PLAN FOR USING AND DISSEMINATING THE FOREGROUND

Grant Agreement number: 31744

Deliverable D10.3.1

Project acronym: FAMOS

By: Jon Holmes, FAMOS Exploitation Manager,

and CEO of Michelson Diagnostics Ltd

WP10 Leader (Exploitation)

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Introduction

This document comprises the *plan* for managing the use & dissemination of foreground IP generated in FAMOS, during the project. It is expected that by the end of the project, further activities will be under way to exploit IP after the project ends, and this plan sets out how this goal will be achieved.

The PUDF is a contractual document that sets out in detail and verifiable manner the intentions and plans of the consortium partners to use and disseminate foreground IP. It is an evolving document that is updated during the project and is formally reviewed at **6-monthly intervals** and issued at **12 monthly intervals.**

The PUDF comprises two main sections, (1) Dissemination of Knowledge and (2) Exploitation, and a final section concerning Risks.

The Dissemination section deals with foreground IP that is put into the public domain. All of the content is by definition public. It addresses what publishable results have been produced, how they have been protected, and the method and location of dissemination, as well as which consortium members own it.

The Exploitation section deals with the plans for commercially exploiting Foreground IP. The content will be kept confidential (although of course disclosed to the European Commission).

It includes:

- The IP register – all patent applications, trademarks, registered designs etc.
- Register of exploitable foreground, the anticipated resulting product, application, timetable for exploitation, the IP owner(s) and any 3rd parties involved in the exploitation.
- Detailed characterisation of each exploitation opportunity (market size assessment, competitive environment, regulatory & reimbursement barriers etc.), and additional funding accessed by members of the consortium
- Details of any background IP required to exploit

The final section on Risks includes a register of any Risks that have been identified during the project:

- Technology risks eg. successful exploitation depends on development of new technology by partners outside the consortium
- Legal risks, eg potential to infringe 3rd parties' IPR
- Partnership risks, eg. Potential for conflicts of interest within the consortium if two parties wish to exploit the same IP, or disputes over IP ownership
- Environmental, health or safety risks – any potential risks identified that could be created by the proposed new products

Section 1 - Dissemination of Knowledge (public)

This section describes the dissemination measures, including any scientific publications relating to foreground. Its content will be made available in the public domain thus demonstrating the added-value and positive impact of the project on the European Community.

This section shall include a list of planned dissemination activities (publications, conferences, workshops, web, press releases, flyers, etc) in free text format.

1.1 Knowledge management and dissemination objectives

Knowledge management:

Management of knowledge, of intellectual property, and of other innovation-related activities arising in the project is one of the key tasks for the Project Management. A Consortium Agreement covering these issues (among others) has been signed by all partners. Please refer to the Consortium Agreement.

Rules for disclosure of Confidential Information within the consortium are set out in the Consortiu Agreement. The Consortium has also formally agreed that Confidential Information may be disclosed to 3rd parties outside the Consortium on a need-to-know basis under a Non-Disclosure Agreement (NDA) with format approved by the Consortium. All such NDA that are signed will be included in the IPR register below.

Dissemination Plan

Information Portal

1. Public Website

   A public website has been set up (www.famos-fp7.eu) which describes the project objectives, consortium, advisory board, and acts as an organ for dissemination of publically available non-peer-reviewed information such as press releases and information sheets. This website is maintained by Consortium Member DTU

2. Secure Communications Area & ftp document server

   Consortium members can access a secure area from the public website that enables confidential sharing of data and results. This facility is maintained by Consortium Member DTU but individual members are responsible for uploading data and results.

Public Outreach – Application Groups

FAMOS is a large project with multiple areas of clinical interest and applications, such as skin cancer and eye diseases. To manage the dissemination, Application Groups will be set up in each area, providing a focus for people and organisations to interact with the project members. Each Application Group has a Primary Contact (contact details posted on the website). Any company or person wishing to find out more, or who is involved in some way with the project on a non-confidential basis, will be invited to join as an Application Group Member. The Application Group Members will be invited to all of thr public meetings and dissemination events of the

Group, and will be kept informed by email of key publicly available results. A company of organisation that wishes to get actively involved in the exploitation of IP will be invited to join as an Application Group Project Partner (see section 2), subject to Consortium approval.

Publication Register

Table 1. List of all publications of FAMOS results in peer-reviewed journals:

