# D6.2 - Project Dissemination Plan

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| **Project number:** | 248623 |
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| **Project title:** | **T**hree-dimensional **A**daptive **C**amera with **O**bject Detection and Foveation |
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| **Responsible organisation:** | TEC |
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| **Abstract:** | The following document gives an overview of the dissemination activities planned for the TACO project. It describes the dissemination strategy as well as the actual events and activities carried out by the partners. |
| **Keywords:** | Dissemination, Strategy, Activities |

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| **Dissemination level:** | Public |
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| **Instrument:** | STREP |
| **Thematic Priority:** | ICT |

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# 1 Introduction

The purpose of dissemination is to make TACO a successful and sustainable project by raising the awareness and publicity of the TACO project as well as its outcome. In this context, the target groups for external dissemination activities are on the one hand the general public and on the other hand potential business partners as well as specific scientific experts. Further target audiences are public institutions like governmental and European audiences.

In order to reach the particular awareness level intended, the **partners have to continuously work in the field of dissemination and public relations**. To support them as well as to provide them with a graphical identity within the consortium, the partners have to be provided with templates (for presentations and reporting) and various communication materials (web site, fact sheet, press release etc.).

The purpose of this plan is to collect information on the dissemination activities already completed or planned during the 36 months run time of the TACO project. It contains a plan for already carried out and prospectively upcoming activities based on a form, collected from each partner; it describes the dissemination channels to be used and the dissemination material to be produced and indicates their schedule. So, the dissemination plan gives an overview of the various activities and enables their coordination. So this dissemination plan can be regarded a guideline and will be supplemented in the course of the project duration.

The dissemination activities of the TACO project have been arranged into a logical sequence of various activities, which will be described in the following "Dissemination strategy" section. The real planned activities will follow later in the second section "Planned dissemination of knowledge".

Additional dissemination activities will be organised when the partners have prepared more detailed plans for their work. Invitations to contribute to both publications and conferences are expected as the project receives more attention throughout Europe and the rest of the world. These activities will be reported during the periodic reporting after the end of each project period.

However, as a first step, the appropriate dissemination strategy will be described hereafter.

# 2 Dissemination strategy

The dissemination strategy of the TACO project is made up of two consecutive phases, which are described in more detail below.

During the **awareness-oriented phase,** the goal is to raise public awareness about the project and the problems it aims to tackle.

The **result-oriented phase,** as the second phase, aims to promote the results of the project, so that potential interested parties (i.e. vendors or integrators) may get to know the achievements of TACO and their benefits.

The two phases of dissemination require different methods and activities to be undertaken in order to achieve their goals.

**Awareness-oriented phase**

During this phase of the dissemination, tasks involve the setting up of basic marketing material and awareness-raising presentations at different related events. Thus, the main activities will be the following:

- Setting up a common project design, such as the TACO logo, templates for documents and presentations.
- Creating and maintaining the project website which will describe the challenges and goals of the project and will present the project members.
- Designing the project information material (such as a leaflet and an introductory off-the-shelf presentation), which can be distributed electronically later on without investing greater efforts.
- Giving introductory presentations at conferences and workshops about the challenges and goals of TACO in order to raise awareness among scientific and industrial stakeholders and to establish the basic brand name of TACO.

**Result-oriented phase**

During this dissemination phase, results of the TACO project will be published to promote these to stakeholders in the area of robotics. The planned activities are:

- Display and promote public deliverables and news for viewing and downloading on the project website in order to show the aliveness and progress of the project and to keep interested parties up-to-date.
- Presentations at international conferences and workshops introducing the theoretical results of the TACO project. These presentations will still be research-oriented.
- High-level scientific articles will be submitted to scientific conferences

The TACO consortium will publish and disseminate press releases after having reached important milestones of the project. These press releases will be circulated to representatives of the international press in the field of robotics.

# 3 Planned dissemination of knowledge

During the TACO project life-time, the project partners will promote and encourage research on the TACO topic, targeting European and international companies and research centres, as well as creating interest in the general public.

The following overview summarises all planned dissemination activities that have been carried out or which are planned to take place in the future.

**Planned Dissemination Activities:**

Access through events: Innovation created by the TACO project will give all partners an opportunity to submit various papers that will be presented at international conferences and meetings and also be submitted to international journals. Promotion through international exhibitions, colloquia and professional conferences and workshops is planed, e.g.:

- SPIE Photonic West Symposium and Exhibit (San Jose, USA),
- SPIE Photonics Europe Symposium and Exhibit (Strasbourg, France),
- Transducers, Eurosensors, IEEE MEMS, IEEE/LEOS Optical MEMS, IEEE/ASME,
- Journal of Micro-Electro-Mechanical Systems: Micromechanics, microdynamical systems,
- IOP, Journal of Micromechanics and Microengineering: Covers all aspects of microelectomechanical structures, devices and systems, as well as micromechanics and micromechatronics.
- 3DIMPVT Conference: 3D Imaging, Modelling, Processing, Visualization and Transmission (Hangzhou, China)
- ICRA – IEEE International Conference on Robotics and Automation (Shanghai, China)

SPIE, Journal of Micro/Nanolithography, MEMS and MOEMS: Development of lithographic, fabrication, packaging and integration technologies for microopto-electro-mechnical (MEMS and MOEMS), and photonics industries.

Elsevier, Sensors and Actuators A: Focuses on the research and development of solid-state devices for transducing physical signals.

