COST Action IC1206
(Action 26.03. 2013. – Action 25.03. 2017.)

De-identification for privacy protection in multimedia content

PROGRESS REPORT 2
(Action start date: 26.03.2013. – Report date: 26.09.2015.)

This report is submitted by the MC Chair on behalf of the Management Committee and is validated by the Scientific Committee of the COST Association.

Confidentiality: the document will be made available to the public via the Action page on the COST website except for Section II.D.

Executive summary of the Progress Report:
(max.500 words) (to be completed by Action Chair describing the Action's progress with achieving the Action MoU objectives and generating outputs and impacts – see Annex 1 definitions)

The achievements according to objectives defined in MoU (pages 11-12) are:
- Sharing knowledge and technology among experts
    - 28 COST countries link
    - 1 COST Near Neighbour Countries, 3 non COST countries (USA, China, Argentina) link
    - 45 MC members
    - 165 members of WG1 - WG4 from 45 institutions participating in the Action link
    - 6 MC meetings
    - 7 WG1-WG4 meetings: 53 presentations and 8 invited speakers links 1 2 3 4 5 6 7
    - 2 Core Group meetings links 1 2
- Transfer of knowledge to all stakeholders
    - BiForD 2014 Special Session on Biometrics & Forensics & De-identification and Privacy Protection organized by IC1206 and IC1106 COST Actions link
    - IEEE FG 2015 Workshop De-identification for Privacy Protection in Multimedia link videolink linkPapers
    - IEEE MIPRO 2015 Special Session on Biometrics, Soft-biometrics and De-identification link
- Links with other organizations, international projects and COST Actions
    - IC1106 "Integrating Biometrics and Forensics for the Digital Age" link
    - 2 joint meetings of IC1206 WG4, IC1106 WG6 and the EAB, Darmstadt, 2013., 2015. links 1 2
- Cooperation with regulatory and standards bodies
    - NIST link
    - EAB (European Association for Biometrics)
    - Hungarian Data Protection Authority
    - Croatian Data Protection Agency
- Training of ESRs and end-users by means of training schools
    - 21 STSMs links 1 2 3
    - the first training school was prepared in the period from June to September and held in Limassol, Cyprus in 7-11 October 2015. link
- Multi-lateral and national projects
    - 10 proposed projects in the field of de-identification and privacy protection (eg. SCOPES, NATO SPS, USensor - Innovative Training Networks)
    - approved projects: H2020 OCTAVE, "De-identification for Privacy Protection in Surveillance Systems" DePPSS, "De-identification Methods for Soft and Non-Biometric Identifiers" DeMSI, "Enhancing Information Security through Robust Audio-Visual Biometrics under Spoofing Attacks"

- De-identification methods for privacy protection
  - proposed taxonomy of the classes of biometric/soft biometric/non-biometric identifiers that are normally present in multimedia contents; see NISTIR 8053 "De-Identification of Personal Information" link
  - proposals of new methods for the de-identification of faces in different poses on video
  - development of new methods for soft-biometrics de-identification (tattoos, gender)
  - new methods for de-identification in natural language processing and on-line speaker de-identification using voice transformation
- Legal, ethical and social repercussions of de-identification
  - legal aspects of biometric data processing: current state link
  - legal aspects of CCTV Data De-Identification link
  - social costs of surveillance and the case of Biometrics link
- Gender balance and ESRs in the COST Action (WG1-WG4)
  - 25 % female
  - 19% ECIs/ESRs
- International, SMEs and industry cooperation
  - Carnegie Mellon University, USA
  - University of North Carolina at Charlotte, USA
  - Institute of Automation, Chinese Academy of Sciences, China
  - CONICET, Argentina
  - Safran Morpho
  - Alpineon (SME)
  - SignalGeneriX (SME)
- Inclusiveness target countries
  - among 20 ITCs 13 countries participate in the Action
- More than 150 scientific papers were published within the scope of this Action link

Summary assessment of Progress Review by Action Rapporteur:

This COST Action mainly focuses on the privacy preserving problem when biometrics are used as a mean of personal identification. In particular, the so-called de-identification approach is proposed for investigation.

Although this COST Action's range is mainly on biometrics, participants also investigated non-biometrics based systems (multi-media documents) and soft biometrics as well. The goals declared in the MoU have been generally reached and allowed a good dissemination effort. The impact of what obtained so far is expected, on average, to be forseen in 2-5 years, which is quite reasonable since de-identification is a novel research topic. This also partially justifies the fact that, besides a good dissemination activity, the numerous partners in this Action did not couple with a significant exploitation activity, which are expected to appear in the Final report.

Main core of the Action has been the publication of several conference papers, whose quantity appears a bit slight with respect to the number of participants (28) during three years (2013-2015). The majority of them has been published in events organized by the Action's partners, whose target has been largely made up of scientific experts. From this point of view, a better focus on a larger spectrum of targets is necessary. On the other hand, two project proposals have been done thanks to this Action and this is for sure a very good achievement for all partners.

The Action is a bit lacking of cooperation with other IPCs (only one case is reported in this Report), whilst the list of invited speakers to the events organized by this Action's partners are very good and added a significant value to the promoted research in this COST Action.

To sum up, my evaluation of this COST Action is positive. I found it very interesting and its expected results are very promising for the future of (non)biometric applications.

Action Rapporteur	Name: Gian Luca Marcialis Institution: University of Cagliari Country: Italy

Validation by Scientific Committee

This report was validated by the Scientific Committee on: <insert date of SC validation>

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I. Progress Report
I.A. COST Action Profile

Objective/ Aim

C.1 Aim

The aim of the Action is to facilitate and promote coordinated efforts in automated person de-identification in multimedia content (text, image, audio and video) through the provision of an effective and innovative approach to the integration of relevant European experts, institutions and organisations, as well as non-COST experts (from China and United States). The Action will deliver concrete results of collaborative research based on vibrant partnerships across disciplinary boundaries. The expected deliverables include novel approaches to robust de-identification, based on the development of effective methods and algorithms for concealing (or removing where appropriate) the biometric identifiers as well as soft- and non-biometric features in the given multimedia documents. Moreover, the Action will deliver guidelines and recommendations for the development of standards in order to maximise the efficacy and employability of de-identification. It will provide the required insights and perspectives on social, ethical, legal aspects of privacy, and will facilitate self-sustaining links and cooperation amongst the researchers, the potential end-users, and system integrators.