No.	Paper citation reference (Harvard format or similar)	Consortium Partner(s) involved	Date of publication	Work Package
1	ASHOK, P. C., PRAVEEN, B. B., BELLINI, N., RICHES, A., DHOLAKIA, K. & HERRINGTON, C. S. 2013. Multi-modal approach using Raman spectroscopy and optical coherence tomography for the discrimination of colonic adenocarcinoma from normal colon. *Biomed. Opt. Express,* 4**,** 2179-2186.	USTAN	16.09.13	7
2	Andreas Buehler, Marcin Kacprowicz, Adrian Taruttis, Vasilis Ntziachristos: Real-time handheld multispectral optoacoustic imaging, Optics Letters, Vol. 38, Issue 9, pp. 1404-1406	HMGU, IT	01.05.13	8
3	Un-mixing Molecular Agents From Absorbing Tissue in Multispectral Optoacoustic Tomography, Stratis Tzoumas, Nikolaos Deliolanis, Stefan Morscher, Vasilis Ntziachristos, IEEE TRANSACTIONS ON MEDICAL IMAGING, 2013-0535	HMGU, IT	Pending	8
4.	Ole Bjarlin Jensen, Anders Kragh Hansen, André Müller, Bernd Sumpf, Angelika Unterhuber, Wolfgang Drexler, Paul Michael Petersen, and Peter E. Andersen, „Power Scaling of Nonlinear Frequency Converted Tapered Diode Lasers for Biophotonics", IEEE. J. Sel. Topics. Quantum Electron. (invited) Accepted for publication, 2013.	DTU, FBH, MUW	10.11.2013	3+6
5	Buehler A, Dean Ben XL, Razansky D, Ntziachristos V. Volumetric optoacoustic imaging with multi-bandwidth deconvolution.IEEE Trans Med Imaging. 2013 Sep 16. IEEE Trans Med Imaging. 2014 Apr; 33(4):814-21.	HMGU	30.04.2014	8
6.	Angelika Unterhuber, Boris Považay, André Mueller, Ole Bjarlin Jensen, Marcus Duelk, Marieh Esmaeelpour, Tuan Le, Paul Michael Petersen, Christian Velez, Peter E. Andersen, and Wolfgang Drexler, "Simultaneous dual wavelength eye tracked ultrahigh resolution retinal and choroidal optical coherence tomography", Optics Letter 2013 38 (21): 4312-4315	MUW, DTU, EXA, FL	1.11.2013	3, 5, 6, 7
7.	M. Liu, N. Schmitner, M.G. Sandrian, B. Zabihian, B. Hermann, W. Salvenmoser, D. Meer, W. Drexler, "In vivo three dimensional dual wavelength photoacoustic tomography imaging of the far red fluorescent protein E2-Crimson expressed in adult zebrafish",	MUW	29.08.013	8

	Biomed Optics Exp, Vol. 4, Issue 10, pp. 1846-1855 (2013) http://dx.doi.org/10.1364/BOE.4.001846			
8.	Bonesi M, Minneman MP, Ensher J, Zabihian B, Sattmann H, Boschert P, Hoover E, Leitgeb RA, Crawford M, Drexler W. Akinetic all-semiconductor programmable swept-source at 1550 nm and 1310 nm with centimeters coherence length. Opt Express. 2014 Feb 10;22(3):2632-55. doi: 10.1364/OE.22.002632. PubMed PMID: 24663556.	MUW	15.07.2013	5,8
9.	A. Kumar, W. Drexler, R.A. Leitgeb, "Subaperture correlation based digital adaptive optics for full field optical coherence tomography," Opt Express. 2013 May 6;21(9):10850-66. doi: 10.1364/OE.21.010850. PubMed PMID: 23669942.	MUW	6.05.2013	5
10	Vionnet L, Gateau J, Schwarz M, Buehler A, Ermolayev V, Ntziachristos V. . 24MHz Scanner for Optoacoustic Imaging of Skin and Burn, IEEE Trans Med Imaging. 2013 Nov 7. [Epub ahead of print]	HMGU	07.11.20013	8
11.	A. Unterhuber, B. Považay, A. Müller, O. B. Jensen, M. Duelk, M. Esmaeelpour, T. Le, P. M. Petersen, C. Velez, P. E. Andersen, and W. Drexler, "Simultaneous dual wavelength eye tracked ultrahigh resolution retinal and choroidal optical coherence tomography" Virtual J. Biomed. Optics. 9, 1, 2014.	MUW, DTU, EXA, FL	1.14.2014	2+3+6
12.	Vionnet L, Gateau J, Schwarz M, Buehler A, Ermolayev V, Ntziachristos V. 24-MHz Scanner for Optoacoustic Imaging of Skin and Burn IEEE Trans Med Imaging. 2014 Feb;33(2):535-45.	HMGU	2014 Feb	8
13.	Mathias Schwarz, Andreas Buehler, Vasilis Ntziachristos, Isotropic high resolution optoacoustic imaging with linear detector array and bi-directional scanning, Journal of Biophotonics, 1-11, (2014)	HMGU	2014	8
14.	Frequency-encoded multiplexed CARS microscopy by rapid pulse shaping, Jonathan M. Levitt, Ori Katz and Yaron Silberberg, J.Mod. Opt. DOI: 10.1080/09500340.2013.867080 (2014)	WIS	2014	7
15.	Li J, Taylor A, Papakonstantinou I, Zhang E and Beard P (2014) Highly sensitive optical microresonator sensors for photoacoustic imaging, Proc. of SPIE, Vol. 8943, paper 89430C	UCL	3/2014	8
16.	Johnson SP, Ogunlade O, Zhang E, Laufer J, Rajkumar V, Pedley RB, Beard P (2014) Photoacoustic tomography of vascular therapy in a preclinical mouse model of colorectal carcinoma, Proc. of SPIE, Vol. 8943, paper 89431R	UCL	3/2014	8
17.	Huynh N, Zhang E, Becke M, Arridge S, Beard P and Cox B (2014) Patterned interrogation scheme for compressed sensing photoacoustic imaging using a Fabry Perot	UCL	3/2014	8

