



## Galileo W-CDMA Integrated Navigation

# GAWAIN

## Dissemination & Use Plan (DUP)

Delivery D4

IfEN-GAWAIN-DUP

Issue 2

Revision 0

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## Change Record

Issue	Revision	Date	Change Status	Origin
1	-	19.11.2004	First Issue of document	EW
2	0	18.11.2005	First revised issue: - New expected individual results added (chap. 2.1 and 4.2 and 4.3) - Update of approach to dissemination and use (chap. 2.2) - Update of dissemination activities (chap. 3.1 to 3.4) - Insertion of another relevant project and details on standardisation committees, chap. 3.5 Some minor changes, e.g. added abbreviations	IfEN, Infineon, DICE, JKU

# 1 Introduction

## 1.1 Scope

This document provides details on the dissemination and exploitation activities and plans being carried out within the work packages WP 8100/8200 of the GAWAIN project. This issue (2.0) is the second version of the document. With further progress of the project, a third updated version of the document will be prepared and delivered at M6 (Final Meeting).

## 1.2 References

The applicable documents are normative.

### 1.2.1 Applicable Documents

Local No.	Title	Code	Vers.	Date
AD-01	Annex 1 of Contract No.: IST-2001-34227 Information Society Technologies, Shared-cost RTD Project			05.12.2003

Table 1-1: Applicable Documents

### 1.2.2 Reference Documents

Local No.	Title	Code	Vers.	Date
RD-01	GAWAIN Deliverable D1*: Market Requirements & Business Case Assessment	GAWAIN-D1	Iss3.1	18.11.2005

Table 1-2: Reference Documents

## 1.3 List of Abbreviations

3GPP	3rd Generation Partnership Project
DUP	Dissemination & Use Plan
GAWAIN	Galileo W-CDMA Integrated Navigation
GIS	Geographical Information System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HW	Hardware
IEEE	Institute of Electrical and Electronics Engineers

LBS .....	Location Based Service
OGC .....	Open Geospatial Consortium
PDA.....	Personal Digital Assistant
SW.....	Software
TBD.....	To be determined (by contractor)
UMTS.....	Universal Mobile Telecommunications System
WLAN.....	Wireless Local Area Network

## 1.4 Documents Outline

This document is composed of the following main sections:

Chapter 1, this section, explains the purpose of the document, includes an overview and guidelines for reading it and provides the applicable and reference documents.

Chapter 2 gives an overview of the various main results that are expected and describes the approach to dissemination and use.

In chapter 3 the dedicated dissemination activities are presented.

Chapter 4 describes the GAWAIN use plan including the general project exploitation prospects as well as a summary of the individual plans of the consortium partners.

The ANNEX, which is non-public, contains more details on the exploitation prospects and possible business plans of the consortium and the individual partners.

## 2 Overview

### 2.1 Expected results

This section provides an overview of the GAWAIN results that could be disseminated and/or exploited. Intermediate results are *not* given in this context. The following table shows each result's title, the corresponding work package(s) it arises from, the timing of when the result would be available, and whether the result is for dissemination and/or use.

#	Main results	Work package	Time of availability	Intended dissemination / use
1	Virtual software prototype (SW receiver simulator) enabling end-to-end simulations and high flexibility in algorithmic design	<i>WP 4000:</i> Functional Development	Already available	Internal use
2	Integrated UMTS-GPS receiver prototype	<i>WP 6000:</i> Integrated Prototype Implementation & Test	Presumably 04/2006	Dissemination; exploitation (results usable exclusively within the consortium)
3	Integrated Galileo-UMTS receiver prototype	<i>WP 6000:</i> Integrated Prototype Implementation & Test	Presumably 04/2006	Dissemination; exploitation (exclusively within the consortium)
4	Simulation Environment for combined SatNav/UMTS RF Transceivers	<i>WP 6100:</i> Assessment & Selection of Antenna and RF-Frontend Components for UMTS	First version presumably 12/2005	Internal use
5.1	User Terminal prototype with test applications appropriate for typical scenarios within the <i>Intelligent Transport</i> environment	<i>WP 7200:</i> Test application 1 – “Intelligent Transport”	Presumably 07/2006	Dissemination and exploitation
5.2	User Terminal prototype with test applications appropriate for typical scenarios within the	<i>WP 7300:</i> Test application 2 – “Ubiquitous Tourism”	Presumably 07/2006	Dissemination and exploitation

