Intelligent and Efficient Travel Management for European Cities

The In-Time Package

Introduction

In-Time is a Pilot Type B Project funded by the
European Commission, DG Information Society and Media
in the CIP-ICT-PSP-2008-2 Programme

Terms and Conditions

1. Introduction

The In-Time package contains the documentation and technical specification of the In-Time data and service model which defines the In-Time interface as described in the official In-Time project documentation. The official In-Time project documentation is available on the public project website www.in-time-project.eu.

The In-Time package is the initial result of the research and development pilot project In-Time; it is only intended to being used for popular science and information purposes. The In-Time package only shall be used for testing, research and developing purposes on a non-profit and non-commercial basis at its users' own risk; all intellectual property rights shall be retained.

The In-Time package is only available for registered users. In order to download and use the package the user has to register on the website www.in-time-project.eu and to accept to comply and adhere to these terms and conditions by clicking the "I accept" button at the end of this document.

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In order to access certain information, material or services, the user may be required to provide information about itself (such as identification or contact details). The user agrees that any information given to the In-Time consortium will be accurate, correct and up to date.

The user shall use its best efforts to use the In-Time package in a professional, first-class manner in order to preserve and enhance the goodwill of the project and to retain all intellectual property rights associated with the In-Time package. The user agrees that it will not engage in any activity that interferes with or disrupts the In-Time package or any services related thereto.

The In-Time package shall only be used for research and development purposes on a non-profit and non-commercial basis in accordance with these terms and conditions. The user agrees to use the In-Time package and any information and material related thereto only for purposes that are permitted by the terms and conditions imposed by the In-Time consortium and any applicable law, regulation or generally accepted practices or guidelines.

The user acknowledges and agrees to be solely responsible for (and the In-Time consortium has no responsibility vis-à-vis the user or vis-à-vis any third party) any breach of obligations under these terms and provisions and for the consequences of any such breach. In the event of a violation of these terms and conditions, the user shall indemnify and hold the In-Time consortium harmless from and against any claims or damages (whether direct, indirect, incidental, consequential, punitive or damages for loss of profit, business interruption, loss of programmes or other data), including where a third party brings a claim.

The In-Time consortium shall have the right at any time to amend these terms and conditions or to impose, as necessary, other terms of use or requirements not provided herein, in particular, the user shall be obliged to comply and adhere to any further copyright and proprietary notices.

3. Consideration

The user may use the current version of the In-Time package free of charge for non-profit and non-commercial purposes in compliance with these terms and conditions.

4. Intellectual property

The In-Time package has been developed and designed by taking into account several European and International standards, including DATEX 2, IFOPT, SIRI, NAPTAN, Transmodel, TPEG, Journeyweb, standards from the ISO 19000 series, OGC and OASIS. The user acknowledges and agrees that all legal rights, title and interest, including intellectual property rights of such standards at all times shall be and remain with their respective title holders.

Furthermore, the user acknowledges and agrees that all legal rights, title and interest, including intellectual property rights of the design of the In-Time package interface as the work of the integration, harmonization and implementation of a multiple/cross domain, common data and service interface and all information and material related thereto at all times shall be and remain with the In-Time consortium.

For the interpretation of these terms and conditions "intellectual property" shall mean tradeò marks, trade names, patents, inventions, design rights, copyrights, and all other similar proprietary rights, including, where such rights are obtained or enhanced by registration, any registration of such rights or applications or rights to apply for such registrations.

The In-Time package, its content as well as all information and material made available by the In-Time consortium to the user neither may be reproduced nor made accessible to third parties without the In-Time consortium's consent. The In-Time consortium may at any time demand that all such information and material shall be returned by the user to the In-Time consortium without having to state reasons.

The user undertakes to refrain from doing anything that might endanger, jeopardize or infringe the ownership or any other intellectual property rights associated to the In-Time package. In particular, the user agrees that it shall not register or attempt to register any of the intellectual property rights in any jurisdiction and shall not challenge the title of such rights.

The user shall hold harmless and indemnify the In-Time consortium from and against any and all suits, claims, actions, demands, expenses, damages, liabilities, penalties, costs (including reasonable legal expenses and attorney's fees) resulting directly or indirectly from any claims, lawsuits or actions raised by or initiated by any third party alleging the infringement of any third party intellectual property right as a result of or in connection with the use of the In-Time package.

5. Exclusion of warranties

Considering that the user may use the In-Time package free of charge, the In-Time consortium disclaims all warranties and liabilities, either express or implied, relating to the availability, continuance, quality, completeness, accuracy, fitness for purpose or achievement of a particular result or non-infringement with respect to the In-Time package, its content and all other information, material or documentation that is contained therein, delivered by, resulting from or otherwise related to the In-Time package and all services provided in relation thereto, including support or other technical services, and disclaims all warranties and liabilities that the outputs will be free from error. No advice or information, whether oral or written, obtained by the user from the In-Time consortium or through or from services shall create any warranty. The user explicitly acknowledges that the In-Time package, its content or any information and material related thereto may contain misprints, mistakes or inconsistences and that the In-Time consortium shall not be held liable for any of such errors or faults.

In particular, the In-Time consortium does not provide any warranty with regard to the intellectual property rights related to or resulting from In-Time package, including the standards referred to by the In-Time package. The In-Time consortium does not warrant that the intellectual property rights are valid and subsisting, in full force and effect and have or will not be cancelled, expired or abandoned.

Any information, data, conclusion or recommendation related to the In-Time package, including all material or other documentation as well as services, only is provided on the basis that such information, data, conclusion and recommendation is verified by the user prior to the use and that the user will be solely responsible for any damage that results therefrom. All information, material and services are provided '"as is" and "as available".

6. Limitation of liability

The user expressly understands and explicitly agrees to use the In-Time package and all information, material and services related thereto at its sole risk and liability.

The In-Time consortium explicitly excludes its liability to the fullest extent permitted by law. In particular, the In-Time consortium shall in no event be liable for any damages (whether direct, indirect, incidental, consequential, punitive or damages for loss of profit, business interruption, loss of programmes or other data) in connection with or related to the use or failure to use, modification, availability (including any permanent or temporary cessation), accuracy, completeness and the quality related to the In-Time package, its content and any other information and material related thereto, whether based on contract or statutory law or other rules and regulations and whether negligent or otherwise. In particular, the In-Time consortium shall not be liable for any violation of intellectual property rights by the user related to the In-Time package, its content, information and material.