C.2 Objectives

The main objectives considered for the Action can be summarized as follows.
- To establish mechanisms for sharing knowledge and technology among experts in different (usually complementary) fields related to automated de-identification and reversible de-identification for privacy protection in multimedia contents.
- To determine the classes of biometric/soft biometric/non-biometric identifiers that are normally present in multimedia contents. Special attention will be paid to a combination of identifiers that belong to different classes and appear simultaneously in multimedia documents (e.g., voice and lip-motion; face and gait, dressing and gesture) and methods for dealing with such identifiers.
- To specify approaches to characterising the correspondence between the choice of de-identification method(s) and the given scenarios and environments.
- To provide innovative solutions for concealing, or removal of, identifiers while preserving data utility and/or naturalness (e.g. de-identification of voice and face in a given video document whilst preserving natural movement of lips).
- To investigate reversible de-identification and to provide a thorough analysis of security risks of reversible de-identification.
- To provide a detailed analysis of legal, ethical and social repercussion of reversible/non-reversible de-identification (e.g., repercussion of reversible/non-reversible de-identification on the behaviour of users of social networks such as Facebook, YouTube and Twitter; determination of privacy protection requirements on Internet sites and social networks; and scientific and technical approaches to fulfilling such requirements);
- To establish cooperation with regulatory and standards bodies (IEC, ITU-T, CEN) in preparation of guidelines and recommendations for maximising the efficacy and employability of de-identification (e.g. cooperation with ISO/IEC Joint Tech. Committee)
- To promote and facilitate the transfer knowledge to all stakeholders (scientific community, end-users, etc.) through workshops, conference special sessions, seminars and publications.
- To initiate innovation in the training of ESRs and end-users by means of training schools (e.g., online and onsite schools and events and STSMs);

Details			
MoU:	IC1206-MoU	Start of Action:	26/03/2013
CSO approval date:	21/11/2012	End of Action:	25/03/2017

COST Member Countries and Cooperating State having accepted the MoU

Country	Date	Country	Date	Country	Date	Country	Date
Austria	08/04/2013	Belgium	26/03/2013	Bosnia and Herzegovina	12/03/2013	Croatia	14/12/2012
Cyprus	13/02/2013	Czech Republic	27/02/2013	Denmark	19/12/2012	FYR Macedonia	25/12/2012
Finland	14/01/2013	France	22/01/2013	Germany	17/01/2013	Greece	26/02/2013
Hungary	07/10/2013	Ireland	24/11/2014	Israel	09/10/2013	Italy	29/01/2013
Malta	19/12/2012	Netherlands	02/07/2013	Norway	29/05/2013	Poland	14/12/2012
Portugal	11/01/2013	Serbia	24/04/2013	Slovakia	08/08/2013	Slovenia	25/03/2013
Spain	30/11/2012	Switzerland	01/03/2013	Turkey	10/04/2013	United Kingdom	27/11/2012

Total: 28

Intentions to Accept the MoU

0

Other participants:

Institution Name	Country
Carnegie Mellon University	United States of America
Institute of Automation, Chinese Academy of Science	China
West Virginia University	United States of America
CONICET, Buenos Aires	Argentina
Yanka Kupala State University of Grodno, Belarus	Belarus, COST Near Neighbour Country

Contacts
Chair/ Vice Chair

Position	Name	Contact details	Country	Date of PhD:	Gender
Chair:	Prof Slobodan RIBARIC	University of Zagreb, Faculty Electrical Engineering and Computing Unska 3,10000 Zagreb, Croatia Tel. +38516129952 slobodan@zemris.fer.hr	Croatia	1982.	M
Vice Chair:	Prof Carmen GARCIA MATEO	Universidad de Vigo EE de Telecomunicacion Campus Universitario,36310 Vigo,Spain Tel. +649136767 carmen.garcia@uvigo.es	Spain	1993	F

Working Group Leaders

WG#	WG Title	WG Leader	Country	Date of PhD:	Gender	Number of participants
1	De-identification methods for biometric identifiers	Isabel Trancoso	Portugal	1987	F	75
2	De-identification methods for soft- and non-biometric identifiers	Zheng-Hua Tan	Denmark	1999	M	47
3	Applications and added value of de-identified data	Jean-François Bonastre	France	1994	M	24
4	Ethical, bioethical, societal and legal aspects and guidelines for de-identification and reversible de-identification	Emilio Mordini	Italy	1981 (MD)	M	19

Other positions if applicable (STSM Coordinator, WG Vice Leader, Task Force Leader…)

Position	Name	Country	Date of PhD:	Gender
STSM Coordinator	Patrizio Campisi	Italy	1999	M
WG1 Vice Leader	Piotr Staroniewicz	Poland	2001	M
WG2 Vice Leader	Marcos Faundez Zanuy	Spain	1998	M
WG3 Vice Leader	Ivo Ipšić	Croatia	1996	M
WG4 Vice Leader	Joe Cannataci	Malta	1986	M

Action website:	http://costic1206.uvigo.es/

I.B. Progress with MoU objectives and deliverables and additional outputs
MoU objectives

MoU objective	Achieved Yes/ Partially/ No	Evidence of (partial) achievement including hyperlink to enable assessment of the achievement[1]. Justification if full achievement is not foreseen

To establish mechanisms for sharing knowledge and technology among experts in different (usually complementary) fields related to automated de-identification and reversible de-identification for privacy protection in multimedia contents.	Yes	For each objective insert evidence of (partial) achievement including hyperlink to enable assessment (by the Action Rapporteur) of the achievement and access by end users
		--- 	
		53 presentations in 7 WGs meetings links 1 2 3 4 5 6 7
		8 invited speakers:
		  - Raul Sanchez-Reillo
		  - Anil K. Jain
		  - Krum Garkov
		  - Patrick Bours
		  - Andrea Cavallaro
		  - Els Kindt
		  - Peter Kimpián
		  - Claudio Ferretti
		21 Short Term Scientific Missions links 1 2 3
		Preparation of the First training school link

To determine the classes of biometric/soft biometric/non-biometric identifiers that are normally present in multimedia contents. Special attention will be paid to a combination of identifiers that belong to different classes and appear simultaneously in multimedia documents (e.g., voice and lip-motion; face and gait, dressing and gesture) and methods for dealing with such identifiers	Yes	The following proposed taxonomy of the identifiers in multimedia content that have to be de-identified in order to protect privacy is inspired by the Safe Harbour approach. According to this approach, which constitutes the guiding principles for de-identification in healthcare applications, there are 18 types of identifiers that have to be de-identified in order to cover the identity of the recipients of health-care services (patients).
		Taxonomy:
		
		• Non-biometric identifiers including text context, speech context, specific socio-political and environmental context, dressing style, and hairstyle;
		  - de-identification and anonymization of medical databases link 1 2
		  - hair de-identification link
		  - de-identification in natural language processing links 1 2
		  - security and protection of digital images by using watermarking methods link
		
		• Biometric identifiers are the distinctive, measurable, generally unique and permanent personal characteristics used to identify individuals. In the following, they are usually categorized as physiological (face, iris, ear, fingerprint) versus behavioural (voice, gait, gesture, lip-motion, stile of typing);
		  - face de-identification links 1 2 3 4 5 6 7 8 9 10 11 12 13 14

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[1] The links to the outputs and deliverables will be used by the Action Rapporteur in assessing the progress.

