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COST Action FP1104 (22/05/2012– 21/05/2016)

New possibilities for print media and packaging - combining print with digital

FINAL ACHIEVEMENT REPORT

This report on the full lifetime of the Action 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 Achievement Report:

This Action started with a goal of promoting discussion on the benefits that may be achieved from novel combinations of print and digital. Already at the time of proposing the Action, many technologies were available for different, innovative combinations of physical products and digital services but actual use of these technologies was fairly modest in the area of printed products. As the Action has progressed, the industry has faced increasing pressure towards digital transformation underpinning the importance of studying the phenomenon from different perspectives; technological, business and people.

It was mentioned in the MoU that the forest and printing industry is facing very difficult times, which makes it crucial for them to find new solutions, both products and services that are widely accepted within the European continent and have good possibilities to succeed also outside Europe. In this Action we aimed at producing and bringing forward relevant information for the benefit of the industry through selected focus areas into which effort was directed. In WG1 (Customers and Users) two sub-groups worked with increasing understanding on how Europeans use news media and looking at cultural differences on how European students use paper or screen in their work. Information of the actual use of media products and services and the habits of people is very important to understand in order to develop new services that fit well into the everyday life of people. In WG 2, Technology, the focus was mainly in printed electronics technology and applications. As the market for print products has changed, this has clearly affected also topics that are taught in the university level. There has been a great need for exchanging information on teaching topics related to printing electronics that have been discussed within WG2. As a result, a training school programme was created and run twice during the Action. Collaboration with the training school continues still after the Action has ended. WG3, Content, aimed at bringing ideas of new, playful ways of innovating to the Action. This group was responsible for arranging innovation workshops, and as a result a deck of cards for innovation purposes was created. In WG4 the aim was to consider Implications on the European paper and printing industry brought by due to digital transformation. This WG worked in collaboration with organizations such as Intergraf and Iarigai. This collaboration was supported by the Action through arranging keynote speakers from the Action to different events in which industry representatives were present. We have also had active participants in the Action from the industry. In addition to meetings, we also arranged an exhibition in conjunction with the final conference of the Action.

Three successful Training Schools were arranged. Collaboration with Printed electronics training school has continued after the Action ended. Several STSM's were used for sharing knowledge, learning new methods and writing joint articles.



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Summary assessment of outcomes and impacts by Action Rapporteur:

The goal of this Action was to develop a cross-disciplinary network for active discussion between the industry and academia on combining print and digital in developing innovative fibre-based products. The Action successfully reached its objectives and provided main deliverables assumed by the MoU. The activities were organized in four working groups (WGs) which interacted and communicated permanently. The cross-cultural studies on the changes in media use (WG1) and review presentations of invited experts had important contributions to the understanding of actual use of media products and services in relationship with people habits. The interaction of paper with digital media and solutions on combining print with digital for new paper products were reviewed by WG2 members, which identified also the need for new teaching topics on printing electronics. New ideas to combine print and digital for fibre-based products were promoted in the WG3, where a deck of cards for innovation was created. The WG4 promoted constructive discussions between the industry and academia on how the European paper industry could benefit from combining print with digital, which benefited of the input from all WGs. Good collaboration with professional organizations and industry is demonstrated by the two joint conferences organized with Iarigai and by “Paper evolutions” exhibition, organized with CEPPI. The deliverables include also co-authored publications and “The Age of Fibre” brochure, addressed to the scientific and technical communities, as well as to European consumers. The roadmap to show the vision of development in the areas of print media and packaging was substituted with other deliverables, such as a vision paper and training school programme on printed electronics. Action’s members had meetings to prepare H2020 proposals, but there are no actual projects resulted. Additional outputs of the Action are the participation with demonstrators at European Paper Week and media releases. These achievements were possible by creating and extending a cross-disciplinary network of the scientists and industry representatives, using COST networking tools, such as: conferences, innovation workshops, industry meetings, training schools, short-term scientific missions and dissemination activities. The participation of Inclusiveness Target Country representatives (50%) and of young researchers (35%) had high contribution to network extending and results dissemination. A success story of this Action is the vision of future need regarding university level education in the area of printed electronics (training school curricula) which already produced a significant scientific impact. Good collaboration with industry is another success, which could generate significant technological impact in near future. Coordination and management of this Action was very professional. Important indicators of successful coordination are the networking of a high number of participants from 29 COST Member Countries, representing more than 40 organizations of different research fields (printing, paper and packaging, electronics, informatics, human science and economics), collaboration with paper and printing European industries and perfect gender balance (50:50) achieved during Action running