	planar sensor, Proc. of SPIE, Vol. 8943, paper 894327			
18.	Hochuli R, Beard PC, Cox B (2014) Accuracy of Approximate Inversion Schemes in Quantitative Photacoustic Imaging, Proc. of SPIE, Vol. 8943, paper 89435V	UCL	3/2014	8
19.	Ellwood R, Zhang EZ, Beard PC and Cox BT (2014) The use of acoustic reflectors to enlarge the effective area of planar sensor arrays, Proc. of SPIE, Vol. 8943, paper 89436A	UCL	3/2014	8
20.	Haas P, Esmaeelpour M, Ansari-Shahrezaei S, Drexler W, Binder S. Choroidal Thickness in Patients With Reticular Pseudodrusen Using 3D 1060-nm OCT Maps. Invest Ophthalmol Vis Sci. 2014 Apr 25;55(4):2674-81. doi: 10.1167/iovs.13-13338. PubMed PMID: 24651554	MUW	2014	5
21	AK Hansen, OB Jensen, B Sumpf, G Erbert, A Unterhuber, W Drexler, P E Andersen, and P M Petersen, ”Generation of 3.5 W of diffraction-limited green light from SHG of a single tapered diode laser in a cascade of nonlinear crystals,” SPIE LASE, 896406-896406-6	DTU, FBH, MUW	2014	3
22	Ashok, P.C., Praveen, B.B., Bellini, N., Riches, A., Dholakia, K., Herrington, C.S. Combined information from Raman spectroscopy and optical coherence tomography for enhanced diagnostic accuracy in tissue discrimination, Proceedings of SPIE, Volume 8939, 2014, Article number 2039855	USTAN	2014	7
23	Label-free haemogram using wavelength modulated Raman spectroscopy for identifying immune-cell subset, Ashok, P.C., Praveen, B.B., Campbell, E.C. Dholakia, K., Powis, S.J.. Proc SPIE 8939, doi: 10.1117/12.2039836	USTAN	2014	7
24	Development of a fiber based Raman probe compatible with interventional magnetic resonance imaging, Ashok, P.C., Praveen, B.B., Rube, M., Cox, B., Melzer, A., Dholakia, K. Proc. SPIE 8935, Article number 89351J	USTAN	2014	7

Public Dissemination Register

Table 2. List of all events or instances of public dissemination of FAMOS results, including presentations, workshops, press releases, webinars etc.

No.	Type	Author(s)	Consortium Partner(s) involved	Title	Date	Place (City,country)	Type & Size of Audience	Work Package
1	Press Release Published in (4 trade journals)	J Holmes	MDL	European Commission backs biophotonics 'FAMOS' consortium with €10.1M…	24.10.12	Europe	Business Leaders, Scientific	10
2	Talk	A. Buehler, M.Kacprowicz, A. Taruttis, V. Ntziachristos	HMGU, IT	Real-time handheld multispectral optoacoustic imaging	12.5.13	Munich, Germany	ECBO 2013 Scientific community ~100 people	8
3	Poster	A. Buehler; N. Burton; M. Kacprowicz; A. Taruttis; S. Morscher; V. Ntziachristos	HMGU, IT	Real-time handheld multispectral optoacoustic imaging on human volunteers	19.9.13	WMIC Savannah,USA	Scientific community ~100 people	8
4	Poster	N. Burton; A. Buehler; M. Kacprowicz; W.H. Driessen; J. Claussen; T. Sardella; D. Razansky; V. Ntziachristos	HMGU, IT	High rate cardiac imaging by multispectral optoacoustic tomography	19.9.13	WMIC, Savannah,USA	Scientific community ~100 people	8
5	Lecture	Bernd Sumpf	FBH	Applied Laser Spectroscopy	October-December 2012	Berlin	PhD Students	WP3

6	Presentation	André Müller	DTU/FBH	High-power green diode laser systems for biomedical applications	Nov 2012	Berlin	50 Scientists	WP3
7	Press release - published in 8 journals	FBH	FBH/DTU/Femtolasers	More Light! – for Medicine	March 2013	-	-	WP3
8	Invited talk, Topical Problems of Biophotonics - 2013	P. E. Andersen, O. B. Jensen, A. Müller, B. Sumpf, A. K. Hansen, P. M. Petersen, A. Unterhuber, and W. Drexler	DTU, FBH, MUW	Green, compact diode laser-based systems for biophotonics application	21-27 July 2013	Nizhny Novgorod, Russia	Scientific	3+6
9	Plenary talk, Saratov Fall Meeting	P. E. Andersen, O. B. Jensen, A. Müller, B. Sumpf, A. K. Hansen, P. M. Petersen, A. Unterhuber, and W. Drexler	DTU, FBH, MUW	Green, compact diode laser-based systems for biophotonics application	23-28 September 2013	Saratov, Russia	Scientific	3+6
10	Invited talk	Vasilis Ntziachristos	HMGU	Optical Imaging Redefined with Multi-Spectral Optoacoustic Tomography	19.9.13	WMIC, Savannah	Scientific community ~100 people	8
11	Educational session	Vasilis Ntziachristos	HMGU	Optoacoustic imaging	18.9.13	WMIC Savannah	Scientific community ~100 people	8
12	Invited talk Photonex 2013	P. Beard	UCL	***Pre-clinical photoacoustic imaging***	April 2013	London	Scientific/industry	WP8
13	Invited talk OSA	P. Beard	UCL	***In vivo pre-clinical photoacoustic imaging of cancer***	April 2013	Hawaii	Scientific	WP8