An overview of the potential dissemination contributions of the project partners is given below:

## *3.1 Contribution of each partner*

An overview of the potential dissemination activities of the project partners is given below:

**TEC**

TEC will provide the TACO-project IT-infrastructure – more precisely the whole set of tools which will foster the project cooperation, communication and dissemination, whereby the project website will serve as the most versatile external information and communication tool for a worldwide audience. In addition TEC will elaborate a TACO-project leaflet as well as a press release together with the other partners. Furthermore we intend to widely disseminate the TACO-project ideas and its results at various conferences and workshops.

**OTL**

In terms of dissemination, papers will be submitted on the results of the testing to suitable conferences and journals. The results and the project will also be discussed with suitable contacts in both industrial and academic fields.

**TUW**

Main dissemination is scientific through conferences (e.g., ICRA, IROS, CogSys, SciCog, ICVS, ISVC, ECCV) and journal publications (e.g., MVA, IVC, CVIU).

**FHG**

- Conferences and Publications: Research results will be submitted to scientific conferences and journals.
- We plan to present the results related to the MOEMS technology at the following scientific conferences: SPIE Photonic West Symposium and Exhibit (San Jose, USA), SPIE Photonics Europe Symposium and Exhibit (Strasbourg, France), Transducers, Eurosensors, IEEE MEMS, IEEE/LEOS Optical MEMS
    - IEEE/ASME, Journal of Micro-Electro-Mechanical Systems: Micromechanics, microdynamical systems, microfabrication technologies useful for MEMS, modelling and design issues for MEMS, MEMS characterization and reliability.
    - IOP, Journal of Micromechanics and Microengineering: Covers all aspects of microelectomechanical structures, devices and systems, as well as micromechanics and micromechatronics.
    - SPIE, Journal of Micro/Nanolithography, MEMS and MOEMS: Development of lithographic, fabrication, packaging and integration technologies for microopto-electro-mechnical (MEMS and MOEMS), and photonics industries.
    - Elsevier, Sensors and Actuators A: Focuses on the research and development of solid-statt devices for transducing physical signals.

**SINTEF**

SINTEF will disseminate project results through publishing project information on the company web site, scientific articles relating to research within 3D foveation algorithms and communicating the project's concept and results to new and existing customers. We plan to publish scientific papers and hold presentations at top, scientific symposiums including CVPR (IEEE Conference on Computer Vision and Pattern Recognition) and 3DIMPVT (3D Imaging, Modelling, Processing, Visualization and Transmission). Project results will further be exploited in current and future research projects undertaken by SINTEF.

**CTR**

CTR will present results of the TACO project at different conferences and scientific workshops with relevance to MOEMS based sensor devices; in particular, it is planned to participate at SPIE Photonics West, covering the latest enabling technologies and applications for micro- and nanofabrication and Photonics Europe, an appropriate European conference of SPIE with one focus on Micro/Nano Technologies Metamaterials, Devices, MEMS, MOEMS, Nanometrology. CTR will present results of the TACO project in line with the planned presence on international fairs with topics on Microtechnology and sensors.

## Exploitation

Next to the dissemination of project results, exploitation of the TACO achievements is of crucial importance. We differentiate between public exploitation, not directly interested in commercial revenue focusing on benefits at the level of the society, and business exploitation with clear commercial motives.

The main stakeholders in public exploitation are the research institutes of TACO. The research results will be brought back into the scientific world and channelled back to other research and development projects in the robotics domain allowing cross-fertilization.

By updating educational material based on the new results, young generations of European engineers and developers will be kept close to the state-of-the-art.

The exploitation activities are the basis for exploiting the results concerning the following aspects:

- fund the optimisation of the breadboard e.g. in terms of mass, size, manufacturing aspects, costs
- strengthen the market position of industrial partners (addressing new markets or expansion of product portfolio with competitive advantage, comparatively short time-to-market)
- fund the development of application-specific versions (e.g. indoor / outdoor)
- generate revenue through licensing fees from manufacturers
- leverage for future research and industrial projects

The exploitation phase is specifically targeted at potential clients of the TACO technology, i.e. at integrators and developers who could be interested in harvesting TACO functionality. Specific activities of this phase include:

- Publishing of the TACO system technology and TACO use examples in order to lay the foundation of potential commercial projects.
- Participation at robotic-oriented exhibitions, fairs and workshops, where the results of the project can be presented to business stakeholders and contacts for potential commercial projects can be built.
- Individualised demonstrations to interested stakeholders during the negotiation of business projects.

The exploitation of the project results is clearly defined in the objectives of TACO. As the project consortium consists of major European players in both science and industry the usage of the results will be exploited in both the science and commercial sector. The main exploitation will be through each partner's own organisation.

**TEC:**

Experience gained will be funnelled into our industrial services on requirement engineering. As an emerging SME, the reputation gained from the project will positively influence our future acquisition activities. We further provide workflow based management support systems for cooperative research efforts on national and European level. Project experience will trigger improvements of TEC's "Trusted knowledge Suite". Any novelties introduced will elevate the market position of this IT tool.

**SHADOW:**

Shadow is developing advanced robotic technologies based around manipulation (see e.g. FP7 Project HANDLE) and is keen to bring high-grade 3-d vision technologies to bear in this area. Shadow will be looking at ways to integrate the TACO sensing technologies into their existing product developments, as well as reaching out to current and new partners to explore routes to market for the TACO sensing system.

**OTL:**

Given a successful outcome of the TACO project OTL will integrate TACO systems into their own products where suitable, offer the solution to clients wherever benefits could be seen and pursue the supply, sale and integration of the TACO system itself.

**TUW:**

In terms of exploitation our main strategy is to exploit the gained knowledge to stay at the forefront of vision research for robotics in Europe and to exploit specific results for spin offs.