Action Rapporteur

Name : Prof Elena Bobu
 Institution: “Gheorghe Asachi” Technical University of Iasi
 Country: Romania

I. Achievement Report

I.A. COST Action Profile

Objective/ Aim

The goal of this Action is to promote the benefits that may be achieved from novel combinations of print and digital. It will also be used to enhance innovations that will make use of the benefits of both print and electronic media as well as innovations where print and electronic media are combined. Several examples exist where successful combinations have been achieved e.g. through the use of image recognition, augmented reality or printed electronics to bring interactivity into fiber based products. To give the forest industry a competitive edge this Action will focus on new innovations by combining knowledge of the end users with most recent technological achievements. New models of ongoing change in social interaction and in the cultural products of paper and electronic media will be elaborated and proposed. The results will promote critical and theoretical discussion on the changing meanings of contemporary media culture. The Action will explore new business opportunities for the fiber based products and the value chains of print media and packaging through novel, innovative uses. It will also serve as a channel for communication between industry and academia, thus contributing to the development of new commercial applications.

Details

MoU: 4173/11 Start of Action: 2012-05-22
 CSO approval date: 2011-12-01 End of Action: 2016-05-21

COST Member Countries and Cooperating State having accepted the MoU

Country	Date	Country	Date	Country	Date	Country	Date
Austria	26/03/2012	Belgium	04/09/2012	Bulgaria	23/03/2012	Croatia	08/02/2012
Czech Republic	27/08/2012	Denmark	27/09/2012	Estonia	15/12/2014	Finland	16/01/2012
France	21/03/2012	Germany	20/01/2012	Greece	06/06/2012	Hungary	04/06/2012
Ireland	08/02/2012	Israel	15/12/2014	Italy	09/01/2012	Lithuania	03/10/2012
Malta	21/08/2013	Netherlands	17/01/2012	Norway	08/03/2012	Poland	11/06/2012
Portugal	10/05/2012	Romania	21/08/2013	Serbia	14/06/2012	Slovakia	30/05/2012
Slovenia	07/12/2011	Spain	04/01/2012	Sweden	08/02/2012	Switzerland	04/05/2012
United Kingdom	16/12/2011						

Intentions to Accept the MoU

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Contacts

Chair/ Vice Chair

Position	Name	Contact details	Country	Date of PhD:	Gender
Chair:	Anu Seisto	Dr Anu SEISTO VTTTietotie 302150 EspooFinland anu.seisto@vtt.fi	FI	1998	F
Vice Chair:	Claire Gauzente	Prof Claire GAUZENTE Institut deconomie et management de Nantesrue de la censive du tertre44000 NANTESFrance claire.gauzente@univ-nantes.fr	FR	2002	F

Working Group Leaders

WG#	WG Title	WG Leader	Country	Date of PhD:	Gende	Number of participants
1	Customers and users	David Frohlich	GB	1983	M	40
2	Technology	Tim Claypole	GB	1980	M	40
3	Content	Frans Mäyrä	FI	1999	M	10



4	Implications on the European paper and printing industry	Sanne Tiekstra	NL	-	F	20
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Other positions if applicable (STSM Coordinator, WG Vice Leader, Task Force Leader...)

