PRO VISION
Perceptually Optimised Video Compression

Annual Training Activity Report (ATAR) - Provision ITN

Deliverable D5

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1. Summary

This document provides a first vision of the PROVISION (PeRceptually Optimised Video CompresSION) ITN project after few months of activity (only 14% of the fellows.month have been engaged) since its kick-off. The report summarizes the training activities performed in the Project for the period from 01/09/2013 to 01/10/2014.

The aim of the PROVISION-ITN Project is to provide to train Early Stage Researchers (ESR) and Experienced Researchers (ER) the highest level of training in advanced video compression and transferable skills to research teams, with the ultimate goal of delivering transformational research, innovative technology and new international standards.

Training activities are conducted in the context of high-level European research collaboration between some of the leading and most appropriate universities, research institutes, companies and end-user enterprises in Europe. The trained researchers will have significant competitive advantages in securing better jobs in academia or industry, and will be prepared as leaders in the development and uptake of this technology.

An integrated training programme complements technical and management activities. This provides a broader scientific education for the teams and helps to produce the new generation of researchers equipped with the interdisciplinary and transferrable skills needed by industry and academia. The PROVISION-ITN Project's training objectives are delivered via:

- Permanent training of ESRs and ERs during their individual project (supervised by two full partners and advised by one associated partner through secondments).
- Knowledge-exchange through distributed shared platforms.
- Complementary schooling of ESRs and ERs through network activities and specific training hubs.

During the considered period, partners focused their activities on searching suitable candidates to perform their activities on the project. The Table 1 summarizes information about the actual recruitments by the full partners, and the Figure 1 displays the fellows group.

Host	Position	Fellow name	Months in the Project
HHI	ESR2	Santiago DE LUXAN HERNANDEZ	12 months
	ER1	Dan GROIS	5 months
UoB	ESR4	Miltiadis ALEXIOS PAPADOPOULOS	7 months
BBC	ER3	Sebastian SCHWARZ	4 months
	ESR5	Andre SEIXAS DIAS	8 months
RWTH	ESR6	Uday THAKUR	6 months
	ESR7	Olena CHUBACH	6 months
UoN	ESR9	Karam NASER	7 months
	ESR10	Yashas RAI	4 months
	ESR12	Ahmed ALDAHDOOH	1 month

Table 1: Recruitment summary - the hosts are the Full Partners of the Project: HHI (Fraunhofer Heinrich Hertz Institute, Germany), UoB (University of Bristol, UK), BBC (British Broadcasting Corporation, UK), RWTH (RWTH Aachen, Germany) and UoN (University of Nantes, France).

Figure 1: The fellows group constituted of, from left-to-right and top-to-down, Ahmed ALDAHDOOH, Andre SEIXAS DIAS, Olena CHUBACH, Dan GROIS, Santiago DE LUXAN HERNANDEZ, Miltiadis ALEXIOS PAPADOPOULOS, Yashas RAI, Karam NASER, Sebastian SCHWARZ and Uday THAKUR.

2. Project training program

For the period, the training of the ESRs and ERs includes the major layers encompassed by the Project training concept, including scientific, technological and complementary skills. The **Core training** is provided directly by the PROVISION-ITN project during its meetings, it counts 3 types of activities (see also the Table 2):

- **Team-building training**, which aims to equip the fellows with important skills necessary to conduct a research and a team. It includes knowing how to communicate using various vectors. It also aims at strengthening the ties between the fellows. Interactive activities are then favored.
- **Scientific training**, which aims to equip the fellows with the scientific background necessary to understand the Project context in general and to conduct their project in particular. It includes knowing the video compression problems, its actual and future challenges, but also how to use and develop tools. The training activity is then complete with lectures and seminars, plus practical exercises.
- **Other training**, these are the other activities that allow the fellows to better know the Project life and the work packages progress. Active participation can be proposed to the fellows for some activities.

The **Individual training** is the global training that the fellow received to reach his career objectives. Indeed, the fellow has to manage his project, to progressively get through different activities the necessary skills in order to reach the objectives that he announced in his career development plan. The set of considered skills is organized in this report

as, research skills and techniques, research management, communication skills, other professional training, and other activities. So in the section 2.2, each fellow summarizes his individual training in link with his short-term objectives. Note that each synthesis has to be analyzed considering the duration of the fellow in the Project.

Activity	What	By	Type	When Where	Objectives (in brief)
Team Building training	"PechaKucha style presentations"	ESRs & ERs	Presentation	22 Sept. Nantes	To introduce yourself (CV)
	"Newsletters and Flyer"		Work group	23 Sept. Nantes	To design a newsletter and a flyer for the Project
	"Pitching ideas"	BBC Training Academy		25 Sept. Nantes	To pitch ideas
	"Presentation Skills"			26 Sept. Nantes	To present research skills
	"Video Making Session: What is video compression ?"	O. Rétif, P. Le Callet (UoN), A. Nestler (HHI)		25 Sept. Nantes	To design a video and use it to introduce your project
	"Video Making Session: Introduction to our ESRs and ERs"			26 Sept. Nantes	
Scientific training	"The new HEVC video compression"	Pr. J. Ohm (RWTH)	Lecture	26 Feb. Berlin	To know HEVC
	"Overview, Perspectives and Principles in Standardization"			23 Sept. Nantes	To know about video standards
	"HEVC Overview"	Dr. M. Wien (RWTH)			To know HEVC details
	"HEVC HM Software Overview"	K. Sühring (HHI)			To know the HM
	"HEVC HM Reference Software - Practical Session"		Lab		To use the HM
	"Texture Analysis and Synthesis for Coding"	Pr. D. Bull (UoB)	Seminar	24 Sept. Nantes	To know about texture A/S
	"Texture and Motion Models"	Pr. J. Ohm (RWTH)			To know about motion in video
	"Visual Quality Assessment"	P. Guillotel (Technicolor)			To know about VQA
Other training	"WP1 Requirements & Benchmarking"	Dr. S. Schwarz (BBC)	Workshop	22 Sept. Nantes	To know about the WP1
	"WP5 Tests Models and Core experiments"	Dr. D. Grois (HHI)			To know about the WP5
	"WP2 Advanced Motion Models"	Pr. J. Ohm (RWTH)			To know about the WP2
	"WP3 2D/3D Reconstruction Methods"	Pr. D. Bull (UoB)			To know about the WP3
	"WP4 Perceptual Tools and Quality Assessment"	Pr. P. Le Callet (UoN)			To know about the WP4
	"WP6 Dissemination"	Dr. K. Hopf & A. Nestler (HHI)		23 Sept. Nantes	To know about the Project website/ intranet & linkedin / Facebook
	"WP7 Coordination & Training"	Dr. D. Agrafiotis (UoB)			To know about the Vitae framework

Table 2: The Core training program of the Project for the considered period.

2.1 Core training by the Project

Two project meetings occurred during the period, one in February 2014 in Berlin (3 days), the other in September 2014 in Nantes (5 days).

The Berlin kick-off was mainly an organizational/ administrative meeting.. Although, it provided the opportunity for the people involved in the project to meet and interact, and three fellows received training in form of a lecture.

The meeting in Nantes brought together all the partners of the project and in particular 9 ESRs and 2 ERs (see Figure 2). During the week, various training activities were organized for the fellows according to a balanced program (see the Annex 3.1) mixing team-building training, scientific training and other trainings.
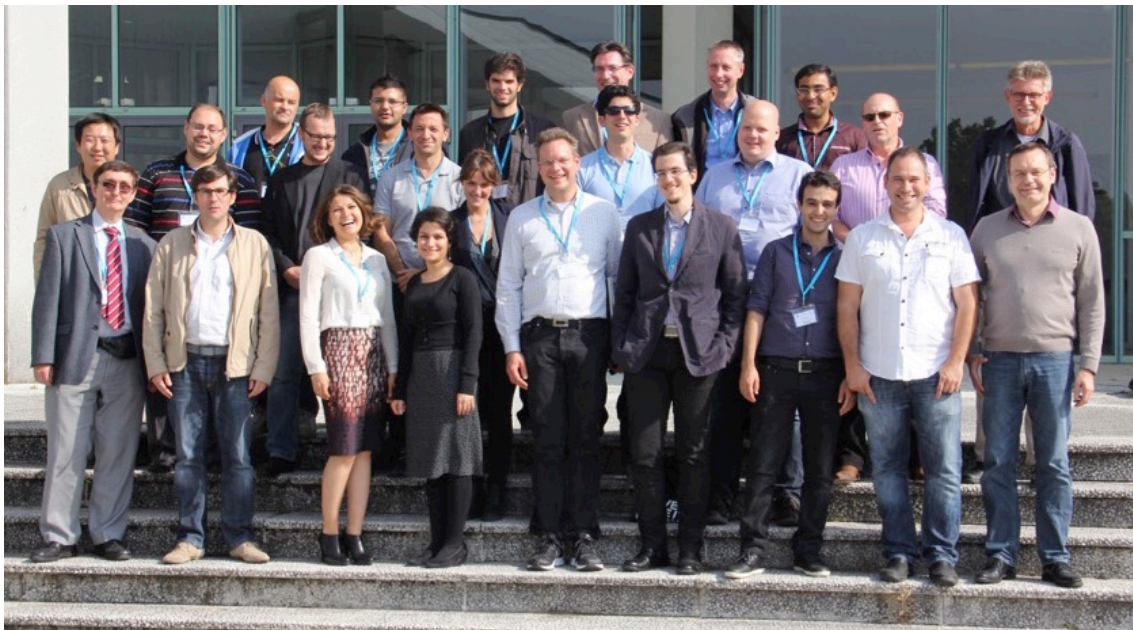
Figure 2: People at the meeting in Nantes.

2.1.1   Team-building training

The meeting in Berlin provided a first opportunity for the recruited ESRs and ERs to meet and interact.