**FHG:**

The results of the TACO project will be published in relevant scientific and technical journals as well as via Internet. Furthermore the results will be presented on several conferences linked to technology and application of MOEMS devices. In agreement and cooperation with our partners first of all SINTEF, IPM and CTR the results (e.g. 3D sensing system) will be presented on international fairs (e.g. Photonics West, MEMS/Micromachining (Tokio), Laser).

**SINTEF:**

The experience and the knowledge obtained from TACO are expected to generate several spin-off projects within 3D analysis, robot vision and 3D machine vision for SINTEF. The algorithms developed in TACO will be implemented in toolboxes and libraries which will form a base for further research and function as important building blocks when solving complex problems for our customers in the future.

## *3.2 Description of planned dissemination activities*

The dissemination activities of the TACO consortium that are planned until this point are collected below.

| Instrument | Description | Target / Markets |
|---|---|---|
| Publications, Presentations | scientific journals and Conferences | scientific community |
| Publications, Presentations | user-oriented Journals and Conferences | potential users, system integrators and manufacturers |
| Breadboard | at Exhibitions and Tradeshows | potential users, system integrators and manufacturers |
| Product sheet | Presentation of specifications, results and competencies | handout for exhibitions and tradeshows |
| Direct acquisition | direct communication with selected target customers | acquisition of system, acquisition of application-specific tailoring |
| Articles | press releases, interviews | short efficient presentation to attract public and media attention |
| Short demonstration film | support for presentations, exhibitions and tradeshows | to attract public and media attention, potential users, system integrators and manufacturers |
| EUCognition | Presentation of specifications, results and competencies | European research and industrial community within cognitive robotics |
| EuRobotics | Presentation of specifications, results and competencies | European research and industrial community within cognitive robotics |

Table 1: Type of planned Dissemination Activities

### 3.2.1 Active participation in conferences and workshops

Active participation in conferences and workshops is defined: The participation in conferences and workshops is considered active if the TACO project partner is in the role of a speaker, presenter or moderator.

| **Name of the conference, official web-site** | **Date** | **Location** (city, country) | **Type and size of the audience** | **Topic and goal of the event** | **Relevance to TACO (Partners involved)** |
|---|---|---|---|---|---|
| ICT2010 | 27-29.09.2010 | Brussels, Belgium | International | Presenting Commission ICT work | Shadow will display their involvement in several projects and the on-going interactions (SHADOW) |
| SAB2010 | 24.-28.08. 2010 | Paris, France | International , 120 participants | Smart sensors | Presenting the TACO sensor concept (SINTEF) IPMS: Co-author of |

| **Name of the conference, official web-site** | **Date** | **Location** (city, country) | **Type and size of the audience** | **Topic and goal of the event** | **Relevance to TACO (Partners involved)** |
|---|---|---|---|---|---|
| | | | | | the submitted paper |
| Conference MEMS & Min. Systems at SPIE Photonics West | 22.-27.01.2011 | San Francisco, USA | International | Optical MEMS, quasi-static 1D-scanner | Oral presentation and conference paper (IPMS) |
| Conference MEMS & Min. Systems at SPIE Photonics West | 22.-27.01.2011 | San Francisco, USA | International | Optical MEMS integrated piezo-resistive position sensor for MEMS scanners | Oral presentation and conference paper (IPMS) |
| ICRA – International Conference on Robotics and Automation | 09.-13.05.2011 | Shanghai, China | International, 2000 researchers | Top robotics conference | Present first results (TUW, SHADOW, OTL, SINTEF) |
| Conference on Computer Vision and Pattern Recognition (CVPR) | 20.-25.06.2011 | Colorado Springs, USA | International | 3D foveation / saliency sensors and algorithms | Arrange a workshop on 3D foveation (SINTEF) |
| IEEE / LEOS, conf. OMEMS & Nanophotonics | 08.2011 | Istanbul, Turkey | International | Optical MEMS, IPMS: properties & control of quasi-static 1D scanner | Oral presentation and conference paper (IPMS) |
| IROS – Intelligent Robots and systems Conference | 10. 2011 | San Francisco, USA | International, 1800 researchers | Top robotics conference | Present intermediary results (TUW) |
| Austrochip 2011 | 10. 2011 | Austria | International | Microelectronics | Presentation of results (CTR) |
| SPIE Photonics West 2011 | 25.-27.11.2011 | San Francisco, USA | International | Photonics conference | Presentation of results (CTR) |
| 3DIMPVT | 16.-20.05.2011 | Hangzhou, China | International | Top 3D image processing conference | Oral presentation and conference paper (SINTEF) |
| ICRA – International Conference on Robotics and Automation | 14.-19.05.2012 | Minneapolis, USA | International, 2100 researchers | Top robotics conference | Present intermediary results (TUW, SHADOW, OTL, SINTEF) |
| International Symposium on Robotics and Intelligent Sensors (IRIS | 03.2012 | Nagoya, Japan | International | Technical forum for development and application of | Oral presentation and conference paper (FHG-IPM) |