	<i>Ubiquitous Tourism</i> environment			
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Table 2-1: Overview of expected main results

## 2.2 Approach to dissemination and use

To communicate the project results and the recommendations derived from them to the various appropriate audiences, an efficient mix of different information strategies will be applied. Mainly the following aspects are considered:

- Attendance of relevant conferences, workshops and fairs
- Exchange of information and experiences with other relevant projects
- Publication of articles in appropriate journals and magazines
- Provision of project information via the GAWAIN website
- Tutorials at selected conferences
- Contributions to 3GPP standardization

All these tasks will contribute to proceed with an effective commercialisation phase built on the results of GAWAIN, after the project completion.

## 2.3 Market projections

A detailed analysis of the market requirements and projections has been conducted in the frame of GAWAIN work package 2100 (Consolidation of Market Requirements & Business Case Assessment) as described in [RD-01]. The focus of this research has been on two areas of particular interest for GAWAIN: the 'intelligent transport market' and the 'ubiquitous tourism market'. In the following the main conclusions of this study are briefly summarized.

With respect to the GAWAIN objectives four significant groups can be distinguished within the *intelligent transport* segment, i.e. road, rail, intermodal freight and intermodal passenger transport. Basically two main classes can be identified for the requirements definition: The consumer class and the professional class. The former is targeted on high-volume solutions for in-car Navigation / Communication applications and is considered as the primary target group for GAWAIN. According to the latest estimates by the research firm Strategic Analytics the worldwide market value for in-vehicle telematics systems will be 7.4 billion US\$ in 2005 and about 8.4 billion US\$ by the year 2010. The professional class is characterized by more specialized Navigation/Communication solutions for the medium/low-volume market, mainly focusing on the container and trailer market.

Regarding the *tourism segment* GAWAIN focuses particularly on solutions for the LBS market. The term *LBS* has been excessively strained in recent years and many former revenue forecasts were quite overoptimistic indeed. Nevertheless the market prospects for mobile solutions based on combined navigation and communication capabilities are considered to be



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still promising. According to Strategic Analysts consumer location applications will generate over 8 billion US\$ in global services in 2008.

For the tourism market the following LBS segments are of particular interest: Location based *Information*, *Billing* and *Safety* Services. A crucial factor for all kinds of personal navigation solutions is of course a high degree of hardware integration resulting in compact and flexible devices.

## 3 Description of dissemination activities and plans

### 3.1 Conferences, workshops, demonstrations etc.

The GAWAIN project has been presented by members of the consortium at the following conferences:

- IEEE RFIC 2004, Fort Worth / TX (USA), 6 – 8 June 2004; presentation of some GAWAIN related results at the WSB workshop: *Overview of UMTS Test Cases and Their Impact on Receiver Specifications*
- ION-GNSS 2004 International Technical Meeting, Long Beach / CA (USA), 21 – 24 September, 2004; paper and presentation: *Hybrid Galileo/W-CDMA Receiver Prototype for Mass-Market Applications*
- 2nd ESA Workshop on Satellite Navigation User Equipment Technologies NAVITEC 2004, ESTEC, Noordwijk (NL), 8 – 10 December, 2004; poster presentation: *A Combined Galileo/GPS Receiver Architecture for Consumer Market Applications*
- European Wireless 2005, Nikosia, April 2005, paper and presentation: *An improved path profiling algorithm for mobile positioning in UMTS*
- IST Mobile & Wireless Communications Summit, 19 to 23 June 2005, Dresden/GER; presentation with title: *On the design of a configurable UMTS/NAVSAT Transceiver*
- European Navigation Conference GNSS 2005 in Munich/GER, 19 – 22 July 2005; presentation with title: *A Hybrid Galileo / UMTS Receiver Prototype for Mass-Market Applications*
- 9th WSEAS International Conference on Communications, July 2005, Athens, Greece, presentation with the title: *A Digital-Front-End Enhanced Multi-Mode/Multi-Standard Wireless Receiver*
- 16<sup>th</sup> Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications, 11 – 14 September 2005, Berlin/GER; presentation with title: *Combined GNSS/UMTS Receiver Architecture for User Equipment Positioning*

Furthermore, the GAWAIN project has been presented in the frame of a lecture for the Master Course on *Navigation and Related Applications* at the University Turin/Italy, the 12 July 2005.