Position	Name	Country	Date of PhD:	Gender
STSM Coordinator	Claire Gauzente	FR	2002	F
WG1 Vice Leader	Pedro Isaias	PT	1999	M

Action website:	http://virtual.vtt.fi/virtual/cost/index.htm
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I.B. Achievement of MoU objectives and deliverables and additional outputs

MoU objectives

MoU objective	Achieved Yes/ Partially/ No	Evidence of (partial) achievement
Increasing understanding on how new innovations may be created by taking into account the users and the technological possibilities	Yes	This was the main objective in the Action meetings arranged. Agenda of each meeting and most of the presentation slides are available on the Action web pages: http://virtual.vtt.fi/virtual/cost/events.htm
To create new models and scenarios of ongoing change in social interaction and cultural products of paper and electronic media	Yes	This topic was mainly addressed in the two sub groups working in WG1. One of them was led by prof. Nossek and prof. Schroeder and concentrated on news media consumption through different channels in different countries. Special session was arranged at the Larigai conference 2015 for presenting the results (slides available here: http://jpmtr.org/index-1.html , session 4) . Another sub group was led by prof. Fortunati and Dr Vincent concentrating on students working habits on paper and screen. This collaboration yielded several publications (see http://virtual.vtt.fi/virtual/cost/publications.htm) and a summary of the results presented at the Larigai conference 2015 (http://jpmtr.org/index-1.html , session 5B).
To strengthen the user-centric mindset in product development in paper, board and printing industries through product development process description based on several hands-on examples	Partially	User-centric or customer-centric mindset is built in the service dominant logic that drives the innovation in the area of hybrid products and services. Examples of services where the user was taken into account in early phases of the development process were presented in several Action meetings and industry meetings (http://virtual.vtt.fi/virtual/cost/industry_meetings.htm) . However, it is very difficult to point out evidence on the industry actually utilizing the information in their own development work.
To present possibilities for renewal in the forest and printing sector through innovative services in the value chains of print media and packaging	Yes	Several examples were presented in the Action meetings and in the Larigai conference 2015 and some examples were collected into the Paper evolutions exhibition, see brochure here: http://mediainnovationstudio.org/wp-content/uploads/2015/09/Paper-Evolutions.pdf .
Via conferences, innovation workshops and researcher exchange pull together European scientific expertise and industry relevant for the Action and create a cooperation network	Yes	Our Action meetings attracted good number of participants and they all received very good feedback from the balance of research and application oriented presentations. We arranged innovation workshops in conjunction with the meetings in Lisbon and Swansea, and as a joint project prepared a deck of cards for innovation purposes including information from several technologies making it possible to combine physical and digital worlds. This deck of cards was given to all participants at the Larigai conference 2015. Several STSM's (http://virtual.vtt.fi/virtual/cost/stsms.htm) and three international training schools (http://virtual.vtt.fi/virtual/cost/training.htm) were supported by the Action and all together 10 industry meetings had speakers from the Action attending the meeting.

Form strong coordinated European research activities offering new possibilities for print media and packaging through combining print with digital	Yes	Coordinated collaboration including several research groups from different countries already took place during the Action (e.g. two sub groups in WG1, joint demonstrators) and are continuing after the Action ended. An ongoing COST Action FP1405 is taking forward some of the ideas that started in this Action and another COST Action was recently proposed (“Online Social Networks for Business”). Several H2020 preparations have been and are being worked with by different groups especially in the area of printed electronics. Even though no joint projects have started so far, collaboration will continue e.g. in preparation of projects for PILOTS–05–2017 call with deadline in Oct 2016. Training school on printed electronics is continuing also after this Action ended. Collaboration with Iarigai organization was build during this Action and this continues in COST Action FP1405 as well.
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MoU deliverables