	”Optical Molecular Probes, Imaging, and Drug Delivery”							
14	Invited talk ”NC3Rs/ESP KTN Imaging Technology Development for the 3Rs Workshop”	P. Beard	UCL	***Preclinical photoacoustic imaging***	June 2013	London	Scientific	WP8
15	Keynote Institute of Physics, Optics+ Ultrasound Meeting	P. Beard	UCL	***Biomedical photoacoustic imaging: physics, technology and applications***	May 2013	Nottingham	Scientific	WP8
16	Oral Presentation	Praveen C. Ashok, Bavishna B. Praveen, Nicola Bellini, Andrew Riches, Kishan Dholakia, C. Simon Herrington	USTAN	Combined Information from Raman Spectroscopy and Optical Coherence Tomography for Enhanced Diagnostic Accuracy in Tissue Discrimination	02/2014	San Francisco, USA	Academic + Industry	WP1
17	Oral Presentation	Praveen C. Ashok, Bavishna B. Praveen, Martin	USTAN	Development of a Fiber based Raman Probe Compatible with Interventional Magnetic	02/2014	San Francisco, USA	Academic + Industry	WP2

		Rube, Benjamin Cox, Andreas Melzer and Kishan Dholakia		Resonance Imaging				
18	Oral Presentation	Praveen C. Ashok, Bavishna B. Praveen, Elaine C. Campbell, Kishan Dholakia and Simon J. Powis	USTAN	Label-free Haemogram using Wavelength Modulated Raman Spectroscopy for Identifying Immune-cell Subset	02/2014	San Francisco, USA	Academic + Industry	WP3
19	Feature of the week in OCT news	Praveen Ashok	USTAN	Multi-modal approach using Raman spectroscopy and optical coherence tomography for the discrimination of colonic adenocarcinoma from normal colon	27/10/2013		Academic + Industry	WP4
20	Oral presentation	A. Unterhuber, A. C. Fernandez, T. Kamali, A. K. Hansen, O. B. Jensen, B. Sumpf, G. Erbert, P. M. Petersen, P. E. Andersen, W. Drexler	MUW, DTU, FBH	***A novel compact femtosecond Ti:sapphire laser with inherently synchronized high-power fiber amplifier for nonlinear microscopy***	02.2014	Photonics West, San Francisco, USA	Academic Industry	WP3+ WP6
21.	Oral presentation	A. K. Hansen, O. B. Jensen, B. Sumpf, G. Erbert, A. Unterhuber, W. Drexler, P. E. Andersen, P. M. Petersen	DTU, MUW, FBH	***Generation of 3.5 W of diffraction-limited green light from SHG of a single tapered diode laser in a cascade of nonlinear crystals***	02.2014	Photonics West, San Francisco, USA	Academic Industry	WP3+ WP6
22	Oral	Karsten König	JL	***Optical Biopsies with***	17/03/14	Dubai, United	Academic +	WP6

	Presentation			***Multiphoton Tomography***		Arab Emirates	Industry~80	
23	Oral Presentation	Martin Weinigel	JL	***A novel clinical multimodal multiphoton tomograph for AF, SHG, CARS imaging, and FLIM***	5/02/14	San Francisco, USA	Scientific, ~60	WP6
24	Exhibition booth at Medica		JL		20.-23.11.2013	Düsseldorf, Germany	Industry	WP6
25	Invited lecture	Yaron Silberberg	WIS	Controlling light in complex media: Looking around corners and through turbid layers	Sep 2013	Murten, Switzerland	1st EOS Topical Meeting on Frontiers in Optical Imaging (FOI 2013), Scientific	WP7
26	Invited lecture	Yaron Silberberg	WIS	Shaping the Waves: Engineering Optical Wavefront for Biomedical Imaging	Nov 2013	Virginia, USA	Janelia Conferences	WP7
27	Invited lecture	Yaron Silberberg	WIS	Lecture series at the 1st MicroCOR winter school on Chemical Imaging by Coherent Raman and nonlinear microscopy	Feb 2014	Les Houches Physics School, France	Scientific	WP7
28	Prize / web article	Tuan Le	FL	***Names finalist in SPIE Prism Awards 2013 in Life Sciences category*** http://www.biophotonics-digital.com/biophotonics/201301?pg=38	Jan 2013	Photonics West, San Francisco, USA	Industry / Scientific	WP3
29	Prize / video interview	Tuan Le	FL	***CLEO Innovation Award (honourable mention)***	Jun 2013	CLEO, San Jose, USA	Industry / Scientific	WP3
30	Invited talk	P. Beard	UCL	***Photoacoustic imaging using endogenous and genetically encoded contrast***	28/4/2014	Miami	Academic + Industry	WP8