For the upcoming period it is planned to present the GAWAIN project e.g. at the Munich Navigation Summit 2006 as well as on one (or several) appropriate fair(s) or exhibition(s). For instance it is also planned to exhibit the integrated UMTS-GPS prototype at the 3GSM World Congress 2006 in Barcelona. It is further intended to give tutorial sessions covering the tasks and the work done within GAWAIN at the IEEE VTC 2006-Fall conference (September 2006, Montreal) and at the European Microwave Week (September 2006, Manchester):

- Combined radio frequency circuits for UMTS, Galileo, GPS
- UMTS baseband signal processing

- Galileo/GPS baseband signal processing
- Location techniques of a hybrid Galileo/GPS/UMTS system

## 3.2 Articles published

The following paper has already been published:

R .Stuhlberger, G. Hueber, G. Strasser, M .Schmidt, A. Springer, L. Maurer, "On the Concept of a Multi-Standard Wireless Receiver Enhanced with a Digital-Front-End", *WSEAS Trans. on Communications*, vol. 4, no. 10, pp.1092-1099, Oct 2005

For the upcoming period publications in professional journals and magazines are planned. For instance in the *EURASIP Journal on Applied Signal Processing* an article will soon be published (title: "System Considerations for a Combined UMTS/GNSS Receiver").

## 3.3 Project info leaflet

A leaflet has been prepared for distribution at various events where GAWAIN is presented (e.g. workshops, fairs, conferences) as well as for distributing it via E-Mail to people who show particular interest in the project. This leaflet provides a general overview of the GAWAIN objectives, the expected main results and the consortium members.



The leaflet contains the following information:

- Co-funded by the EC**  
Contract Number: IST-2001-34227
- Time frame of the GAWAIN project:**  
January 2004 till October 2006
- The GAWAIN consortium consists of the following companies and institutes:**
  - IfEN GmbH (Coordinator)**  
Alte Gruber Strasse 6  
D-85506 Poing / Germany  
Fonc: +49 (8121) 2238-10  
Fax: +49 (8121) 2238-11  
<http://www.ifen.com>
  - Infinion Technologies AG**  
Kastenbauerstrasse 2  
D-81677 Munich / Germany  
Fonc: +49 (89) 234-202 46  
Fax: +49 (89) 234-813 85  
<http://www.infineon.com>
  - DICE GmbH & Co KG**  
Freisladter Strasse 315  
A-4040 Linz / Austria  
Fonc: +43 (732) 2468-7180  
Fax: +43 (732) 2468-7124  
<http://www.dice.at>
  - Johannes Kepler University Linz**  
Altenberger Strasse 69  
A-4040 Linz / Austria  
<http://www.jku.at>
  - Institute for Communications and Information Engineering**  
Fonc: +43 (732) 2468-9711  
Fax: +43 (732) 2468-9712  
<http://www.icie.uni-linz.ac.at>
  - Research Institute for Integrated Circuits**  
<http://www.riic.at>

**For more information please visit our Homepage:**  
[www.gawain-receivers.com](http://www.gawain-receivers.com)  
E-Mail: [gawain@gawain-receivers.com](mailto:gawain@gawain-receivers.com)

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V1.1- 07/2005

The leaflet also features a central graphic with a globe, satellite orbits, and a hexagonal logo labeled 'GAWAIN' with 'INTEGRATED', 'NAVIGATION', 'GALILEO', and 'W-CDMA' around it. Below the globe, there are images of a mobile phone and a highway with cars, with the text 'UMTS' above the phone.