MoU deliverable	Delivered Yes/ Partially/ No	Evidence of (partial) delivery
D1.1 Survey report on the changes in media use in the different countries D1.2 International seminar on changes in media use D1.3 Report on the impact of changes in media use D1.4 International seminar on the impact of the changes in media use D1.5 Roadmap	Yes	D1.1 Countrywise survey reports were presented at the third Action meeting in Ljubljana. D1.2 The third Action meeting in Ljubljana (http://virtual.vtt.fi/virtual/cost/events_4.htm) with Naomi Baron and Richard Harper as invited speakers. The fourth Action meeting in Montegrotto with Kevin Barnhurst as the keynote speaker (http://virtual.vtt.fi/virtual/cost/events_5.htm) D1.3 Results of studies of the on going change have been published in several journal papers. Final results were presented in the Iarigai conference 2015 (http://jpmtr.org/index-1.html). D1.4 Sessions 4 and 5B at the Iarigai conference 2015. D1.5 Roadmap format was seen as not the best way to visualize the development in this area / decision by MC on Sept 9, 2015. A vision paper was prepared together (Frohlich, D., Seisto, A., Perez, M., Schroder, K., Vivo, J., Gauzente, C. and Isaias, P. (2015), Transmedia reading and next generation paper).
D2.1 International seminar on Printed Functionality today including seminar documentation D2.2 Documented new ideas and innovation embryos on combining print and digital D2.3 A number of documented case studies, pilots and demonstrators on printed functionality D2.4 International seminar on new applications of printed functionality in media and packages	Yes	D2.1 Iarigai conference in Swansea jointly arranged with the COST Action. Extended abstracts published in Advances in Printing and Media Technology Vol. XLI(I), list of contents here: http://www.iarigai.org/images/jpmtr-abstracts/Vol-41W-contents.pdf , the actual publication is password protected for the moment. D2.2 Innovation workshop was arranged at the second Action meeting in Lisbon. A decision was made regarding a card deck for innovation purposes, documentation may be found here: https://docs.google.com/document/d/1CWokd136LjWeNmOPCSVdHk-RgMM7ocgcbI5h4wKLNxE/edit# D2.3 Paper evolutions exhibition: http://mediainnovationstudio.org/wp-content/uploads/2015/09/Paper-Evolutions.pdf D2.4 Iarigai conference in Helsinki jointly arranged with the COST Action. Extended abstracts published in Advances in Printing and Media Technology Vol. XLII(II), list of contents here: http://www.iarigai.org/images/Advances-14/Advances-

D2.5 Roadmap		<p>15/advances-vol-422015_open_1.pdf , the actual publication is password protected for the moment.</p> <p>D2.5 Roadmap format was seen as not the best way to visualize the development in this area / decision by MC on Sept 9, 2015.</p> <p>The training school programme presents the areas which have been seen as the most important in the future from the viewpoint of printed electronics for educating talented students.</p>
<p>D3.1 International seminar on social media applications including documentation</p> <p>D3.2 Survey on new applications in media on games, learning and social knowledge</p> <p>D3.3 Roadmap</p>	Yes	<p>D3.1 The fourth Action meeting in Montegrotto (http://virtual.vtt.fi/virtual/cost/events_5.htm) and the sixth Action meeting in Zagreb (http://virtual.vtt.fi/virtual/cost/events_7.htm) .</p> <p>D3.2 Keynote presentation by Jussi Holopainen in Zagreb (http://virtual.vtt.fi/virtual/cost/events_7.htm)</p> <p>D3.3 Roadmap format was seen as not the best way to visualize the development in this area / decision by MC on Sept 9, 2015.</p> <p>The most important task of this WG was to create discussion and bring more knowledge on how gamelike approach could be used in the development process of new applications or in the applications. This was a continuous process during the whole lifetime of the Action.</p>
<p>D4.1 WG Report on contribution to applied printed functionality</p> <p>D4.2 WG Report on contribution to new service forms</p> <p>D4.3 WG Report on the future value chain of print media and packaging</p> <p>D4.4 International seminar on service to media and packaging with final report</p> <p>D 4.5 Roadmap</p>	Yes	<p>D4.1 Keynote presentation by Stan Farnsworth at the sixth Action meeting in Zagreb (http://virtual.vtt.fi/virtual/cost/events_7.htm) and Harri Kopola and Martina Greschonig at the Iarigai conference 2015 (http://jpmtr.org/index-1.html , Keynotes)</p> <p>D4.2 Keynote presentations by Marja Toivonen and Anna Viljakainen at the Iarigai conference 2015 (seventh Action meeting in Helsinki). Presentations available here: http://jpmtr.org/index-1.html (Keynotes). The presentation by Viljakainen will also be published as a journal paper in the special issue of Journal of Printing and Media Technology Research later this year (2016).</p> <p>D 4.3 A survey was carried out in seven countries related to future prospects of functional printing as seen from the industry viewpoint. The results were published in a presentation at the Iarigai conference 2015 (http://jpmtr.org/index-1.html , session 1A, M. Drzkova). The presentation by Drzkova will also be published as a journal paper in the special issue of Journal of Printing and Media Technology Research later this year (2016).</p> <p>D4.4 Iarigai confereces arranged together with the the Action including invited keynote presentations in Swansea 2014 and Helsinki 2016</p> <p>D4.5 Roadmap format was seen as not the best way to visualize the development in this area / decision by MC on Sept 9, 2015.</p> <p>Our vision of the future was presented and discussed with industry members in the joint events arranged (http://virtual.vtt.fi/virtual/cost/industry_meetings.htm) .</p>