| **Name of the conference, official web-site** | **Date** | **Location** (city, country) | **Type and size of the audience** | **Topic and goal of the event** | **Relevance to TACO (Partners involved)** |
|---|---|---|---|---|---|
| 2012)<br>IRIS 2010: http://ns1.ohka.cs.is.nagoya-u.ac.jp/~iris_admin/index.html | | | | intelligent sensors in robotics | |
| SPAR 2012<br>SPAR 2010: http://www.igi.eu/event-reader/events/spar-2010.html?month=201202 | 03.2012 | Houston/ Texas, USA | International, 750 attendees | 3D laser scanning, new data capture and process. Technologies for 3D surveying and dimensional control | Oral presentation and conference paper (FHG-IPM) |
| Sensor + Test 2012<br>Sensor + Test 2010: http://www.sensor-test.de/ | 06.2012 | Nürnberg ;Germany | International, 509 exhibitors, 7400 visitors, 16,000m$^2$ (2010) | Leading forum for sensorics, measuring and testing technologies worldwide | Booth, presentation of sensor (FHG-IPM) |
| IEEE International Workshop on Safety, Security & Rescue Robotics (SSRR 2012)<br>SSRR 2010: http://robotics.jacobs-university.de/SSRR2010/ | 11.2012 | Denver, USA | International | Robots' overall design and crucial components, e.g., for advanced locomotion, and intelligent onboard functionalities | Oral presentation and conference paper (FGH-IPM) |
| IEEE / LEOS, conf. OMEMS & Nanophotonics | 08.2012 | USA, location still to be anncd. | International | Optical MEMS, IPMS: MEMS components for adaptive TOF sensor | Oral presentation and conference paper (IPMS) |
| Symposium on Fusion Technology (SOFT) | 09.2012 | Will be anncd. only in 09/10 | International, 600-700 delegates | Fusion technology conference | Presentation of experimental results applying TACO system to a simulated fusion scenario (OTL) |
| IROS – Intelligent Robots and systems conference | 10.2012 | Portugal | International, 1800 researchers | Top robotics conference | Present final results (TUW) |
| Conf. VDE Mikrosystemtechnik | 10.2012 | Berlin, Germany | National | Micro system technology | Oral presentation and conference paper (IPMS) |
| Vision 2012 | 11.2012 | Stuttgart, | International | World's most | Booth, presentation |

| **Name of the conference, official web-site** | **Date** | **Location** (city, country) | **Type and size of the audience** | **Topic and goal of the event** | **Relevance to TACO (Partners involved)** |
|---|---|---|---|---|---|
| Vision 2010: http://www.eventseye.com/fairs/f-vision-2817-1.html | | Germany | , 292 exhibitors, 5700 visitors, 21000 $m^2$ (2009) | important trade fair for machine vision | of sensor (FHG-IPM) |
| International Conference on Control, Automation, Robotics and Vision (ICARCV 2012) ICARCV 2010: http://www.icarcv.org/2010/ | 12.2012 | Asia | International | Robotics perception systems; image/video analysis; feature extraction, grouping and segmentation ; scene analysis; pattern recognition | Oral presentation and conference paper (FHG-IPM) |
| SPIE Photonics West 2012 | 2012 | San Francisco , USA | International | Photonics conference; Optical MEMS, 2D-quasistatic MEMS vector scanner | Present final results (CTR) IPMS: oral presentation and conference paper |
| SPIE Photonics Europe | 2012 | Brussels, Belgium | International | Photonics and microtechnology | Presentation of results (CTR) |
| 3D-PVT | 2012 | Still to be anncd. | International | capture, represen-tation, storage, transmission, processing, and visualization of 3D geometric and photometric models and their use | SINTEF, TUW |
| Conf. IEEE MEMS & Nanophotonics | 01.2013 | East Asia, location still to be anncd. | International | MEMS, IPMS: synchronized vector scanning of large aperture MEMS scanners | Oral presentation and conference paper (IPMS) |
| IEEE International Conference on Robotics and | 04.2013 | Karlsruhe , Germany | International , 2200 researchers | All areas of robotics and automation | Present final results (TUW, SHADOW, OTL, SINTEF) Oral presentation |

| **Name of the conference, official web-site** | **Date** | **Location** (city, country) | **Type and size of the audience** | **Topic and goal of the event** | **Relevance to TACO (Partners involved)** |
|---|---|---|---|---|---|
| Automation (ICRA2013) ICRA 2011: http://2011.ieee-icra.org | | | | | and conference paper (FHG-IPM) |
| SPIE Photonics West 2013 | 2013 | San Francisco , USA | International | Photonics conference | Present final results (CTR) |

Table 2: Summary of actively participated conferences and workshops

### 3.2.2 Passive participation in conferences and workshops

| **Name of the conference, official web-site** | **Date** | **Location** (city, country) | **Type and size of audience** | **Topic and goal of the event** | **Role of partner, relevance to TACO, (Partners involved)** |
|---|---|---|---|---|---|
| RSS 2010 | 27.-30.06.2010 | Zaragoza , Spain | International | Manipulation workshop | SHADOW |
| CVPR 2010 | 13.-18.06.2010 | San Francisco , USA | International | 3D video analysis, saliency | SINTEF |
| 3D-PVT | 18.-20.5.2010 | Paris, France | International | 3D data analysis and acquisition | SINTEF |
| AMA workshop on integrated piezo-resistive silicon sensors | 22.06.2010 | Darmstadt, Germany | National | State of the art of silicon based piezo resistive sensors | IPMS (input required for MEMS design of integrated position sensors realized in WP03) |
| Symposium on Fusion Technology (SOFT) | 09.2012 | Will be anncd. only in 09/10 | International , 600-700 delegates | Fusion technology conference | Promotion of fusion related TACO project results on OTL's conference stand (OTL) |