Figure 3-1: GAWAIN Info Leaflet, front/back

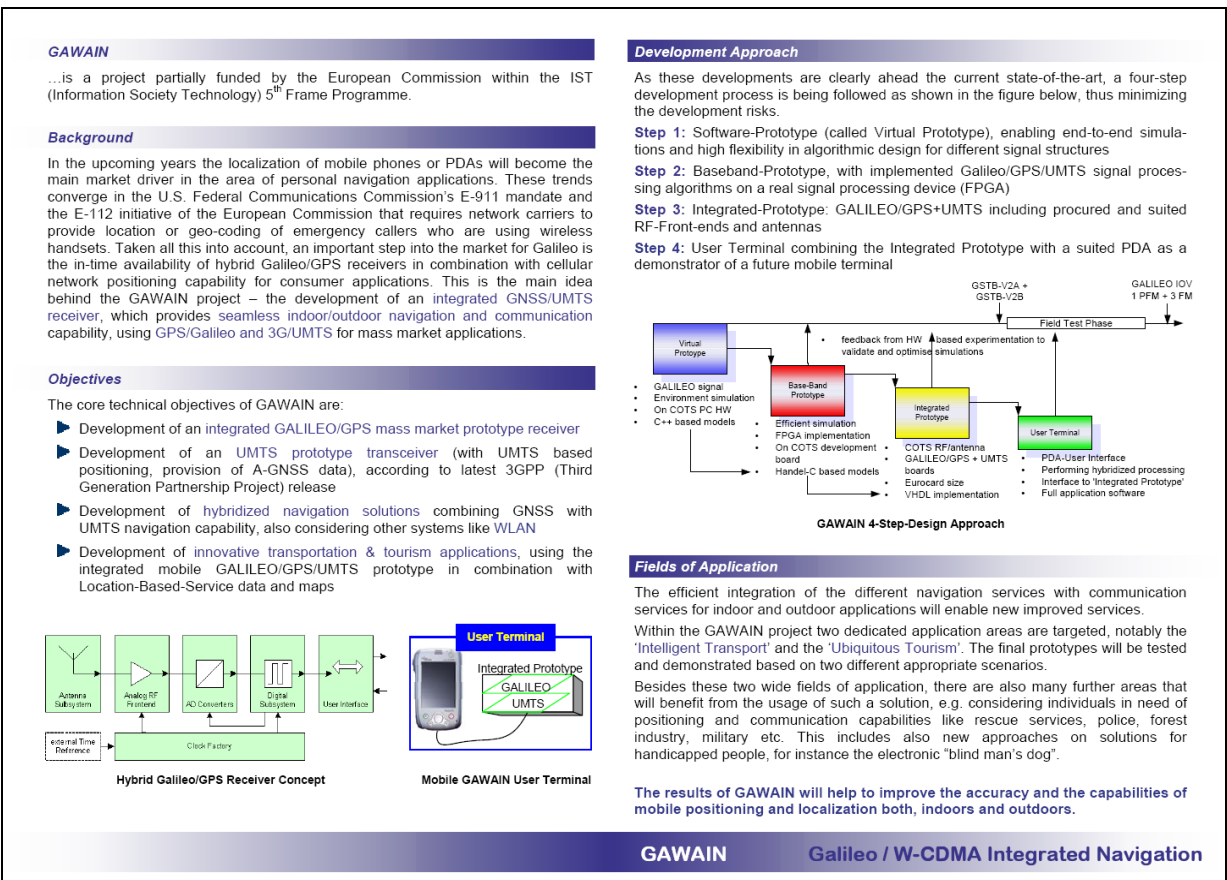


Figure 3-2: GAWAIN Info Leaflet

### 3.4 Web presence

An official web page of the project has been installed and is maintained by IfEN GmbH. The URL of this site is <http://www.gawain-receivers.com>.

The web page provides information on the project as well as on EC funding and links to the other consortium partners. It includes both public announcements and dissemination publications reflecting the progress of the project and offers all relevant public documents.

The page is organised in a public and private respectively internal section respectively. The public website provides project details, current news and consortium information, as well as an up to date list of results, presentations and publications. In the course of the project progress further appropriate contents will be offered.

The private website provides non-public information and details as well as internal project operation, and remains secured from the public.

The following figure depicts the home page of the GAWAIN project.