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

<p>Please describe any other outputs and achievements, 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.”</p>
<p>The Action provided an excellent framework for joint discussions around the future of printed products and what they may be transformed into by means of modern technology. An important output of the Action was</p>

the jointly arranged exhibition “Paper evolutions – Exploring digital and physical paper futures”. In the exhibition, we presented a wide variety of concrete examples of how to benefit from technology and how physical and digital may be combined. There were also several examples of what else paper and board may be used for than the traditional media and packaging products. Photogallery of the exhibition may be found here: <http://iarigai-helsinki.vtt.fi/gallery/iarigai2015PaperEvolutionsPhotoGallery/index.html> . Some demonstrators presented in the exhibition were also invited to the European Paper Week event organized by CEPI and into The Age of Fibre publication (<http://www.cepi.org/node/19790>). The exhibition also received interest from the media, see e.g.:

In-person coverage :

<http://www.maaseuduntulevaisuus.fi/mets%C3%A4seinille-suut-puhuvalla-tapetilla-1.127419>

Press release:

Compute Scotland - <http://www.computescotland.com/paper-goes-hitech-8198.php>

Paperazzo - <http://www.paperazzo.de/paperazzo/ContentEn/NewsDetail/8504>

EE Times http://www.electronics-eetimes.com/en/the-future-of-print-and-paper-digital-hybrids.html?cmp_id=7&news_id=222925935

The Action was presented at “COST Science Night 2013” and received very good feedback from the audience. We also had the opportunity to be one of the COST representatives at the HAICTA conference in 2013 (<http://virtual.vtt.fi/virtual/cost/collaborations.htm>) .

Co-authored publications

This table contains the (up to) ten most significant co-authored publications resulting from the Action. All publications are on the topic of the Action, co-authored by at least two Action participants from two different countries participating in the Action.