The team-building event organized in Nantes had several objectives. One was to give to the ESRs and ERs, the opportunity to interact (many for the first time) and to work together (through physical and intellectual activities) in a supportive environment. For instance, training activities were oriented to the self-presentation (through different and innovative techniques) of the fellows and to the communication about their research projects. The other goal was to give them basic and specific skills that are very important when you start a PhD, have to manage research and sell your work. These skills are needed to manage an ambitious research project and contribute as a member or leader of a team.

The ESRs and ERs have also participated in team working about "Newsletter and Flyer" for the Project. The fellows, divided in teams, led their own workshops on the creation of a leaflet describing the project, and on the production of

a newsletter for the project. They compared existing examples in order to retain the most interesting cases, and they designed a first model. At the end they proposed and explained to all the partners (see Figure 3), the structure for the leaflet and the newsletter that they plan to produce soon.

Figure 3: Presentation of the work team results.

The program of the team building activities (training of transferable skills) was:

- "Pitching Ideas" by BBC Training Academy
- "Video Making Session: What is video compression? " by Olivier Rétif (UoN) who is engineer and head of the audiovisual service at Polytech'Nantes, Patrick Le Callet (UoN) and Antje Nestler (HHI)
- "Presentations Skills" by BBC Training Academy
- "Video Making Session: Introduction to our ESRs and ERs " by Olivier Rétif (UoN), Patrick Le Callet (UoN) and Antje Nestler (HHI)

The BBC academy is very renowned for its training and its development activities. It was the relevant actor to equip the fellows with the skills needed to develop their potential in order to pitch ideas and to present skills. The fellows also greatly appreciated the associated workgroup activity where they learned how to create a short film. At the end of this activity, the fellows were able to deliver a short video about the PROVISION-ITN project, this video will appear on the consortium website.

Besides training, in order to facilitate free exchange of experience and concerns, the program included a social event: a dinner was organized for all the partners and the fellows (see Figure 4). They had also the opportunity to share other meals and to enjoy together the visit of the nice city of Nantes (see Figure 5).

Figure 4: Social event - diner in Nantes.

Figure 5: Visit of Nantes.

2.1.2   Scientific training

The ERSs and ERs benefit of the best scientific training where high skilled researchers involved in the project give the talks and share their huge experience. These lectures and practical exercises are fundamental for the fellows in order for them to fully apprehend the video compression domain through all its different aspects (principles, latest standards, models, perspectives...), at the beginning of their PhD research.

The meeting at Berlin hosted a workshop introducing the new HEVC video compression standard given by Prof. Jens Ohm (RWTH) who currently co-chairs the MPEG video subgroup and the Joint Collaborative Team on Video Coding (JCT-VC), which develops the HEVC standard.

During the meeting at Nantes, the fellows attended two high-level lectures. The speakers who gave talks in their field of expertise are full partners of the Project (see Figure 6). The program of the lectures was:

- "Overview, Perspectives and Principles in Standardization" by Prof. Jens Ohm (RWTH) who has a long record of research and teaching in video coding. Since 2002 he has been chairing/co-chairing various standardization activities in video coding (see also just above).

- "HEVC Overview" by Dr. Mathias Wien (RWTH) who has more than 10 years of experience in video coding standardization. He has participated as a proponent in the Calls for Proposals for HEVC, 3D-HEVC, and SHVC. He has also authored a textbook on HEVC.
- "HEVC HM Software Overview" by Karsten Sühring (HHI) who was involved in the development of the H.264/AVC reference software. He is now one of the coordinators for the development of the HEVC software.

Practical sessions were also proposed to the group of fellows during a full afternoon interactive workshop:

- "HEVC HM Reference Software - Practical Session" by Karsten Sühring (HHI) (see just before).

Figure 6: Lectures at Nantes by Prof. Ohm (left) and Dr. Wien (right).

During the meeting in Nantes a scientific seminar was also organized. The presentations were then proposed to a larger public composed of International Master of Science Students and PhD Students from the University of Nantes, the ESRs and ERs, and the other project partners (see Figure 7). It was a nice opportunity for the supplementary public (nearly 30 people) to take benefit of didactic state-of-the art presentations by senior researchers. The speakers (see Figure 8) were full or associated partners of the Project, and the program of the seminar was:

- "Texture Analysis and Synthesis for Coding" by Prof. Dave Bull (UoB) who shared his great experience of the domain by giving a complete review. Note that Prof. Bull has supervised 36 PhDs and has published over 450 academic papers, 3 books and numerous patents.
- "Texture and Motion Models" by Prof. Jen Ohm (RWTH) whose expertise is internationally recognized in the domain (see before).
- "Visual Quality Assessment" by Philippe Guillotel (Technicolor) who is a distinguished scientist at Technicolor Research & Innovation. He has worked in the Media & Broadcast Industry for more than 20 years, with a special focus on video coding systems and perceptual coding.

All the public, and in particular the students (fellows included), showed an enthusiastic interest to these brilliant and solid presentations. They also appreciated particularly the communicative energy of the speakers.

Figure 7: Seminar at Nantes - the large public.

Figure 8: Seminar at Nantes - the speakers: Prof. Ohm (left), Prof. Bull (center) and P. Guillotel (right).

2.1.3   Other training

The meeting in Nantes was also a workshop for the 2nd kick-off of the Project (see Figure 9). By attending the presentations of some Work Packages (which are often state-of-the-art presentations), the fellows are familiarized with all scientific aspects of the Project. Exactly they attended to these presentations:

- "WP2 Advanced Motion Models" by Prof. Jens Ohm (RWTH)
- "WP3 2D/3D Reconstruction Methods" by Prof. Davis Bull (UoB)
- "WP4 Perceptual Tools and Quality Assessment" by Prof. Patrick Le Callet (UoN)

For the "WP6 Dissemination", they attended to the detailed presentations of some communication tools that are evidently essential for the Project:

- "Introduction to the website / intranet" by Dr. Klaus Hopf (HHI)
- "Introduction to LinkedIn, Facebook" by Antje Nestler (HHI)

For the "WP7 Coordination & Training", they received the presentation of the Vitae framework that aims to track career development and progress:

- "Introduction to the Vitae Researcher Development Framework" by Dr. Dimitris Agrafiotis (UoB) who explained and illustrated the benefits of the structured tool that is not just a recording system, but a complete training and personal development framework.

Figure 9: The 2nd kick-off Project (scientific workshop).

The ESRs and ERs also had an active participation for some specific activities (from a certain point of view, these activities have also partly team-building objectives):

- The PechaKucha style presentations of their CV (by all the fellows ESRs and ERs)
- A peer-to-peer transmission, by the more experimented ERs which animated two Work Package presentations:
    - "WP1 Requirements & Benchmarking" by Dr. Sebastian Schwarz (BBC)
    - "WP5 Tests Models and Core experiments" by Dr. Dan Grois (HHI)
- An ESR (Miltiadis Alexios Papadopoulos, UoB) also shared his experience with the others during an "Introduction to the Vitae Researcher Development Framework".

2.2 Individual training – Link with the short-term objectives

2.2.1   ESR2: Santiago DE LUXAN HERNANDEZ

Host: Fraunhofer Heinrich Hertz Institute

Start date: 16 October 2013

Research subject: Perceptual Rate-Quality Optimisation for Analysis and Synthesis

Research results:

As mentioned in the Career Development Plan, the ESR has developed a framework to study the most relevant regions in the video sequences that are not efficiently coded by HEVC. He has created as well a representative database and started to apply different methods to identify these regions. The research is in an analysis stage to validate the methods used at the moment. Once this phase is finished, the fellow intends to start to develop new tools that will improve the coding efficiency of the regions of interest.

Research skills and techniques and management:

The fellow has acquired very important skills to investigate how to formulate and solve complex problems in the research field. He has been working in the Fraunhofer-HHI Image Processing Department, where he has acquired skills to develop and test the performance of video coding software. Furthermore, he has benefited from the scientific and intellectual exchanges between colleagues of the department and from other related research institutes at the Technical University Berlin (TUB).

The fellow has also received scientific training in the last PROVISION training weeks in Berlin (24-26 February 2014) and Nantes (22-26 September 2014) about different interesting topics: HEVC Overview by Jens Ohm; Overview, Perspectives and Principles in Standardization; HEVC overview by Mathias Wien; HM reference software overview; Texture Analysis and Synthesis for Coding; Texture and Motion Models; Some Elements of Perceptual Video Compression.

The ESR is going to carry out two secondments: the first one will take place in the last quarter of 2015 at RWTH Aachen University and the second one is going to be at Technicolor in Rennes (France) in 2016 (Technicolor is one of the Associated Partners of PROVISION and thus part of the Supervisory Board). He is currently preparing the first of them in terms of possible topics and research partners. This will be an excellent opportunity to improve his work by interacting with researchers with similar topics in this university, as well as helping him to broaden his contact network.

Communications skills:

As mentioned earlier, the fellow's workplace is the Image and Video Coding Group in the Image Processing Department of the Fraunhofer HHI. The fellow is developing advanced communication skills by interacting with his colleagues, as well as with researchers with similar topics in TUB and other ESRs from PROVISION partners.

He has also received training in transferable skills in the context of the last PROVISION training week in Nantes. In these activities the ESR had to:

- Prepare a small presentation to introduce himself to other provision researchers and to give them a brief summary of his work in some kind of an elevator pitch, which is important for introducing the work in network situations, where there is not much time for explanation.

- Participate in a communication skills course given by the BBC Academy to help him improve how to pitch ideas and improve his presentation skills.
- Work in a team with other PROVISION researchers to design and prepare a newsletter, a leaflet and a video about the project.
- Prepare a small interview about his contributions to the project, which gave him first camera experience and media training.

Other professional training:

The fellow has taken part in a course for employees of the Fraunhofer-HHI Image Processing Department to learn how to use the subversion software about how to maintain current and historical versions source code and documentation.