7. Provision of the In-Time package

The In-Time package is still being tested and constantly amended, and, consequently, subject to revision from time to time. The In-Time consortium reserves the right, at its own discretion, to amend and modify the In-Time package, its content and information and material related thereto at any time without any prior notice. The user acknowledges and agrees that the form and nature of services provided with respect to the In-Time package may change from time to time without prior notice.

As part of this continuing innovation, the user acknowledges and agrees that the In-Time consortium may stop at any time (permanently or temporarily) providing or prevent the user from accessing the In-Time package and any information, material and services (or any features within the services) related thereto at the In-Time consortium's sole discretion, without prior notice. The In-Time consortium explicitly reserves the right, at its own discretion, to discontinue, limit, suspend or to terminate the provision of the In-Time package, its content as well as any information, material and services related thereto at any time without any prior notice.

8. Termination

The user agrees to remain bound by these terms and conditions (as amended from time to time) for as long as the user remains using the In-Time package and the information and material as well as the services related thereto. The In-Time consortium may terminate these terms and conditions at any time with immediate effect.

Notwithstanding the before mentioned, the right to use the In-Time package automatically ends on March 31, 2012.

This section shall not affect the In-Time consortium's rights regarding the provision of the In-Time package as set out above.

9. Governing law and jurisdiction

These terms and conditions shall be interpreted and governed in all aspects according to the laws of the Republic of Austria with exclusion of the UN-Convention on the International Sale of Goods (CISG) and without regard to its conflict of law provisions.

The Vienna Commercial Court shall have exclusive jurisdiction to settle any dispute or claim arising out of or in connection with these terms and conditions or its subject matter or formation (including non-contractual disputes or claims).

10. Severance

If and for so long as any provision of these terms and conditions (or any part thereof) shall be deemed to be judged invalid for any reason whatsoever, such invalidity shall not affect the validity or operation of any other provision of these terms and conditions except only so far as shall be necessary to give effect to the construction of such invalidity, and any such invalid provision shall be deemed severed from these terms and conditions without affecting the validity of the balance of these terms and conditions.

11. Entire Agreement

These terms and conditions constitute the whole agreement between the In-Time consortium and the user and supersede all previous agreements relating to its subject matter.

Getting started with In-Time

The main objective of the In-Time ICT-PSP Pilot Project is to pilot the architectural solutions investigated and specified in the FP6 eMOTION project [eMOTION, 2007] in six European sites – Brno, Bucharest, Florence, Munich, Oslo and Vienna –, providing a general, pan-European service infrastructure to support the efficient provision and operation of Multimodal Real Time Traffic and Travel Information (RTTI) services to road and transport users.

To make the In-Time concepts widely available for implementation in follower cities, public documentation exists in form of Project Deliverables. To further ease the process of transfer of In-Time to follower cities, a "package" has been specifically prepared.

The present document is the entry point to start the process of understanding, designing and implementijng an In-Time system. It introduces the In-Time Package itself and the technical specification also provided as part of the package.

The focus will be on the provision of a common data and service offerings through the interoperable, multi-service B2B In-Time server offering a Commonly Agreed Interface (CAI), largely based on EU ITS and web service standards, enabling the access and use of multimodal, Real-Time Traffic Information (RTTI) data and services available on a regional level via a Regional Data/Service Server (RDSS).

The In-Time server is intended for use by Traffic Information Service Providers (TISPs) as a standardised access layer to local RTTI services and information to enhance their service provision to road and transport end-users. This concept is applicable not only to the In-Time RDSSs and TISPs but also to any other follower RDSS and TISP, as long as they use the In-Time interface to exchange data and to make use of existing services.

In-Time specifications, necessary to design and implement the Commonly Agreed Interface, are largely based on the architecture and infrastructure specifications of the eMOTION Project (www.emotion-project.eu). These have been carefully reviewed during the project phase for consolidation and adoption. eMOTION and In-Time Documentation can be used to fully understand and use the specification.

In-Time provides interoperability between systems in the field of traffic and transport information systems.

A multi-service, standardised Common Interface is the key supporting element for interoperability.

In-Time system overview

The In-Time system can be seen as a service-oriented middleware infrastructure providing a number of data/services, covering individual traffic, public transport, weather, location based services, and intermodal transport planning, enabling Traffic Information Service Providers (TISPs) to access RDSS data and services when operating their value added end-user services.

The interoperable, multi-service, standardised Commonly Agreed Interface (CAI), is the key supporting element of this middleware infrastructure and the indispensable feature for the achievement of the interoperability features. Using the CAI in pilot sites will ensure a standardised access of real-time multimodal traffic data for external TISPs.

This model ensures the easy access to all urban traffic related data within one region resulting in the distribution to the end-users via several consistent information channels and in parallel enhancing user acceptance. Common interface specifications are defined to give the necessary reference for current and new pilot site and TISP.

The In-Time technical specifications have been defined following a Model Driven Architecture (MDA) approach and are comprised of the following main elements:

- a reference model of data and services – formally defined in UML and integrating the conceptual models of several European standards, including DATEX 2, TPEG, SIRI, IFOPT, etc. – to fully describe the data and service provision made available by In-Time through the standard B2B interface.
- an encoding of the conceptual model in a Geography Markup Language (GML) Application Schema, providing the exchange format for In-Time data with other services and applications.
- a set of WSDL files, generated from the conceptual definition of In-Time services, providing a formal description of the In-Time services usable by external applications according to the standard publish-find-bind paradigm.

Using GML enables In-Time to exploit the OGC Web Feature Service concept as a data interface along the same lines followed by European Spatial Data Infrastructures (SDIs) and depicted by the INSPIRE Directive.

