

INTERACT – Interactive Manual Assembly Operations for the Human-Centered Workplaces of the Future

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Summary:

This is the final version of the INTERACT project Dissemination Report.

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EXECUTIVE SUMMARY

The content of this document is the outcome of INTERACT Task 7.1 - "Dissemination.". The main purpose of this document is to:

- Report the dissemination activities executed by the end of the project.
- Report the main dissemination channels and dissemination material used in the project.

1. INTERACT DISSEMINATION STRATEGY

1.1. INTERACT dissemination approach

The main steps that constitute the dissemination approach of INTERACT are presented in the following figure.

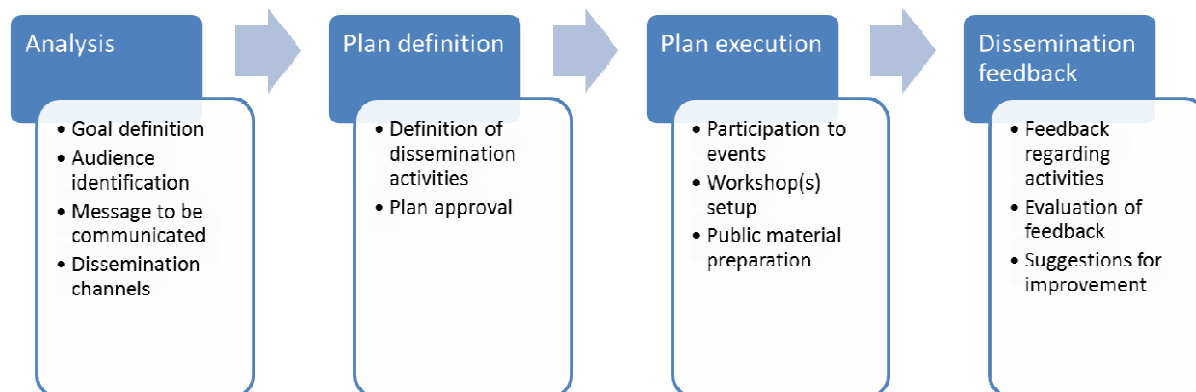


Figure 1: INTERACT dissemination steps

1.2. Goals definition

The dissemination activities goals and their assessment are given in the table below.

Goal Description	Assessment
Build awareness around the project.	There was no specific initial target regarding the number of people that should become aware of the project and its activities. Based on the number of dissemination events (41 events) and the visibility of those events (i.e. estimated audience) it can be estimated that a number of 15.000 people have become aware of the project (through events, internet, phase-to-phase meetings etc.)
Communicate research findings and to stimulate ongoing interest in the work of INTERACT.	The objective has been to publish approximately 20 scientific papers. By the end of the project 14 papers have been published. Thus it makes sense to assume that within a 2-years period after the end of the project the goal of 20 scientific papers can be reached.
Lay the foundations for establishment and reinforcement of a wide network of potential users (customers). This will maximize exploitation opportunities of the INTERACT solution throughout and beyond its development.	Although the initial target was to formulate a rather closed Industrial Interest Group that would have some more insight into the project’s activities the consortium has organized open workshops (mainly at exhibitions and conferences, ICT Lisbon 2015, CATS 2016). Moreover, the consortium has provided an online, free version of the INTERACT solution that aims to attract potential users from different branches worldwide. IMI

	has provided an open source version of the Fusion Kit https://github.com/fg-uulm/fusionkit) with the email of creating an active ecosystem around this INTERACT result.
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Table 1: INTERACT dissemination goals assessment

1.3. Audience identification

After the goals have been defined it is important to identify the audience that should be targeted with dissemination activities. This is highly important since it will guide the selection of the appropriate means to communicate with the audience. There are different types of audience or groups of interest that could be interested in the developments of INTERACT. External (to the project) audience may include academia members and industry while internal (to the project) audience may include students or teams/units of the INTERACT companies.