The ESR is going to participate in the seminar "Der Weg zur erfolgreichen Promotion" (The right way to a get a PhD successfully) in November 2014, in which the ESR learns important skills about the development and organization of his PhD, such as how to organize the research materials, the importance of writing down all the scientific ideas, the different stages spanned in the process of developing the PhD, how to motivate himself to be more productive, etc.

The following Table 3 summarizes the progress of the fellow.

	Objective	To be done	Scheduled	Done
Research results	To publish in international	ICIP, PCS or similar 2015		
	To submit one journal paper	An IEEE paper (TCSVT or similar) 2015		
Research Skills and techniques, and Research management	To attend workshops and seminars	PROVISION Workshop September 2015 BBC, London, UK		PROVISION Workshop and seminar 22-26 September 2014 UoN, Nantes, France
	To attend courses	PROVISION Courses September 2015 BBC, London, UK	PROVISION Courses 23-27 February 2015 RWTH, Aachen, Germany	Development and organization of a PhD 12-14 November 2014 Fraunhofer Academy, Bonn, Germany
				Source Coding and Digital Image Communication Winter Semester 2013 and Summer Semester 2014 TUB, Berlin, Germany
	To follow a secondment	Technicolor 2015 Technicolor, Rennes, France	RWTH Last quarter of 2015 RWTH, Aachen, Germany	
Communication skills	To promote the Project through outreach activities	To be done		
	To work in groups inside Provision	PROVISION work group September 2015 BBC, London, UK	PROVISON work group 23-27 February 2015 RWTH, Aachen, Germany	PROVISION team building & work group 22-26 September 2014 UoN, Nantes, France
Other professional training	To follow trainings			Subversion Training 23 April 2014 HHI, Berlin, Germany
Other activities	To follow cultural and social activities			Participation in amateur Choir and Orchester Concerts Since october 2013 Berlin, Germany

Table 3: Synthetic view of the progress of the fellow Santiago De Luxan Hernandez.

2.2.2   ER1: Dan GROIS

Host: Fraunhofer Heinrich Hertz Institute (HHI)

Start date: 1 May 2014

Research subject: Test Model I (WP 5)

Research Results:

The Fellow is involved in specification, development and maintenance of the ITN reference software (i.e., the test model). The Fellow provided clear guidelines for the rest of fellows for the reference software update procedure toward starting the process of defining test data in collaboration with ESRs and other ERs.

The Fellow conducted several discussions with the rest of the fellows, and as a result, it was decided to develop the ITN reference software on a basis of HM 16.2, which is currently a latest version of the HEVC reference software. The main concerns were whether to use the latest reference software version HM 16.2, which includes the HEVC range extensions, or to use the previous version HM 15.0 without the range extensions. Finally, it was decided to use the HM 16.2 due to the following: a) the version 16.2 contains more than 20 bug fixes compared to the 15th version, while almost all of these bugs are relevant also for the 15th version (i.e. without the "range extensions"); b) in addition, several hundreds of code lines have been cleaned, as well as many variables have been renamed for the clearer representation ; c) also, by such a way, the upgrade process to next versions becomes much easier compared to a case when starting from version 15.

Research skills and Techniques, and Research Management:

As a part of the training program, the Fellow participated at the PROVISION Kick Off & Training Meeting at Nantes, France between September 22 and 26, 2014. During this one-week meeting, the Fellow participated in technical talks and lectures for enriching Fellow's technical and research skills.

Also, the Fellow participated at JCT-VC standardization meeting, which took place in Strasbourg, France from October 17 till October 24 (see Figure 10). There were many educating discussions, including discussions on High Dynamic Range (HDR), Wide Color Gamut (WCG), etc. In addition, there was a brainstorming & panel discussion of the future video codec development. This session was chaired by Jorn Ostermann from the University of Hannover, and there were 7 highly-known panelists from the industry: Stephane Pateux from Orange, Zhong Luo from Huawei, Harald Alverstrand from Google, Anne Aaron from Netflix, Jeonghoon Park from Samsung, Paul Torres from Qualcomm, and Roger Bolton from Ericsson. As a result, attending the JCT-VC meeting was very important for Fellow's technical skill development.

Figure 10: The JCT-VC standardization meeting in Strasbourg, France, October 2014.

In addition, the Fellow attended the International Conference on Image Processing (ICIP), which took a place between October 27 and October 31, 2014 in Paris, France (see Figure 11). As it is widely known, the ICIP conference is sponsored by the IEEE Signal Processing Society and is a premier forum for the presentation of technological advances and research results in the fields of theoretical, experimental, and applied image and video processing. During the ICIP conference, the most recent advances in the video coding field have been presented and discussed, such as new video compression algorithms, new perceptual quality metrics and perceptual pre-processing techniques, etc. In addition, during the conference, several very interesting and educating workshops have been conducted, such as "Image and Video Processing for Defense, Transportation, Homeland Security, and Observation from Space: Industrial Expectations and Technological Challenges", as well as various tutorials on the "hottest" research topics with regard to the video/image processing. Since the ICIP conference brings together leading engineers and scientists in image and video processing from around the world, the Fellow used this opportunity to introduce the PROVISION ITN project to many academic and industrial members, while emphasizing its importance and huge potential. As a result, the Fellow got many positive feedbacks, while there was a clear interest in this project and its outcomes.
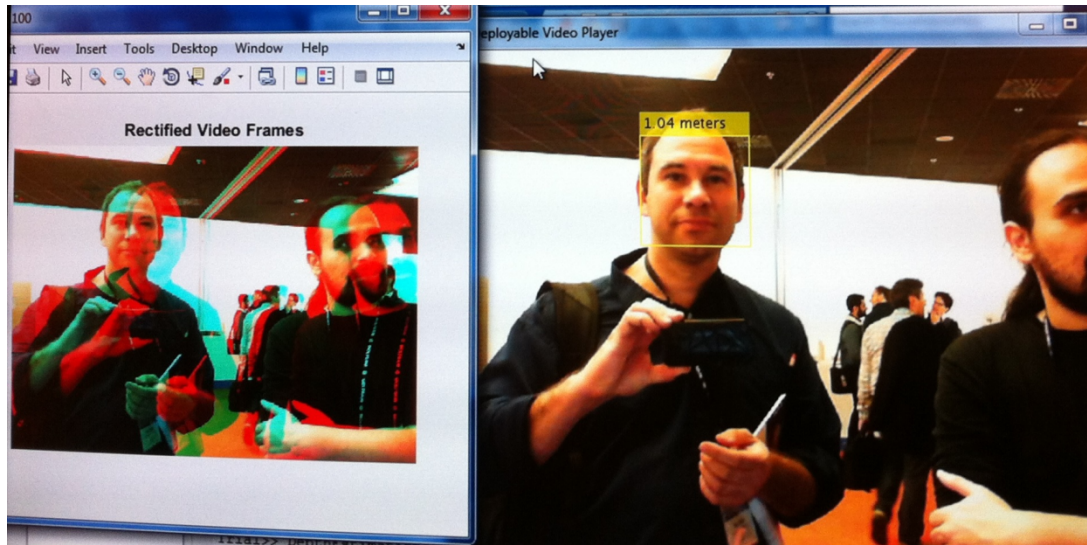
Figure 11: Demonstration at ICIP'2014.

Communications skills:

During the PROVISION Kick Off & Training Meeting at Nantes, France (September 22 till 26, 2014), the Fellow attended series of sessions for improving Fellow's communication skills. Particularly, the Fellow attended the "Presentation Skills" and "Pitching Ideas" sessions, which were conducted by the BBC Training Academy as well as the "Video Making Sessions" for making a video film that is supposed to introduce the PROVISION ITN project to the general audience.

The Fellow is responsible for the PROVISION ITN newsletter along with three other ESRs, thereby forming a Newsletter Team. The Newsletter Team recently proposed a template for the PROVISION newsletter as well as proposed particular issues to be presented at the first edition of the newsletter.

The Table 4 summarizes the overall training/research progress of the fellow.

	Objective	To be done	Scheduled	Done
Research results	To publish in top-tier conferences	ICIP 2015, and the like. 2015…		
	To submit 2-3 top-tier journal papers	IEEE journals:TCSVT, TIP 2015		
Research Skills and techniques, and Research management	To attend workshops and seminars	PROVISION Workshop September 2015 BBC, London, UK		PROVISION Workshop and seminar 22-26 September 2014 UoN, Nantes, France
	To attend courses	Engineering Leadership for Mid-Career Professionals June 2015 BBC, London, UK Entrepreneurship: TechCrunch Disrupt 2015 PROVISION Courses September 2015 BBC, London, UK	PROVISION Courses 23-27 February 2015 RWTH, Aachen, Germany	
	To attend top-tier conferences	ICIP 27-30 Sept. 2015 Quebec, Canada	ICME July 2015 Torino, Italy ICIP 27-30 October Paris, France	
	To participate in JCT-VC Meetings	JCT-VC meetings February, 2015	JCT-VC meetings June, 2015 JCT-VC meetings October, 2014 Strasbourg, France	
	To follow a secondment	VITEC July-August 2015 Paris, France	UoN September-October 2015 UoN, Nantes, France	
Communication skills	To promote the Project through outreach activities	To be defined		
	To work in groups inside Provision	PROVISION work group September 2015 BBC, London, UK Publication of the 1st issue of a PROVISION Newsletter February-March 2015	PROVISON work group 23-27 February 2015, RWTH, Aachen, Germany	PROVISION team building & work group 22-26 September 2014 UoN, Nantes, France
Other activities	To follow cultural and social activities	To be defined		

Table 4: Synthetic view of the progress of the fellow Dan Grois.

2.2.3   ESR4: Miltiadis ALEXIOS PAPADOPOULOS

Host: UoB

Start date: 01/03/2014

Research subject: Perceptual Rate-Quality Optimization – Quality Metrics Evaluation

Research results:

The researcher is currently working on creating an extended video samples database of high spatial and temporal resolution (UHD in 120fps) using dedicated professional equipment (RED Epic 5K Camera). With the help of a fellow research of his group, he has already acquired several (~80) 10secs sequences, which are to be properly graded and evaluated prior to their public release. Work on this particular database will form a publication for ICIP 2015. The researcher focuses his research on evaluating the performance of HEVC HM on sequences that include different textures (static/dynamic, natural/homogeneous etc.) and planning on introducing a new way of characterizing the included information of a sequence, instead of just using traditional SI-TI characterization.