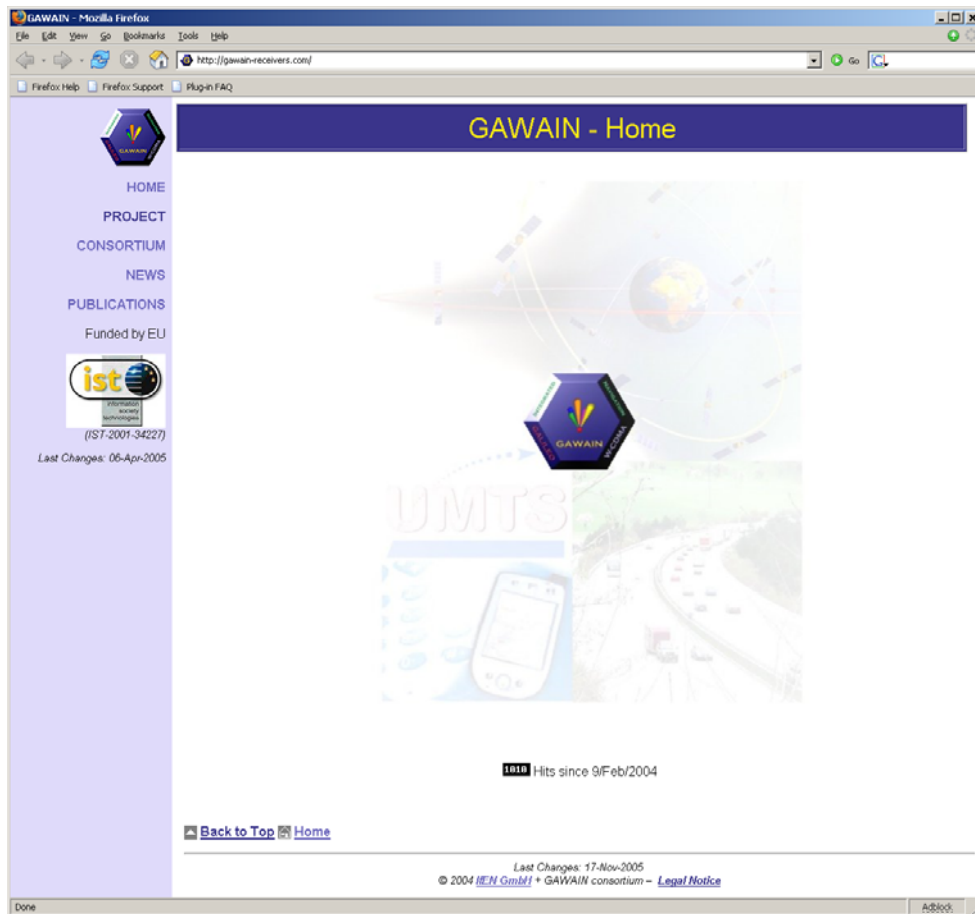


Figure 3-3: GAWAIN project home page

The website is structured as follows:

## HOME

The home page of the GAWAIN project, as depicted in the previous figure.

## PROJECT

An overview of the project, description of the planned HW and SW developments along with a work plan outline and the GAWAIN milestones.

## CONSORTIUM

Information on the members of the GAWAIN consortium, accompanied with partner links:

- IfEN GmbH (consortium coordinator)
- Infineon Technologies AG
- DICE GmbH & Co KG
- Johannes Kepler University Linz, Institute for Communications and Information Engineering
- Johannes Kepler University Linz, RIIC Research Institute for Integrated Circuits

## NEWS

News on the project, e.g. conference presentations or participation in workshops

## PUBLICATIONS

This section contains all the public documents, presentations and some further publications like e.g. press articles.

## INTERNALS [restricted]

Non-public information and details as well as internal project operation, secured from the public.

The GAWAIN web site also serves as a common point of contact for external audiences. For this purpose, an e-mail account has been made available for any contacts, problems or questions:

[gawain@ifen.com](mailto:gawain@ifen.com)

## 3.5 Clustering and standardisation

### 3.5.1 Relevant other projects

The following projects (ongoing or recently finished) have been identified as relevant for the GAWAIN project:

- **GAUSS:** EC 5<sup>th</sup> framework project IST-1999-20532, ‘GALILEO and UMTS Synergetic System’ (coordinator: Telespazio). This project has ended in 03/2003.
- **PARAMOUNT:** EC 5<sup>th</sup> framework project IST-2000-30158 (coordinator: IfEN). This project has ended in 11/2003.
- **GALADRIEL:** ESA project - GALILEO Ground Reference Receiver Pre-Development (prime IfEN). The project has ended in 01/2004
- **GATE:** DLR project - GALILEO Test and Development Environment (prime IfEN), phase A/B finalised July 2003 with PDR. Phase C/D started in 05/2004 and will be finished in 08/2006.
- **GIFTS:** EC 5<sup>th</sup> framework project IST-2000-29364, ‘Global Intermodal Freight Transport System’ (coordinator: Telespazio). This project has ended on 31/08/2004
- **Ultra Wide-Band (UWB) In-Building Positioning Demonstrator:** ESA project (prime: Thales Research Ltd, UK). This project has been completed in September 2004.