Audience Description	Assessment
Academic and research community	There are three main audience groups that are interested in the work of INTERACT: a) interest in the core technologies of the project (digital human simulation, computers graphics, computer interaction, sensing technologies), b) digital factory technology (process simulation, digitization) and c) production engineering application (process design/validation, ergonomics). This categorization reflects the transition from core/basic technology research, to applied technology research and eventually to industrial applications research. The consortium has published 14 scientific papers and until now most of the publications were submitted in areas mostly relevant to the third group. However, this did not have the expected impact maybe because the INTERACT solution was not mature enough to have an impact in this group. However, latest dissemination activities and publications have focused more on the first two groups. For example Daimler's activities in Heidelberg and Gothenburg have targeted to digital factory audience, IMI's publication in 8th ACM SIGCHI targets more core computer interaction technology and DFKI MIG2016 publication in computer graphics audience.
Industrial sector, Professional Associations (wider audience)	A key objective of INTERACT dissemination is to address and trigger the active involvement of industrial and user communities. Although the original objective of the project was to attract interest from different sectors (apart from automotive and white goods) and this could be achieved through the participation in industrial events (e.g. CEBIT 2015/2016, co-Summit 2015), the project seems to have succeed in attracting the interest of people from other sectors. However, the interest is merely from technology oriented people (e.g. PLM experts, VR experts) and not final users.
Industrial target group	Although the initial target was to formulate a rather closed Industrial Interest Group that would have some more insight into the project's activities the consortium has organized open workshops.
Wider public	The wider public should be aware of INTERACT scope and objectives, owing the innovative character of the developed technologies. In this context INTERACT through the events has become aware to people, companies and organizations that do not necessarily have some direct or indirect relevance with the objective and the scope of the project.
EU Technology platforms	The European Factories of the Future Research Association (EFFRA) platform can be used in order to communicate to a mainly industrial group the relevance and impact of INTERACT technology to the industry. Although the EFFRA

	platform focuses onto Factory of the Future (FoF) projects there is the intention to extend their scope and include non-FoF research project that however have an impact on manufacturing. LMS is an EFFRA partner and will utilize this opportunity by the time EFFRA goes for it.
EU or national, regional projects working on a similar domain	INTERACT has established co-operations with the following research projects: <ul style="list-style-type: none"> • ARVIDA: Angewandte Referenzarchitektur für Virtuelle Dienste und Anwendungen, partially funded by the BMBF (01IM13001B) • PROMONDI: Prospektive Ermittlung von Montagearbeitsinhalten in der Digitalen Fabrik partially funded by the BMBF (02PJ1111)
Internal audience	Ensuring effective internal communication and dissemination among the Consortium partners represents an important key success element for the INTERACT. Through demonstration workshops in industrial settings INTERACT results have reached the internal audience in the industrial partners.

Table 2: INTERACT target audience assessment

1.4. Message to be communicated

The messages to be communicated are closely related to the project's goal and objectives. They should be designed taking into account the different groups of interest identified and the phase of the project. The main "vehicle" to communicate the message of INTERACT have been the project videos that are available through YouTube channel <https://www.youtube.com/channel/UCEIE0U1dXHVY1r5vIBUMmIw>.

The key message that is delivered through the project's video is that:

- Bridge the gap between textual and 3D geometrical assembly planning.
- Automatically generate realistic 3D worker simulations from textual descriptions.
- Let workers and engineers interactively optimize manual processes in joint workshops.

The video has been presented in several occasions (events, workshop etc) in order to convey the key message of INTERACT.

Moreover, more specific messages such as the developments of the project (e.g. motion recording system, motion simulation, EAP etc.) have been described though specific videos (again available through the YouTube channel).

1.5. INTERACT dissemination tools/channels

Dissemination activities will focus on the use of websites, publication of papers, newsletters, and face to face contacts through meetings and targeted dissemination events, conferences and exhibitions. These events will be public and timely advertised to attract a large audience. Selected channels of communication can be summed up in following:

- INTERACT project's website and intranet to show INTERACT developments
- Social Media Networking (LinkedIn, Twitter)
- E-mails/newsletters/leaflets to specialized stakeholders.
- Press releases/articles published in both the INTERACT's web site and the specialized channels/media.
- Events primarily targeted to specialized stakeholders, and also to the public at large.
- Scientific publications to journals and conferences.
- Open workshop and industrial workshops

Project portal

The INTERACT public Web Portal has been primarily developed and is available online since project M01 for all people around the globe that are interested in the project and also to facilitate some of the project dissemination needs, for publishing news and information about that and communication between the project coordinator with everyone who is interested in the project. Access to the public and private web portal is provided by the link: <http://www.interact-fp7.eu/>.