31	Keynote	Kishan Dholakia	USTAN	Shaping the Future of Raman Spectroscopy	August 2014	Int Conf on Raman Spectrsocopy Jena, Germany	Academic + Industry	WP4
32	Invited	Kishan Dholakia	USTAN	***Multi-modal approach using Raman spectroscopy and optical coherence tomography***	June 2014	LALS 2014, ULM, Germany	Academic, Industry	WP4
33	Poster presentation	M. Liu, N. Schmitner, M.G. Sandrian, B. Zabihian, B. Hermann,W. Salvenmoser, D. Meyer, W. Drexler	MUW	***In vivo spectroscopic photoacoustic tomography imaging of a far red fluorescent protein expressed in the exocrine pancreas of adult zebrafish***	02/02/2014	San Francisco, USA	Scientific community	WP8
34	Oral presentation	B. Zabihian, B. Hermann, M. Liu, M.G.Sandrian, N. Schmitner, D. Meyer, W. Drexler	MUW	***Contrast Agent Enhanced all optical detection PAT/OCT***	08/03/2014	Obergurgl, Austria	Workshop, ~40 people	WP8
35	Oral presentation	M. Liu, B. Hermann, B. Zabihian, N. Schmitner, B. Mauer, W. Weninger, M. G. Sandrian, D. Meyer, W. Drexler	MUW	***In vivo dual modality photoacoustic and optical coherence tomography imaging in zebrafish and chick embryo***	09/03/2014	Obergurgl, Austria	Workshop, ~40 people	WP8
36	Oral presentation	B. Hermann, B. Zabihian, M. Liu, W. Drexler	MUW	***Towards in vivo clinical dermatologic dual modality photoacoustic and optical coherence tomography***	09/03/2014	Obergurgl, Austria	Workshop, ~40 people	WP8
37	Oral	M. Liu, M. G.	MUW	***Development of dual modality***	09/03/2014	Obergurgl,	Workshop, ~40	WP8

	presentation	Sandrian, B. Hermann, B. Zabihian, Y. Yuan, W. Drexler		***photoacoustic, optical coherence tomography imaging systems --- from sub-cellular structure to whole-body imaging***		Austria	people	
38	Oral presentation	Implementation of a non-uniform FFT combined with sparse grid sampling in photoacoustic image reconstruction	MUW	***J. Schmid, T. Glatz, B. Zabihian, W. Drexler and O. Scherzer***	29/04/2014	Vienna, Austria	Worshop	WP8
39	Feature of the week/permanent in OCT news	Angelika Unterhuber, Boris Považay, André Mueller, Ole Bjarlin Jensen, Marcus Duelk, Marieh Esmaeelpour, Tuan Le, Paul Michael Petersen, Christian Velez, Peter E. Andersen, and Wolfgang Drexler	MUW, DTU, FL, EXA	***Simultaneous dual wavelength eye tracked ultrahigh resolution retinal and choroidal optical coherence tomography***	01/12/2013		Scientific community - web	WP3. 5.6,7
40	Oral presentation	Angelika Unterhuber, Alma del Carmen Fernandez, Tschackad Kamali Anders K. Hansen,	MUW, DTU, FL, EXA	***A novel compact femtosecond Ti:sapphire laser with inherently synchronized high-power fiber amplifier for nonlinear microscopy***	03/02/2014	San Francisco, USA	Scientific community	WP3, 7

		Ole B. Jensen, Bernd Sumpf, Götz Erbert, Paul M. Petersen, Peter E. Andersе3, Wolfgang Drexler1						
41	Oral presentation	T. Kamali, B. Považay, W. Drexler, A. Unterhuber	MUW	***Application of online Fourier Transform CARS***	01/02/2014	San Francisco, USA	Scientific community	WP7
42	Special feature of OSA's Optics Infobase	Angelika Unterhuber, Boris Považay, André Mueller, Ole Bjarlin Jensen, Marcus Duelk, Marieh Esmaeelpour, Tuan Le, Paul Michael Petersen, Christian Velez, Peter E. Andersen, and Wolfgang Drexler	MUW, DTU, FL, EXA	***Simultaneous dual wavelength eye tracked ultrahigh resolution retinal and choroidal optical coherence tomography***	14/01/2014	The Virtual Journal for Biomedical Optics	Scientific community	WP3, 5,6,7
43	Poster	T. Kamali, B. Herrmann, B. Považay, W. Drexler and A. Unterhuber	MUW	***Multimodal Fourier transform CARS and Spectral Domain OCT using a single ultrafast Ti:Sapphire laser***	08-15/06/2013	6th International Graduate Summer School Biophotonics, Van, Sweden	Graduate Summer School	WP7
44	Invited talk	W. Drexler	MUW	***New Aspects of Retinal OCT***	4/14	World	Opthalmologists	5

						Opthlalmic conference		
45	Invited talk	W. Drexler	MUW	***Latest developments of retinal OCT***	4/14	World opthalmic conference	Opthalmologists	5
46	Invited talk	W. Drexler	MUW	***Mulitmodal OCT for functionl, molecular optical biopsy***	4/14	NTU Singapore	Academic	6,7,8
47	Invited talk	W. Drexler	MUW	***Pushing the limits of OCT***	3/14	Macular Vision Research Foundation	Opthalmologists	5
48	Invited talk	W. Drexler	MUW	***Multimodal OCT***	2/14	San Sebastian	Research	6.7,8
49	Invited talk	W. Drexler	MUW	***Multimodal OCT***	2/14	Froniters om OCT	Research	6,8,8
50	Invited talk	W. Drexler	MUW	***Top technology trends***	1214	Califronia	Research	5
51	Invited talk	W. Drexler	MUW	***Shedding lught on preclinical imaging1/14***	1/14	Ausrian Soc. Nuclear Medicine	resarch	7,8
52	Invited talk	W. Drexler	MUW	***Choroidal OCT***	1/14	Macular of Paris	Opthalmologists	5
53	Invited talk	PE Andersen	DTU	***Green diode-based lasers for biophotonics***	30/11/2014	Kiev, Ukraine	Research	3

Section 2 - Exploitable knowledge and its use (confidential)

This section is confidential.