Research Skills and techniques, and Research management:

The researcher has participated in the project's last general meeting in Nantes, September 2013, where he received training on improving his communication, organization and presentation skills. He received scientific training during the meeting on a number of interesting topics, including but not limited to: HEVC Overview by Jens Ohm; Overview, Perspectives and Principles in Standardization; HEVC overview by Mathias Wien; HM reference software overview; Texture Analysis and Synthesis for Coding; Texture and Motion Models; Some Elements of Perceptual Video Compression.

Figure 12: Equipment used for making the new database.

Figure 13: The new shooting/editing/subjective testing suite as reformed by the fellow.

He also invested time in acquiring skills in professional cinematography and photography, operating successfully related equipment (RED Epic, Phantom FLEX, REDCINE-X Pro software, see Figure 12). Lastly, he took part in the evaluation of the Vitae RDF Planner, a tool useful for personal career development from the scope of a researcher and PhD student.

Triggered by Dr Andrew Watson's visit in UoB, he proceeded in the reformation of VIL and in particular of the two editing/shooting/viewing studios (see Figure 13).

The fellow also followed courses on efficient research management, research data storage and PhD management, as part of UoB's policy on new postgraduates. Finally, he also took part in several subjective tests of fellow co-researchers, as a test subject, acquiring skills on performing proper evaluation trials. This also led to forming a cooperation with researchers from various disciplines, e.g. Experimental Psychology, gaining valuable knowledge for his own work.

Communications Skills:

The researcher is currently managing the creation of the project's public promotion video, alongside with a couple of fellow PROVISION ESRs. He previously took part in a communication skills training course supported by BBC, thus improving his ability to pitch ideas and to present them in an elegant and comprehensive way. Apart from that, he contributed to creating PROVISION's technical promotional video, by giving a short interview on camera, making himself accustomed to speaking in such occasions. In Nantes, he introduced himself, his skills and some of his ideas, in an elevator pitch form, given the short amount of time available.

Other professional training:

The researcher undertook Teaching Assistant lab duties for University of Bristol's EENG course "Signals & Systems", supported by his second supervisor Dr Dimitris Agrafiotis. Last May, he also had several hours of invigilation duties.

Despite that, he is reforming the Visual Information Laboratory's website, migrating to another platform and introducing new features to it.

Other activities:

The researcher is member of the local photography society called UoB's PhotoSoc, learning and practicing the concepts of analog and digital photography. He also joined the Future Ideas international academic competition as member of the Future of Design committee jury (profile and statement).

The following Table 5 summarizes the progress of the fellow.

	Objective	To be done	Scheduled	Done
Research results	To publish in international conferences	ICIP 2015 27-30 Sept. 2015 Quebec, Canada		
	To form new database of 4K sequences	Make database publically accessible 2015	Categorize sequences, form new descriptors based on measurement of texture January 2015 UoB, Bristol, UK	
			Captured ~80 sequences of 10secs at 120fps November 2014 UoB, Bristol, UK	
Research Skills and techniques, and Research management	To attend workshops and seminars	PROVISION Workshop September 2015 BBC, London, UK		PROVISION Workshop and seminar 22-26 September 2014 UoN, Nantes, France
	To attend courses	PROVISION Courses September 2015 BBC, London, UK	Courses on Managing his PhD, Research methodology and Storage of research data November 2014 UoB, Bristol, UK	
	To develop skills on specialized equipment		Build and maintain data storage and Beowulf cluster on a laboratory environment February-March 2015 UoB, Bristol, UK	Learnt operation of RED Epic, RED Cine, Phantom FLEX July 2014 UoB, Bristol, UK
	To follow a secondment		Secondment in BBC 2015 BBC, London, UK	
Communication skills	To support the creation of Project's public awareness video	Present a draft script to the project's administration January 2015 UoB, Bristol, UK	Created draft of content with aid from some of the project's members October-November 2014 UoB, Bristol, UK	
	To cooperate with other researchers	Cooperation with researcher from psychology department November 205 UoB, Bristol, UK		
	To work in groups inside Provision	PROVISION work group September 2015 BBC, London, UK	PROVISON work group 23-27 February 2015 RWTH, Aachen, Germany	PROVISION team building & work group 22-26 September 2014 UoN, Nantes, France
Other professional training	To invigilate during examination periods			Invigilation Summer 2014 UoB, Bristol, UK
	To assist as a Teaching Assistant		"Signals & Systems" November 2014 UoB, Bristol, UK	
	To develop a website	Publish beta version of website internally for evaluation January 2015 UoB, Bristol, UK	Created draft form of VIL's new wordpress based website October 2014 UoB, Bristol, UK	
Other activities	To develop professional skills indirectly associated with field of expertise		Evaluate applications as member of the Future of Design committee jury in Future Ideas international competition February 2015 UoB, Bristol, UK	Practising film shooting and development in PhotoSoc 2014 UoB, Bristol, UK

Table 5: Synthetic view of the progress of the fellow Miltiadis Alexios Papadopoulos.

2.2.4   ER3: Sebastian SCHWARZ

Host: BBC

Start date: 09/06/2014

Research subject: RB - Requirements and Benchmarking

Research results:

The fellow's main responsibility in PROVISION is the leadership of WP1 on "Use Cases, Service Requirements and User Behaviour". Within this work package, his job is to describe the practical systems targeted by the other research activities in WP2 to 5. He provides the context (use cases, scenarios and performance requirements) in which the technologies developed within PROVISION should be used and tested. Throughout the project, the fellow surveys the results achieved in WP 2-5 to help collate the different research paths towards our common research goals. Furthermore, the ER has a close eye on latest trends in technology and updates the project members on the latest activities in related projects, businesses and standardisation bodies.

Most of the fellow's responsibilities in WP1 are ongoing work. Following is a brief overview on his work topics, including accomplished and upcoming milestones:
- Use cases, service requirements and limits:
  - Proposed PROVISION common testing conditions (02.09.2014)
  - Industry survey on requirements for next generation Perceptually Optimised Video Coding (upcoming)
- Identify challenging content for video compression:
  - Analysis of complex video test sequences (ongoing)
  - Analysis of dynamic texture test sequences (ongoing)
  - Investigate video content features for coding performance estimation (ongoing)
  - Preliminary report provided internally (17.10.2014)
  - First draft of final report expected by 27.11.2014
- Synchronisation and integration between work packages:
  - Provided common test sequences on project FTP (22.09.2014)
  - Proposed common HM coding configurations (22.09.2014)
  - Proposed joint report files for coding experiments (22.09.2014)

The fellow is also assigned to a task in WP2 on new concepts for reference picture selection and will start working on this task from November 2014 on.

Research Skills and techniques, and Research management:

The fellow's scientific training benefits greatly from his current secondment at the University of Nantes, France (01.09.-28.11.2014). He receives supervision from some of the leading experts in human vision modelling and assistance in defining the requirements and constraints for WP1.

With further regard to his scientific training, the fellow participated in a variety of courses and events over the last few months. The main highlights, apart from the internal PROVISION training week, were the a joint DVB and EBU workshop on HDR video technologies in Munich, Germany (17.06.2014), and the QualiNet Summer School on Statistical and learning methods for reliable assessment of Quality of Experience in Nantes, France (25.-28.08.2014). The fellow also attended BBC R&D lunchtime lectures on Digital Signal Processing. In the near future the fellow will attend the 110th MPEG meeting in Strasbourg, France (17.-24.10.2014), and the 2014 International Conference on Image Processing (ICIP) in Paris, also France (27.-30.10.2014).

The ER is actively contributing to the scientific community as a reviewer for international journals, such as IEEE Transactions on Image Processing, IEEE Transactions on Circuits and Systems for Video Technology, and Springer 3D Research.

Communications Skills:

Apart from scientific skills, the ER received excellent transferable skills training, mostly by the BBC Academy, such as pitching ideas (25.09.2014), and presentation skills (26.09.2014). Follow-up courses in "influencing others" and "conversations that count" are scheduled for January and February 2015.

In addition to the training sessions, the fellow had the chance to exercise his skills in internal and external outreach activities:

- Presenting PROVISION to the general public during the 20th Commonwealth Games BBC R&D IP production showcase (London, 23.07-03.08.2014) (see also Figure 14).
- Preparing a special session proposal on perceptual-motivated video compression for the 2015 International Conference on Image Processing (ICIP) together with Prof. David Bull and Prof. Patrick Le Callet.
- Leading the information leaflet activities to raise the awareness for PROVISION, MSCA and perceptual video compression in industry, academia and the general public.
- Contributing to the storyline for the outreach videos "What is PROVISION" and "Introduction to our ESRs and ERs.

Figure 14: The fellow presented PROVISION during the 20th Commonwealth Games.

Other professional training:

The ER has completed an online training course on project management fundamentals by the BBC Academy (21.08.2014) as preparation of an upcoming two-day project management training event in the near future.

Other activities:

The fellow was certified as ambassador for the United Kingdom's science, technology, engineering and mathematics network (STEMNET). STEM Ambassadors use their enthusiasm and commitment to encourage young people to enjoy STEM subjects. They open the doors to a world of opportunities and possibilities that come from pursuing STEM subjects and careers. On his return to England, the ER is looking forward to inspire young people and support teachers in the classroom by explaining current trends in video technology research and industry.

The following Table 6 summarizes the progress of the fellow.