In the portal as well as in Twitter the events that INTERACT partner plan to participate are announced (see Figure 2). Moreover, in the “News” part of the portal feedback from several INTERACT activities is provided to the wider audience.

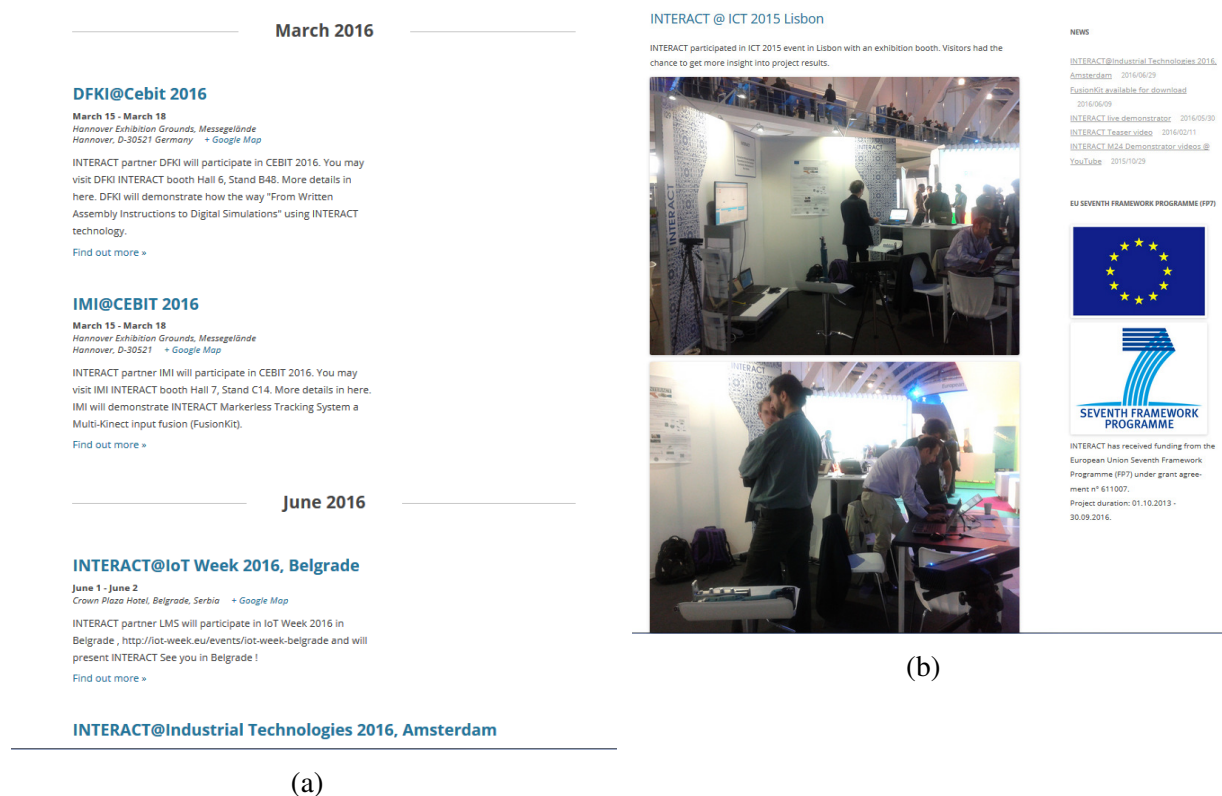


Figure 2: Snapshots: a) from Upcoming Events announcing page on the portal Events and b) from project News

INTERACT Video: Since December 2014 the project’s video that presents in an intuitive way the key objectives and approach of the project has been prepared and uploaded in the portal as well as in INTERACT YouTube channel.



Figure 3: Video snapshot in YouTube

INTERACT YouTube channel: A channel is being maintained in YouTube (<https://www.youtube.com/channel/UCEIE0U1dXHVVYr5vIBUMmIw>) that includes several public INTERACT videos (12 videos until Sept. 2016). The videos uploaded in the channel cover the whole range of INTERACT developments (motion simulation, recognition, EAP and sensors).