In this section we specify the exploitable foreground and provide the plans for exploitation. The project is following the instructions and using the templates specified by the Commission for the "Plan for Use and Dissemination of Foreground" which is due for delivery at the end of theproject.

Intellectual Property Rights – Applied for or Registered

The PUDF will provide a list of all intellectual property rights that have been applied for or registered.

Results with Potential Commercial or Industrial Applications

2.1 Exploitation Procedures

As discussed in section 1, the FAMOS Consortium provides a mechanism through which organisations outside the Consortium can get directly involved with exploitation of FAMOS Foreground IP, through 'Application Groups'. The ground rules for interacting with these 3rd parties regarding confidentiality etc. is set out in the Consortium Agreement. The outside organisation can apply to become an Application Group Partner. A baseline requirement must be that the organisation must have something to offer, in terms of cash or resources for project objectives, or a clear route to commercial exploitation – mere membership for interest only is not permitted. The request will be reviewed by the Consortium Members. Any Consortium Member can veto the request on reasonable grounds eg. conflict with own exploitation plans, however in most cases it is expected that the request will be welcomed. In this case, a NDA will be signed with the organisation and then a agreement will be negotiated concerning the actual interaction (licensing, collaboration etc.)

Foreground IP register

Table 4. Details of all Intellectual Property generated in FAMOS

No.	Type of IP protection (patent, trademark etc.)	Description	Consortium Owners	Work Package	Date of filing of protection	Protected in which territories	Details of dependence on background IP (if any)
1	Patent	Microstructured optical fiber, supercontinuum light source comprising microstructured optical fiber and use of such light source	NKT	3	July 13	TBD	

NDA Register

Table 5. List of Non Disclosure Agreement signed

No.	Name of Organisation	NDA signed with which Consortium Partners?	Scope of NDA	Date signed

Application Group Project Partner Application Register

Table 6. List of Application Group Project Partners

No.	Name of Organisation applying to be Application Project Partner	Application Group	Approved by Consortium (Yes/No)	Date approved	Nature of involvement with FAMOS

Exploitable Results Register

Table 7. List of all exploitable results

No.	*Exploitable Result*	*Exploiting Consortium Partner*	*Work Package*	*Is IP protected? How?*	*Foreseen route to exploitation*
	Results definition shall be clearly specified and easily identifiable in relevant market terms. If a FAMOS deliverable, state which	*Partner involved in result and coordinating its data collection*			*Eg. Product to be developed & sold by partner XXX*
1	Accessory to TiSapph lasers to adress CARS (del. 3.14)	NKT Photonics	3	Yes, by NKT background IP on fiber production	Product to be developed by NKT in interaction with MUW, WIZ, FL and JL and to be sold by NKT
2	Frequency doubled tapered diode lasers	DTU	3	Yes, by DTU background IP	A new spin-off company, Norlase, has been established in January 2014.
3	Tunable visible low energy high repetition rate OPO	Elforlight	4	No	Development of product by EL in collaboration with IN, with inputs from UCL, HGMU, MUW
4	Single longitudinal mode green laser	Elforlight	4	No	Development of product by EL
5	Diode pumped ultra-compact sub 20fs lasers	FL	3	Yes, by FL background IP	Evaluating / demonstrating the strengths and benefits of this novel fs-laser through experts in FAMOS By future integration of diode pump sources in all compact fs-lasers, FL becomes commercial provider for - affordable (cost-effective) sub 20 fs lasers - the most compact (smallest, lightest) sub 20 fs lasers commercially available

Characterisation of each Exploitable Result

Table 8. Exploitable Result Review

Exploition result no. from table 7	1. Accessory to TiSapph lasers to address CARS
Describe the innovation content of result	Developing a PM fiber suitable for add on to ultrashort TiSapph lasers to address lipid and potientially also fingerprint CARS
Who will be the customer?	Either fiber laser vendors at Femtolasers, system builders as Jenlab or university labs who already have a TiSapph laser
What benefit will it bring to the customers?	Extend the capability of TiSapph laser and facilitate making CARS experiments
When is the expected date of achievement in the project (Mth/yr)?	The development is expected to end by June 2015
When is the time to market (Mth/yr)?	The product is expected to be launched in 2016
What are the estimated costs to exploit (product development)	At the current stage (Oct 2013) this is still hard to estimate, as the fiber testing on the first iteration is still not concluded
How will this be funded?	By NKT
What is the approximate price range of this result / price of licences?	The business model is yet undecided and pricing will depend on whether it is a sold as a stand alone product or integrated in a system. If it is to be sold as stand alone, the target price is expected being around 3000 €
What is the estimated market size in no. of units?	50 pieces/year, but could be more if TiSapph development in FAMOS extends market share for this laser type