GML encodings of In-Time accessible data are embodied into XML schema definitions (XSDs) associated to each Application Schema of the In-Time Data Model. XSD files are the starting point for the concrete use of the In-Time specifications as they enable the automatic generation of code libraries, the configuration of OGC-compliant web platforms (providing WFS and WMS) etc. XSD is in fact the standard to express a set of rules to which an XML document must conform in order to be considered 'valid' according to that schema.

In more practical terms, the In-Time XSD can be used to:

- formally describe an XML document
- validate a XML document
- generate human readable documentation.

The In-Time XSDs enable code generation which allow contents of XML documents to be treated as objects in the programming environment (Java, C#, etc..).

Overall, the following domains are covered by the existing In-Time conceptual model XSD and WSDL definitions:

- Static road traffic
- Dynamic road traffic & weather
- POIs +Static and dynamic parking
- Static and dynamic public transport
- Dynamic traffic event
- Static and dynamic flight
- Dynamic Multimodal Journey Planning

Specifications such as XSD and WSDL definitions constitutes the building blocks for the design and set up of the infrastructure and the components necessary to run the In-Time system in pilot cities and TISPs.

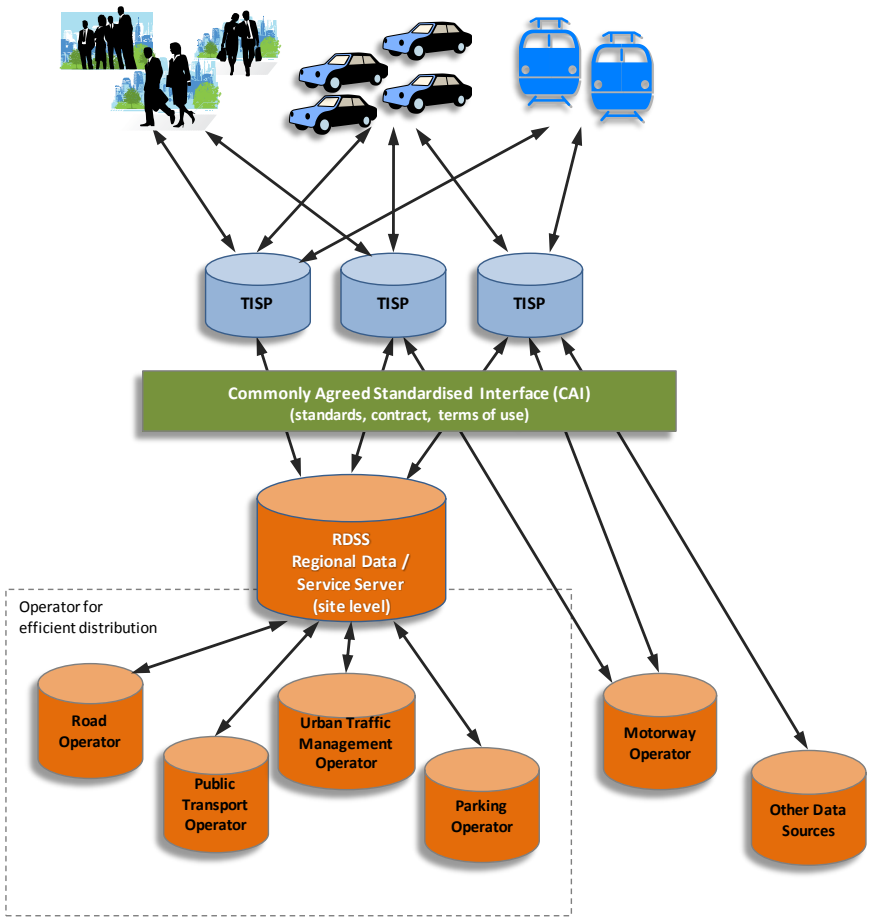
The In-Time package is a resource aiming at supporting the technical implementation of the CAI for any follower city. The package includes the complete interface data model definition in form of UML conceptual model and XSD definition; a simplified data model derived from the complete one as it has been used in the project; source code for concrete implementation of service interfaces and documentation.

This document is a reference to understand the In-Time package and an entry point to start understanding the technical specification and to trigger the process of design and implementation of an In-Time system in follower cities. Specific and detailed references to publicly available specification documents are present.

The figure in the next page provides a summarised view of the reference application context for In-Time, showing the key elements and actors in RTTI service provision for a generic site (city, metropolitan area, region, etc.).

This application context can be briefly summarised as follows:

1. The starting point of the targeted In-Time RTTI service chain is provided by the local data sources and information services available in the site. These cover, usually, a number of transport domains and services, including: individual traffic, public transport, parking, weather information, intermodal transport planning.

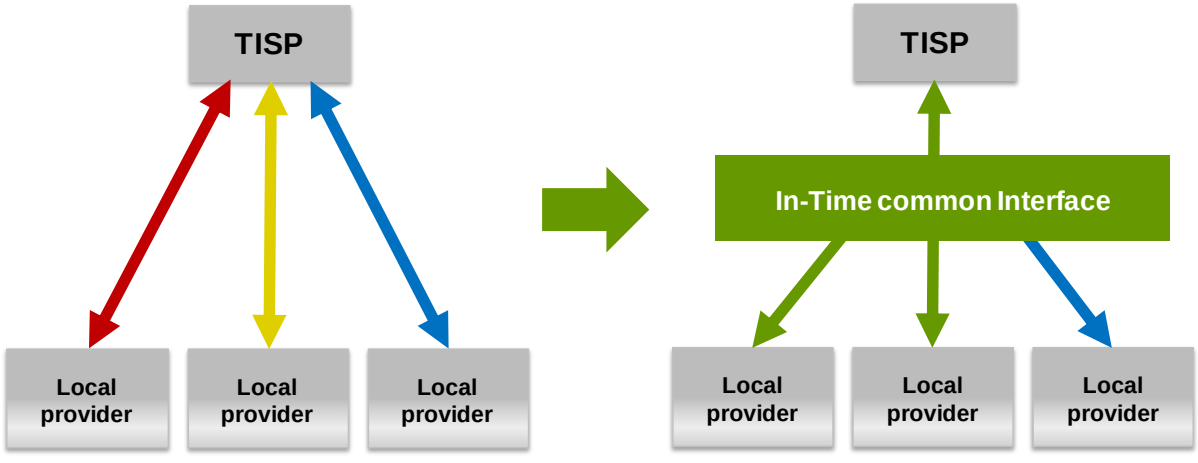


2. The data sources and services related to the above individual components of traffic and mobility in a given site are more and more often combined, providing integrated services – Regional Data/Service Servers (RDSS) – that offer users and Traffic Information Service Providers (TISPs) a unique access point to the local travel and traffic information; this is especially the case of large cities, metropolitan areas and, sometimes, regions.