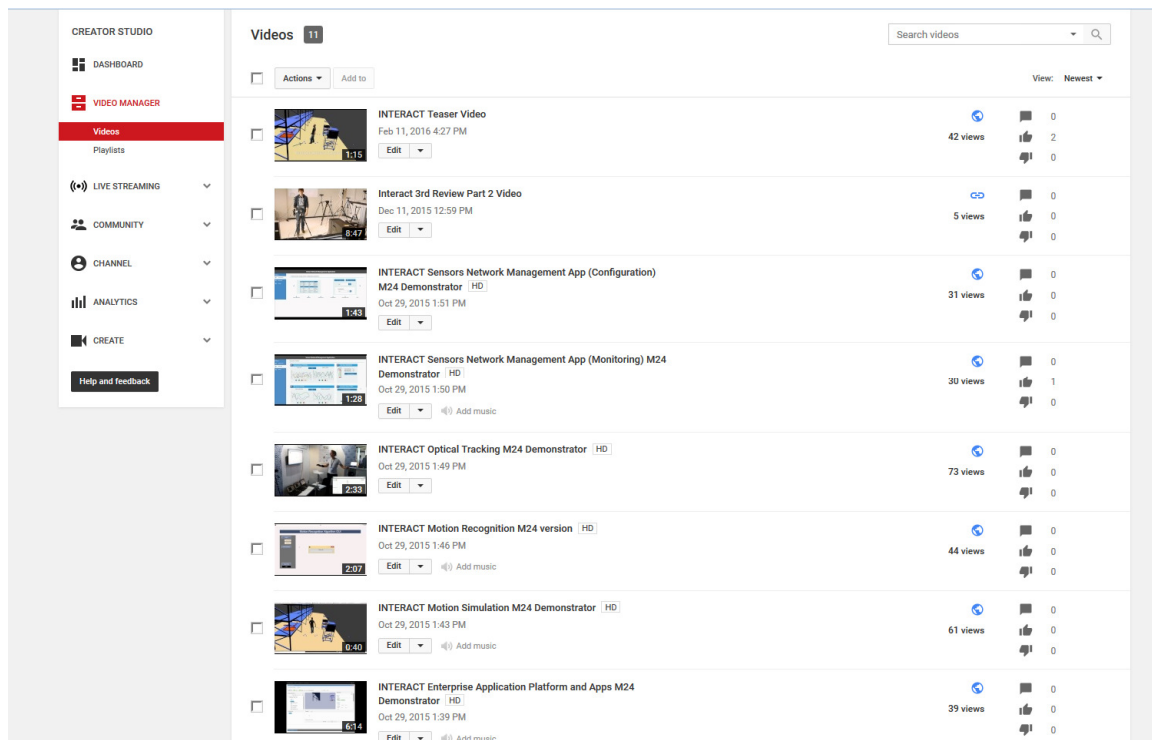


Figure 4: INTERACT YouTube channel

INTERACT poster: The first version of the INTERACT poster has been prepared and is available to INTERACT partners for dissemination purposes (see here for example: <http://www.interact-fp7.eu/?p=383>)



Figure 5: INTERACT poster

Twitter: @INTERACT_FP7 project maintains a Twitter account for informing the general public on main activities, news, releases etc.



Figure 6: INTERACT Twitter account snapshot.

2. DISSEMINATION ACTIVITIES UNDERTAKEN

In Table 3 below a list with all project dissemination activities is reported. This list is cumulative starting from the beginning of the project.

No	Type of activity[1]	Main leader[2]	Title	Date / Period	Place	Type of audience[3]	Size of audience	Countries addressed[4]
1	Project web portal	LMS	INTERACT project web portal	1/11/2013 – 30/09/2014	Internet	All types	1000	Worldwide
2	Presentation of INTERACT project	LMS	Brainstorming Workshop “Towards 2030 InterNet Business Innovation	20 March 2014	Athens, Greece	Research community	50	Europe
3	Newsletter	LMS	INTERACT Newsletter Issue 1	5 May 2014	Internet	All types	200	Worldwide
4	INTERACT Twitter account	LMS	INTERACT Twitter	1/10/2013 - TBD	Internet	All types	300	Worldwide
5	INTERACT LinkedIn	LMS	INTERACT LinkedIn	1/10/2013 - TBD	Internet	Professionals	100	Europe (mainly)
6	Brochure	LMS/Daimler	INTERACT brochure	1/9/2014	Internet	All types	300 (print outs)	Europe (mainly)
7	Paper presentation	Daimler	Automatic proposal of assembly work plans with a controlled natural language	24/7/2014	Naples	Scientific, international, production engineering background	30	Worldwide
8	Paper presentation	Daimler	Improving A* walk trajectories with B-splines and motion capture for manual assembly verification	24/7/2014	Naples	Scientific, international, production engineering background	30	Worldwide