What is the competition (i) today (ii) future?	
Who are the consortium partners involved in the result?	NKT, MUW, WIZ, FL, JL
Who will be the exploitation leader?	NKT
Who are the external industrial partners involved in exploitation? (partners, sponsors, etc…)?	None, so far
Have you protected or will you protect this result? How? When?	Yes it is covered by background IP from NKT
Is there any dependency on background IP? Owned by whom?	Yes, but only on NKT background IP
What agreements, if any, have been signed regarding the exploitation, between Consotrtium Partners and/or external organisations?	None, so far

Exploition result no. from table 7	2. Frequency doubled tapered diode lasers
Describe the innovation content of result	Developing a laser module based on frequency doubled DBR tapered diode lasers. The lasers are capable of emitting 1-10 W of laser light in the blue-green spectral range
Who will be the customer?	Producers of Ti:sapphire laser systems, producers of laser based measurement equipment, producers of laser display systems
What benefit will it bring to the customers?	A cost-effective, compact and low noise laser for their applications. The laser can be tailor-made with respect to wavelength and power range.

When is the expected date of achievement in the project (Mth/yr)?	The development of the laser has been conducted and the spin-off company Norlas Aps. started in January 2014
When is the time to market (Mth/yr)?	Products are launched by January 2014
What are the estimated costs to exploit (product development)	The product development has ended and products launched.
How will this be funded?	By Norlase
What is the approximate price range of this result / price of licences?	There is no list price. Price will be by quotation, dependend on configuration.
What is the estimated market size in no. of units?	10-100 pieces/year in the first year, but could be significantly more once market penetration has occurred.
What is the competition (i) today (ii) future?	(i) Direct competition is diode pumped solid state lasers and optically pumped semiconductor lasers (ii) In the future, direct diode lasers may be available but for the power range of 1-10 W of visible light in a diffraction limited beam, diode lasers have some challenges.
Who are the consortium partners involved in the result?	DTU (making system), FBH (Diode lasers), FL (Ti:S specs) and MUW (Imaging validation)
Who will be the exploitation leader?	Norlase (DTU)
Who are the external industrial partners involved in exploitation? (partners, sponsors, etc…)?	Norlase Aps., Eagleyard (FBH spin-off)
Have you protected or will you protect this result? How? When?	Yes it is covered by background IP from DTU
Is there any dependency on background IP? Owned by whom?	No

What agreements, if any, have been signed regarding the exploitation, between Consortium Partners and/or external organisations?	None, so far

Exploition result no. from table 7	3. Tunable visible low energy high repetition rate OPO
Describe the innovation content of result	Low threshold operation
Who will be the customer?	Photoacoustic microscopy research groups and equipment manufacturers
What benefit will it bring to the customers?	High speed imaging due to high repetition rate. All solid state rugged
When is the expected date of achievement in the project (Mth/yr)?	Development completed 2015
When is the time to market (Mth/yr)?	Product available Early 2016 in basic form
What are the estimated costs to exploit (product development)	Too early to estimate
How will this be funded?	By EL. Possibly other grants
What is the approximate price range of this result / price of licences?	Expected price approx €30,000

What is the estimated market size in no. of units?	10 per year initially, 20% growth
What is the competition (i) today (ii) future?	Opotek have lower rep rate higher energy OPOs. No exact competitor known. Not aware of emerging competition but may be possible
Who are the consortium partners involved in the result?	EL, IN, UCL
Who will be the exploitation leader?	EL
Who are the external industrial partners involved in exploitation? (partners, sponsors, etc…)?	Yet to be found
Have you protected or will you protect this result? How? When?	No. Unlikley
Is there any dependency on background IP? Owned by whom?	No
What agreements, if any, have been signed regarding the exploitation, between Consortium Partners and/or external organisations?	None yet

Exploition result no. from table 7	4. Single longitudinal mode green laser
Describe the innovation content of result	mJ energies at 1kHz with Single Longitudinal Mode (narrow linewidth, long coherence length) operation
Who will be the customer?	Holography, interferometry, research groups and equipment manufacturers. Novel wavefront imaging techniques

What benefit will it bring to the customers?	High speed imaging due to high repetition rate. All solid state rugged
When is the expected date of achievement in the project (Mth/yr)?	Development completed 2015
When is the time to market (Mth/yr)?	Product available late 2015 in basic form
What are the estimated costs to exploit (product development)	Too early to estimate
How will this be funded?	By EL. Possibly other grants
What is the approximate price range of this result / price of licences?	€15-25k
What is the estimated market size in no. of units?	10-20 units per year initially
What is the competition (i) today (ii) future?	Passat have lower energy SLM
Who are the consortium partners involved in the result?	EL, IN
Who will be the exploitation leader?	EL
Who are the external industrial partners involved in exploitation? (partners, sponsors, etc…)?	Yet to be found

Have you protected or will you protect this result? How? When?	No. Unlikley
Is there any dependency on background IP? Owned by whom?	No
What agreements, if any, have been signed regarding the exploitation, between Consotrtium Partners and/or external organisations?	None yet