Table 3: Summary of passively participated conferences and workshops

### 3.2.3 Scientific articles and publications

| Author(s); Date | Title | Journal title, volume, issue, page numbers | Type | Topic, Connection to TACO (Partners involved) |
|---|---|---|---|---|
| Jens T. Thielemann, Thilo Sandner, Stefan Schwarzer, Ugo Cupcic, Henrik Schumann-Olsen, Trine Kirkhus | TACO: A Three-dimensional Camera with Object Detection and Foveation | Smart Sensors Workshop @ SAB2010: http://smartsensors.webnode.com/ | International | A generic presentation of the concept behind TACO, summarized in 4 pages. |
| A. Tortschanoff et al. (2011) | "Phaselocked driving of MEMS based Lissajous scanners" (tentative) | e.g. Applied Optics | International | Scanner concept, design and intermediate results (CTR) |
| Th. Sandner, A. Tortschanoff et al. (2011) | "Synchronized driving of MEMS scanner arrays" (tentative) | Proc. SPIE | International | Driver electronics (CTR, IPMS) |
| M. Lenzhofer et al. (2011) | "Phase locked loop driver for MEMS mirror synchronization" (tentative) | Proc. SPIE (Smart Sensors, Actuators and MEMS) | International | Driver electronics (CTR) |
| A. Tortschanoff et.al (2013) | "3D sensors, basics and details" (tentative) | e.g. Sensors and Actuators | International | Scanner + drivers + synchronization, final results |
| SINTEF, TUW | Foveation | e.g. PAMI/CVIU | International | System presentation with special focus on final results of 3D foveation algorithms |
| Thilo Sandner, Michael Wildenhain, Thomas Grasshoff, Stefan Schwarzer | Synchronized large aperture scanner array for MEMS based LIDAR systems (working title) | SPIE-JM3: Journal of Micro/Nanolithography, MEMS, and MOEMS (invited for publishing in 2010) | international | IPMS; resonant 1D-MEMS scanners for LIDAR systems IPM: in terms of phase based distance measurement |
| Thilo Sandner, Thomas Grasshoff, Harald Schenk | Design, characteristics and limits of comb driven resonant micro scanning mirrors | JMEMS or Appl. Optics (planed for 2011) | international | IPMS; characteristics and limits of resonant MEMS scanners |
| Thilo Sandner, Thomas Grasshoff, Harald Schenk | MEMS based Laser scanning Imager with Diagonal Progressive Scanning | JMEMS or Appl. Optics (planed for 2011) | international | IPMS; Imager concept with progressive scanning enabled by bi-resonant Lissajous scanning |
| Thilo Sandner, | Quasitstatic | JMEMS (planed for | international | IPMS: basic |

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|---|---|---|---|---|
| Denis Jung | MEMS scanner with vertical comb drives (working title) | 2011) | | MEMS concept of quasistatic (1D)-scanner |
| Thilo Sandner, Thomas Grasshoff, Georg Erley, Andreas Tortschanoff | Gimbal 2D-MEMS mirror for raster scanning using resonate / linear actuation (working title) | JMEMS (planed for 2012) | international | IPMS: MEMS device for raster (2D)-scanning<br>CTR: control of linear axis |
| Thilo Sandner, Georg Erley, Thomas Grasshoff, Andreas Tortschanoff | Non-gimbal 2D-MEMS mirror for flexible vector scanning (working title) | JMEMS (planed for 2013) | international | IPMS: basic MEMS concept of quasistatic (1D)-scanner<br>CTR: control of linear axis |
| Thilo Sandner, Georg Erley, Thomas Grasshoff, Andreas Tortschanoff | Synchronized adaptive MEMS scanning for foveated TOF sensors (working title) | JMEMS or Appl. Optics (planed for 2013) | international | IPMS: basic MEMS concept of quasistatic (1D)-scanner<br>CTR: control of linear axis |
| Thilo Sandner, Georg Erley, Thomas Grasshoff, Andreas Tortschanoff | Non-gimbal 2D-MEMS mirror for flexible vector scanning (working title) | JMEMS (planed for 2013) | international | IPMS: basic MEMS concept of quasistatic (1D)-scanner<br>CTR: control of linear axis |
| Co-authors of IPMS: Thilo Sandner, Georg Erley | Foveated TOF camera | Technical journal: e.g. Photonics News, to address directly the industrial system developers and industrial applications | international | Adaptive TOF sensor TACO; SINTEF, IPM, IPMS, CTR, IPMS: co-author related to MEMS components |

Table 4: Summary of scientific articles, publications and presentations

### 3.2.4 Courses, talks organised

| **Partners involved** | **Date; Location** | **Course title, content** | **Type and size of the audience** |
|---|---|---|---|
| SINTEF | 2011 | Norwegian Society of Automatic Control meeting | National |

Table 5: Summary of courses organised

### 3.2.5 Web-sites

| Web-site | Description of the main TACO related information | Partners involved |
|---|---|---|
| http://www.taco-project.eu | The official website of the TACO project | TEC |
| http://www.ctr.at | The website of the partner CTR | CTR |
| http://www.fraunhofer.de | The website of the partner FHG | FHG |
| http://www.oxfordtechnologies.co.uk | The website of the partner OTL | OTL |
| http://www.shadowrobot.com | There will be a link on the Shadow Robot website to TACO official website | SHADOW |
| http://www.sintef.com | SINTEF OMD's website with link to TACO official site | SINTEF |
| http://www.tuwien.ac.at | The website of the partner TUW | |
| http://www.technikon.com | Short project description and link to the official homepage | TEC |
| http://www.shadowrobot.com/news/news.shtml<br>http://twitter.com/shadowrobot | The TACO project was already mentioned on the SHADOW website and on Twitter | SHADOW |

Table 6: Summary of relevant web-sites

#### 3.2.5.1 TACO Project Website

A first preliminary version of the TACO project website containing all basic information was already available in M01. However, the fully official website was being prepared in parallel and has been officially launched end of M03.