		- voice de-identification links [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#) [15](#) [16](#) [17](#) - gait de-identification links [1](#) [2](#) - de-identification of persons performing various activities links [1](#) [2](#) [3](#) - de-identification of online handwritten signals [link](#) - de-identification of vein pattern [link](#) • Soft biometric identifiers provide some vague physical, behavioural or adhered human characteristic that is not necessarily permanent or distinctive (height, weight, eye colour, silhouette, age, gender, race, moles, tattoos, birthmarks, scars). In most cases soft biometric identifiers alone cannot provide a reliable personal identification, but they can be used for improving the performance of recognition or to classify people into particular categories, which is also privacy intrusive. - tattoos links [1](#) [2](#) [3](#) [4](#) - gender links [1](#) [2](#) - age [link](#) - race [link](#) - skin colour links [1](#) [2](#) - siluethe and weight links [1](#) [2](#) Active participation in preparation of Internal Report 8053 - De-Identification of Personal Information/ National Institute of Standards and Technology (U.S. Department of Commerce) NIST/ [link](#) 25 papers on BiForD 2014 Special Session on Biometrics & Forensics & De-identification and Privacy Protection organized by IC1206 and IC1106 COST Actions [link](#) 7 papers on IEEE FG 2015 Workshop De-identification for Privacy Protection in Multimedia [link](#) [videolink](#) [linkPapers](#) 4 papers on IEEE MIPRO 2015 Special Session on Biometrics, Soft-biometrics and De-identification [link](#)
To specify approaches to characterising the correspondence between the choice of de-identification method(s) and the given scenarios and environments	Partially	The general framework of de-identification describes different scenarios from still image capture to video capturing (casual videos, public surveillance and private surveillance videos), audio and audio-video capturing, criteria for de-identification and methods of subverting the de-identification. • Simple scenario of face de-identification in still images links [1](#) [2](#) [3](#) • De-identification in videos links [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) • De-identification in drone's videos links [1](#) [2](#) [3](#) • De-identification in social networks [link](#)

To provide innovative solutions for concealing, or removal of, identifiers while preserving data utility and/or naturalness (e.g. de-identification of voice and face in a given video document whilst preserving natural movement of lips)	Yes	face de-identification links 1 2 3 4 5 6 7 8 9 10 11 12 13 14 voice de-identification links 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
To investigate reversible de-identification and to provide a thorough analysis of security risks of reversible de-identification	Partially	Reversible de-identification used in social networks Secure JPEG Scrambling Enabling Privacy in Photo Sharing link
To provide a detailed analysis of legal, ethical and social repercussion of reversible/non-reversible de-identification (e.g., repercussion of reversible/non-reversible de-identification on the behaviour of users of social networks such as Facebook, YouTube and Twitter; determination of privacy protection requirements on Internet sites and social networks; and scientific and technical approaches to fulfilling such requirements)	Partially	Due to the social, legal and political importance of privacy protection, de-identification also requires a platform for studies of the legal, ethical and social aspects of de- and re-identification in multimedia content and social network sites, as well as the strong cooperation of experts from technical and social sciences. Privacy protection in citizen identification processes link Legal aspects of biometric data processing: current state of affairs link BiForD 2014. Session II. link The legal impact of digital age on employment relationship. link Strategic agenda on Ethical, societal, and Privacy aspect of biometric Technologies 2 joint meetings of IC1206 WG4, IC1106 WG6 and the EAB, Darmstadt, 2013., 2015. link 1 2
To establish cooperation with regulatory and standards bodies (IEC, ITU-T, CEN) in preparation of guidelines and recommendations for maximising the efficacy and employability of de-identification (e.g. cooperation with ISO/IEC Joint Tech. Committee)	Yes	NIST link EAB (European Association for Biometrics) links 1 2 Hungarian Data Protection Authority links 1 2 Croatian Data Protection Agency links 1 2 2 joint meetings of IC1206 WG4, IC1106 WG6 and the EAB, Darmstadt, 2013., 2015. link 1 2
To promote and facilitate the transfer knowledge to all stakeholders (scientific community, end-users, etc.) through workshops, conference special sessions, seminars and publications	Yes	BiForD 2014 Special Session on Biometrics & Forensics & De-identification and Privacy Protection organized by IC1206 and IC1106 COST Actions link EAB, Preserving Privacy in an Age of Increased Surveillance - A Biometrics Perspective, October 27, 2014, London link IEEE MIPRO 2015 Special Session on Biometrics, Soft-biometrics and De-identification link BiForD 2014 Special Session on Biometrics & Forensics & De-identification and Privacy Protection organized by IC1206 and IC1106 COST Actions link IEEE FG 2015 Workshop De-identification for Privacy Protection in Multimedia link videolink linkPapers Safran Morpho Alpineon (SME) SignalGeneriX Ltd (SME)

To initiate innovation in the training of ESRs and end-users by means of training schools (e.g., online and onsite schools and events and STSMs)	Partially	7 WG meetings - participations of ESRs and PhD students links 1 2 3 4 5 6 7 Preparation of the First training school link 8 invited speakers links 1 2 3 4 5 6 7 21 STSMs links 1 2 3

MoU deliverables

MoU deliverable	Level of progress[1]	Evidence of (partial) delivery achievement including hyperlink to enable assessment of the delivery[1]. Justification if full achievement is not foreseen

Novel solutions in the field of de-identification.
Novel approaches to robust de-identification, based on the development of effective methods and algorithms for concealing (or removing where appropriate) the biometric identifiers as well as soft- and non-biometric features in the given multimedia documents
	Yes	• Non-biometric identifiers:
		  - de-identification and anonymization of medical databases link 1 2
		  - hair de-identification link
		  - de-identification in natural language processing links 1 2
		  - security and protection of digital images by using watermarking methods link
		
		• Biometric identifiers:
		  - face de-identification links 1 2 3 4 5 6 7 8 9 10 11 12 13 14
		  - voice de-identification links 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
		  - gait de-identification links 1 2
		  - de-identification of persons performing various activities links 1 2 3
		  - de-identification of online handwritten signals link
		  - de-identification of vein pattern link
		