	Objective	To be done	Scheduled	Done
Research results	To provide common testing conditions		Revised draft January 2015	Proposed first draft 2 September 2014
	To provide industry survey on video coding requirements		Report January 2015 / Survey sent out November 2014	
	To analyse challenging video content		Follow-up report February 2015 / First report 17 October 2014	
	To synchronise and integrate			Common test pool, test configurations, report sheets, tools 22 September 2014
Research Skills and techniques, and Research management	To attend conferences, workshops and seminars	PROVISION Workshop September 2015 BBC, London, UK	110th MPEG Meeting 20-24 October 2014 Strasbourg, France / ICIP 2014 27-30 October 2014 Paris, France	PROVISION Workshop and seminar 22-26 September 2014 UoN, Nantes, France / DVB/EBU HDR Workshop 22-26 September 2014 Munich, Germany
	To attend courses	PROVISION Courses September 2015 BBC, London, UK / Courses about "Project management", "Management fundamentals", "Leading creative processes" 2015 BBC, London, UK	PROVISION Courses 23-27 February 2015 RWTH, Aachen, Germany / Course about "Influencing skills" 20 January 2015 BBC, London UK / Course about "Conversation skills" 20 January 2015 BBC, London UK	Qualinet Summer school 25-28 August 2014 UoN, Nantes, France
	To follow a secondment	Secondment with associated partner August 2015	Ongoing secondment at UoN 1 September - 28 November 2014 UoN, Nantes, France	
Communication skills	To promote the Project through outreach activities	Propose special session to ICIP September 2015 Québec city, Canada	Talk on perceptual video compression 24 November 2014 Technicolor, Rennes, France	20th Commonwealth games 23 July -03 August 2014 Glasgow, Scotland
	To work in groups inside Provision	PROVISION work group September 2015 BBC, London, UK / Supporting PROVISION outreach video in 2015	PROVISON work group 23-27 February 2015 RWTH, Aachen, Germany / Leading PROVISION leaflet activities	PROVISION team building & work group 22-26 September 2014 UoN, Nantes, France
Other professional training	To attend other trainings			Project management (online) 21 August 2014 BBC academy (on line)
Other activities	To take part in outreach activities	Promote STEM subjects to young people in the UK 2015 London, UK		Certified as STEMNET ambassador August 2014 London, UK

Table 6: Synthetic view of the progress of the fellow Sebastian Schwarz.

2.2.5   ESR5: Andre SEIXAS DIAS

Host: BBC

Start date: 1st February 2014

Research subject: Rate-Quality Optimisation II

Research results:

The research activities conducted so far are going according to the plan. The main objective set for the initial phase of the research work was to identify the main weaknesses of the state-of-the-art Rate-Distortion Optimisation solutions in terms of the perceptual aspects of video signals. At a first stage, this task involves getting familiar with state-of-the-art video compression solutions and the related software tools. At a second stage, several experiments need to be carried to test the state-of-the-art video compression solutions under challenging scenarios in order to search for potential areas of improvement. At the moment, the second stage is still being conducted and some research outcomes are expected upon its conclusion. These outcomes are expected to be published in an international conference.

Research skills and techniques and management:

The ESR has acquired some valuable research skills during these initial months in the project. These skills are, in their majority, related to the fact that the ESR's host institution is a full partner from the industry, allowing him to have a close contact with the research industry in the field of video compression.

Moreover, the ESR is currently on a secondment to another full partner (HHI) in Berlin. During this secondment, the fellow has been carrying an investigation on just noticeable distortion models and their application in video compression solutions. So far, this secondment has proved to be very valuable, as the ESR has been exposed to different research practices and has had the opportunity to establish contact with many highly skilled researchers in the field.

Apart from the aforementioned experiences, the ESR also participated in the 3rd Qualinet Summer School in Nantes on statistical and learning methods for reliable assessment of Quality of Experience. During this summer school, the fellow had the chance to enhance his research skills by attending several courses on relevant topics for his research, such as:

- Subjective test design and analysis.
- Machine learning and neural networks for QoE assessment.
- Verification and validation for objective measurement algorithms.
- Quality estimator effectiveness.

The fellow also participated in a group work within the Qualinet Summer School (see Figure 15). The topic of this group work was "Subjective Data Analysis" and it was performed together with 5 other attendees of the Summer School, under the supervision of an experienced researcher. The results of this group work were presented by the fellow and his group members in a final plenary presentation session on the last day of the Summer School.

Finally, the participation in the Qualinet Summer School was also an opportunity to establish contact with other researchers in the field and to acquire relevant knowledge that will be a valuable asset for his future research work.

Communications skills:

The ESR had the chance to improve his communication skills by attending the kick-off project meeting in Berlin (February 2014) and the second kick-off project meeting in Nantes (September 2014). The second kick-off meeting in Nantes, in particular, gave the ESR the chance to present some of his research work to the other fellows, supervisors and associate partners. Moreover, during this meeting, the ESR was involved in several training activities specifically aimed at improving the fellows' communication skills, such as the courses on "Presentation Skills" and "How to Pitch my Ideas" offered by the BBC Academy.

The participation in the Qualinet Summer School in Nantes was also an excellent opportunity for the fellow to develop his communication skills. The fellow had to present himself and his current research activities in a poster presentation session on the first day of the event. The participation in the group work within the Summer School also allowed the fellow to further develop his communication skills by interacting with the other attendees and presenting the outcomes of their joint effort.

Figure 15 : Group work presentation in the final plenary presentation session of the 3rd Qualinet Summer School in Nantes.

Other professional training:

The ESR received some extra technical training by attending the Digital Signal Processing Lectures offered by the BBC R&D department. These lectures target to improve the knowledge of the members of the BBC R&D department in digital signal processing.

Other activities:

The ESR completed his eligibility to work as an ambassador of the Science, Technology, Engineering and Mathematics (STEM) program in the UK. This program targets to offer dissemination actions in British schools to encourage young students to pursue a career in the STEM fields of study. The ESR is expecting to be involved in some of these actions after his return to the UK from his secondment at HHI in Berlin.

A summary of the progress of the fellow is shown Table 7.

	Objective	To be done	Scheduled	Done
Research results	To submit one International conference paper	Submit a paper to an international conference - MMSP 2015 or similar 2015		
Research Skills and techniques, and Research management	To attend Workshops and Seminars	PROVISION Meeting August 2015 BBC, London, UK	PROVISION Meeting 23-27 February 2015 RWTH, Aachen, Germany	PROVISION Kick-off Meeting 24-26 February 2014 HHI, Berlin, Germany PROVISION Kick-off Meeting II 22-26 September 2014 UoN, Nantes, France
	To attend courses	PROVISION Lectures August 2015 BBC, London, UK	PROVISION Lectures 23-27 February 2015 RWTH, Aachen, Germany	Qualinet Summer school 25-28 August 2014 UoN, Nantes, France PROVISION Lectures 22-24 September 2014 UoN, Nantes, France
	To go on a Secondment to a Full Partner		Study of Just Noticeable Distortion Models August-December 2014 HHI, Berlin, Germany	
Communication skills	To participate in Group Works	PROVISON Group Work August 2015 BBC, London, UK	PROVISON Group Work 23-27 February 2015 RWTH, Aachen, Germany	Qualinet Summer School Group Work 25-28 August 2014 UoN, Nantes, France PROVISON Group Work 22-26 September 2014 UoN, Nantes, France
	To receive Training in Communication Skills			BBC Academy Training 25-26 September 2014 UoN, Nantes, France
Other professional training	To have Technical Training Activities for the BBC R&D staff			Digital Signal Processing Lectures February-July 2014 BBC, London, UK
Other activities	To take Part in Outreach Activities	STEM Outreach Early 2015 London, UK		

Table 7: Synthetic view of the progress of the fellow Andre Seixas Dias.

2.2.6   ESR6: Uday THAKUR

Host: RWTH Aachen University

Start date: 1st April 2014

Research subject: Analysis and Synthesis of Static and Dynamic Textures

Research Results:

The fellow investigated state-of-art texture analysis and synthesis models and will continue to investigate it further in the coming months. He worked on strategic planning towards the development of novel methods for texture analysis and synthesis in coming months. He also learnt to perform simulation on HM software and will continue to learn it, followed by implementation of identified approach.

Research skills and techniques and management:

The fellow participated in the HM training session (24th Sept., 2014) hosted by the PROVISION group at Nantes. The HM training provided the ESR skills on how to run simulation on HM software.

He performed literature study on the state of art solutions in texture synthesis and is also attending relevant courses like multimedia communication system and computer vision at RWTH. The courses will help the ESR in better understanding of the research.

He attended plenary session at the Marie Sklodowska Curie Conference (19-20 June, Copenhagen) on writing scientific proposals for an ERC grant. The event helped the ESR to improve the technical writing skills.

ESR is scheduled to have two secondments in second/third year (2015, 2016), one at the UOB, which is full partner followed by MSRA Beijing, which is an associate partner. These secondments will train the ESR in complementary technical skills and provide assistance in developing analysis and synthesis tools for static and dynamic textures.

Communications skills:

The fellow attended workshop on "Working within a Team" at the Marie Sklodowska Curie Conference (Copenhagen, see Figure 16). The workshop helped ESR in inculcating skills like how to support, motivate, and communicate with other team members. The workshop helped the ESR to be a better teammate in the PROVISION team.

He regularly participates in the lab meetings held once in every 2-weeks time with other colleagues at his workplace. In the meeting, ESR communicates his research with other fellows and exchange ideas. The meeting helps the ESR in developing his presentation and communication skills.

Figure 16: The ESR at the MSCA conference, in Copenhagen.

The PROVISION meeting held at Nantes (22-26 Sept, 2014), in the meeting the ESR presented his research to other members of the team (see Figure 17).

Figure 17: At the PROVISION meeting in Nantes, the fellow is presenting his research.

He participated in the 2-days communication skills course held at Nantes, offered by the BBC Academy. The course helped the ESR on how to pitch ideas and improve his presentation skills.

He worked with other PROVISON teammates to design a newsletter and a promotional video for the project. The activity helped in teambuilding and creative thinking.