3. Traffic Information Service Providers –e.g. navigation service providers, journey planning service providers, etc. – are more and more often in need of accessing local site data (and services) to be able to ensure their end-users updated local information and dynamic services (e.g. "connected" navigation services). A main issue, here, is the variability of local service/technical constraints and requirements (i.e. different technologies, data models, interfaces, protocols, etc.) which requires different interfacing solutions are adopted in the different sites.

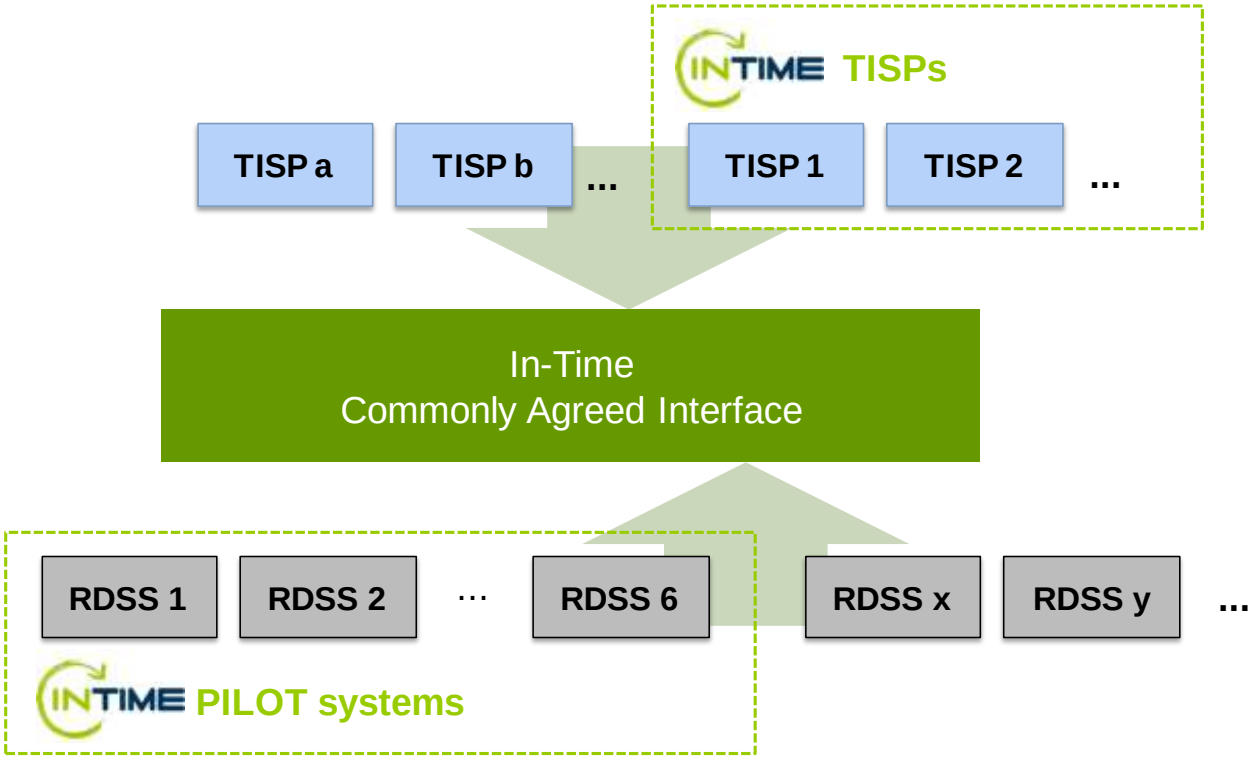
4. In-Time addresses this part of the service chain, having as the fundamental concept and goal the piloting of an innovative pan-European approach to RTTI service provision based on an open, standardised service oriented infrastructure offering B2B services that will facilitate access to local transport related data and RTTI service provision by TISPs.

Fundamental to the definition of the In-Time infrastructure is the standardised data and service Commonly Agreed B2B Interface (CAI) enabling standardised access to real-time multimodal travel and transport information available in the application site. Generally, access to local



data/services is supported by available integration services (RDSSs). However, In-Time also assumes that individual local services/systems can be accessed through the B2B CAI.

The specifications and design of the In-Time middleware infrastructure – and particularly of the B2B CAI – are general enough to ensure it's application even to those sites that do not provide RDSS integration. This is a key property of the final In-Time architecture which has the important consequence of (1) being neutral to the specific views (operation models, service models, policies, etc.) adopted by any individual site, and (2) supporting migration paths from decentralised systems/application to more centralised ones.



In-Time end user services

As outlined, In-Time provides an **enabling infrastructure** intended to improve the provision of RTTI end-user services by improving access to and use of local, updated travel and traffic information in the application site (area) with the aim of leading to better modal choices by the travellers and road users.

The detailed specifications and design of the In-Time system therefore take as a reference a set of target RTTI end-user services the system is to support. Much work in this area was done in the predecessor eMOTION project [eMOTION, 2006], based on the definition of European ITS services carried out by TEMPO which distinguishes between "Minimum ITS Services" and "Common ITS Services". The Minimum ITS Services are "considered as being essential and should become available in all Member States" whereas "Common ITS Services "should be compatible wherever available".

Based on the background analysis carried out within eMOTION, as well as on the user needs and requirements of the In-Time TISPs and involved sites, the investigation of user groups expectations conducted within the project analysis phase has lead to the selection of the **target In-Time End-User RTTI services.**

A base requirement for the In-Time system (infrastructure) is thus the provision of the data and services related to such In-Time End-User services that TISPs can use as the basic "building blocks" to build up and provide their value-added services (like e.g. multi-modal journey planning and information, navigation, etc.) to the users.