		• Soft biometric identifiers:
		  - tattoos links 1 2 3 4
		  - gender links 1 2
		  - age link
		  - race link
		  - skin colour links 1 2
		  - siluethe and weight links 1 2

Guidelines and recommendations for the development of standards	Partially	Active participation in preparation of Internal Report 8053 - De-Identification of Personal Information/ National Institute of Standards and Technology (U.S. Department of Commerce) NIST/ link
Ethical, bioethical, societal and legal aspects and guidelines for de-identification and reversible de-identification	Partially	Privacy protection in citizen identification processes link Legal aspects of biometric data processing: current state of affairs link BiForD 2014. Session II. link The legal impact of digital age on employment relationship. link Strategic agenda on Ethical, societal, and Privacy aspect of biometric Technologies 2 joint meetings of IC1206 WG4, IC1106 WG6 and the EAB, Darmstadt, 2013., 2015. link 1 2

Co-authored publications and FP7/ H2020 proposals
The co-authored publications and FP7/ H2020 proposals/ projects resulting from the Action are listed on the page following the "Additional outputs and achievements" section

Additional outputs and achievements

Please describe any other outputs and achievements that have resulted or are in progress, focusing in particular on those that contribute to the COST mission of "COST enables break-through scientific developments leading to new concepts and products and thereby contributes to strengthen Europe's research and innovation capacities."

The outputs and achievements that have resulted or are in progress:
- JPEG transmorphing algorithm, which converts an image to its processed version while preserving sufficient information about the original image in the processed image. It does this by inserting partial information about the original image in the application markers of the processed JPEG image file, so that the original image can be later recovered. This JPEG transmorphing algorithm will be included in the standards for privacy protection on social networks. linkPaper linkPresentation

- Mini-drone video dataset: The created dataset consists of 38 different contents captured in full HD resolution, with a duration of 16 to 24 seconds each, shot with the mini-drone Phantom 2 Vision+ in a parking lot. The dataset contents can be clustered in three categories: normal, suspicious, and illicit behaviours. Normal content depicts people walking, getting in their cars and parking their vehicles. In suspicious content, nothing a priori wrong happens but people act in a questionable way. Contents with illicit behaviours show people miss-parking their vehicles, stealing items and cars, or fighting. All participants read and signed a consent form, stating they agree to appear with their vehicles in the video. linkDatabase linkSTSM linkPresentation linkPaper

- Innovative Training Networks (ITN) H2020-MSCA-ITN-2016 Proposal (in progress) "USENSOR" - "Humans as a sensor by fusion of Biometrics & Social Media" (This proposal is to be evaluated as ETN): USensor (You Sensor) proposes a European Training Network which considers Soft Biometrics and Social Media complementary approaches that turn individuals into sensors, providing a rich stream of data concerning their current physical, emotional and social context. Taking advantage of this information to promote smart society requires multidisplinary professionals with know-how in the field of Privacy & Security of personal information as the tools a Social Biometrics professional need to deploy in order to provide privacy-protecting mechanisms that do not have an impact on usability and preserve the sensitive nature of the personal information, alleviating the ever-increasing concerns that users of social networks pose regarding how private information is handled.

- Scientific and industrial cooperation on the H2020 project OCTAVE, Objective Control of TAlker VErification. The part of the project concerns the sensitive aspects related to the secure and safe collection, transmission, storage and processing of personal data. Initially the existing legal framework for the manipulation of personal data is surveyed as it will form the context for all developments of the TBAS platform. To this end applicable EU legislation and member state specializations will be surveyed and documented. In addition to the legal framework, the technical framework for the development of the TBAS platform will be defined. Existing standards, procedures, best practices, as well as applicable technologies will be surveyed and documented as well. Both the legal and the technical framework will form the security context in which the development of the TBAS platform will take place. It will also provide its input related to the security aspects for the collection, transmission and manipulation of personal data during the development and implementation of the TBAS platform. To this end it will monitor compliance of the platform with the documented legal and technical framework and will implement the functionalities related to the secure manipulation of personal data. Finally, it will provide an assessment and feedback for the applicability of the legal and technical frameworks in which the TBAS platform will be developed. The OCTAVE partners are: academic bodies (University of Hertfordshire, University of Aalborg, University of Eastern Finland); research institutes (Fondazione Ugo Bordoni, Research and Education Laboratory in Information Technologies, EURECOM); product vendors (Validsoft, APLcomp) and custom solution developers based on

State of Art products (Advalia); large-scale ICT integrators (ATOS); large-scale Business users (SEA, Findomestic). ProjectLink

- Work in the progress is related to the "Privacy by design" - Approach to privacy that uses technology as a way to enforce legal obligations. Goal is to identify and mitigate privacy risks from the very beginning, when the means for the processing of data are determined and throughout the lifecycle of the processing. PresentationLink

Co-authored publications and FP7/ H2020 proposals
Co-authored publications

Enter in the table below only publications on the topic of the Action, co-authored by at least two Action participants from two different countries participating in the Action and for which the Action networking added value. A maximum of ten publications may be entered. If the Action has more than ten such publications the Core Group should select the ten most significant ones to include in the table below.