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 ¹)	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 ² 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 ³ ?	Is it peer-reviewed?	Was the added value of the Action Networking necessary for the publication?
1	Farinosi M, Lim C & Roll J (2015), Book or Screen, Pen or Keyboard? A Cross-Cultural Sociological Analysis of Writing and Reading Habits Basing on Germany, Italy and the UK, Telematics and Informatics 33(2016)2, pp.410-421	Farinosi M	3	Farinosi M, IT, main author, responsible for the Italian data Roll J, GE, responsible author for the German data	1	2015	2015	DOI:10.1016/j.tele.2015.09.006	yes	yes	yes	yes	yes	yes
2	Držková M., Tiekstra S., Miranda P., Isaiás P., Karlović I., Szentgyörgyvölgyi R., Muck T., Vehmas K., Gauzente C., Seisto A. Innovative Combinations of Print & Digital – attitudes towards change in the European printing industry in Advances in Printing and Media Technology, Vol. XLII – Online edition II, Proceedings of the 42nd International Research Conference of iargai, 6–9 September 2015, Helsinki, Finland, pp. 33–40. Ed. P. Gane, International Association of Research Organizations for the Information, Media and Graphic Arts Industries, Darmstadt 2015. ISSN 2409-4021, ISBN 978-3-9870704-1-9	Držková M	10	Držková M., CZ, main author Tiekstra S., NL Miranda P., PT Isaiás P., PT Karlović I., RS Szentgyörgyvölgyi R., HU Muck T., SI Vehmas K., FI Gauzente C., FR Seisto A., FI	1, 4	2015	2016		yes	yes	yes	yes	yes	yes
3	Fortunati L, Taipale S & Farinosi M. (2014), Print and online newspapers as material artefact, Journalism August 2015 vol. 16 no. 6 830-846,	Fortunati L	3	Fortunati L, IT, main author Taipale S, FI Farinosi M., IT	1	2014	2014	DOI: 1464884914545439	yes	yes	yes	yes	yes	yes
4	Fortunati L. & Vincent J. (2014), Sociological insights on the comparison of reading/writing on paper with reading/writing digitally, Telematics & Informatics 31(1):39–51	Fortunati L	2	Fortunati L., IT Vincent J., UK	1	2014	2014	DOI: 10.1016/j.tele.2013.02.005	yes	yes	yes	yes	yes	yes
5	Hölig, S., Nielsen, R.K., & Schröder, K.C. (2016). Changing forms of cross-media news use in Western Europe and beyond. In Linaa Jensen, J., Mortensen, M. & Ørmen, J (Eds.). News across Media – The Production, Distribution and Consumption of News in a Cross-media Perspective. New York: Routledge.	Hölig, S	3	Schröder, K.C., DK	1	2016	2016	-	partly	no	no	yes	yes	no
6	Himma-Kadakas M, Kõuts R 2015 Who Is Willing to Pay for Online Journalistic Content? Media and Communication, 3 (4), 106–115	Himma-Kadakas M	2	Kõuts R, EE	1	2015	2015	10.17645/mac.v3i4.345	yes	no	no	yes	yes	no
7	Pallottino F, Hakola L, Costa C, Antonucci F, Figorilli S, Seisto A, Menesatti P, ACCEPTED. Printing on Food or Food Printing: a review. ACCEPTED BY FOOD AND BIOPROCESS TECHNOLOGY (IF2014=2.691, Q1) accepted on 4/02/2016	Pallottino F	7	Pallottino F, IT, main author Hakola L, FI Costa C, IT Seisto A, FI Menesatti P, IT	1,4	2015	2016		yes	yes	no	yes	yes	yes

¹ MC Member/ MC Substitute/ MC Observer/ WG Member/ Training School Trainee/ STSM Recipient/ Other Action Participant

² Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

³ H2020 Societal Challenges are "Health, demographic change and wellbeing"; "Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy"; "Secure, clean and efficient energy"; "Smart, green and integrated transport"; "Climate action, environment, resource efficiency and raw materials"; "Europe in a changing world - inclusive, innovative and reflective societies"; "Secure societies - protecting freedom and security of Europe and its citizens"

8	Panáč O., Držková M., Klanjšek Gunde M. Colorimetric and thermal analyses of reversible thermochromic composites using crystal violet lactone as a colour former, in Book of Abstracts, CEEC-TAC3, 25–28 August 2015, Ljubljana, Slovenia. Central and Eastern European Committee for Thermal Analysis and Calorimetry, Academica Greifswald, Germany, 2015, p. 369. ISBN 978-3-940237-34-7	Panáč O	3	Držková M., CZ Klanjšek Gunde M., SI	2	2015	2015	https://katalog.vsb.cz/documents/182084?locale=cs	yes	no	yes	no	yes	yes
9	Peřinka N., Držková M., Randjelović D. V., Bondavalli P., Hajná M., Bober P., Syrový T., Bonnassieux Y., Stejskal J. Characterization of Polyaniline-Based Ammonia Gas Sensors Prepared by Means of Spray Coating and Ink-jet Printing, Sensor Letters, Vol. 12, No. 11, pp. 1620–1627, November 2014.	Peřinka N	9	Držková M., CZ Randjelović D. V., RS Syrový T, CZ	2	2014	2014	DOI: 10.1166/sl.2014.3362	yes	no	yes	no	yes	yes
10	Frohlich, D., Seisto, A., Perez, M., Schroder, K., Vivo, J., Gauzente, C. and Isaias, P. (2015), Transmedia reading and next generation paper	Frohlich, D	7	Frohlich, D., UK main author Seisto, A., FI Perez, M., ES Schroder, K., DK Vivo, J., ES Gauzente, C. FR and Isaias, P, PT	1,2,4	2015	to be published in 2017		yes	yes	yes	yes	yes	yes

