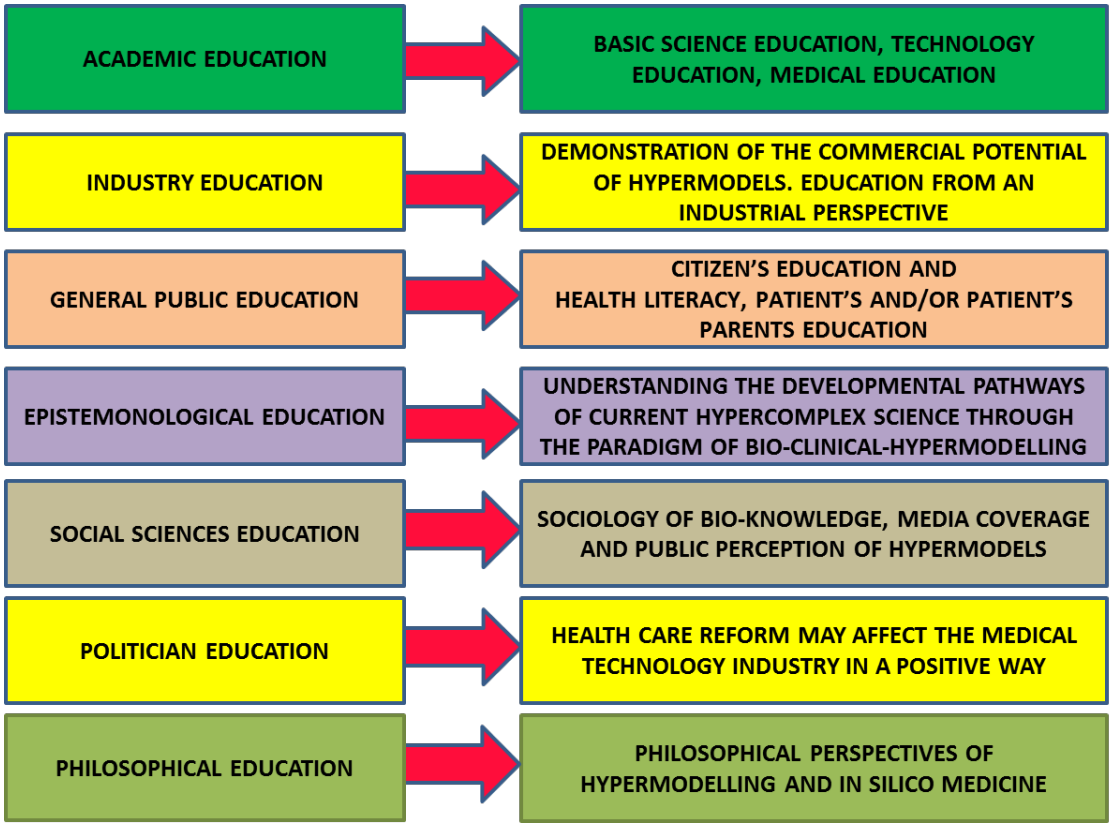
Complete clinical exploitation of the CHIC platform would in any case require the validation provided by prospective clinical trials. The design of such trials are out of the scope of the CHIC project, however some preliminary consideration in terms of the costs and possible funding of the clinical trials would be explored by the end of the project.

4.2.2 Research exploitation

The CHIC platform is to be also used as a platform for in silico experimentation in the generic biological and clinical research context (basic science exploitation). In this exploitation track, numerous in vitro and animal testing experiments are expected to be replaced with a less laboratory demanding and life-friendlier in silico experiments (http://www.vph-institute.org/upload/vphinst-response-to-petition-ban-animal-exp-approved_52efc4606d3d6.pdf).

4.2.3 Educational exploitation

Apart from components of patient individualized decision support systems and generic research platforms, the CHIC platform could also be used as educational tool in the context of academic education (basic science, technology and medical education), general public education (patient's and/or parents' education, citizen's education and health literacy), industry education (education from an industrial perspective), politician education, epistemological, philosophical and social sciences education.



4.2.4 Innovation radar questionnaire

At the end of the third year of the CHIC project the partners have been working on the Innovation Radar Questionnaire as a useful source for considering all aspects of the exploitation of the CHIC platform as a whole.

The current answers to the questionnaire are draft based on the current development status and will be updated in the last year of the project.

Title of the innovation

Cancer multiscale hypermodeling: clinical relevance, integrative strategies, multimodeller algorithms, simulation software, IT technologies, clinical adaptation, clinical evaluation and partial clinical validation.