Other professional training:

The fellow also supervised two master degree students for seminar presentation on "Selected Topics in Signal Processing". In addition to this the fellow is currently supervising a project on "Static & Dynamic Texture Synthesis" which will be accomplished by 2 master degree students. The supervision helps the ESR to gain first hand teaching knowledge and improve communication skills.

The ESR is also enrolled in Chinese language course for his all-round development.

A summary of the progress of the fellow is shown Table 8.

	Objective	To be done	Scheduled	Done
Research results	To do Literature survey			Static & Dynamic textures April-Oct 2014 RWTH, Aachen, Germany
	To perform basic simulations on HM			HM software July-Sept 2014 RWTH, Aachen, Germany
Research Skills and techniques, and Research management	To attend workshops and seminars	PROVISION Workshop September 2015 BBC, London, UK	PROVISION Workshop 23-27 Feb 2015 RWTH, Aachen, Germany	PROVISION Workshop 22-26 Sept 2014 UoN, Nantes, France
	To attend courses	PROVISION Courses September 2015 BBC, London, UK	Computer Vision, Multimedia Communication System 1 March 2015 RWTH, Aachen, Germany	
			PROVISION Courses 23-27 Feb 2015 RWTH, Aachen, Germany	
			Poster presentation and networking at conferences 27-28 Nov 2014 RWTH, Aachen, Germany	
	To develop softs, to integrate into the Project joint test model	Static texture synthesis Jan-May 2015 RWTH, Aachen, Germany	Texture analysis using complex wavelets May-Nov 2014 RWTH, Aachen, Germany	
		Dynamic texture synthesis Dec-Oct 2015 RWTH, Aachen, Germany		
	To follow a secondment		Analysis & Synthesis of static and Dynamic textures March 2016 UoB, Bristol, UK	
Communication skills	To promote the Project through outreach activities	European Researcher Night 2015 Aachen, Germany		
		Others events 2015 Aachen, Germany		
	To work in groups inside Provision	PROVISION work group sept-15 BBC, London, UK	PROVISON work group 23-27 Feb 2015 RWTH, Aachen, Germany	PROVISION team building & work group 22-26 Sept 2014 UoN, Nantes, France
Other activities	To supervise trainees	Bachelor/Master Thesis 2015 onwards RWTH, Aachen, Germany	Project for master students Sept 2014 -Mar 2015 RWTH, Aachen, Germany	
			Seminar Presentation on Selected topics in signal processing Sept-Dec 2014 RWTH, Aachen, Germany	

Table 8: Synthetic view of the progress of the fellow Uday Thakur.

2.2.7   ESR7: Olena CHUBACH

Host: RWTH Aachen University

Start date: 04 April 2014

Research subject: Estimation and Compression of Advanced Motion Fields

Research results:

As mentioned in the Career Development Plan, the ESR is investigating the state of the art in methods of estimation and compression of motion fields and identifying novel methods for efficient motion representation. Currently research is in the stage of analysis and investigation of the performance impact of the proposed approach. The ESR started implementation of identified approach in MATLAB.

Research skills and techniques and research management:

The ESR has acquired important skills in formulation and solving complex problems in the research field. While working at RWTH Aachen University she has acquired skills in testing of video coding software performance. Furthermore, she has gained experience in the scientific and intellectual exchanges with colleagues of the department and other related research institutes of RWTH Aachen University.

The ESR has received scientific training in the PROVISION meeting in Nantes (22-26 September 2014) on next topics:

- Overview, Perspectives and Principles in Standardization;
- HEVC Overview;
- HM Reference Software Overview;
- Texture Analysis and Synthesis for Coding;
- Texture and Motion Models;
- Some Elements of Perceptual Video Compression.

During the next year the ESR is going to carry out two secondments: the first one is planned to take place at BBC (British Broadcasting Corporation) in April – July 2015; the second one will be at one of PROVISION associated partners. The decision on this second secondment is currently under planning and will be determined in near term. The secondments will provide an excellent opportunity for the ESR to achieve complementary technical skills in standardization activities and broadcasting technologies as well as assisting in developing coding tools for advanced motion representation. In addition, it will help her to broaden her contact network.

Communications skills:

The ESR has attended MSCA Conference, opened to Marie Curie Fellows and alumni. The theme was "Transferable skills: MSCA added value for your CV" that focused on Marie Curie Fellows non-research skills which are very useful for a researcher. The conference took place on the 19-20 June 2014 in Copenhagen, Denmark.

The ESR attends Video Coding Group meetings at the Institut für Nachrichtentechnik, held every two weeks. She is developing her communication skills through the daily interaction with her colleagues, as well as with researchers with similar topics at RWTH and other ESRs from PROVISION partners.

She also got experience in practicing transferable skills in the context of the PROVISION meeting in Nantes (22-26 September 2014). During these activities the ESR performed the following tasks:

- Prepare a presentation for introducing herself to other PROVISION researchers and giving them a brief overview of her work.
- Participate in a communication skills course given by BBC Academy, which helped her to improve pitching ideas and presentation skills.
- Work in a team with other PROVISION researchers in order to design and prepare a newsletter, a leaflet and a video template about the project.
- Prepare an interview about her contributions to the project.

The fellow also helps logistically to organize the next PROVISION Meeting in Aachen (23-27 February 2015).

Other professional training:

The ESR has attended following seminars, provided by the Center for Doctoral Studies of RWTH Aachen University:

- Poster Presentation and Networking at Conferences (11-12.09.14)
- Good Scientific Practice (18-19.09.14)
- Academic Presenting (07,14,21.11.14)

During the next few months, it is planned to attend following seminars provided by RWTH Aachen University:

- Scientific Writing Webinar (Essential Techniques for Writing Good Scientific Texts) (November 2014 – January 2015)
- Training Session in Introduction to Project Management (29.01.15)

Also, the ESR attends lectures, provided by RWTH:

- Multimedia Communication Systems 1 and 2 (Prof. Dr.-Ing. Jens-Rainer Ohm) (Summer-Winter Semester 2014-2015)
- Computer Vision (Prof. Dr. Bastian Leibe) (Winter Semester 2014-2015)
- German language courses (Winter Semester 2014-2015)

For the next few months, the ESR will supervise a hired student assistant, who will work on motion modeling under her guidance.

The following Table 9 summarizes the progress of the fellow.

	Objective	To be done	Scheduled	Done
Research results	To construct a software framework	Performance assessment and preparation of scientific papers based on the work implementation 2015 RWTH, Aachen, Germany	Investigation of motion estimation and motion compensation approaches in the frequency domain. Implementation of identified approach in MATLAB 2015 RWTH, Aachen, Germany	Investigation of motion estimation and motion compensation approaches in HEVC April-June 2014 RWTH, Aachen, Germany
Research Skills and techniques, and Research management	To attend workshops and seminars	PROVISION Workshop September 2015 BBC, London, UK	Voice and Presentation Training 27-27 January 2015 RWTH, Aachen, Germany	PROVISION Workshop and seminar 22-26 September 2014 UoN, Nantes, France
		Scientific Writing 3 (Writing and Publishing Scientific Research Papers) 2015 RWTH, Aachen, Germany	Project Management 04-05 March 2015 RWTH, Aachen, Germany	Poster Presentation and Networking at Conferences 11-12 September 2014 RWTH, Aachen, Germany
			Academic Presenting 07,14,21 November 2014 RWTH, Aachen, Germany	Good Scientific Practice 18-19 September 2014 RWTH, Aachen, Germany
			Scientific Writing 2 (Essential Techniques for Writing Good Scientific Texts) November 2014 – January 2015 RWTH, Aachen, Germany	
	To attend courses	PROVISION Courses September 2015 BBC, London, UK	PROVISION Courses 23-27 February 2015 RWTH, Aachen, Germany	Multimedia Communication Systems 1 and 2 April-July 2014 RWTH, Aachen, Germany
			Video Coding: Algorithms and Specification 2-13 March 2015 RWTH, Aachen, Germany	
			Computer Vision October 2014 – February 2015 RWTH, Aachen, Germany	
	To follow a secondment	Secondment at BBC April-July 2015 BBC, London, UK		
Communication skills	To promote the Project through outreach activities	Science Night 2015 August 2015 RWTH, Aachen, Germany		MSCA Conference 19-20 June 2014 Copenhagen, Denmark
	To work in groups inside Provision	PROVISION work group September 2015 BBC, London, UK	PROVISON work group 23-27 February 2015 RWTH, Aachen, Germany	PROVISION team building & work group 22-26 September 2014 UoN, Nantes, France
Other professional training	To supervise trainees	Supervision of hired student assistants 2015 RWTH, Aachen, Germany	Supervision of hired student assistants December 2014 - February 2015 RWTH, Aachen, Germany	
Other activities	To follow cultural and social activities	German language courses 2015 RWTH, Aachen, Germany	German language courses October 2014 – March 2015 RWTH, Aachen, Germany	

Table 9: Synthetic view of the progress of the fellow Olena Chubach.

2.2.8 ESR9: Karam NASER

Host: UoN

Start date: 01/03/2014

Research subject: Perceptual Fidelity and Spatio Temporal Textures

Research results:

The fellow started the investigation on texture similarity as a part of his research on texture perception. He realized a state-of-the-art on this problem considering its psychophysical, neurobiological and signal processing point of view. He focused mainly on similarity metrics from texture retrieval problem.

In parallel he published the results of this first study in the Digital Signal Processing conference (DSP, 20-23 August 2014, in Hong Kong).

The fellow is planning to continue his work by further investigating about the models of spatio-temporal texture perception. Besides that, he will also have deep insight looking at texture synthesis and segmentation, rate distortion optimization and perceptual post-processing.

Research Skills and techniques, and Research management:

The fellow has participated in the 3rd Qualinet Summer School hold in Nantes (25-28 August 2014), about "Statistical and learning methods for reliable assessment of Quality of Experience". During these 4 days, the fellow attended courses in different aspects of Data Quality assessment:

- Subjective test design and data analysis
- Machine learning and Neural Network for QoE assessment
- Verification and validation for objective measurement algorithms
- Statistical methods for video quality assessment
- Quality estimator of effectiveness
- Statistical Analysis and dataset alignment
- Neural Networks in R

Besides that, the summer school organized an active learning consisting on Group Work (consisting of 6 attendees under the supervision of an experienced researcher), and plenary Group Work Presentation (presentation of results). So the fellow participated to these Group Works on the topic of verification and validation and of a quality metric.