The official project website provides an overview on the project and up-to-date information on its activities and results, as well as contact details, partner information and information on events.

The website is set up as content management system (Joomla!). The usage of a readily available open source solution which also includes a number of tools for online WYSIWYG editing, and its adaptation to the project needs, helped to keep the development costs low. The website can be viewed with a standard web browser and will be kept alive throughout the project period and a few years afterwards.

The TACO project website is available under the following link:

http://www.taco-project.eu/

The project website serves as the most versatile information and communication tool, because on the one hand it provides the opportunity to provide information for a worldwide audience and on the other hand enables a working platform for the project team members.

Apart from the public area, there is a password-protected area reserved for project participants in order to share project-internal data. Only registered partners are able to enter it and can benefit from the options offered there. These include for example a calendar for appointments and meetings, a forum for information exchange concerning special topics, a Wiki function to post and/or deal with articles, mailing lists for reaching special mailing groups as well as archives of the mailing lists.

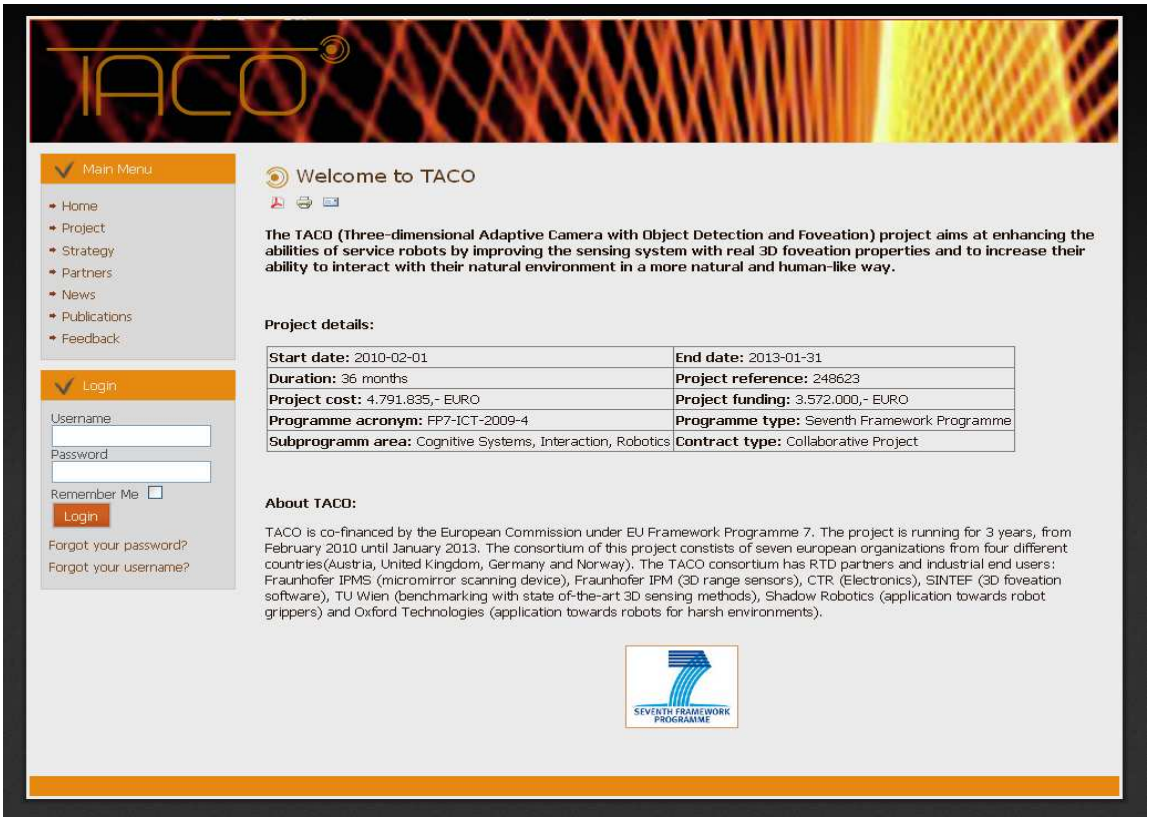


Figure 1: Website of the TACO Project

### 3.2.6 Press releases, newsletters

| Title | Publication details | Partners involved |
|---|---|---|
| Monthly Newsletter | The progress of the TACO project will be published in SHADOW's monthly newsletter. | SHADOW |
| Opening project newsletter | Published to SHADOW's media list; several resulting articles | SHADOW |
| "Grenzenlos forschen im Netzwerk" | Article in the CTR annual report 2009 | CTR |
| Company Newsletter | 3x Article in the newsletter "CTR-times" (2010, 2011, 2012) | CTR |
| "3D-kamera skal gi roboter bedre syn" ("3D sensor gives robots better vision") | Press release, released | SINTEF |
| "Demonstration of a new 3D sensor that gives robots better vision" | Press release, 2012 | SINTEF |
| Press release for exhibitions e.g. on Photonics West, OPTOS, Micromachining/MEMS or Laser, subject will be on quasi-static MEMS scanners for flexible and beam steering as well as their use in an adaptive TOF camera | Jan. 2012: Fraunhofer Press Release | FHG-IPM, FHG-IPMS |
| MEMS components for TOF sensors | Technical journals e.g. Photonics, etc. | IPMS |
| MEMS based TOF sensor (entire system) | Technical journals e.g. Photonics, etc. | SINTEF, IPMS, IPM, CTR |

| | | |
|---|---|---|
| TACO – Development of an adaptive 3D camera | Vista – Newsletter of Oxford Technologies Ltd (Spring 2010) | OTL |
| 3D Kamera ermöglicht Robotern künftig eine „bessere Sicht“ | Distribution via www.pressetext.at in May 2010 in relation to a successful project start; The press release is also available on the TACO project website | TEC |
| Robots to emulate human vision | the engineer, June 1, 2010, http://www.theengineer.co.uk/news/news-analysis/robots-to-emulate-human-vision/1002721.article | Based on an interview with SINTEF |
| Roboter, die mit "Menschenaugen" sehen | derstandard.at, July 7, 2010, http://derstandard.at/1276413543970/Roboter-die-mit-Menschenaugen-sehen | TUW |