No	Type of activity[1]	Main leader[2]	Title	Date / Period	Place	Type of audience[3]	Size of audience	Countries addressed[4]
9	Presentation	Daimler	Das EU-Projekt INTERACT – Montageabsicherung mit statistisch erzeugten Werkerbewegungen	11/9/2014	Aachen	Automotive industry + Research + Standardization societies	100	German
10	Presentation	Daimler, IMK	Automatisiert zur 3D-abgesicherten Montageplanung, Fachkongress: Digitale Fabrik@Produktion	4/11/2014	Braunschweig, Germany	Automotive +Aerospace + PLM industry	200	German (mainly)/European
11	Video	LMS	INTERACT video	18/12/2014	Internet	All types	1000	Worldwide
12	Poster/Booth/Lecture	LMS	INTERACT booth co-Summit 2015	10/3/2015	Berlin	All types	500	Europe (mainly)
13	Poster/Booth/Lecture	DFKI	CEBIT 2015	16/3/2015	Hannover	All types	1000	Worldwide
14	Deliverables upload	LMS	Public deliverables upload	20/4/2015	Internet	All types	1000	Worldwide
15	Paper presentation	Daimler	Measuring motion capture data quality for statistical human motion synthesis	26/6/2015	Naples	Scientific, international, production engineering background	30	Worldwide
16	Paper presentation	Electrolux	Ergonomic analysis in manufacturing process. A real time approach	26/6/2015	Naples	Scientific, international, production engineering background	30	Worldwide

No	Type of activity[1]	Main leader[2]	Title	Date / Period	Place	Type of audience[3]	Size of audience	Countries addressed[4]
17	Paper presentation	DFKI	Joint Angle Data Representation for Data Driven Human Motion Synthesis	26/6/2015	Naples	Scientific, international, production engineering background	30	Worldwide
18	Paper presentation	DFKI	Interactive planning of manual assembly operations: From language to motion	26/6/2015	Naples	Scientific, international, production engineering background	30	Worldwide
19	Paper presentation	HADATAP	Light-responsive RFID tags for precise locating of objects in manual assembly verification workshops	26/6/2015	Naples	Scientific, international, production engineering background	30	Worldwide
20	Paper presentation	IMI	On the use of Multi-Depth-Camera based Motion Tracking Systems in Production Planning Environment	26/6/2015	Naples	Scientific, international, production engineering background	30	Worldwide

No	Type of activity[1]	Main leader[2]	Title	Date / Period	Place	Type of audience[3]	Size of audience	Countries addressed[4]
21	Paper presentation	IMK	Ergonomic assessment for DHM simulations facilitated by sensor data	26/6/2015	Naples	Scientific, international, production engineering background	30	Worldwide
22	Paper presentation	LMS	Motion parameters identification on shopfloor environment for the authoring of manual tasks in digital human simulations	26/6/2015	Naples	Scientific, international, production engineering background	30	Worldwide
23	Deliverables upload	LMS	Initially CO deliverables upload: D3.3.2, D3.3.3, D4.2.1 and D4.3.2.	6/7/2015	Internet	All types	1000	Worldwide
24	Presentation	DAIMLER	EDM CAE Forum 2015	23/7/2015	Stuttgart	Industrial	500 (audience), 5000 (slides)	Germany, Europe
25	Presentation	IMK	IMK 2015 Industrial Competence Conference (ICC)	16/09/2015	Chemnitz	Industrial		Germany, Europe