NO.	Bibliographic data (including: Title, Authors, Title of the periodical or the series, Issue number or volume, Publisher, Year of publication, Relevant pages)	Main author	Number of authors	Action participants listed among the authors (Name, country and role[2])	WGs involved in publication	Date of submission (must be after Action start date)	Expected date of publication (if not already published)	Persistent link to publicly available version of the paper (if available) or the abstract	Is/Will open access[3] provided to this publication?	Is/ will COST be cited/ acknowledged in the publication?	Are/ will COST funds (be) implicated in this publication	Relevance to H2020 Societal Challenges[4]?	Is it peer-reviewed?	Was the added value of the Action Networking necessary for the publication	Impact Factor (if applicable)
1	J. Portêlo, B. Raj, I. Trocoso, Logsum using Garbled Circuits, PLoS One, vol. 10, n. 3, doi: 0.1371/journal.pone.0122236, March 2015	J. Portêlo	3	Isabel Trancoso, Portugal, MC member Bhiksha Raj, USA, MC observer	WG1, WG2	February 2014	Already published	http://www.inesc-id.pt/pt/indicadores/Ficheiros/11006.pdf	yes	no	no	yes	yes	Yes	3.234
2	Ribaric, S.; Pavesic, N., An overview of face de-identification in still images and videos, Automatic Face and Gesture Recognition (FG), 2015 11th IEEE International Conference and Workshops on, Year: 2015, Volume: 04 Pages: 1 - 6	Ribaric, S.	2	Ribaric, S., Croatia, MC member ; Pavesic, N., Slovenia, MC member	WG1, WG2, WG4	January, 2015.	Already published	http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7285017	no	yes	yes	yes	yes	yes	N/A
3	Marinozzi, S.; Faundez Zanuy, M., Digital speech algorithms for speaker de-identification Cognitive Infocommunications (CogInfoCom), 2014 5th IEEE Conference on Year: 2014, Pages: 317 - 320	Marinozzi, S	2	Marinozzi, S.;Italy, WG member Faundez Zanuy, M. Spain, MC member,	WG1, WG2	January, 2014.	Already published	http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7020470	no	yes	yes	yes	yes	yes	N/A
4	Pavel Korshunov ,Marco V. Bernardo, Antonio M.G. Pinheiro, Touradj Ebrahimi Impact of Tone-mapping Algorithms on Subjective and Objective Face Recognition in HDR Images Proceeding CrowdMM '15 Proceedings of the Fourth International Workshop on Crowdsourcing for Multimedia Pages 39-44	Pavel Korshunov	4	Antonio Pinheiro (Portugal, MC member) Touradj Ebrahimi (Switzerland MC member)	WG3, WG4	July 2015	October 2015	http://infoscience.epfl.ch/record/210823/files/2015-crowdmm-hdr-cameraready.pdf	Yes	Yes	No	yes	Yes	Yes. An STSM started this collaboration	N/A
5	Bonetto, M.; Korshunov, P.; Ramponi, G.; Ebrahimi, T. Privacy in mini-drone based video surveillance Automatic Face and Gesture Recognition (FG), 2015 11th IEEE International Conference and Workshops on Year: 2015, Volume: 04 Pages: 1 - 6	Margherita Bonetto	4	Touradj Ebrahimi (Switzerland MC member), Margherita Bonetto, WG memeber	WG3, WG4	March 2015	Already published	http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7285023	Yes	Yes	No	yes	Yes	Yes. An STSM started this collaboration	N/A 7
6	KRIŽAJ, Janez, ŠTRUC, Vitomir, DOBRIŠEK, Simon, MARČETIĆ, Darijan, RIBARIĆ, Slobodan. SIFT vs. FREAK : assessing the usefulness of two keypoint descriptors for 3D face verification. In: Special Session on Biometrics, Forensics, De-identification and Privacy Protection, Opatija, Croatia, May 29 - 30, 2014. RIBARIĆ, Slobodan (ur.).BiForD 2014 : proceedings, (MIPRO, ISSN 1847-3938). Rijeka: Croatian Society for Information and Communication Technology, Electronics and Microelectronics - MIPRO, cop. 2014, pp. 123-128	KRIŽAJ, Janez	5	ŠTRUC, V., Slovenia, WG Member; Dobrišek S., Slovenia, MC Substitute; Ribaric S., Croatia, Action Chair; MARČETIĆ, D, Croatia, WG Member	WG1, WG2	Early 2014	Already published	On IEEE Xplore: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6859775	No, but a freely accessible copy of the publication is available from the homepage of one of the authors: http://luks.fe.uni-lj.si/sl/osebje/vitomir/pub/MIPRO2014a.pdf	Yes	Yes	Yes	Yes	Yes	N/A

#	Publication	First author	No.	Authors / countries / roles	WG	Date	Status	Link							
7	MARČETIĆ, Darijan, RIBARIĆ, Slobodan, ŠTRUC, Vitomir, PAVEŠIĆ, Nikola. An experimental tattoo de-identification system for privacy protection in still images. In: Special Session on Biometrics, Forensics, De-identification and Privacy Protection, Opatija, Croatia, May 29 - 30, 2014. RIBARIĆ, Slobodan (ur.). BiForD 2014 : proceedings, (MIPRO, ISSN 1847-3938). Rijeka: Croatian Society for Information and Communication Technology, Electronics and Microelectronics - MIPRO, cop. 2014, pp. 69-74	MARČETIĆ, Darijan	4	ŠTRUC, V., Slovenia, WG Member; N. Pavešić, Slovenia, MC Member; Ribaric S., Croatia, Action Chair; MARČETIĆ, D., Croatia, WG Member	WG1, WG2	Early 2014	Already published	On IEEE Xplore; http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6859766	No	Yes	Yes	Yes	Yes	Yes	N/A
8	JUSTIN, Tadej, ŠTRUC, Vitomir, DOBRIŠEK, Simon, VESNICER, Boštjan, IPŠIĆ, Ivo, MIHELIČ, France. Speaker de-identification using diphone recognition and speech synthesis. In: 11th IEEE International Conference on Automatic Face and Gesture Recognition (FG 2015), Ljubljana, Slovenia, May 4-8, 2015. FG 2015, IEEE 2015, DeID, pp. 1-7	JUSTIN, Tadej	6	ŠTRUC, V., Slovenia, WG Member; Dobrišek S., Slovenia, MC Substitute; Vesnicer B., Slovenia, MC Substitute; Mihelič F., Slovenia, MC Substitute; I. Ipšić, Croatia, MC Member	WG1, WG2	15. October 2014	Already published	On IEEE Xplore: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7285021	No, but a freely accessible copy of the publication is available from the homepage of one of the authors: http://luks.fe.uni-lj.si/sl/osebje/vitomir/pub/Deid2015.pdf	Yes	Yes	Yes	Yes	Yes	N/A
9	"Privacy-preserving photo sharing based on a public key infrastructure" Lin Yuan, David McNally, Alptekin Küpçü, Touradj Ebrahimi SPIE Optical Engineering + Applications 2015	Lin Yuan	4	Alptekin Küpçü (Turkey MC member), Touradj Ebrahimi (Switzerland MC member)	WG3, WG4	July 2015	Already published	http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=2444249 http://infoscience.epfl.ch/record/210903/files/spie_2015_privacy.pdf	Yes	yes	No	Yes - Secure societies - protecting freedom and security of Europe and its citizens	yes	Yes. An STSM started this collaboration	N/A
10	Person De-identification in Activity Videos', M. Ivasic-Kos, A. Iosifidis, A. Tefas, I. Pitas, 37th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), 2014	M. Ivasic-Kos	4	M. Ivasic-Kos (Croatia WG member) I.Pitas(Greece, MC member)	WG3	May 2014	Already published	http://ieeexplore.ieee.org/xpl/articleDetails.jsp?reload=true&arnumber=6859767	No	Yes	No	Yes	Yes. An STSM started this collaboration	Yes. An STSM started this collaboration	N/A

FP7/ H2020 Proposals and projects
This table contains FP7/ H2020 proposals/ projects spinning off from Action activities and including in the proposing consortium at least three Action participants from at least three different countries participating in the Action.