Describe the innovation

Cancer multiscale hypermodeling is an innovative modular approach to the modeling of cancer and its response to treatment. Hypomodels simulating crucial biological mechanisms,

possibly developed by different cancer modelers, are integrated into hypermodels. The latter, following clinical validation, predict the response of a given patient to candidate therapeutic schemes. Hypermodels in conjunction with the supportive technologies developed are to serve as a clinical decision support systems.

Is the innovation developed within the project

Under development

Characterise the type of innovation

New product
New service (except consulting ones)
New process

Is the innovation to be introduced to the market or to be deployed within a partner

No exploitation planned

Is there a clear owner of the innovation in the consortium or multiple owners?

Multiple owners

Indicate the step(s) already done (or are foreseen) in the project in order to bring the innovation to (or closer to) the market

Technology transfer: Planned in project

Engagement of both research team and partner's business units in project activities: Done or ongoing

Market study: Not planned in project but needed/desirable

Prototyping in laboratory environment: Done or ongoing

Prototyping in real world environment: Planned in project

Pilot, Demonstration or Testing activities: Done or ongoing

Feasibility study: Done or ongoing

Launch a start-up or spin-off: Not planned in project but needed/desirable

Standardisation: Done or ongoing

Application for private or public investment: Not planned in project but needed/desirable

Securing private investment: Not planned in project but needed/desirable

Securing public investment: Not planned in project but needed/desirable

Business Plan: Not planned in project but needed/desirable

Indicate which participant(s) (up to a maximum of 3) is/are the key organisation(s) in the project delivering this innovation. For each of these identify under the next question their needs to fulfil their market potential.

Organisation 1: ICCS

Organisation 2: USAAR

Organisation 3: FORTH

Indicate their needs to fulfil their market potential

Organisation1 (ICCS)

Investor readiness training
Investor introductions
Biz plan development
Expanding to more markets
Legal advice (IPR or other)
Mentoring
Partnership with other company (technology or other)
Incubation
Startup accelerator

Organisation2 (USAAR)

Investor readiness training
Investor introductions
Biz plan development
Expanding to more markets
Legal advice (IPR or other)
Mentoring
Partnership with other company (technology or other)
Incubation
Startup accelerator

Organisation3 (FORTH)

Investor readiness training
Investor introductions
Biz plan development
Expanding to more markets
Legal advice (IPR or other)
Mentoring
Partnership with other company (technology or other)
Incubation
Startup accelerator

Market size: What is the approximate market size for this innovation

Not known

Market maturity: The market for this innovation is ...

Emerging: There is a growing demand and few offerings are available

Market dynamics: is the market ...

Growing

Level of innovation: What is the level of innovation?

Very innovative satisfies a well-known market need

Market competition: How strong is competition in the target market?

Patchy, no major players

When do you expect that such innovation could be commercialised?

More than 5 years

How does the consortium engage end-users?

End user organisation in the consortium and is actively engaged in co-creating the innovation(s)

Are there in the consortium internal IPR issues that could compromise the ability of a project partner to exploit new products/solutions/services, internally or in the market place?

Yes [in the sense that special agreements are needed for such a scenario]

Which are the external bottlenecks that compromise the ability of project partners to exploit new products, solutions or services, internally or in the market place?

Regulation

Financing

*Indicate how many patents have been applied for by the project.**

None

*How do you consider the project's performance in terms of innovation?**

Exceeding expectations

General observations of the innovation expert on this project's innovation performance.

How would you rate the level of commitment of relevant partners to exploit the innovation?

Very High

Please indicate the 1 partner (excluding large enterprises) that the panel considers to be the most impressive in terms of innovation potential

ICCS

Please provide concrete recommendations for the project to improve its innovations and their potential to deliver impact in - or close to - the market place. Recommendations that imply changes to the project's design and / or work plan must also be detailed in the project review report

Clinical validation through specially designed prospective clinical trials to take place afer the completion of the project. Implementation of the necessary adaptations to be eventually dictated by the prospective clinical validation process.

5 Individual exploitation plans

USAAR-KU Leuven exploitation plans

The own foreground of USAAR and KU Leuven will be exploited using the same channels as for the clinical output described under 4.2.1.

ICCS exploitation plans

ICCS plans to use most of the components and systems being developed by CHIC in the context of future research endeavours within the intercontinental level by taking into account all pertinent legal and ethical restrictions. Eventual future EC funded projects constitute primary targets of such a strategy.