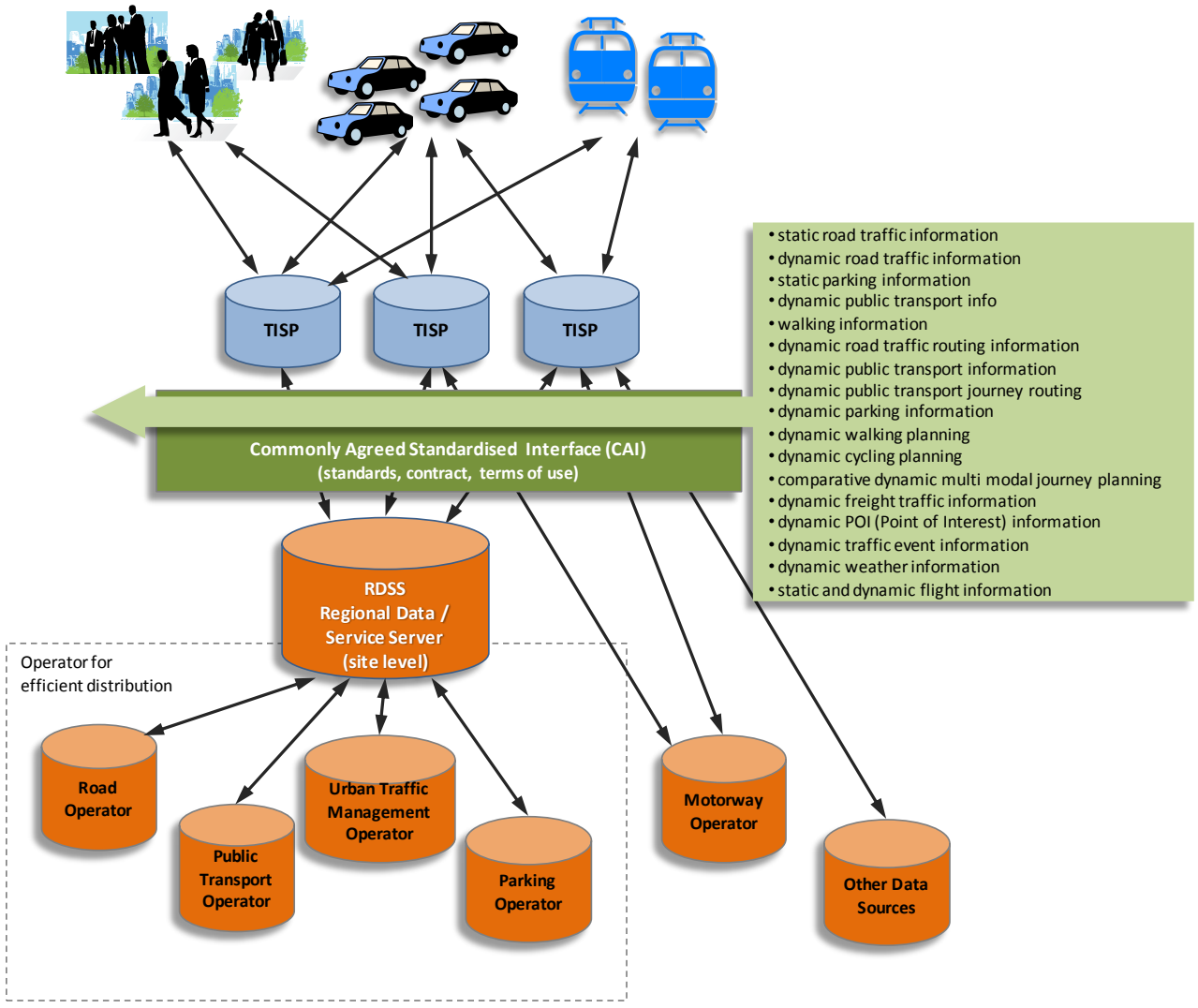
The In-Time system – and particularly the In-Time B2B CAI – will be able to provide access to local data sources and services (generally, mediated by the RDSS but also, in some cases, through direct access to individual data sources / services) enabling the implementation and provision of the reference End-User services by a TISP.

Architectural approach and components

The In-Time architecture follows the general principles of the eMOTION architecture, which is fully and detailed described in [eMOTION; 2008]. Essentially, it provides a consolidated (and somehow simplified) version of the eMOTION architecture mainly focusing on and including the core elements required to meet the In-Time general objectives related to RTTI provision.

The design of the architecture focuses on enabling interoperability of TISP applications with respect to (1) data available in different sites and transport environments, and (2) related to different transport domains and systems. This is achieved by rooting the design of the architecture on (a) general open standards for service oriented applications (e.g. W3C, OASIS, etc.), (b) reference EU ITS standards (i.e. data models, protocols, interfaces, etc.), and (c) open geospatial information/service standards (e.g. ISO/TC 211 and OGC, the Open Geospatial Consortium) which provide also the basis of standardised Spatial Data Infrastructures (SDIs) such as the reference European SDI INSPIRE [INSPIRE, 2010].

The key design principles adopted at the basis of the In-Time architecture are briefly summarised as follows.