The fellow will continue developing further skills and build up scientific network through taking courses offered by the university of Nantes (such as scientific writing, methodology and strategy of research) and also attending conferences (possibly VPQM 2015 and ICIP 2015).

He will have in July 2015, his secondment in Aachen under the supervision of Prof. Dr. Jens-Rainer Ohm. He will be trained about advanced motion models for spatio-temporal textures.

Communications Skills:

The fellow had the chance to develop his communication skills through several occasions (for promoting PROVISION and video compression) with different types of audience (industrials, researchers, general public including school children).

He participated to a "Start West" event (8 April 2014, in Nantes, see Figure 18) and to the Web2Day (4-6 June 2014, in Nantes, see Figure 19), where he was in charge of communicating with many funders, start-uppers and businessmen about video compression in general and about the ITN-PROVISION project in special.

Figure 18: "Start West" event in Nantes.

He also participated to "La Fête de la Science" (9-10 October and 16 October 2014, in Nantes and its area, see Figure 20), where the audience is young primary school pupils, and he introduced them, in a friendly manner using simple demos, some aspects of the research and the image compression.

The fellow has co-organized events hold in his lab (IRCCyN). He helps logistically with his colleagues the organization of the 3rd Qualinet summer school and to the PROVISION meeting in Nantes (22-26 September 2014). He is also in the organization Committee of the "Welcome day event PhD Students" (20 November 2014, in Polytech Nantes), where the main scope is to show the organization, the role and the missions of the ED STIM (for "Ecole Doctorale STIM") for helping the new PhD students.

Other professional training:

The fellow, as being interested in developing his academic career, obtained other skills during this period. He co-supervised 2 internships (with the responsibility to distribute tasks and to help the students):

- March-June 2014: master thesis for the international master MDM (Master degree in multimedia and data management, Polytech Nantes) on the topic of *Fractal Domain Texture Similarity Metric*.
- July-September 2014: internship for a 4th year engineering student of Polytech'Nantes on the topic of *Machine Learning Approach for Prediction Textures Compression Distortion*.

Currently he co-supervises a project (an introduction to research work) of one semester (September 2014-January 2015) for a 5th year engineer student of Polytech'Nantes. The topic is about *Dynamic Texture Classification and Rate-Distortion Optimization*.

The fellow has been enrolled in teaching activities in October 2014 for the international master MDM (see above). Exactly he taught and prepared a course about HEVC and its 3D extension, comprising 6 hours of lectures, 3 hours of practical session using the HM, and a group work (review of research papers). He plans also to continue teaching this course in 2015.

The following Table 10 summarizes the progress of the fellow.

	Objective	To be done	Scheduled	Done
Research results	To publish in international conferences	ICIP 2015 27-30 Sept. 2015 Quebec, Canada	VPQM (submited) 5-6 February 2015 Arizona, USA	DSP 20-23 August 2014 Hongkon, China
	To submit one journal paper	An IEEE paper about "Texture similarity applied to video coding" september 2015		
Research Skills and techniques, and Research management	To attend workshops and seminars	PROVISION Workshop September 2015 BBC, London, UK		PROVISION Workshop and seminar 22-26 September 2014 UoN, Nantes, France
	To attend courses	PROVISION Courses September 2015 BBC, London, UK	Courses about Scientific writing, Methodology and strategy of research Spring semester 2015 UoN, Nantes, France PROVISION Courses 23-27 February 2015 RWTH, Aachen, Germany	Qualinet Summer school 25-28 August 2014 UoN, Nantes, France
	To develop softs, to integrate into the Project joint test model		Static texture similarity metric April 2015 UoN, Nantes, France	Experimenting STSIM in HEVC April-June 2014 UoN, Nantes, France
	To participate to one VQEG meeting	VQEG Meeting July 2015		
	To follow a secondment		Study of Advanced Motion Models July 2015 RWTH, Aachen, Germany	
Communication skills	To promote the Project through outreach activities	Fête de la Science October 2015 Nantes Others events 2015 Nantes	Fête de la Science 9-10 October 2014 Nantes and its area	Start West 8 April 2014 Nantes Web2day 4-6 June 2014 Nantes
	To work in groups inside Provision	PROVISION work group September 2015 BBC, London, UK	PROVISON work group 23-27 February 2015 RWTH, Aachen, Germany	PROVISION team building & work group 22-26 September 2014 UoN, Nantes, France
Other professional training	To teach		HEVC course for MDM Master October 2014 & October 2015 Polytech'Nantes, France	
	To supervise trainees	Internship for engineer students July-september 2015 Polytech'Nantes, France	Project for engineer students Sept 2014 -Jan 2015 Polytech'Nantes, France	Master thesis for MDM Master March-June 2014 Polytech'Nantes, France Internship for engineer student July-Sep 2014 Polytech'Nantes, France
Other activities	To follow cultural and social activities	"Français Langue Etrangère" course May 2015 UoN, Nantes, France		

Table 10: Synthetic view of the progress of the fellow Karam Naser.

2.2.9   ESR10: Yashas RAI

Host: UoN
Start date: 01/06/2014
Research subject: Short Term Quality Metric

Research results:

ESR-10 began his work on "Short Term Quality Metric" by a thorough literature review to understand the state of the art regarding of three important aspects that he believes are key to his model: Attention Mechanisms, Theory of Perception and Short Term Visual Memory. He has understood and critically analyzed the past research and results from several noted Human-Machine Interaction Scientists, Psychophysicists, Neuroscientists and Vision Researchers. He has developed a model and a road-map of what problems and effects are important for him to develop a Short Term Quality Metric and is now performing a more detailed analysis on certain blocks key to his model.
The fellow is currently investigating the effect of peripheral vision mechanisms and the role they play in influencing saliency and perceptual annoyance. The fellow is planning to continue his work by further investigating the role of Spatio-Temporal CSF at Sub and Supra Threshold regions in addition to various masking effects. He has laid the necessary groundwork and is performing further investigations in this direction.

Research Skills and techniques, and Research management:

To learn further about the theory of Quality Analysis, the fellow attended the Qualinet Summer School - "Statistical and learning methods for reliable assessment of Quality of Experience". During the 4 days, the fellow attended courses in different aspects of Data Quality assessment including,

- Subjective test design and data analysis
- Machine learning and Neural Network for QoE assessment
- Verification and validation for objective measurement algorithms
- Statistical methods for video quality assessment
- Quality estimator of effectiveness
- Statistical Analysis and dataset alignment
- Neural Networks in R

In addition, the summer school organized an active learning consisting on Group Work (consisting of 6 attendees under the supervision of an experienced researcher), and plenary Group Work Presentation (presentation of results). The fellow participated to the Group Works on the topic of verification and validation and of a quality metric.
The fellow will continue developing skills and build up scientific network by taking courses offered by the University of Nantes (such as scientific writing, methodology and strategy of research), online courses related to the Theory of Visual Perception (ex - from Duke University),
In the summer of 2015, the fellow plans a brief research visit to his secondment institution i.e. BBC, London under the supervision of Dr. Martha Mrak who is also one among the board members of his PhD Thesis. He plans to continue

his work on temporal distortion perception mechanisms further, and develop a professional insight into his work there which will further his career prospects in the future. In addition, the fellow has a planned internship with Technicolor in Sep 2016 and is therefore closely following their activities.

Communications Skills:

Promoting PROVISION by means of various outreach activities and other organizational responsibilities has helped the fellow to further his communication skills with different types of audience (academic and corporate researchers, general public including school children). In addition, the fellow has learned the technique of interacting and marketing the value of his research, more specifically the project - PROVISION, to leading academicians and scientists from the industry.

He also manned a stall at the Web2Day event (see Figure 19) between 4-6 June 2014 held in Nantes, where he was in charge of communicating with many venture capitalists, startups and businessmen about his work on video and also about the ITN-PROVISION project.

Figure 19: "Web2Day" event in Nantes.

He also participated in the "La Fête de la Science" (see Figure 20) between 9-10 October and 16 October 2014 held in Nantes and its surroundings, where primary school pupils in the age-group of 9-10 years were introduced to video compression using simple demos and also some aspects of research problems in the area of image compression.

Figure 20: Participation to "La Fête de la Science"

The fellow has co-organized events in his lab (IRCCyN) -and has been especially active in the organization of the 3rdQualinet summer school. The Summer school had participants from all over the world and he was involved in every aspect of the event ranging from preparing the venue to finally greeting off the participants. In addition, he was active in the organizational activities of the PROVISION meeting in Nantes held between 22-26 September 2014.

Other professional training:

As the fellow has expressed extreme interest in advancing his career in the direction of corporate research, appropriate activities are planned for him in the year 2015/16.

He is expected to be closely involved with the activities of the organization, Technicolor in the year 2015-16 in addition to having a short stint of about two months at the BBC in London. In this way he is expected to get a taste of ongoing research in this area in the big corporate organizations.

He plans also to supervise Bachelor students on an exchange program from India and Master students from the MDM course at University of Nantes, in the month of February 2015.

The following Table 11 summarizes the progress of the fellow.