Since ICCS is the research hub of the School of Electrical and Computer Engineering (SECE) of the National Technical University of Athens (NTUA), several forms of the CHIC outcome will serve as the starting point for the conduction of new doctoral theses and post-doctoral research.

In SECE-NTUA the globally first post-graduate course dedicated to multiscale cancer modelling and in silico medicine was designed and taught by the CHIC coordinator, Research Prof. G. Stamatakos. (http://chic-vph.eu/highlights/details/article/first-postgraduate-course-on-in-silico-medicine/, http://www.vph-institute.org/news/new-postgraduate-subject-on-multiscale-cancer-modelling-and-in-silico-medicine-mscm-ism.html). Within this context the entire outcome of the CHIC project will also serve as an academic educational platform.

USFD-CINECA exploitation plans

VPH-HF is a collaborative product developed starting from a previous result achieved during the VPH-OP EC project. The aim is to exploit the final release of VPH-HF developed in CHIC as a customisable platform for the execution of multiscale models to simulate physical phenomena and healthcare systems in different scenarios. The ideal way to exploit the value built in this framework is to sell services/consultancy and customised solutions through a spin-off company. A more detailed plan will be developed, with the agreement of the CHIC consortium, in a later stage closer to the end of the CHIC project.

FORTH exploitation plans

FORTH is planning to also individually exploit some of the developed CHIC technologies first by sustaining them after the end of the project for as long as is possible with own sources. At the same time it will continue the development of the tools by seeking opportunities for new collaborations with organizations for which the tool could be useful or within the context of future projects.

FORTH will also contact Medical University Schools in Greece for evaluating and using the DrEye tool in a scenario where a professor could ask the students to annotate DICOM images and perform a number of post-processing tasks using powerful CHIC technologies. In parallel, FORTH will attempt to further evaluate and promote the tools also in Greek hospital networks by licensing them for clinical sites. To this end, FORTH and in particular the computational medicine laboratory is coupled with the Center for eHealth Applications and Services (CEHA) which develops and deploys professional IT software for the healthcare sector providing integrated and qualitative tools and solutions. CEHA has expressed its initial interest to assess the possibility of commercialization of some of these products.

Moreover, FORTH will seek opportunities to re-use and/or expand its CHIC tools to current or future research projects.

UCL exploitation plans

The RICORDO suite, which UCL developed to handle CHIC's metadata and knowledgebase, are widely applicable outside of CHIC, and UCL is optimistic about sharing these benefits with other research projects as well.

TEI-C exploitation plans

TEI - C is mainly involved in WP5 which focuses on the definition of the architecture for subsequent implementation and integration. The architecture specification will provide the software architecture design patterns to effectively guide and support the construction of a coherent and consistent system. Particular emphasis will be given to the definition of appropriate interfaces among the modules to enable interoperability. As a result the foreground knowledge that will be generated by TEI-C - through its participation in these highly demanding activities - will be used in updating the relevant courses that Prof. Tsiknakis teaches at TEI-C, which include a) modeling and simulation of biomedical systems, and b) Advanced topics in eHealth and mHealth systems and services

CUSTODIX exploitation plans

Custodix' core business is securing sensitive data. Since its founding, Custodix has always focused on the life sciences sector where the need for data protection is clear. For this the company provides a variety of services and products, such as Trusted Third Party data collection services, de-identification tools, data privacy consultancy, etc.

Within the CHIC project, Custodix is responsible for providing the tools to ensure data protection compliance (such as the security infrastructure and the CHIC de-identification services). Two aspects of the CHIC work are important for exploitation by Custodix. First of all, within the project, research is continued on the de-identification tools: CATS and PIMS, which contributes to their continuous improvement.

Secondly, the CHIC project is one of the projects in which Custodix has been able to further research its ideas on improving the integration of security in service oriented IT environments (with high requirement with respect to data protection). The goal of this work is to design a unified solution to identity provision, access management and audit, which allows building highly secure IT systems without compromising on development complexity and end-user usability. Custodix believes such a solution has commercial value.

Although the different components of the framework (identity manager, security proxy, access management components, audit services, etc) are envisaged to be marketable in a wide range of domains, the initial focus for exploitation will be the health and clinical domain (where the majority of the Custodix commercial activity resides). The high level of security that the framework aims to bring through its exceptional features (e.g. credential delegation) is expected to be a differentiator in this domain (cf. sensitive medical data).