NO.	Title	Name and country of main proposer	Number of proposers	Action participants listed among the proposers (Name, country, role[3] in the Action)	Funding agency submitted to	Date submitted	Date results expected	Result	Call identifier	Relevance to H2020 Societal Challenges[4]?	Was the added value of the Action Networking necessary for the proposal / project?
Projects											
1	OCTAVE - Objective Control for TAlker VErification	Fondazione Ugo Bordoni (FUB), Italy (coordinator)	12	Aladdin Ariyaeeinia, The University of Hertfordshire, UK (partner), MC member Zheng-Hua Tan, Aalborg University, Denmark (WG leader) , MC member Tomi Kinnunen, University of Eastern Finland, Finland (partner) , MC member	European Commission (H2020)	August 28, 2014	February, 2015	Accept	H2020-DS-2014-2015	Yes: Secure societies (protecting freedom and security of Europe and its citizens.)	Absolutely yes!
Proposals											
	USENSOR: Humans as a sensor by fusion of Biometrics & Social Media Academic Partnership MARIE SKŁODOWSKA-CURIE ACTIONS Innovative Training Networks - European Training Networks (ITN-ETN)	Universidade de Vigo (UVIGO), Spain (Coordinator)	13	Els Kindt, MC member Katholieke Universiteit Leuven, Belgium Jana Dittmann, WG1 member Otto-von-Guericke University of Magdeburg, OVGU Slobodan Ribaric, MC member University of ZagrebFER	European Commission (H2020)	12 January 2015	May 2015.	Reject, but improved version of the proposal will be submitted on 12 January 2016	H2020-MSCA-ITN-2015	yes	yes

I.C. Networking

Added value of the Networking
Please describe here the added value of the networking, highlighting in particular anything that would not have happened without the Action networking.   - The cooperative environment induced by networking of scientists, experts and researchers from different and complementary areas as well as SMEs and enable opportunities to create effective cooperation and stimulate new directions of research in the field of de-identification and privacy protection.   - Owing to the interdisciplinary approach to privacy in multimedia content, the Action creates the opportunities for exploring the added value of de-identified data and supports the harmonisation of progress in privacy and security.   - The impact of the Action will indeed extend to approaches in the development of new applications ranging from speech-based services in telephony, through video-based behavioural monitoring in care homes and hospitals, to intelligent surveillance networks in airports and railway stations.   - Given the interdisciplinary nature of the approach to privacy protection, the Action has provided the impact on the wider scientific community – new philosophical, social, legal and ethical perspectives on privacy protection in the digital age.   - Guidelines and recommendation for new standards for maximising the efficacy and employability of de-identification and reversible de-identification.   - Novel ideas in the fields of biometric science and technology, forensic science and audio-video surveillance technology.   - The Action provides continuing education and training framework, especially for Early Career Investigators (ECIs)/ Young Researchers and end-users, who will in turn support the sustainability of the efforts in the future.

Extent of the networking
Describe the extent of the networking among the participants in the Action. Were all participants integrated into the networking equally? Were those targeted by COST policies on Inclusiveness Target Countries (ITCs), Early Career Investigators (ECIs)/ Young Researchers, and gender balance fully integrated into the Action networking?   At the beginning of the COST Action (kick-off meeting) there were 18 partners and now there are 28 COST countries, 1 COST Near Neighbor Countries (Belarus), 3 non COST countries (USA, China, Argentina). The number of MC members and WGs member increased from 32 to 45, and from 46 to 165 respectively.   Among 28 partner-countries there are 13 Inclusiveness target countries/ITCs (from the total number of 20 ITCs countries) that participate in the Action (46 % partner-countries are ITCs countries)   Gender balance and Early Career Investigators (ECIs)/ Young Researchers in the COST Action (WG1-WG4) are as follows: - 25 % female   - 19% ECIs/ESRs   - Vice-chair of the Action: Prof. Carmen Garcia Mateo   - Chair of WG1: De-identification methods for biometric identifiers Prof. Isabel Trancoso   - STSM Committee: Prof. Carmen Garcia Mateo   - Financial Reporters: Dr. Jerneja Zganec Gros and Dr. Dijana Petrovska   Special attention is devoted to training of Early Career Investigators (ECIs)/ Young Researchers and end-users by means of STSMs and training schools. Until now there are 21 STSMs. The first training school was prepared in the period from June to September and held in Limassol, Cyprus in 7-11 October 2015.

I.D. Impacts

The impacts that have resulted, or might result from the Action are described in the following table.

Description of the impact	Type of impact[5]	Timing of impact[6]
Enter one impact per line, and specify the type and timing of the impact.		
JPEG transmorphing algorithm for privacy protection in social networks	Scientific/ technological	Foreseen within 2 years
"Privacy by design" - Approach to privacy that uses technology as a way to enforce legal obligations.	Scientific/ technological	Foreseen 2-5 years
Guidelines and recommendations for the development of standards: Taxonomy of the classes of biometric/soft biometric/non-biometric identifiers that are normally present in multimedia contents; see NISTIR 8053 "De-Identification of Personal Information"	Societal	Achieved
Novel solutions in the field of de-identification in the given multimedia documents	Scientific/ technological	Foreseen within 2 years
Ethical, bioethical, societal and legal aspects and guidelines for de-identification and reversible de-identification	Societal	Foreseen 5-10 years

I.E Dissemination and exploitation of Action results

Describe the Action's dissemination and exploitation approach as well as all activities undertaken to ensure dissemination and exploitation of Action results and the effectiveness of these activities.			
Add description here			
Item/ activity	**Target audience**	**Result**	**Hyperlink**
Special Session on Biometrics & Forensics & De-identification and Privacy Protection organized by IC1206 COST Action	Experts, end-users, ECIs/ESRs and Public audience	25 papers and presentations/invited speeches	link
IEEE FG 2015 Workshop De-identification for Privacy Protection in Multimedia	Experts, end-users, ECIs/ESRs and Public audience	7 papers and presentations/invited speeches	link videolink linkPapers
IEEE MIPRO 2015 Special Session on Biometrics, Soft-biometrics and De-identification	Experts, end-users, ECIs/ESRs and Public audience	4 papers and presentations/invited speech	link
COST Action website	Experts, end-users, ECIs/ESRs and Public audience	About 90.000 individual visitors	http://costic1206.uvigo.es
2 joint meetings of IC1206 WG4, IC1106 WG6 and the EAB, Darmstadt, 2013., 2015.	Experts, end-users, ECIs/ESRs and Public audience	presentations/invited speeches	links 1 2
Guidelines and recommendations for the development of	Experts, end-users, ECIs/ESRs and Public audience	Report	link