No	Type of activity[1]	Main leader[2]	Title	Date / Period	Place	Type of audience[3]	Size of audience	Countries addressed[4]
26	Internet link	LMS	FutureEnterprize community (http://www.futureenterprise.eu/groups/interactive-manual-assembly-operations-human-centered-workplaces-future)	01/05/2015	Internet	All types	1000	Worldwide
27	Newsletter	LMS	INTERACT Newsletter Issue 2	15/10/2015	Internet	All types	200	Worldwide
28	Exhibition	LMS, INTRASOFT, IMI, HADATAP	INTERACT ICT 2015 booth	20/10/2015	Lisbon	All types	300	Worldwide
29	Web (YouTube)	ALL	INTERACT M24 results videos	29/10/2015	Internet	All types		Worldwide
30	Presentation	Daimler	EU-Projekt INTERACT Automatisierte Simulation manueller Montagevorgänge	15/2/2016	Ulm	Automotive suppliers, Automotive IT suppliers Automotive R&D	20	Germany
31	Presentation	HADATAP	Typology of RFID systems	28/2/2016	Zakopane (Poland)	Scientific (Poland, Slovakia), production engineering background	250 (70 organizations)	Poland (mainly)

No	Type of activity[1]	Main leader[2]	Title	Date / Period	Place	Type of audience[3]	Size of audience	Countries addressed[4]
32	Presentation	DAIMLER	Automatisiert von einer textbasierten Montageplanung zur 3D-Werkersimulation	1/3/2016	Heidelberg	VR community, PLM software companies, OEMs	300	Germany
33	Workshop	Daimler	INTERACT – Statistische Bewegungsmodelle zur interaktiven Absicherung manueller Montageprozesse in Workshops	2/3/2016	Aachen	Scientific, Standardization bodies, Industry	30	Germany
34	Booth/Leaflet	DFKI	CEBIT 2016	14-18/3/2016	Hannover	All types	1000	Worldwide
35	Exhibition	DFKI	Hannover Messe	15/3/2016	Hannover	All types		Worldwide
36	Exhibition	IMI	Hannover Messe	15/3/2016	Hannover	All types		Worldwide
37	Presentation	DAIMLER	INTERACT - Realistic 3D human worker simulation with data driven modeling	5/4/2016	Munich	Standardization bodies, Industry, Research community	60	Germany, Europe
38	Presentation	DAIMLER	CATS 2016	16/5/2016	Göteborg	Research community	30	Worldwide
39	Web (portal)	INTRASOFT	INTERACT public demonstrator	30/5/2016	Internet	All types		Worldwide

No	Type of activity[1]	Main leader[2]	Title	Date / Period	Place	Type of audience[3]	Size of audience	Countries addressed[4]
40	Presentation	LMS	IoT Week 2016	2/6/2016	Belgrade	Industrial and research	20	Europe
41	Poster/Leaflet	LMS	Industrial Technologies 2016	22/6/2016	Amsterdam	Industrial and research	200	Europe

Table 3: Dissemination activities log

In the following table the list of project scientific publications is reported.

No	Title	Main Author	Title of the journal or the conference	Number, date.	Publisher	Place of publication	Year of publication	Relevant pages	Permanent identifiers ¹ (if available)	Is open access provided to this publication ²
1	Automatic proposal of assembly work plans with a controlled natural language	Manns, M.	9th CIRP Conference on Intelligent Computation in Manufacturing Engineering - CIRP ICME '14				2014			
2	Improving A* walk trajectories with B-splines and motion capture for manual assembly verification	Manns, M.	9th CIRP Conference on Intelligent Computation in Manufacturing Engineering - CIRP ICME '14				2014			
3	Measuring motion capture data quality for statistical human motion synthesis	Manns, M.	48th CIRP Conference on MANUFACTURING SYSTEMS - CIRP CMS 2015				2015			
4	Ergonomic analysis in manufacturing process. A real time approach	Del Fabbro, E.	48th CIRP Conference on MANUFACTURING SYSTEMS - CIRP CMS 2015				2015			

¹ A permanent identifier should be a persistent link to the published version full text if open access or abstract if article is pay per view) or to the final manuscript accepted for publication (link to article in repository)

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.