I.C. Networking

Added value of the Networking			
<p>This Action focused especially on bringing together research scientists and industry representatives from very different fields. The main idea in this was to share ideas and learn new viewpoints through joint meetings and testing new approaches (e.g. in different innovation workshops). In the Action meetings we raised different topics and themes that made it possible to listen to presentations both from the theoretical and practical viewpoints (all presentations available in the Action website). In this sense, networking and learning from different disciplines was what the Action was for, and the possibility of learning for each other was well utilized in STSM's (final reports available in the Action website). It would have been considerably more time consuming and not as systematic to find similar contacts without the Action. The network also made it possible to create a training school programme on printed electronics that is continuing after the Action ended.</p>			
<p>The table below shows the extent to which it would have been possible to achieve each of the Action's objectives without the Action networking.</p>			
MoU objective	Possibility of achievement without Action networking		
	Fully	Partially	Impossible
Increasing understanding on how new innovations may be created by taking into account the users and the technological possibilities		x	
To create new models and scenarios of ongoing change in social interaction and cultural products of paper and electronic media			x
To strengthen the user-centric mindset in product development in paper, board and printing industries through product development process description based on several hands-on examples			x
To present possibilities for renewal in the forest and printing sector through innovative services in the value chains of print media and packaging		x	
Via conferences, innovation workshops and researcher exchange pull together European scientific expertise and industry relevant for the Action and create a cooperation network		x	
Form strong coordinated European research activities offering new possibilities for print media and packaging through combining print with digital		x	
Extent of the networking			
<p>Inclusiveness Target Countries (ITCs), Early Career Investigators (ECIs)/ Young Researchers, and gender balance were very well taken into account during the Action. The lead of the Action (chair, vice-chair and grand holder) was all female, but WG leaders were both male and female. Gender balance in the meetings was close to 50:50 and the proportion of Young Researchers was very stable, about 35%, in every meeting arranged. We also had a good balance of female and male participants who took responsibility of leading joint activities (e.g. surveys and joint articles). Our network included several active participants from ITCs who helped in organizing meetings and finding local industry representatives to participate in the meetings. During the first Action year we were not able to attract many STSM's, but as the Action proceeded also this number increased.</p>			

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 ⁴	Timing of impact ⁵
Several scientific meetings, joint publications, patent applications, IPR generation	Scientific	Achieved
Knowledge transfer towards industry in the form of prototypes, exhibition	Technological	Achieved

⁴ Scientific/ technological, Economic, Societal

⁵ Achieved/ Foreseen within 2 years/ Foreseen 2-5 years/ Foreseen 5-10 years/ Foreseen 10+ years

Knowledge exchange on student (early stage researcher) level	Scientific	Achieved
Traning workshops	Technological / Scientific	Achieved
Media publicity	Societal	Achieved
Future impact to industry through education though renewed curriculum	Scientific / Societal	Foreseen 2-5 years
Researcher mobility, new career opportunities through the network	Economic	Achieved, Foreseen within 2 years
Sharing common practices in research	Scientific	Achieved