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[5] Scientific/ technological, Economic, Societal
[6] Achieved/ Foreseen within 2 years/ Foreseen 2-5 years/ Foreseen 5-10 years/ Foreseen 10+ years

standards: Taxonomy of the classes of biometric/soft biometric/non-biometric identifiers that are normally present in multimedia contents; see NISTIR 8053 "De-Identification of Personal Information"			
7 WG1-WG4 meetings	Experts, end-users, ECIs/ESRs and Public audience	53 presentations and 8 invited speakers links	Links 1 2 3 4 5 6 7
Training of ECIs/ESRs and end-users by means of training schools	ECIs/ESRs, experts	21 STSM	Links 1 2 3
the first training school was prepared in the period from June to September and held in Limassol, Cyprus in 7-11 October 2015	Experts, end-users, ECIs/ESRs and Public audience	presentations/invited speeches	Links 1 2

I.F. Action success(es)

COST regularly communicates the successes of Actions. At this point in time what aspect(s) (outcomes and/ or impacts, rather than activities) of this Action is/ are the most suitable for communication?

Description of the success story	Dimension of the success ■ Breakthrough: scientific, technological or socioeconomic ■ Policy implementation (specify which policy) ■ Capacity building
Privacy is one of the most important social and political issues in our information society, characterized by a growing range of enabling and supporting technologies and services. Amongst these are communications, multimedia, biometrics, big data, cloud computing, data mining, internet, social networks and audio-video surveillance. Each of these can potentially provide the means for privacy intrusion. De-identification is one of the main approaches to privacy protection in multimedia contents (text, still images, audio and video sequences and their combinations). It is a process for concealing or removing personal identifiers, or replacing them by surrogate personal identifiers in personal information in order to prevent the disclosure and use of data for purposes unrelated to the purpose for which the information was originally obtained. Building on the existing and emerging national research projects in relevant areas and the effective cooperation among partners , the Action is envisaged to deliver considerable advances and novel solutions in the field of de-identification for privacy protection in multimedia. Based on the collaboration amongst a reasonably wide range of European experts and researchers as well as relevant scientists from non-COST countries novel methods for de-identification of non-biometric, biometric and soft biometric identifiers are developed: text de-identification, face de-identification in still images and videos, voice and speakers de-indetification, tattoos, hairstyles de-identiification.	Breakthrough: scientific, technological or socioeconomic
The outcomes of this Action provide an effective approach to addressing the growing problem (technical, legal, ethical) of privacy protection in multimedia content, and create opportunities for exploring the added value of de-identified data, and facilitate the continued capability for the preservation of privacy in multimedia content, as the digital document technology advances. Cooperation with regulatory and standards bodies such as: EAB (European Association for Biometrics), NIST, national data protection authorities and data protection agencies results with new views and policies regardin privacy protection.	Policy implementation
Effective mechanisms are provided to support early stage researchers (ECIs/ESRs) through Short Term Scientific Missions, summer schools, training programs, invited lecturers, and workshops. It is believed that promoting ECIs/ESRs is an essential contributor to the sustainable success in the field. A special attention is given to the involvement of female researchers and, in particular, female ECIs/ESRs in the Action. The main objective of the Action is to bring together scientists and experts from different fields and to foster the creation of a new scientific community for the purpose of dealing with different aspects of de-identification-based privacy preservation. The new community includes the required scientific excellence in various fields, from social and legal sciences to computer science, pattern recognition, computer vision, digital speech and image processing, and biometrics. The Action offers the most appropriate framework for the proposed	Capacity building

activities, as it supports the networking of existing independent EU research teams involved in national rsearch programmes in relevant areas.

Moreover, it provides an appropriate platform for the exchange of experiences and results of research in the field of concern, the determination of the way forward, and the coordination of the collective effort.

Based on such approach the results of the COST Action are a number national research projects in the field of de-identiofication as well as a new H2020 project.

II. Management Report

II.A. Overview of expenditure

Insert below in the yellow cells the summary of figures from the Yearly Financial Reports (YFRs) of completed Grant Periods and an IFR of any incomplete Grant Period – the Totals (non-yellow cells) will automatically sum.

	Grant Period 1	Grant Period 2	Grant Period 3	TOTAL
GP start and end dates	(01/06/2013-31/05/2014)	(01/06/2014-31/05/2015)	(01/06/2015-26/09/2015)	
Grant Holder institution	Universidad de Vigo (ES)	Universidad de Vigo (ES)	Universidad de Vigo (ES)	
Meetings	EUR 75.118,76	EUR 64.774,41	EUR 29.240,03	EUR 169.133,20
Training Schools	EUR -	EUR -	EUR -	EUR -
STSMs	EUR 17.583,00	EUR 18.640,00	EUR 4.130,00	EUR 40.353,00
Dissemination	EUR 2.984,76	EUR 1.500,00	EUR -	EUR 4.484,76
OERSA[1]	EUR -	EUR -	EUR -	EUR -
Total Scientific Expenditure	EUR 95.686,52	EUR 84.914,41	EUR 33.370,03	EUR 213.970,96
FSAC[2]	EUR 14.352,98	EUR 12.737,16	EUR 5.005,50	EUR 32.095,64
TOTAL	EUR 110.039,50	EUR 97.651,57	EUR 38.375,53	EUR 246.066,60

[1] OERSA = Other Expenses Related to Scientific Expenditure (e.g. bank charges)

[2] FSAC = Amount received by Grant Holder for Financial Scientific and Administrative Coordination

II.B. Budget and Participation management

II.B.1 Budget spent in relation to individuals/ institutions outside participating COST countries

STSMs from or to institutions from countries other than Participating COST countries

The table below describes the added value STSMs to approved institutions in IPC or NNC or Specific Organisations and any STSMs from an approved institution in an NNC to a participating COST country.

Grantee		Host		Date	Topic and value added to the Action
Institution	Country	Institution	Country		
Department of Information and Digital Technologies Higher Polytechnic School (EPS) - University of Vic (Spain) Grantee: Dr Jordi Solé-Casals Host: Dr César Caiafa		CONICET – Argentina		From 09-02-2015 to 22-02-2015	Topic: Exploring compressive sensing techniques for de-identification Added value: The stay allowed the participant and the host to meet, share and discuss about common interests in signal processing area and more specifically in TC and CS for biometric applications. They have explored possible common projects and they expect to publish at least one conference paper and, if final experiments are good enough, an article in an indexed journal (ISI-JCR)"

Invited Speakers

The table below highlights the added value of Invited Speakers from COST countries that have not accepted the MoU and/ or non-participating NNC, IPC or Specific Organisations whose participation at a meeting or Training School was reimbursed by the Action.