5	Joint Angle Data Representation for Data Driven Human Motion Synthesis	Du, H.	48th CIRP Conference on MANUFACTURING SYSTEMS - CIRP CMS 2015				2015			
6	Interactive planning of manual assembly operations: From language to motion	S. Busemann	48th CIRP Conference on MANUFACTURING SYSTEMS - CIRP CMS 2015				2016			
7	Light-responsive RFID tags for precise locating of objects in manual assembly verification workshops	B. Gladysz	48th CIRP Conference on MANUFACTURING SYSTEMS - CIRP CMS 2015				2015			
8	On the use of Multi-Depth-Camera based Motion Tracking Systems in Production Planning Environment	F. Geiselhart	48th CIRP Conference on MANUFACTURING SYSTEMS - CIRP CMS 2015				2015			
9	Ergonomic assessment for DHM simulations facilitated by sensor data	D. Gläser	48th CIRP Conference on MANUFACTURING SYSTEMS - CIRP CMS 2015				2015			
10	Motion parameters identification on shopfloor environment for the authoring of manual tasks in digital human simulations	Pintzos, G.	48th CIRP Conference on MANUFACTURING SYSTEMS - CIRP CMS 2015				2015			
11	Experimental effort of data driven human motion simulation in automotive assembly	Manns, M.	6th CIRP Conference on Assembly Technologies and Systems (CATS)				2016			

12	FusionKit: A Generic Toolkit for Skeleton, Marker and Rigid-Body Tracking	Rietzler, M.	Proc. of the 8th ACM SIGCHI Symposium on Engineering Interactive Computing Systems (EICS 16)				2016			
13	Typology of RFID systems,	Gładysz, B.,	In Knosala, R. (Ed.) Innovations in Management and Production Engineering (in Polish: Innowacje w Zarządzaniu i Inżynierii Produkcji), OW PTZP, Opole 2016.				2016			
14	Scaled Functional Principal Component Analysis for Human Motion Synthesis	Du, H.,	Motion in Games 2016				2016			

Table 4: List of scientific publications

INTERACT On-line demo activity (for period 14/06/2016 to 28/08/2016)

Google Analytics has been used to monitor the activity in INTERACT live demonstrator (<http://www.interact-fp7.eu/eap/login>). Using Google Analytics the following numbers have been recorded:

Performance measure	Value												
Sessions	109												
Users	86												
Pageviews	244												
Avg. Session Duration	00:02:37												
Bounce Rate	71.56%												
New visitors	77.98%												
Countries/Location	<table><tbody><tr><td>1. United Kingdom</td><td>64.22%</td></tr><tr><td>2. Greece</td><td>19.27%</td></tr><tr><td>3. Germany</td><td>12.84%</td></tr><tr><td>4. Canada</td><td>1.83%</td></tr><tr><td>5. Portugal</td><td>0.92%</td></tr><tr><td>6. Sweden</td><td>0.92%</td></tr></tbody></table>	1. United Kingdom	64.22%	2. Greece	19.27%	3. Germany	12.84%	4. Canada	1.83%	5. Portugal	0.92%	6. Sweden	0.92%
1. United Kingdom	64.22%												
2. Greece	19.27%												
3. Germany	12.84%												
4. Canada	1.83%												
5. Portugal	0.92%												
6. Sweden	0.92%												

INTERACT Portal Activity (for period 2/09/2015 to 28/08/2016)

Google Analytics has been used to monitor the activity in INTERACT public portal³. Using Google Analytics the following numbers have been recorded:

Performance measure	Value																														
Sessions	3.049																														
Users	2.293																														
Pageviews	5.007																														
Avg. Session Duration	00:01:07																														
Bounce Rate	81,04%																														
New visitors	74.52%																														
Countries/Location	<table border="0"> <tr> <td>1. Germany</td> <td>538</td> <td>17.65%</td> </tr> <tr> <td>2. United States</td> <td>393</td> <td>12.89%</td> </tr> <tr> <td>3. Greece</td> <td>369</td> <td>12.10%</td> </tr> <tr> <td>4. (not set)</td> <td>349</td> <td>11.45%</td> </tr> <tr> <td>5. United Kingdom</td> <td>327</td> <td>10.72%</td> </tr> <tr> <td>6. Italy</td> <td>95</td> <td>3.12%</td> </tr> <tr> <td>7. China</td> <td>92</td> <td>3.02%</td> </tr> <tr> <td>8. Russia</td> <td>87</td> <td>2.85%</td> </tr> <tr> <td>9. Poland</td> <td>83</td> <td>2.72%</td> </tr> <tr> <td>10. France</td> <td>78</td> <td>2.56%</td> </tr> </table>	1. Germany	538	17.65%	2. United States	393	12.89%	3. Greece	369	12.10%	4. (not set)	349	11.45%	5. United Kingdom	327	10.72%	6. Italy	95	3.12%	7. China	92	3.02%	8. Russia	87	2.85%	9. Poland	83	2.72%	10. France	78	2.56%
1. Germany	538	17.65%																													
2. United States	393	12.89%																													
3. Greece	369	12.10%																													
4. (not set)	349	11.45%																													
5. United Kingdom	327	10.72%																													
6. Italy	95	3.12%																													
7. China	92	3.02%																													
8. Russia	87	2.85%																													
9. Poland	83	2.72%																													
10. France	78	2.56%																													