The rationale behind this approach is the following. It has been understood for already quite some time that collaboration and sharing of clinical data is becoming key to the further advancement of medicine. Trying to find the perfect solution to enable this sharing has therefor been a prominent topic in life sciences IT. Originally the general sentiment was that monolith IT systems would encompass the needed functionality. However, the long time to market, the high maintenance cost (even when one needs only one component the complete system needs to be set up and maintained) and the fact that uniform solutions can't fit the wide range of differentiating requirements has caused researchers and clinicians to look to other solutions. In a rather recent wave of pragmatism, different (isolated) tools are built each tackling a specific sub-problem. Many people faced with the challenge to build more complex clinical application environments are thus now turning towards a "pick and choose" strategy for composing their toolset.

The task that does remain is proper integration of these tools. Next to the obvious functional integration aspect (e.g. exchange of data between tools), the importance of security should not be underestimated. The possible impact on usability and manageability is huge. Imagine daily usage of several tools for which one needs to remember different usernames and passwords (or even use different tokens), imagine that sharing rights needs to be reconfigured in every separate tool (and kept in sync), etc. In practice, security encompasses a substantial part of the system integration work in environments in which data protection is important. A framework that offers the required security

functionality at low implementation complexity and integrates (out of the box) with commonly used tools will clearly have a competitive advantage.

In this context, the participation in CHIC not only serves in defining technical specifications and developing the technological components for the security framework, but also to validate if the framework accommodates for all needs of researchers, clinicians, system integrators and compliance officers.

Custodix' exploitation strategy with respect to this security framework already resulted in the spinning-off a commercial version of the Identity Management Service (IdM) (with a reduced feature-set compared to the research work done in the project). This IdM is promoted as an integration tool in the clinical domain in order to find out whether a strategy towards system integration specifically in this domain will pay off. The subsequent result will determine the prioritization of the further development of the security tools or a possible repositioning of the framework.

It goes without saying that with respect to system integration Custodix is complementary to the other CHIC partners, and thus open to any form of commercial cooperation.

UBERN exploitation plans

The software BraTumIA has been released to the scientific community and since last May over 150 download requests have been processed. The software has been clinically evaluated at the local hospital in Bern and will be employed as comparison basis for future developments. Namely, the software will be extended to include longitudinal analysis as well as analysis of low-grade gliomas. In addition, the software's core components will be refactored to enable reutilization of the technologies to other diseases of the central nervous system.

6 Conclusions

This document reports first of all on the activities performed to increase awareness towards the project stakeholders on the CHIC results and positive impacts these might have in the future.

Dissemination has been very active also in the third project year, which resulted in a high number of dissemination events recorded. From the project start, the consortium can report:

- 54 publications on peer-reviewed journals and conference proceedings
- 89 participations of conferences, workshops, events
- 13 other media disseminations

These dissemination items clearly show the commitment of the whole consortium in outreaching potential future users of the CHIC platform and stakeholders with the project outputs.

The second aim of this deliverable is to report on the current status about the exploitation and sustainability plans for the CHIC platform and its component.

The CHIC partners have finalised the list of the exploitable outputs, which have been described together with the type of foreground, the target users, the expected time to market, and the evolution of the respective TRLs from the beginning to the end of the project.

For each output, the responsible partners have identified what will be needed after the end of the project to sustain each component in terms of hardware and software but also effort to support the maintenance of the codes and models. Any dependency to external libraries has also been identified. This helped in identify the sustainability needs also for the CHIC platform as whole.

This is a very important step towards the final exploitation plans, as the costs associated to sustainability have to be covered. For some of the outputs how this can be achieved has been already identified, for others source for funding will be analysed in the following project period.

Individual partners have also updated their own exploitation plans for the components for which they are responsible for.

All these information will be the crucial basis for the next exploitation plans finalisation.

In the last year of the project, more attention will be put in identifying a sustainable exploitation for the CHIC platform as a whole, which will be described in details in the final PUDF document. This will include a roadmap to clinical validation (i.e. how to sustain a prospective clinical trial) and how the CHIC platform will be delivered to the target users (i.e. as a service vs local software installation). The consortium will also update the innovation radar questionnaire to be used to discuss open issued in the future exploitation.

Appendix 1 – Abbreviations and acronyms

WP	Work Package
MoU	Memorandum of Understanding
IPR	Intellectual Property Rights
EC	European Commission
GA	Grant Agreement
CA	Consortium Agreement
CDS	Clinical Decision Support
GBM	GlioBlastoma Multiforme
GNU	GNU's not UNIX
GPL	General Public License
LGPL	Lesser General Public License
BSD	Berkeley Software Distribution
STaRC	Study Trial and Research Centre