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
Action webpage	all	Information on meetings and publications	http://virtual.vtt.fi/virtual/cost/index.htm
Iarigai conference	scientific community	Presentations, special issue of Journal of Printing and Media Technology	http://jpmtr.org/index-1.html Journal special issue to be published
Paper evolutions exhibition	all	Exhibition, catalogue	http://mediainnovationstudio.org/wp-content/uploads/2015/09/Paper-Evolutions.pdf
Deck of cards for innovation	all	Card deck	physical product

I.F Action success(es)

COST regularly communicates the successes of Actions. 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	<ul style="list-style-type: none"> ■ Dimension of the success ■ Breakthrough: scientific, technological or socioeconomic ■ Policy implementation (specify which policy) ■ Capacity building
Multidisciplinary/Transdisciplinary working in the network. The Action brought together scientists from very different fields, including human sciences, printed electronics technology, hybrid applications using e.g. augmented reality technology, business studies and game research.	Capacity building
Exhibition. One of the main final outcomes of the Action was the Paper breakthroughs exhibition arranged, in which several concrete demonstrators were presented combining fibre based materials and digital technology.	Breakthrough: public engagement
Engagement of scientists with industry representatives to exploit knowledge and skills and expose industry to alternative futures. Five meetings were supported every year to engage industry and academia in the discussion of potential future applications combining print and digital.	Capacity building
Alerting hazards in digital visions for the future – paper is still relevant. Our joint vision of the future was put in the form of a position paper (deliverable 1.5)	Scientific, socioeconomic, policy implementation (digital education)
Industry enthused by training schools. Three succesfull training schools were arranged in the areas of printed electronics and user experience.	Scientific, technological, socioeconomic, capacity building

Long term plan for high level education in industry. A vision of future need regarding university level education in the area of printed electronics is seen in the programme created for the training school.	Policy implementation (education), scientific, technological, socioeconomic
Extended network beyond Europe / COST countries with invited experts from USA, Russia, Hong Kong/China in addition to invited lecturers from Europe. Several high level keynotes were invited to participate in the Action meetings.	Capacity building

II. Management Report

II.A. Overview of expenditure

The table below summarises the Action's expenditure throughout its four year life.

	Grant Period 1	Grant Period 2	Grant Period 3	Grant Period 4	TOTAL
GP start and end dates	(2012-07-01- 2013-06-30)	(2013-07-01- 2014-06-30)	(2014-07-01- 2015-06-30)	(2015-07-01- 2016-04-30)	
Grant Holder institution	University of Zagreb, HR	University of Zagreb, HR	University of Zagreb, HR	University of Zagreb, HR	
Meetings	EUR 105 500,00	EUR 104 800,00	EUR 113 900,00	EUR 94 556,35	EUR 418 756,35
Training Schools	EUR -	EUR 36 000,00	EUR 20 000,00	EUR 19 993,32	EUR 75 993,32
STSMs	EUR 15 000,00	EUR 9 600,00	EUR 12 000,00	EUR 8 000,00	EUR 44 600,00
Dissemination	EUR 3 000,00	EUR 4 000,00	EUR 4 000,00	EUR 4 000,00	EUR 15 000,00
OERSA ¹	EUR 3 000,00	EUR 800,00	EUR 800,00	EUR 2 640,00	EUR 7 240,00
Total Scientific Expenditure	EUR 126 500,00	EUR 155 200,00	EUR 150 700,00	EUR 129 189,67	EUR 561 589,67
FSAC ²	EUR 18 800,00	EUR 21 800,00	EUR 21 300,00	EUR 19 378,45	EUR 81 278,45
TOTAL	EUR 145 300,00	EUR 177 000,00	EUR 172 000,00	EUR 148 568,12	EUR 642 868,12

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				
<i>Invited Speakers</i>				
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
Naomi Baron	American University	USA	Add	"Who likes e-books", contribution to deliverable 1.2

Kevin Barnhurst	University of Illinois	USA	2014-04-10	"The fate of mainstream news in the digital era", contribution to deliverable 1.2
Stan Farnsworth	NovaCentrix	USA	2015-03-26	"Printed electronics, business and technical topics", contribution to deliverable 4.1

II.C. Participants

Management Committee			
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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.