Participant name	Institution	Country	Event date	Topic and added value to the Action
Anil K. Jain	Michigan State University	USA	29-30 May 2014	Topic: Biometric Recognition: Some Challenges in Forensics Added value: Prof Anil Jain is a Distinguished Professor in the Department of Computer Science at Michigan State University (USA) where he conducts research in pattern recognition, computer vision and biometrics. Prof Jain is a highly reputed expert on Biometrics. In his talk at MIPRO he pointed out the current challenges related to biometric data acquisition, image quality, robust matching, system security and user privacy. This was of most interest of COST IC1206 participants.
Krum Garkov	Executive Director - European agency for operational management of large-scale IT systems	Bulgaria	29-30 May 2014	Topic: Biometrics and the Future the Large-scale ICT systems Added value: In the last decade infrastructure and technologies that enable biometric authentication has been developed significantly. Today biometrics is considered to be one of the fundamental components of the digital world.

| | | | | It more and more becomes a key enabler and driver of trusted transaction control and identity management in all areas of application of the modern ICT infrastructure, and specifically in the public sector as far as the internal security is concerned. The biometrics technology itself has, in many respects, already become an indivisible part of modern infrastructure and an essential component of life. For eu-LISA the identity management, enabled by biometrics technologies, ultimately creates a genuine opportunity to develop and increase the value that large scale IT systems, managed by the agency, add to the EU Member States and all citizens of EU. |
| Peter Kimpián | Hungarian Data Protection Agency | Hungary | 22-23 June 2015 | <u>Topic:</u> Data protection implications of the use of drones and recommendations

<u>Added value:</u>The Invited Speaker made a detailed presentation of the opinion of the Hungarian DPA on the data protection implications of the use of drones and shared with the group the main recommendations of the Authority in this respect. As the main privacy and data protection issues related to the use of drones originate from the capability of recording images and video footage from the air by the drone the presentation focused on data protection elements and privacy considerations which are to be respected or taken into account when processing images, videos on such tools. |

Dissemination meetings

The table below highlights the added value of Dissemination Meetings financed from Action funds.

Participant name	Role	Country	Date	Location	Topic and added value to the Action
-	-	-	-	-	-

II.C. Participants

Management Committee		
Name	Country	Email address
Prof Slobodan RIBARIC (MC Chair)	Croatia	slobodan@zemris.fer.hr
Prof Carmen GARCIA MATEO (MC Vice Chair)	Spain	carmen.garcia@uvigo.es
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Mr Dirk DE BOT	Belgium	dirk.de.bot@telenet.be
Dr Samir OMANOVIC	Bosnia and Herzegovina	samir.omanovic@etf.unsa.ba
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Prof Borge LINDBERG	Denmark	bli@es.aau.dk
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Dr Dijana PETROVSKA-DELACRETAZ	France	dijana.petrovska@telecom-sudparis.eu
Dr Igor STOJANOVIKJ	FYR Macedonia	igor.stojanovik@ugd.edu.mk
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Prof Yannis STYLIANOU	Greece	yannis@csd.uoc.gr
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Dr Lily MENG	United Kingdom	l.1.meng@herts.ac.uk

II.D. Specific issues

This section is confidential to the Management Committee, and the COST Association (Administration, Scientific Committee and Committee of Senior Officials); and is not included in the version of the report that is published on the COST website.

The Action encountered the following particular difficulties in the implementation of the Action (e.g. imbalances of participation across the Working Groups, inactive country representatives).
Describe the issue(s) here or write "no particular difficulties encountered". N/A
The MC did not accept the pending intentions to accept the MoU shown in Section I.A for the following reason.
Write explanation here N/A

Annex 1

Definitions:

COST Action Challenge (main aim)	"The research question addressed by the COST Action targeting scientific, technological, and / or socioeconomic problems"
COST Action Innovation	"The creation and / or development of new or improved concepts, products, processes, services, and / or technologies that are made available to markets, governments and society"
COST Action objectives	"COST Action objectives are the results that an Action needs to achieve in order to respond to meet its challenge. These are SMART (Specific, Measurable, Achievable, Relevant, Timely) and twofold: research coordination objectives and capacity building objectives."
COST Action research coordination objectives	"Achieving these objectives turns COST Actions from initially scattered teams into one transnational team and leverages the existing funded research. These objectives entail the distribution of tasks, sharing of knowledge and know-how, and the creation of synergies among Action participants to achieve specific outputs."
COST Action capacity building objectives	"Achieving these objectives entail building critical mass to drive scientific progress, thereby strengthening the European Research Area. They can be achieved by the delivery of specific outputs and / or through network features or types and levels of participation."
COST Action networking activities	"any activities organised by the COST Action (whether or not directly funded by COST) in order to achieve research coordination and capacity building objectives."
COST Action networking tools	"instruments through which eligible activities can be funded"
COST Action outputs	"direct results from the COST Action activities. These can be codified knowledge, tacit knowledge, technology, and societal applications."
COST Action impact	"the short- to long-term scientific, technological, and / or socioeconomic changes produced by a COST Action, directly or indirectly, intended or unintended."
COST Action deliverable	"a distinct, expected and tangible output of the Action, meaningful in terms of the Action's overall objectives such as a report, a document, a technical diagram, a software etc. Action deliverables are used to measure its progress and success."
COST Action milestones	"Control points in the Action that help to chart progress. They are also needed at intermediary points so that, if problems have arisen, corrective measures can be taken. A milestone may be a critical decision point in the Action where, for example, the MC must decide which of several technologies to adopt for further development (e.g. core group and MC meetings, mid-term reviews)"
Inclusiveness Target Country (ITC):	Current COST Member Countries targeted by the COST inclusiveness Policy ("Inclusiveness Target Countries" (ITC)): EU 13 (Bulgaria, Cyprus, Czech Republic, Estonia, Croatia, Hungary, Lithuania, Latvia, Malta, Poland, Romania, Slovenia, Slovakia), EU candidate countries (the former Yugoslav Republic of Macedonia, Montenegro, Republic of Serbia, Turkey) and potential EU candidate countries (Bosnia and Herzegovina). In addition, to comply with the EC criteria for 'Spreading Excellence and Widening Participation', Portugal and Luxemburg are included.