Table 7: Summary of press releases, newsletters

### 3.2.7 Other

| Category | Publication details | Type | Partners involved |
|---|---|---|---|
| TV | Kärnten heute (2012) | National | CTR |
| TV | *Schrødingers katt* Leading Norwegian prime time TV programme on popular science; presentation on robot vision and TACO. Will be scheduled autumn 2010. | National | SINTEF |
| Weekly newspaper | List publications | National and others | SINTEF |
| Internet | http://www.eurekamagazine.co.uk/article/24198/3D-sensor-gives-robots-better-vision.aspx | International | SINTEF |
| Internet | http://www.sciencedaily.com/releases/2010/04/100408141300.htm | International | SINTEF |
| Internet | http://theengineer.co.uk/news/better-vision-for-robots/1001684.article | International | SINTEF |
| Internet | http://news.softpedia.com/news/New-Sensors-for-Robots-in-the-Works-139410.shtml | International | SINTEF |
| Exhibition & Trade show | Photonics West Jan. 2011, San Francisco, USA; Demonstrator of linear (quasistatic) 1D scanner | International | IPMS |
| Exhibition & Trade show | Optatec 2011, June 2011; Demonstrator of gimbal 2D-MEMS raster scanner linear (resonant / quasi-static) | National | IPMS |
| Exhibition & Trade show | Micromachining / MEMS 2011, Aug. 2011; Demonstrator of gimbal 2D-MEMS raster scanner linear (resonant / quasi-static) | International | IPMS |
| Exhibition & Trade show | Micromachining / MEMS 2013, San Francisco, USA Demonstrator of synchronized 2D-MEMS raster components / scanner modules for TOF sensors | International | IPMS |
| Interview | | | |

Table 8: Summary of other dissemination activities

### 3.2.7.1 The TACO Logo

In order to improve the visibility of the TACO project, a logo was designed. The logo is used on all internal templates as well as on all kinds of external dissemination tools.

Figure 2: TACO Logo

### 3.2.7.2 TACO Folder

The official TACO folder is a four-page informative and graphically appealing A4 flyer, highlighting the objectives and the work programme of TACO. It can be used and has already been used for distribution at conferences or certain other events in order to provide further visibility to the project. An electronic version of the leaflet is available on the TACO website.

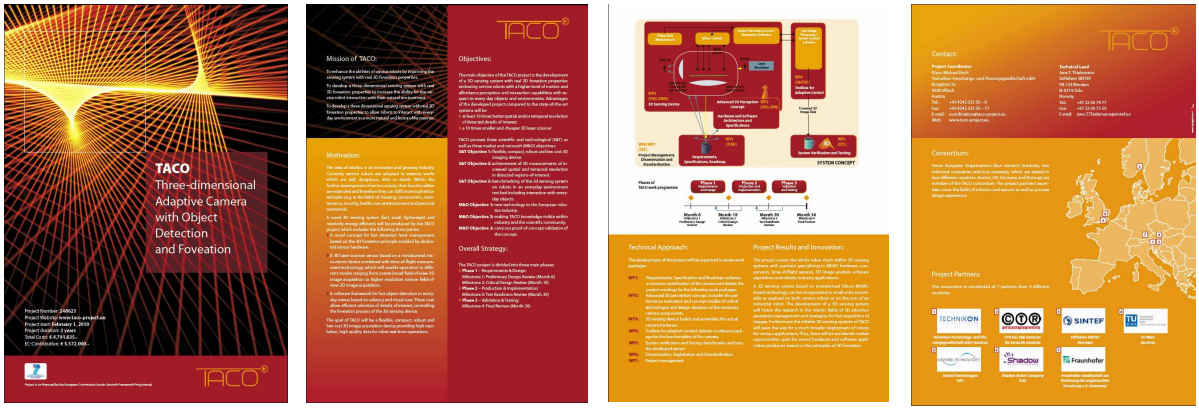


Figure 3: TACO Folder

## *3.3 Contributions to standards*

One of the goals of the TACO project is to widely disseminate the results at different levels and to different communities in order to spread the culture and technologies in the field of robotic design. One target for such dissemination is a set of standardisation working groups whose activities are or can be put in relation with the knowledge developed in TACO. The activities in the field of standardisation will be performed at different levels as appropriate: setting up working groups specifically targeted by the TACO topics, creation of formal liaisons between already existing bodies and the TACO consortium, direct participation in existing bodies, or by interaction with members of existing bodies.

Influencing standardisation activities will be achieved through the TACO project partners. In fact many of them have strong and active links with relevant specification and standardisation bodies to ensure wider use of metrics, standards, evaluation and certification methods and best practices in robotics and sensor technologies.