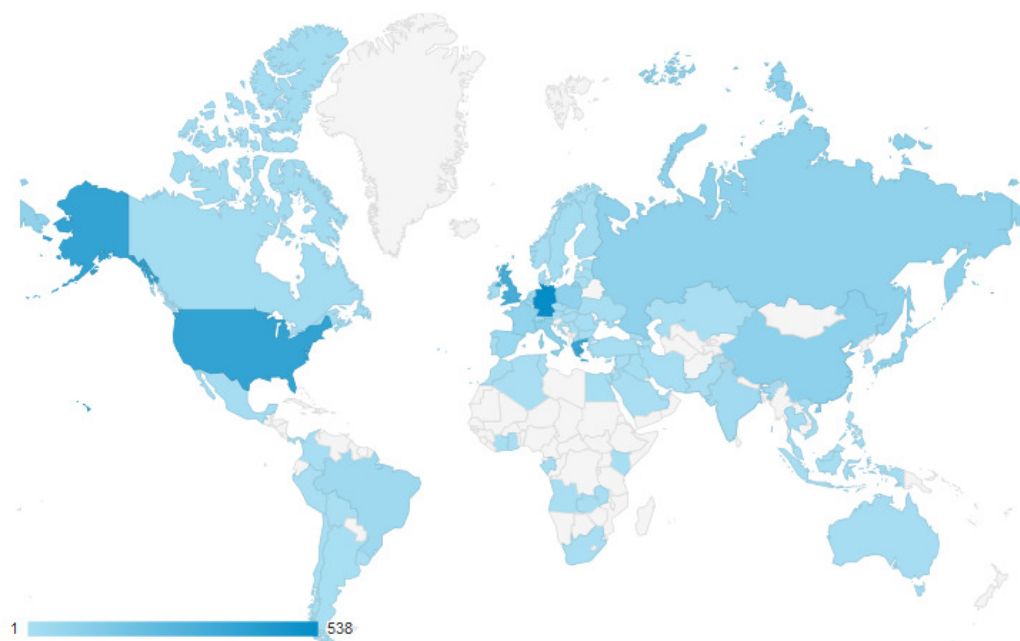


Figure 7: Map of countries (in blue) that have visited INTERACT portal

³ The activity reported involves only the INTERACT public portal however it does not exclude the activity of INTERACT partners when they visit the public portal.

3. CONCLUSIONS

This document describes the activities undertaken and the plan for spreading excellence of INTERACT main achievements and results. Publication of the project results, their dissemination through the INTERACT portal and other appropriate scientific media channels.

An important aspect in all research projects is the communication of the project objectives and results especially since dissemination is an important gate towards the project results' communication. The project dissemination activities have reached a relatively good number of audiences which is estimated to be approx. 15.000 people. The following lessons were learned regarding dissemination activities around project results:

- It is important to categorize the potential audience according to the type of relevance to the objectives of the project. For INTERACT the following groups have been identified a) interest in the core technologies of the project (digital human simulation, computers graphics, computer interaction, sensing technologies), b) digital factory technology (process simulation, digitization) and c) production engineering application (process design/validation, ergonomics).
- Then it is also important to define how (I terms of timing, channel, media etc.) these groups will be approached. For example it makes more sense to approach group (c) above at later stage and groups (a) and (b) at an earlier stage.
- Technology focused workshops such as the ICT Lisbon 2015 provide excellent opportunity for presenting preliminary prototypes.