Service Oriented, Model Driven Architecture

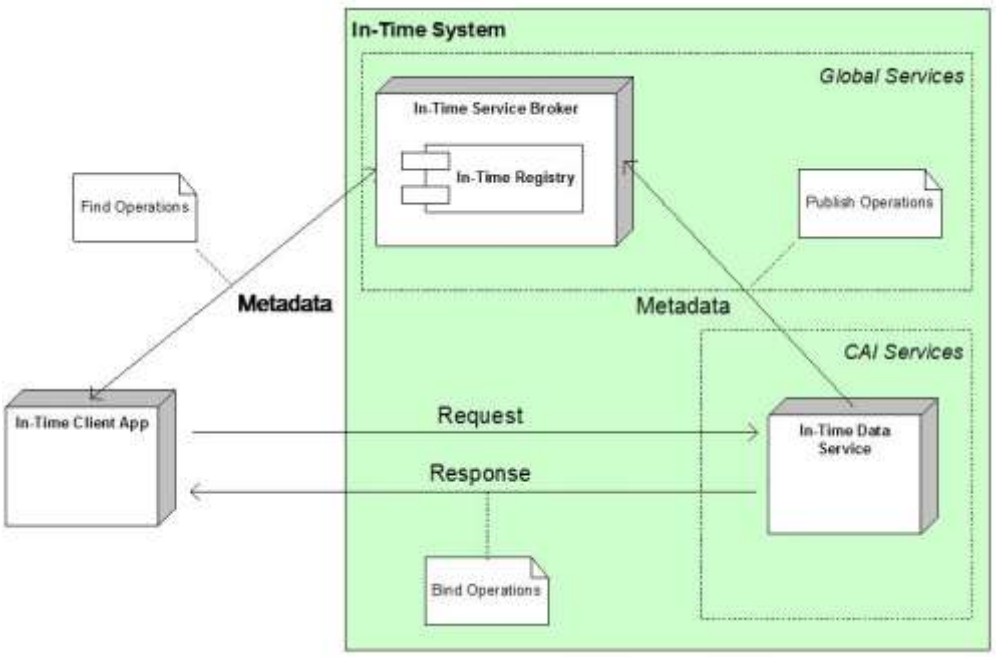
In-Time defines a Service Oriented Architecture (SOA) able to support the provision of multi-modal, on-trip/pre-trip traffic information services accessing widely distributed data and content sources.

An SOA [Marks & Bell, 2006] is essentially a collection of services, generally distributed across a decentralised architecture, able to interact with each other in different ways. SOAs promote an architectural style having a number of base properties of interest for the In-Time application context and objectives outlined in previous section 2.1, including:

- SOAs are built upon services, i.e. self-contained software components, usually realised through platform-independent standards (e.g. XML, SOAP, etc.) that implement well-defined functions accessible/usable through specified interfaces. The In-Time SOA provides a general service oriented architecture in the vertical application domain of RTTI services.
- Service interoperability is a base feature offered by SOAs enabling the provision of open architectural solutions: thanks to the underlying (platform-/language-/operating system-) independence and the published service interfaces, the available services within the SOA not only interact each other but they can be used by third parties to build up applications and other services – specifically, for In-Time, value-added TISP services and applications.
- Services within a SOA can be dynamically discovered (e.g. through "Service Brokers" providing "Directory Services" and UDDI) and used by users and applications (e.g. TISP Services / Applications) through the "publish-find-bind" paradigm; this addresses not only technical issues but also aspects related to operational, service, policy and business related issues, allowing the implementation and operation of the desired service and value chains/models.
- Based on the above properties, the services within a SOA are "loosely coupled" and this ensures the openness and flexibility of the overall architecture with respect to its functional adaptation and evolution over time.

The In-Time SOA specification follows a Model Driven Architecture (MDA) approach [MDA, 2010]: the specification of the data and service models supported by the target system is an essential part of the entire architectural specification and design process. Since the main type of service In-Time is planned to support is the provision of information to the users – i.e. data services supporting the provision of real-time, multi-modal, travel and traffic information to TISPs (and the to transport users) – the MDA approach is particularly well suited, a major part of In-Time specification being the definition of the reference, integrated data model providing the underlying data specification to enable core RTTI services.

Overall, starting from the specifications of the previous eMOTION project, the specification of In-Time model-driven SOA has been achieved



essentially as a revision and consolidation of the available specifications. The In-Time specifications thus reflect the eMOTION MDA specification process, including the following main steps:

- Existing standards in the data domains addressed by In-Time – the ITS application domain and sub-domains – have been reviewed and candidate, applicable standards identified.
- Candidate domain standards have been selected and "harmonised" for the production of an integrated conceptual data model covering the identified requirements for the provision of the reference In-Time End-User services.
- A data model and the associated service models has been designed capturing the core aspects of the required In-Time services and, particularly, of the B2B CAI.
- Concrete specifications, usable for the actual implementation of the In-Time architecture, have been derived from the defined conceptual data and service models, including:
  - a formal definition – through an XML Application Schema defined in GML (Geographic Markup Language) [OGC-GML, 2004] – of the format for data and information exchange between In-Time interface (CAI) and TISP applications/services
  - a formal definition – in WSDL – of the (web) services interfaces provided by the In-Time architecture and enabling access to and use of the data and information provided by the data model underlying the specified MDA.

Technology independence and standards

Following the MDA view, In-Time specifications are independent from – i.e neutral with respect to – specific choices as regards the technologies, platforms, tools adopted for the implementation of the architecture. On the other hand In-Time specifications do provide strong prescriptions as regards the standards adopted at the foundation of the defined system architecture.