Exploition result no. from table 7	5. Diode pumped ultra-compact sub 20fs lasers
Describe the innovation content of result	To necessarily fill the gap of a long missing light source for many biomedical applications this product provides a novel solution to a compact, light-weight, cost and energy efficient ultrafast light source. Fully based on dispersive mirrors it combines a very compact ultrafast Ti:sapphire laser cavity enabling 300 MHz pulse repletion rate with very short optical pulses (<20 fs) and spectral bandwidth of more than 40 nm (FWHM) centered at 800 nm. Delivering up to 200 mW (and finally 500mW) average output power it provides sufficient peak power for many non-linear imaging applications and sufficient wavelength coverage for axial resolution down to sub 4-5 µm in OCT applications. Pumped by frequency doubled diode lasers developed in FAMOS it is going to revolutionize the ultrafast laser market with respect to cost, performance and size of a sub 20fs laser in the < 0.5 W range.
Who will be the customer?	Target customers are all scientific and industrial developers/integrators in the field of MPT, OCT, CARS, Terahertz spectroscopy, twp photon-polymerization, etc.
What benefit will it bring to the customers?	The light source will be half the price, 4-5 x smaller and 5 x lighter than current lasers used in MPT. It is simultaneously usable for OCT (multi-modal) and potentially also applicable to CARS (depending on results in FAMOS).
When is the expected date of achievement in the project (Mth/yr)?	A first diode pumped 20fs laser with ~200mW is expected by this year (2014). Diode pumped 20fs lasers with ~500mW are expected by the end of the project.
When is the time to market (Mth/yr)?	First diode pumped products are targeted by 2016.

What are the estimated costs to exploit (product development)	EUR 1 mio
How will this be funded?	By FL
What is the approximate price range of this result / price of licences?	Price dependends on number of systems per year, and cost of the diode pump laser. Estimated price of a very first unit is <50.000 €
What is the estimated market size in no. of units?	30-100 units/year
What is the competition (i) today (ii) future?	(i) wavelength tunable 100fs lasers from US manufacturers (more expensive, not portable), femtosecond fiber lasers (longer pulses, lower wavelength coverage, lower power) (ii) direct blue diode pumped fs-lasers (could be cheaper, might not be portable due to 75MHz)
Who are the consortium partners involved in the result?	DTU (providing frequency-doubled diode lasers), FBH (providing diode lasers), and MUW+JL (Imaging validation)
Who will be the exploitation leader?	FL
Who are the external industrial partners involved in exploitation? (partners, sponsors, etc…)?	Norlase Aps. (commercially providing frequency-doubled diode lasers) , Eagleyard (FBH spin-off)
Have you protected or will you protect this result? How? When?	Patent application by FL: PCT/AT2012/000291
Is there any dependency on background IP? Owned by whom?	No
What agreements, if any, have been signed regarding the exploitation, between Consotrtium Partners and/or external organisations?	None, so far

Additional Funding Accessed to support Exploitation

Table 9. List of additional funding accessed by the partners

FAMOS Partner(s) that accessed funding	Amount of funding / €	When awarded	Source of funding	Activitites that funding will support, and their connection with FAMOS
MDL	€2.38M	Nov 13	Venture capital	Expansion of sales & marketing of skin cancer OCT scanners in Germany and Australia – FAMOS target market
MDL	€2.26M	Nov 13	FP7 Grant 'ADVANCE'	Clinical validation of algorithms to detect blood vessels in OCT images of skin for skin cancer diagnosis – FAMOS target market
UCL	€1.01M	2013	EPSRC grant No.EP/K009745/1	"Dynamic High Resolution Photoacoustic Tomography System" – could use FAMOS sources
UCL	€0.060M	2013	CRACK IT Challenge NC3R prrof of concept grant	"Validation of photoacoustic tomography as a technology for whole body imaging of macromolecule biodistribution and quantification in mice" – could use FAMOS sources
UCL	€0.36M	2013	EPSRC-CRUK Cancer Imaging Centre renewal.	KCL and UCL Comprehensive Cancer Imaging Centre – could use FAMOS sources
UCL	€0.98M	2014	EPSRC Project grant	Endoscopic photoacoustic devices biomedical sensing and imaging -could use FAMOS sources
UCL	€1.75M	2014	Wellcome grant Innovative Engineering for Health Award	Image-Guided Intrauterine Minimally Invasive Fetal Diagnosis and Therapy -could use FAMOS sources
MUW, EXA	€3.9M	2014	FP7 Grant 'Biopsypen'	Development of a novel a compact and low-cost diagnostic tool for dermatology based on high-performing integrated OCT – collaboration between FAMOS partners
TOTAL	€12.7M			

Section 3 – Risk Assessment and Action Plan

This section is concerned with identifying, managing and mitigating risks associated with the exploitation of Foreground IP. It does not deal with technical or project risks within the FAMOS project itself.

The Consortium shall consider at each 6-monthly review:

- Technology risks eg. successful exploitation depends on development of new technology by partners outside the consortium
- Legal risks, eg potential to infringe 3rd parties' IPR
- Partnership risks, eg. Potential for conflicts of interest within the consortium if two parties wish to exploit the same IP, or disputes over IP ownership
- Environmental, health or safety risks – any potential risks identified that could be created by the proposed new products

Any risk that are identified must be discussed, and a management and mitigation strategy identified and implemented.

Table 10. Risk Analysis Table

Exploitation Result from Table 7	Type of risk	Description of risk. Severity?	Mitigation strategy	Who is responsible	Outcome: risk contained? Yes/No
3	legal	Existing patents: EP 1 535 575 B1 AA61B100FI			