Contacts have been established to several consortia of the projects mentioned above. The relevant project results that were publicly available have been analyzed with respect to their impact on GAWAIN.

### 3.5.2 Relevant standardization committees

There are several standardization committees considered as relevant in some ways for the GAWAIN project:

#### 3.5.2.1 3GPP

<http://www.3gpp.org>

The Third Generation Partnership Project (3GPP) is a collaboration agreement bringing together various telecommunication standards bodies. The 3GPP's scope includes the definition of globally applicable technical specifications and technical reports for a 3rd Generation Mobile System based on evolved GSM core networks and the radio access technologies that they support (→ UMTS).

A work item is drafted for the 3GPP technical specification group RAN (radio access network), "Toward A-GNSS concept", to include the capability of Assisted-Galileo into 3GPP. Location systems currently used are Cell-ID (high service availability but limited service accuracy) and A-GPS (high service accuracy but service availability could be improved, especially when considering the obstacles masking the signals in urban environments). The work item is therefore meant to introduce support of Assisted-Galileo in the 3GPP TSG RAN specifications as a particular case of an Assisted-GNSS to improve the availability and the accuracy of the location services. The acceptance of the work item is planned for December 2005. The work is expected to be finalised in June 2006.

#### 3.5.2.2 IEEE

<http://www.ieee.org>

The Institute of Electrical and Electronics Engineers (IEEE) is the largest technical professional organization in the world. The IEEE serves as a major publisher of journals and a conference organizer in its fields of interest. It is also a leading developer of standards in a broad range of disciplines, including e.g. Power and Energy, Information Technology, Telecommunications and Transportation. In the frame of the IEEE 802.11 a set of WLAN standards have been defined by the responsible IEEE working group.

An integration of WLAN together with GPS/Galileo and UMTS in the GAWAIN receiver prototype is not in the scope of the GAWAIN project. However, such an integration will be analysed considering the further development of GAWAIN based hybridized navigation solutions.

Ranging and location awareness is also a desirable feature in short range wireless networks. Such networks combine low to medium rate communications with positioning capabilities. Ultra-wideband (UWB) signaling is especially suitable in this context because it allows centimeter accuracy in ranging, as well as low-power and low-cost implementation of communication systems. These features allow a new range of applications, including logistics, security applications, medical applications, family communications/supervision of children, search and rescue, control of home appliances, and military applications, among others.



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These new possibilities have also been recognized by the IEEE, which has set-up two new standardization working groups 802.15.3a and 802.15.4a for the creation of new physical layers for low and high data rate communications combined with positioning capabilities within the frame of the ongoing 802.15 standardization process for short range wireless personal area networks (WPANs). Using UWB communications in the physical layer of these systems provides the opportunity for very precise ranging due to the high time resolution of the UWB signals.

## 4 Description of the use plan

This part of the Dissemination and Use Plan outlines the main results (prototype, service, knowledge etc.) of the GAWAIN project, which have exploitation potential. Furthermore, the overall strategy and the individual plans of the partners on how to exploit the results identified are also summarized.

At the current status of the project some basic information on the anticipated utilization of the main results is given. More details will be provided in the upcoming issues of this document as well as within the corresponding versions of the Technological Implementation Plan (eTIP).

### 4.1 Exploitation plans of the project as a whole

The general aim of the project is to improve the competitive position of all participating partners in their respective marketplaces, and to open new fields of business activities by applying the know-how gained through this project.

The plans for the dissemination and exploitation of the results of GAWAIN are targeting in two directions. On the one hand, the integrated GNSS and UMTS receiver hardware derived from the integrated prototype could be exploited on a commercial basis by all participating companies. The experiences and technological breakthroughs in manufacturing an appropriate integrated GNSS and UMTS receiver can be used in other applications and environments.