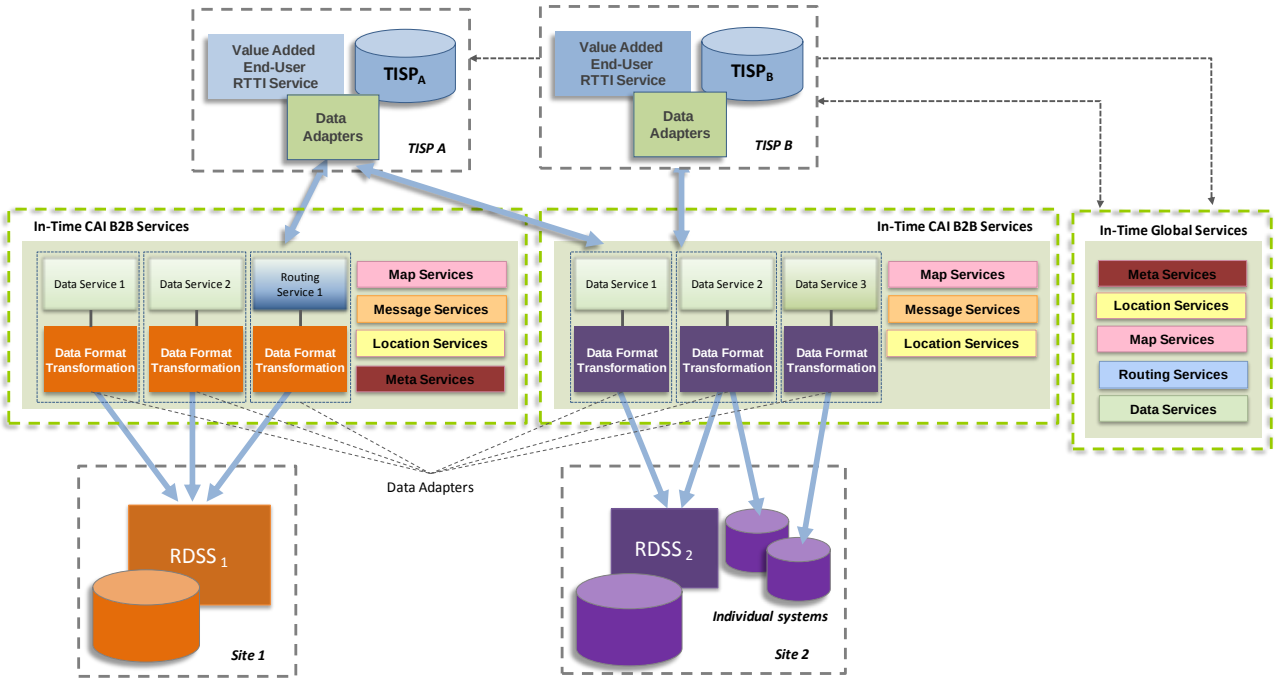
Overall, three main standards areas/levels are adopted as the bases of In-Time SOA specifications and are prescribed for any concrete implementation of the architecture:

1) SOA open standards: aiming at providing a "general" SOA specification for applications and services in the RTTI domain, In-Time embraces as much as possible the main SOA open standards as defined by W3C, OMG and OASIS; these include widely adopted Web Services standards such as e.g. XML; WSDL, SOAP, etc.
2) Geographic Information standards: data and service interoperability in the domain of geo-located information is achieved by compliance with ISO/TC 211 and OGC (Open Geospatial Consortium) standards. This include, particularly, the Web Feature Service (WFS) and Web Map Service (WMS) definitions for specification of standardised service interfaces to provide domain-specific data services and mapping-related services respectively.
3) ITS applications standards: the conceptual Reference Data Model at the basis of In-Time SOA is defined selecting a number of international and European ITS standards harmonised into a single, comprehensive and coherent data model. The most relevant standards involved in the definition of the In-Time conceptual data model come from eMOTION and include: DATEX 2 (for individual traffic and a general situation message model); Transmodel (for public transport base information); SIRI (to describe public transport schedule information); IFOPT (describing fixed transport infrastructures resources and objects); TPEG (for descriptive location referencing, road traffic messages, public transport information messages and parking facilities.

Architecture outline

Based on the general concepts and principles described in previous sections, a high-level definition of the In-Time SOA is outlined as in the following figure.

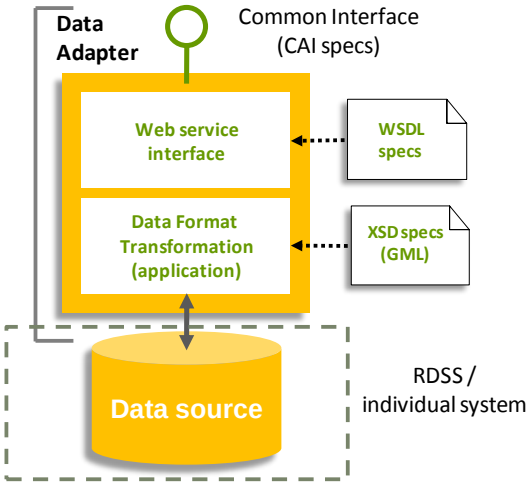
The figure presents a "generic" context of the In-Time SOA including various instantiations of the core elements of the In-Time architecture and the interacting external systems: 2 TISPs, 2 application sites and the various In-Time service categories previously introduced, distributed in different possible ways within the overall



architecture. The key elements can be briefly described as follows:

- The B2B CAI is the core element of the In-Time SOA, providing a set of site-related Data Services – Static Road Traffic Information, Dynamic Road Traffic Information, etc. – Routing Services and Map Services. These are used by TISP applications (value added end-user services) to access and use RTTI information and services in local sites.
- The Data Format Transformation component is an application providing the mapping from the specific site data format into the reference In-Time data format, for the relevant In-Time Data Service (i.e. Static Road Traffic Information, Dynamic Road Traffic Information, etc.).
  Data Format Transformation applications are obtained using the XSD (GML) specification of the target In-Time Data format.
  The Service Interface is defined by the WSDL specification generated from the XSD specification of the target reference Data Model.
- Altogether, the set of Data Adapters necessary to interface the local data/services in a given site provide the concrete implementation of the In-Time B2B CAI in the site.

As previously remarked, site-related data/services can be accessed, via the B2B CAI, either through a data/service integration mediator component – the RDSS available in the relevant site – or directly as individual systems. The Data Adapter concept applies to both cases.



The implementation of Data Adapters on TISP side follows the above concepts: Data Format Transformation from TISP specific data formats into In-Time reference data formats + standardised service interfaces descriptions (WSDL). TISPs Data Adapters are implemented only once and ensure cross-site interoperability as they share the same data and service models exposed by any site related B2B CAI.

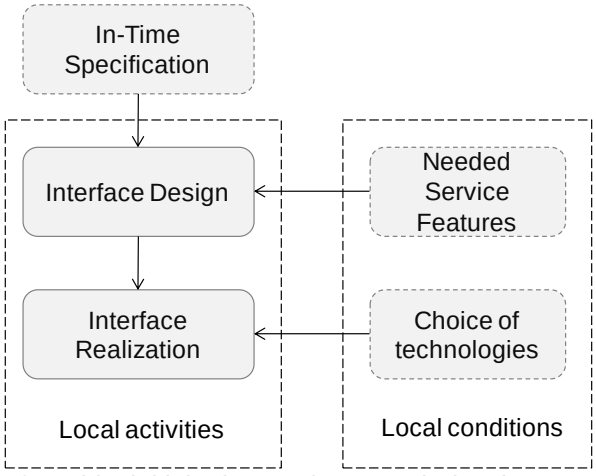
How to implement In-Time in a site

The In-Time specifications constitutes the building blocks for the concrete implementation and set up of the components and infrastructure constituting the In-Time servers and realising the end user services supported by In-Time.