	Objective	To be done	Scheduled	Done
Research results	To publish in international conferences	ICIAP 2015 9-11 Sep 2015 Genova, Italy	QoMEX 2015 26-29 May Greece	
	To submit one journal paper		An IEEE paper about "The Associated human factors in short term video quality evaluation"	
Research Skills and techniques, and Research management	To attend workshops and seminars	PROVISION Workshop September 2015 BBC, London, UK		PROVISION Workshop and seminar 22-26 September 2014 UoN, Nantes, France
	To attend courses	PROVISION Courses September 2015 BBC, London, UK	Courses about Scientific writing, Methodology and strategy of research Spring semester 2015 UoN, Nantes, France PROVISION Courses 23-27 February 2015 RWTH, Aachen, Germany	Qualinet Summer school 25-28 August 2014 UoN, Nantes, France
	To develop softwares related to the research		Gabor+ Motion spatio-temporal CSF based quality metric to be integrated with the HEVC test model April 2015 software to evaluate perceptual disturbance to peripheral artefacts December 2014	
	To participate to one VQEG meeting	VQEG Meeting August 2015	VQEG Meeting participation-3D Video special session December 2014 Nantes	
	To follow a secondment		Short Term Quality Metric June 2016 BBC, London	
Communication skills	Promoting PROVISION via Outreach Activites		Fête de la Science 9-10 October 2014 Nantes and its area	Web2day 4-6 June 2014 Nantes
	To work in groups inside Provision	PROVISION work group September 2015 BBC, London, UK	PROVISON work group 23-27 February 2015 RWTH, Aachen, Germany	PROVISION team building & work group (Leaflet group) 22-26 September 2014 UoN, Nantes, France
Other professional training	To get involved with the activities of a commercial organization		Planned Internship and other research activities at Technicolor 2015 Rennes, France	
	To supervise trainees	Project for a Master Student January 2015 Polytech'Nantes, France	Project for a Bachelor Student February 2015 Polytech'Nantes, France	
Other activities	To follow cultural and social activities		French Language course at the Maison Des Chercheurs-Level A2 January 2015 UoN, Nantes, France	French Language course at the Maison Des Chercheurs-Level A1 September 2014 UoN, Nantes, France

Table 11: Synthetic view of the progress of the fellow Yashas Rai.

2.2.10 ESR12: Ahmed ALDAHDOOH

Host: UoN

Start date: 01/09/2014

Research subject: Content-Aware Delivery (CAD)

Research results:

The fellow started his PhD 3 month ago. In this period, he has been reviewing the state-of-the-art of his problem. Starting with video streaming over RTP/UDP and the error resiliency methods introduced in the previous standards. Then, he started to have deep insight looking in the streaming over HTTP/TCP. In parallel, he reviewed, and still, the perceptual effect of transmission error to the end users.

The fellow's next step is to investigate the HEVC structure, RTP protocol for HEVC, and a wide view in video content properties (spatial and temporal). A paper about sequence-level content-aware R-D-C optimization will be published in respected journal/conference.

Research Skills and techniques, and Research management:

The fellow received scientific and training course in PROVISION meeting in Nantes (22-26/9/2014). These courses included:

- Perspectives and Principles in Standardization;
- HEVC overview;
- HM reference software overview;
- Texture Analysis and Synthesis for Coding;
- Texture and Motion Models;
- Some Elements of Perceptual Video Compression.

In February 2015, he will receive other courses in PROVISION meeting in Aachen. The fellow, also, is planning to have courses offered by university of Nantes (possibly: methodology and strategy of research) or by other academic/research bodies. The fellow joined conference calls of two VQEG-JEG meetings to learn more about research management.

In April 2015 (tentative), the fellow will have his secondment in University of Bristol. He will investigate more in his topic especially error resiliency tools and content properties.

Communications Skills:

The fellow has a chance to do group works in PROVISION meeting. He participated workgroups in Nantes meeting and will participate others in Aachen BBC.

The fellow did not have an opportunity yet to promote PROVISION project, but he plans to participate in outreach activities especially, here in Nantes, "Fête de la Science 2015".

Other professional training:

The fellow plans to pursue his academic career. To do so, he plans to have:

- Teaching lab sessions to Multimedia and Data Management (MDM) Master Program. Especially in Visual perception course (February-March 2015).
- Co-supervising master project of MDM master student if it does not contradict with the secondment period.
- Supervising international guesting bachelor students in Nantes.

He participated to the "Training of trainers" of MEDMOBILE project in Athens in the period of 8-10/10/2014. This project is aiming to train youth academics from Mediterranean area universities in how to write exchange and mobility programs.

The following Table 12 summarizes the progress of the fellow.

Objective	To be done	Scheduled	Done
Research results To publish in international	ICIP 2015 2016		
To submit one journal paper	CSVT 2015		
Research Skills and techniques, and Research management To attend workshops and seminars	PROVISION Workshop September 2015 BBC, London, UK		PROVISION Workshop and seminar 22-26 September 2014 UoN, Nantes, France
To attend courses	PROVISION Courses September 2015 BBC, London, UK	Courses about Scientific writing, Methodology and strategy of research Spring semester 2015 UoN, Nantes, France PROVISION Courses 23-27 February 2015 RWTH, Aachen, Germany	
To develop softs, to integrate into the Project joint test model	Extracting features for video sequences 2015 UoN, Nantes, France		
To participate to one VQEG meeting	VQEG Meeting July 2015		
To follow a secondment	Study of resilience tools April 2015 UoB, Bristol, UK		
Communication skills To promote the Project through outreach activities	Fête de la Science October 2015 Nantes Others events 2015 Nantes		
To work in groups inside Provision	PROVISION work group September 2015 BBC, London, UK	PROVISON work group 23-27 February 2015 RWTH, Aachen, Germany	PROVISION team building & work group 22-26 September 2014 UoN, Nantes, France
Other professional training To teach		HEVC course for MDM Master October 2014 & October 2015 Polytech'Nantes, France	
To supervise trainees	Internship for engineer students July-september 2015 Polytech'Nantes, France		
Other activities To follow cultural and social activities	"Français Langue Etrangère" course May 2015 UoN, Nantes, France	Beginner French Language Course October-December 2014 UoN, Nantes, France Training of trainers of MEDMOBILE project 8-10 October 2014 Athens	

Table 12: Synthetic view of the progress of the fellow Ahmed Aldahooh.

3. Annex

3.1 Program of the Meeting in Nantes (September 2014)

Agenda

**PROVISION Kick Off & Training, Nantes
September 22nd – 26th, 2014**

2nd Kick Off Provision	Consortium + Fellows
Training	ESRs + ERs
Supervisory Board Meeting	SB

MONDAY, 22 September 2014

08:00 – 08:30 hrs	Welcome/ Reception
08:30 – 09:30 hrs	Introduction of ESRs and ERs (3 Minutes per Fellow)
09:30 – 10:30 hrs	Introduction of Consortium & Project Overview by Detlev Marpe, HHI
10:30 – 10:45 hrs	Coffee Break
10:45 – 11:45 hrs	WP 1 Requirements & Benchmarking by Sebastian Schwarz, BBC
11:45 – 12:45 hrs	WP 5 Test Models and Core Experiments by Dan Grois, HHI
12:45 – 14:00 hrs	Lunch
14:00 – 15:00 hrs	WP 2 Advanced Motion Models by Jens Ohm, RWTH
15:00 – 15:30 hrs	Coffee Break
15:30 – 16:30 hrs	WP 3 2D/3D Reconstruction Methods by David Bull, UoB
16:30 –17:30 hrs	WP 4 Perceptual Tools and Quality Assessment by Patrick Le Callet, UoN
17:30 hrs	Wrap Up 1st Day

TUESDAY, 23 September 2014

08:30 – 08:45 hrs	Welcome		
08:45 – 10:00 hrs	WP 7 Coordination & Training by Antje Nestler, HHI Including: Introduction to Vitae by Dimitris Agrafiotis, UoB Input for next training event		
10:00 –10:30 hrs	Coffee Break		
10:30 – 12:30 hrs	WP 6 Dissemination by Patrick Le Callet & UoN Fellows, UoN	10:30 – 11:00 hrs	Introduction Website/ Intranet by Klaus Hopf, HHI
		11:00 – 11:15 hrs	Introduction to Linkedin, Facebook Page by Antje Nestler, HHI
		11:15 – 12:45 hrs	Break Out Session (Group Work) Newsletters and Flyer by Sebastian Schwarz, BBC and Yashas Rai, UoN / Consortium Meeting

12:45 –13.00 hrs	Summary WPs & Questions
13:00 – 14:00 hrs	Lunch
14:00 – 14:30 hrs	Overview, Perspectives and Principles in Standardization by Jens Ohm, RWTH
14:30 – 16:00 hrs	HEVC Overview by Mathias Wien, RWTH
16:00 – 17:00 hrs	HM Overview by Karsten Sühring, HHI
17:00 – 17:30 hrs	Wrap Up 1st Training Session
19 hrs	Social Dinner

WEDNESDAY, 24 September 2014

08:45 – 09:00 hrs	Welcome		
09:00 – 10:00 hrs	Texture Analysis and Synthesis for Coding by Dave Bull, UoB		
10:00 – 11:00 hrs	Texture and Motion Models by Jens Ohm, RWTH		
11:15 –11:30 hrs	Coffee Break/ Welcome Philippe Guillotel, Technicolor		
11:30 – 12:30 hrs	Visual Quality Assessment by Philippe Guillotel, Technicolor		
12:30 – 13:30 hrs	Q&A and Wrap Up 2nd Training Session		
12:30 – 13:30 hrs	Lunch		
13:30 – 16:00 hrs	Supervisory Board Meeting	13:30 – 17:30 hrs	HM Practical Session by Karsten Sühring, HHI
17:30 hrs	END Day 3		

THURSDAY, 25 September 2014

08:15 – 08:30 hrs	Welcome
08:30 – 12:30 hrs	Pitching Ideas by BBC Training Academy
12:30 – 14:00 hrs	Lunch
14:00 – 17:30 hrs	Video Making Session: "What is video compression?"
17:30 hrs	END Day 4

FRIDAY, 26 September 2014

08:15 – 08:30 hrs	Welcome
08:30 – 12:30 hrs	Presentation Skills by BBC Training Academy
12:30 – 14:00 hrs	Lunch
14:00 – 17:00 hrs	Video Making Session: "Introduction to our ESRs and ERs"
17:00 hrs	END Day 5