On the other hand it could be envisaged to exploit the know-how (integration concept, algorithms and software etc.) on the combination of satellite navigation with terrestrial communication systems for positioning purpose acquired throughout the project, by providing it e.g. on a licensing basis to relevant receiver manufacturers or interested user/supplier groups. Additionally, since a core objective within GAWAIN is to develop a comprehensive development and validation tool suite on different levels (SW-prototype simulator, baseband-prototype and RF-prototype), this know-how and tool suite could be exploited on a similar basis.

The efficient integration of the different navigation services with communication services for indoor and outdoor applications enables new improved services. Today the success for a new service is determined by three factors: Having the right contents (i.e. you get what you actually need), having the right user device (integrated navigation & communication) and overall the right price. With now the right device at hand (with ideally the right price), the whole area of intelligent transportation can evolve into serious new services far beyond the currently existing services. GAWAIN may provide an important means to stimulate the market in this respect.

### 4.2 Exploitation plans per result

In this section the exploitation intents for the expected main results as identified in chapter 2.1 are presented.

#### 4.2.1 Virtual software prototype (SW receiver simulator)

As a first important step towards the GAWAIN receiver prototype, an end-to-end SW receiver simulator will be developed. This ‘Virtual Prototype’, which will enable maximum flexibility in algorithm design for different signal structures, is primarily intended for the project internal use, serving as the basis for the subsequent HW implementation. However, this result is considered to be of use also in the frame of other development activities of the involved consortium partners.

#### 4.2.2 Integrated Galileo-UMTS receiver prototype

The most significant output from the GAWAIN project will be the integrated prototype receiver combining GNSS (GPS/Galileo) and UMTS for seamless indoor/outdoor navigation and communication. This result is considered to have a high market potential. Thus, it will be in the special focus of the commercialisation efforts.

The receiver prototype will not be very compact in its dimensions, thus further efforts will be made in order to minimize the hardware dimensions in the post-project phase leading to the commercialisation of the integrated receiver.

#### 4.2.3 Integrated UMTS-GPS receiver prototype

The integrated UMTS-GPS prototype consists of a reduced size secure digital (RS-SD) card with an antenna extension for the A-GPS functionality and a “bar-type” mobile phone platform prototype for the GSM/UMTS functionality and for the delivery of the GPS assistance data. This platform serves as a base for further integration analysis.

To enable the use of the IP generated within GAWAIN, contributions to 3GPP standardisation are planned for 2006.

#### 4.2.4 Simulation Environment for combined SatNav/UMTS RF Transceivers

An important part of the work within GAWAIN is the architectural design of an integrated SatNav/UMTS transceiver. This design step is based on extensive simulations. As an outcome a comprehensive simulation environment for RF transceivers with an interface to baseband simulators has been set up. The developed SatNav/UMTS transceiver simulation environment is based on SystemC. Therefore, integration into other simulation environments that are currently used within DICE/JKU such as Agilent-EEsof ADS, Matlab, Modelsim and CoCentric is possible. This will ease the continued usage of the blocks developed in the GAWAIN project for upcoming simulations of novel RF transceivers.

#### 4.2.5 User Terminal with test applications

For the appropriate testing and demonstration of the GAWAIN prototype receiver a user terminal with two dedicated test applications will be developed and adapted from existing applications respectively. This user terminal will consist of a PDA having an interface to the receiver prototype. In order to allow for the adequate testing and validation of the developed system as well as the demonstration of the concept to the targeted audience, two innovative applications will be developed to run on the user terminal. One application will focus especially on the requirements for the area “Intelligent Transport”, the second one targets on

the field of “Ubiquitous Tourism”. Both applications will integrate appropriate GIS methods and data, e.g. in the form of map display, routing functionality etc.

Besides, it is intended to further expand and improve these applications in order to finally exploit them commercially in the frame of (a) Location Based Service(s).

### 4.3 Further individual partner plans

#### **JKU:**

The knowledge and expertise gained within the GAWAIN project is considered as an important expansion of the competence of JKU. Especially the inclusion of SatNav-related aspects is an extremely valuable asset for future research projects and will strengthen the position of JKU in the international R&D landscape.

As a direct outcome of GAWAIN two PhD students will include their GAWAIN-related work as major part of their theses. Furthermore, the dissemination activities in terms of scientific publications and the planned tutorials contribute to the academic track record.



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