A significant part of the TACO project is targeted towards benchmarking the sensor in itself and towards relevant applications. Where possible, the consortium will apply industry-standard methods

and benchmark databases for quantifying the quality of the TACO system both as a sensor system, and for use within specific scenarios. The use of industry-standard metrics will enable outside communities to directly compare the TACO system to existing technologies. Where existing metrics are inapplicable, the TACO consortium will work to extend and develop appropriate metrics for the benefit of the community.

Many TACO results will be proposed as draft standards to the technical community, with an open request for comments and suggestions. As a general principle, TACO will pursue formal standardization only for mature and proven concepts. This means that only a small fraction of the results of TACO are likely to be submitted for formal standardisation, but it also means that the chances of adoption of such standard contributions will be fairly high. Several TACO members have strong and active links with relevant specification and standardisation bodies which they will use to promote our work.

The consortium also has relations to the American Society for Testing and Materials (ASTM). A main target is to foster activities within the technical Committee E57 on 3D Imaging Systems (http://www.astm.org/COMMIT/SUBCOMMIT/E57.htm), which is also working on the definition of standards in the area of the TACO project. This group which was founded end of 2006 is working in six subcommittees: Terminology, Test Methods, Best Practices, Data Interoperability, Executive and Strategic Planning / Marketing. Due to the activities of the core consortium members a tight relation to other industry developments can be ensured. A first step in the dissemination is the publication of major parts of the project description.

# 4 Cooperation with external organisations

In addition to the various dissemination activities reported above, the TACO consortium is in close cooperation with external organisations. The involved partners and their existing and planned activities are listed below.

| Actual/ planned date | Type, content of the cooperation | Cooperation partners | Countries addressed | TACO partners involved |
|---|---|---|---|---|
| 14th – 17th of June 2010 | First contact with WillowGarage people to check on the idea of using the TACO sensor on their PR2. | WillowGarage | International | SHADOW |
| Ongoing | Keep people at WillowGarage informed about the progress, ask them for feedback. | WillowGarage | International | SHADOW |
| Ongoing | Work with HANDLE project | HANDLE | EU | SHADOW |
| Ongoing | Relationship with possible end-user | UK MOD | UK | SHADOW |
| 2012 | Camera manufacturer | RTD partners of the TACO project | International | SINTEF |
| Ongoing | Automation industry | Robot Norge ++ | National | SINTEF |
| Ongoing | 3D measurement equipment manufacturer | CargoScan | National | SINTEF |
| Ongoing | 3D machine vision software vendor | Tordivel AS | National | SINTEF |
| Ongoing | Surveillance | Detec | National | SINTEF |
| Ongoing | Recycling industry | TOMRA | national | SINTEF |
| Ongoing | Synchronized MEMS drivers (for spectroscopic applications) | HIPERSCAN | EU | CTR, IPMS |
| Ongoing | Working relationship with possible end-user | The ITER Fusion Project | International | OTL |
| Ongoing | Working relationship with possible end-user | The Joint European Torus (JET) - EFDA | International | OTL |
| Ongoing | Working relationship with possible end-user | Dounreay Site Restoration Limited (DSRL) - UKAEA | International | OTL |

Table 9: Cooperation with external organisations

# 5 Participation in projects

## *5.1 Participation in international projects*

In order to promote knowledge sharing and collecting among the Consortium partners and various organisations within similar research sphere, project partners participate also in several other complementary projects, which are listed below.

| ITEA / MEDEA + | | |
|---|---|---|
| **ICT FP7** | | |
| MEMFIS | The MEMFIS project addresses size and power requirements of MEMS-technology and recent achievements in electronic design to develop a miniaturised Fourier-Transform MIR spectrometer. The key research effort dealing with the development of these components is expected to result in unique MEMS devices capable of reliable operation. An integrated control and chemo metrics module converts the spectroscopic data into concentrations. The resulting compact, robust and economical analysers can be deployed in a large number of roles, such as minimally invasive medical diagnostics, environmental and workplace monitoring, industrial real-time process control and even security applications. | TEC, CTR, Fraunhofer IPMS, Bruker, KOC University, RHE, Sopralab, Vigo Systems, HiperScan |
| **Other** | | |
| Leap2Tech | Handling flexible/limp materials by using 3D sensing | SINTEF |

Table 10: Participation in other EC projects

## *5.2 Participation in national projects*

In addition to the projects that are run on the European level, the partners are also active in numerous national projects.

| Austria | | |
|---|---|---|
| KIRAS | Trusted Computing for the Austrian Government. www.trusted-computing.at | Partner involved: TEC |
| MOEMSMOD (COMET-K1) | Development of miniaturized modules for optical position feedback for resonant microscanners with 1D and 2D designs. | CTR, IPMS, Hiperscan |
| **Norway** | | |
| Unmanned Oil Platform | Robotics for oil & gas platforms | Statoil, SINTEF |
| Auto3D | 3D machine vision software | Tordivel, Kongsberg Automotive, Conoptica, SINTEF |
| NextGenRob | Next generation robotics for Norwegian industry. | SINTEF, NTNU, RobotNorge, Tronrud Engineering, Hydro, HÅG, Glendimplex |

Table 11: Participation in national projects

# 6 List of Abbreviations

| | |
|---|---|
| Anncd. | Announced |
| CTR | Carinthian Tech Research AG |
| EC | European Commission |
| EU | European Union |
| FHG | Fraunhofer IPM |
| OTL | Oxford Technologies LTD |
| SHADOW | The Shadow Robot Company Limited |
| SINTEF | Stiftelsen SINTEF |
| TACO | Three-dimensional adaptive Camera with Object Detection and Foveation |
| TEC | Technikon Forschungs- und Planungsgesellschaft mbH |
| TUW | Technische Universität Wien |