The process of implementation of the In-Time services and interfaces is depicted in the figure.

Pre-development activities in pilot sites and by TISPs includes:

1) Identification of the specific part of the data/service model to be used for the concrete implementation of the CAI
2) Definition of target architecture in pilot sites
3) Choice of technologies
4) Design of necessary components and services



After this initial phase, the actual development and implementation activities takes place. The first step to be done in the pre-deployment phase is the definition of the features of interests for the provision of the In-Time services by TISPs using RDSSs data and services.

In-Time defines a huge amount of features in its interface because it aims at covering a very large number of situations and domains, usually not found (all together) in a single city. Implementing all features, including the useless ones, would result in a heavy and less manageable interface.

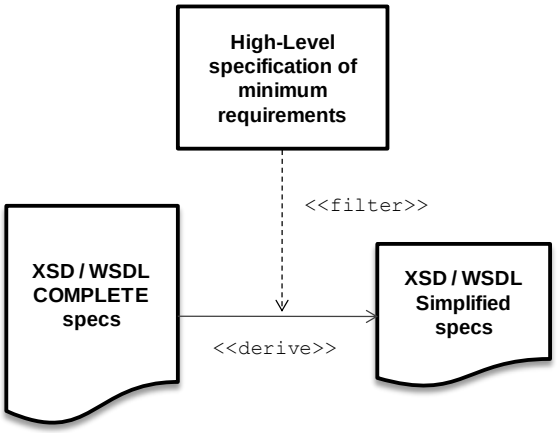
Thanks to the presence of mandatory and non mandatory parts of the model, a selection of the strictly necessary sub-set of data and services can be operated to form a well-tailored interface.

Key driving conditions of such process of reduction comes from **TISPs requirements**. TISPs applications, in fact, typically uses specific information and may not need additional one (whose transmission from a city would the result of no use). Simplifying the In-Time model means that:

- at design time, high-level UML analysis and reduction of features can be operated
- The XSD application schema can be reduced accordingly

XSD definitions are used to configure and instruct service platforms and components used in cities and by TISPs to deliver services exactly compliant with the In-Time format. They are in practice, the instructions for the configuration and set up of the data adapters which are needed to implement the In-Time CAI.

The simplified UML and XSD definitions are derived from the complete one, meaning that full compatibility with it is preserved. The examples included in the In-Time Package (marked as “Simplified”) are those produced during the project implementation of services. Follower cities may have, of course, different needs. Nevertheless,



the requirements coming from TISPs remain the first driving conditions for the definition of a tailored interface.

Contents of the In-Time package

The In-Time package contains:

1) The In-Time conceptual model:
   - Complete UML model (uncompressed file name:)
   - Simplified UML model (uncompressed file name:)
2) XSD and WSDL specification:
   - Complete version (uncompressed file name:)
   - Simplified Version (uncompressed file name:)
3) Source code library:
   - C#, C++ and Java classes (Complete and Simplified version)

All files of the package are in a .zip archive together with the documentation in .pdf format Project Deliverables are the primary source of information to understand and use the In-Time specification.

References

Publicly available project deliverables can be downloaded from the In-Time project web site:

http://www.in-time-project.eu in section: Library – Deliverables

Relevant deliverables:

D 2.4.1 - Report on user groups, their expectations and service definition shortlist

Fine tuning of the end user services based on their expectations

D 3.1.1 - High Level ITS Reference Architecture

The high level reference architecture needs to ensure interoperability and intermodality.

D 3.1.2 - UML schemes finalised

Transfer of the ITS Reference Architecture into UML

D 3.2.1 - Specification Document of In-Time server, interfaces and protocols

This is the main specification document for the In-Time system

D 3.4.1 - Confirmation of In-Time system availability for the start of the demonstration phase

Includes In-Time pilot site specific implementation notes to be taken as examples for follower cities implementation

Literature

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[eMOTION, 2007] eMOTION – Europe-wide multi-Modal On-trip Traffic InformatiON, TREN/06/FP6TR/S07.57248/019939 EMOTION, 2007 (http://www.emotion-project.eu/)

[eMOTION, 2008] “eMOTION System – Technical Specification”, project deliverable D6, March 2008

[INSPIRE, 2010] http://inspire.jrc.ec.europa.eu/

[Marks & Bell, 2006] Eric A. Marks and Michael Bell, "Service Oriented Architecture – A Planning and Implementation Guide for Business and Technology", International Organization for Standardization (ISO), John Wiley and Sons Inc., 2006

[MDA, 2010] http://www.omg.org/mda/

[OGC-GML, 2004] "OpenGIS® Geography Markup Language (GML) Encoding Specification", Version 3.1, Open Geospatial Consortium (OGC), 2004-02-07, Ref.No OGC 03-105r1.

List of Abbreviations and Acronyms

DATEX 2 - (version 2 of European standard for traffic and travel) data exchange (between traffic control and information centres as well as other actors of the traffic and travel information sector)

eMOTION - Europe-wide multi-Modal On-trip Traffic InformatiON

GML - Geography Markup Language

IFOPT - Identification of Fixed Objects in Public Transport

INSPIRE - Infrastructure for Spatial Information in the European Community

ISO - International Organization for Standardization

MDA - Model-Driven Architecture

OASIS - Organization for the Advancement of Structured Information Standards

OGC - Open Geospatial Consortium

POI - Point of Interest

SDI - Spatial Data Infrastructure

RDSS - Regional Data and Service Server

SIRI - Service Interface for Real Time Information

SOA - Service Oriented Architecture

SOAP - Simple Object Access Protocol

TC - Technical Committee

TPEG - Transport Protocol Experts Group

TISP - Traffic Information Service Provider

UML - Unified Modelling Language

WFS - Web Feature Service

WMS - Web Map Server

WSDL - Web Service Description Language

XML - Extensible Markup Language

XSD - XML Schema Definition